Specialized Philippine Enterprise Reference of Experts and Scientists (SPHERES)

Volume 5 No. 1 June 2021

INFORMATION RESOURCES AND ANALYSIS DIVISION
Science and Technology Information Institute
Department of Science and Technology
Gen. Santos Ave., Bicutan, Taguig City, Philippines

ABOUT THE SPECIALIZED PHILIPPINE ENTERPRISE REFERENCE OF EXPERTS AND SCIENTISTS (SPHERES)

The Division of Documentation of the National Institute of Science and Technology published the first volume of the Philippine Men of Science in 1964. It contained one hundred one bio-bibliographies of living men and women in the field of science and technology. It keeps track of our scientists and their contributions for the information and benefit of all. The compilation aims to provide interested users a useful and effective reference.

In 2012, the 24th volume of the Philippine Men of Science was uploaded online to make it more visible and accessible to users. Subsequently, the publication was renamed as the Philippine Men and Women of Science in 2013 to adopt a gender-sensitive title.

Today, the publication is given a new name – Specialized Philippine Enterprise Reference of Experts and Scientists (SPHERES).

The SPHERES brand introduces a new function with a new focus. When it comes to Filipino scientists and experts and their bio-bibliographic information, this compilation serves as a specialized reference for the public. Now with a gender-neutral emphasis and an inclusive sphere of influence, SPHERES is the name to remember.

Each volume of SPHERES consists of two issues annually.

For any inquiries on our publication:
Telefax: (632) 8837-2071 to 82, local 2135
E-mail: spheres@stii.dost.gov.ph WWW: http://spheres.dost.gov.ph/

CONTENTS

EXPERTS AND SCIENTISTS **PAGE**

EXPERTS AND SCIENTISTS **PAGE**

EXPERTS AND SCIENTISTS **PAGE**

Rodney Honrada Perez

Sex: Male

Education:

Kyushu University Fukuoka Japan, Doctor of Philosophy in Microbial Technology, March 2014

Kyushu University Fukuoka Japan, Master in Science in Bioscience and Biotechnology, March 2011

Visayas State University, Bachelor of Science in Food Technology, March 2004

Field of Specialization

Antimicrobial Peptides

Protein Purification

Food Preservation

Lactic Acid Bacteria

Researches:

Article title: Critical fermentation factors that influence the production of multiple bacteriocins of Enterococcus faecium NKR-5-3

Authors: Rodney H. Perez, Kohei Himeno, Takeshi Zendo, Kenji Sonomoto

Publication title: Annals of Tropical Research 4(2), 2020

Abstract:

Bacteriocins from lactic acid bacteria (LAB) are industrially important compounds that have been utilized as a safe food preservative replacing the potentially harmful synthetic chemical preservatives, *Enterococcus faecium* NKR- 5-3 is a novel LAB strain that produces five different bacteriocins' The critical fermentation factors, such as specific medium components and optimum incubation temperature that support the

maximum production of multiple bacteriocins of strain NKR-5-3, were identified. Sucrose and yeast extract were found to be the preferred carbon and nitrogen sources for bacteriocin production of this strain, respectively. The highest bacteriocin production was observed when strain NKR-5-3 was incubated at 25°C. At incubation temperatures beyond 30°C, bacteriocin production was significantly reduced and completely ceased when further raised to 40°C, These findings possess remarkable practical implications as they can be vital in the future design of a cost-effective production system for these bacteriocins. Such a system would address the issue of the high production cost, which has remained the major barrier to the development of the large-scale industrial utilization of these important compounds.

Full text available by request to the author

Article title: Molecular characterization of the possible regulation of multiple bacteriocin production through a three-component regulatory system in Enterococcus faecium NKR-5-3

Authors: Naoki Ishibashi, Naho Matsumoto, Rodney Honrada Perez, Shun Iwatani, et al.

Publication title: Journal of Bioscience and Bioengineering, October 2020

Abstract:

Enterococcus faecium NKR-5-3 produces multiple-bacteriocins, enterocins NKR-5-3A, B, C, D, and Z (Ent53A, Ent53B, Ent53C, Ent53D, and Ent53Z). However, the biosynthetic mechanisms on how their productions are regulated are yet to be fully understood. In silico analysis revealed putative promoters and terminators in the enterocin NKR-5-3ACDZ gene cluster, and the putative direct repeats (5′-ATTTTAGGATA-3′) were conserved upstream of each promoter. Transcriptional analysis by quantitative real-time polymerase chain reaction (PCR) of the biosynthetic genes for the enterocins NKR-5-3 suggested that an inducing peptide (Ent53D) regulates the transcription of the structure genes and corresponding biosynthetic genes of enterocins NKR-5-3, except for Ent53B (a circular bacteriocin), thus consequently regulating their production. Moreover, transcriptional analysis of some knock-out mutants showed that the production of Ent53A, C, D and Z is controlled by a three-component regulatory system (TCS) consisting of Ent53D, EnkR (response regulator), and EnkK (histidine kinase). The production of the circular bacteriocin Ent53B appeared to be independent from this TCS. Nevertheless,

disrupting the TCS by deletion of a single component (enkD, enkR and enkK) resulted in a slight increase of enkB transcription and consequently the production of Ent53B, presumably, as an indirect consequence of the increase of available energy to the strain NKR-5-3. Here, we demonstrate the regulatory control of the multiple bacteriocin production of strain NKR-5-3 likely through the TCS consisting of Ent53D, EnkR, and EnkK. The information of the sharing of the regulatory machinery between bacteriocins in strain NKR-5-3 can be useful in its future application such as designing strategies to effectively dispense its multiple bacteriocin arsenal.

Full text available by request to the author

Article title: Processing and secretion of non-cognate bacteriocins by EnkT, an ABC transporter from a multiple-bacteriocin producer, Enterococcus faecium NKR-5-3
Authors: Hirotoshi Sushida, Miyuki Sakei, Rodney Honrada Perez, Naoki Ishibashi, et al.
Publication title: Journal of Bioscience and Bioengineering 130(6), August 2020

Abstract

EnkT is an ATP-binding cassette (ABC) transporter produced by Enterococcus faecium NKR-5-3, which is responsible for the secretion of multiple bacteriocins; enterocins NKR-5-3A, C, D, and Z (Ent53A, C, D, and Z). EnkT has been shown to possess a tolerant recognition mechanism that enables it to secrete the mature Ent53C from a chimeric precursor peptide containing the leader peptide moieties that are derived from different heterologous bacteriocins. In this study, to further characterize EnkT, we aimed to investigate the capacity of EnkT to recognize, process, and secrete non-cognate bacteriocins, which belong to different subclasses of class II. For this, the non-cognate bacteriocin precursor peptides, including enterocin A, pediocin PA-1, lactococcin Q, lactococcin A, and lacticin Q were co-expressed with EnkT, and thereafter, the production of the mature forms of these non-cognate bacteriocins was assessed. Our results revealed that EnkT could potentially recognize, process, and secrete the non-cognate bacteriocins with an exception of the leaderless bacteriocin, lacticin Q. Moreover, the processing and secretion efficiencies of these heterologous non-cognate bacteriocins by EnkT were further enhanced when the leader peptide moiety was replaced with the Ent53C leader peptide (derived from a native NKR-5-3 bacteriocin). The findings of this study describe the

wide substrate tolerance of this ABC transporter, EnkT, that can be exploited in the future in establishing effective bacteriocin production systems adaptive to complex fermentation conditions common in many food systems.

Full text available by request to the author

Article title: Circular and Leaderless Bacteriocins: Biosynthesis, Mode of Action, Applications, and Prospects

Authors: Rodney H. Perez, Takeshi Zendo, Kenji Sonomoto

Publication title: Frontiers in Microbiology, September 2018

Abstract:

Bacteriocins are a huge family of ribosomally synthesized peptides known to exhibit a range of bioactivities, most predominantly antibacterial activities. Bacteriocins from lactic acid bacteria are of particular interest due to the latter's association to food fermentation and the general notion of them to be safe. Among the family of bacteriocins, the groups known as circular bacteriocins and leaderless bacteriocins are gaining more attention due to their enormous potential for industrial application. Circular bacteriocins and leaderless bacteriocins, arguably the least understood groups of bacteriocins, possess distinctively peculiar characteristics in their structures and biosynthetic mechanisms. Circular bacteriocins have N-to-C- terminal covalent linkage forming a structurally distinct circular peptide backbone. The circular nature of their structures provides them superior stability against various stresses compared to most linear bacteriocins. The molecular mechanism of their biosynthesis, albeit has remained poorly understood, is believed to possess huge application prospects as it can serve as scaffold in bioengineering other biologically important peptides. On the other hand, while most bacteriocins are synthesized as inactive precursor peptides, which possess an N-terminal leader peptide attached to a C-terminal propeptide, leaderless bacteriocins are atypical as they do not have an N-terminal leader peptide, hence the name. Leaderless bacteriocins are active right after translation as they do not undergo any post-translational processing common to other groups of bacteriocins. This "simplicity" in the biosynthesis of leaderless bacteriocins offers a huge commercial potential as scale-up production systems are considerably easier to assemble. In this review, we summarize the current studies of both circular and leaderless bacteriocins, highlighting the progress in understanding their biosynthesis, mode of action, application and their prospects.

Full text available by request to the author

Article title: Mutations near the cleavage site of enterocin NKR-5-3B prepeptide reveal new insights into its biosynthesis
Authors: Rodney Honrada Perez, Haruki Sugino, Naoki Ishibashi, Takeshi Zendo, et al.
Publication title: Microbiology in Press (4), January 2017

Abstract:
Enterocin NKR-5-3B is a 64-residue novel circular bacteriocin synthesized from an 87-residue prepeptide. Albeit through a still unknown mechanism, the EnkB1234 biosynthetic enzyme complex processes the prepeptide to yield its mature active, circular form. To gain insights into the key region/residue that plays a role in Ent53 maturation, several mutations near the cleavage site on the precursor peptide were generated. The interaction of the precursor peptide and EnkB1234 appeared to be hydrophobic in nature. At the Leu1 position, only mutations with helix structure-promoting hydrophobic residues (Ala, Ile, Val, or Phe) were able to yield the mature Ent53B derivative. In this study, we also highlight the possible conformation-stabilizing role of the Ent53B leader peptide on the precursor peptide for its interaction with its biosynthetic enzyme complex. Any truncations of the leader peptide moiety interfered in the processing of the prepeptide. However, when propeptides of other circular bacteriocins (circularin A, leucocyclicin Q, or lactocyclicin Q) were cloned at the C-terminus of the leader peptide, EnkB1234 could not process them to yield a mature bacteriocin. Taken together, these findings offer new perspectives in our understanding of the possible molecular mechanism of the biosynthesis of this circular bacteriocin. These new perspectives will help advance our current understanding to eventually elucidate circular bacteriocin biosynthesis. Understanding the biosynthetic mechanism of circular bacteriocins will materialize their application potential.
Full text available by request to the author

Article title: Nutrition-adaptive control of multiple-bacteriocin production by Weissella hellenica QU 13
Authors: Yoshimitsu Masuda, Rodney Honrada Perez, Takeshi Zendo, Kenji Sonomoto
Publication title: Journal of Applied Microbiology 120(1), November 2015

Abstract:

Aim: To analyze nutrition-adaptive multiple-bacteriocin production by Weissella hellenica QU 13 METHODS AND RESULTS: Weissella hellenica QU 13 produces two leaderless bacteriocins, weissellicins Y and M. Their production was studied in MRS and APT media by quantification analyses with liquid chromatography mass spectrometry (LC/MS), while transcriptional analysis of biosynthetic genes was performed by real time reverse transcription (RT)-PCR. Weissellicin Y production was higher in MRS culture than in APT culture, while weissellicin M production was higher in APT culture than in MRS culture. APT medium contains a higher amount of thiamine than MRS medium, to enhance the growth of heterofermentative lactic acid bacteria. Therefore, thiamine addition to MRS culture enhanced the growth of W. hellenica QU 13; consequently, weissellicin Y production was decreased, while weissellicin M production was not affected. Furthermore, real time RT-PCR analyses indicated that the transcriptional trends of their respective structural genes, welY and welM, were different from each other, and that these two genes' transcriptions responded to nutrition conditions. Conclusion: W. hellenica QU 13 was demonstrated to control weissellicins Y and M production based on nutrition conditions. In addition, differential expression behavior of weissellicins Y and M indicates that each of them would have separate roles to adapt to different environmental situations. Significance and impact: This is the first report that describes nutrition-adaptive multiple-bacteriocin production, in which thiamine inhibits bacteriocin production while it enhances the growth of the producer strain.

Full text available by request to the author

Article title: Functional Analysis of Genes Involved in the Biosynthesis of Enterocin NKR-5-3B, a Novel Circular Bacteriocin

Authors: Rodney Honrada Perez, Naoki Ishibashi, Tomoko Inoue, Kohei Himeno, et al.

Publication title: Journal of Bacteriology, October 2015

Abstract:

Importance: In addition to their potential application as food preservatives, circular bacteriocins are now considered as possible alternatives to therapeutic antibiotics due to their exceptional stability conferred by their circular structure. The successful practical application of circular bacteriocins will become possible only if the

molecular details of their biosynthesis are fully understood. Results of the present study offer a new perspective on the possible mechanism of circular bacteriocin biosynthesis. In addition, since some enterococcal strains are associated with pathogenicity, virulence, and drug-resistance, the establishment of the first multi-genus host heterologous production of Ent53B has a very high practical significance as it widens the area of possible Ent53B applications.

Full text available by request to the author

Article title: Bacteriocins from Lactic Acid Bacteria: A Review of Biosynthesis, Mode of Action, Fermentative Production, Uses, and Prospects

Authors: Rodney Honrada Perez, Maria Teresa M. Perez, Francisco B. Elgado

Publication title: International Journal of Philippine Science and Technology 8(2), 2015

Abstract:

Bacteriocins are antimicrobial peptides that help bacteria fight competing bacteria in microecological systems. Bacteriocins of lactic acid bacteria (LAB) have attracted much interest in recent years because of their properties that make them suitable as natural food preservatives against specific food pathogens, and as possible supplement to antibiotics against drug resistant bacterial strains. LAB bacteriocins are generally classified into the lantibiotics and non-lantibiotics, the latter divided into four sub-groups. To date, only nisin and to a lesser extent, pediocin are the commercially applied bacteriocins for food use. Clinical applications are still limited to animal health. One of the more exciting prospects on the use of bacteriocins is the possibility of subjecting them to bioengineering to either increase antimicrobial activity or further specify their target microorganism. The latter would make it less damaging to the natural gut microflora, which is a common drawback of conventional antibiotic therapy. This paper focuses on the nature, biology, and applications of bacteriocins based on knowledge gained abroad and in the Philippines during the last two decades

Full text available by request to the author

Article title: Two putatively novel bacteriocins active against Gram-negative food borne pathogens produced by Weissella hellenica BCC 7293

Authors: Weerapong Woraprayote, Laphaslada Pumpuang, Amonlaya Tosukhowong, Sittiruk Roytrakul, Rodney Honrada Perez, Takeshi Zendo, Kenji Sonomoto, Soottawat Benjakul, Wonnop Visessanguan
Publication title: Food Control 55, September 2015

Abstract: No abstract
Full text available by request to the author

Article title: Identification, Characterization, and Three-Dimensional Structure of the Novel Circular Bacteriocin, Enterocin NKR-5-3B, from Enterococcus faecium
Authors: Kohei Himeno, Johan Rosengren, Tomoko Inoue, Rodney Honrada Perez, et al.
Publication title: Biochemistry 54(31), July 2015

Abstract:
Enterocin NKR-5-3B, one of the multiple bacteriocins produced by Enterococcus faecium NKR-5-3, is a 64 aa novel circular bacteriocin that displays broad-spectrum antimicrobial activity. Here we report the identification, characterization, and three-dimensional NMR solution structure determination of enterocin NKR-5-3B. Enterocin NKR-5-3B is characterized by four helical segments that enclose a compact hydrophobic core, which together with its circular backbone, impart high stability and structural integrity. We also report the corresponding structural gene, enkB, which encodes an 87 aa precursor peptide that undergoes a yet to be described enzymatic processing that involves adjacent cleavage and ligation of Leu24 and Trp87 to yield the mature (circular) enterocin NKR-5-3B.
Full text available by request to the author

Article title: Enterocin F4-9, a Novel O-Linked Glycosylated Bacteriocin
Authors: Mohamed Maky, Naoki Ishibashi, Takeshi Zendo, Rodney Honrada Perez, et al. **Publication title:** Applied and Environmental Microbiology 81(14), May 2015

Abstract:
Enterococcus faecalis F4-9 isolated from Egyptian salted-fermented fish produces a novel bacteriocin, termed enterocin F4-9. Enterocin F4-9 was purified from the culture supernatant by three steps, and its molecular mass was determined to be 5516.6 Da by mass spectrometry. Amino acid and DNA sequencing showed that the

prepeptide consists of 67 amino acid residues, with a leader peptide containing a double glycine cleavage site to produce a 47-amino-acid mature peptide. Enterocin F4-9 is modified by two molecules of N-acetylglucosamine ß-O-linked to Ser37 and Thr46. The O-linked N-acetylglucosamine moieties are essential for the antimicrobial activity of enterocin F4-9. Further analysis of the enterocin F4-9 gene cluster identified enfC, which has high sequence similarity to a glycosyltransferase. The antimicrobial activity of enterocin F4-9 covered a limited range of bacteria, including, interestingly, a gram-negative strain, E. coli JM109. Enterocin F4-9 is protease-sensitive, active at a wide pH range, and moderately resistant to heat.
Full text available by request to the author

Article title: Purification and characterization of a novel plantaricin, KL-1Y, from Lactobacillus plantarum KL-1
Authors: Kittaporn Rumjuankiat, Rodney Honrada Perez, Pilasombut Komkhae, Suttipun Keawsompong, et al.
Publication title: World Journal of Microbiology and Biotechnology 31(6), April 2015

Abstract:
Three bacteriocins from Lactobacillus plantarum KL-1 were successfully purified using ammonium sulfate precipitation, cation-exchange chromatography and reverse-phase HPLC. The bacteriocin peptides KL-1X, -1Y and -1Z had molecular masses of 3053.82, 3498.16 and 3533.16 Da, respectively. All three peptides were stable at pH 2-12 and 25 °C and at high temperatures of 80 and 100 °C for 30 min and 121 °C for 15 min. However, they differed in their susceptibility to proteolytic enzymes and their inhibition spectra. KL-1Y showed broad inhibitory activities against Gram-positive and Gram-negative bacteria, including Salmonella enterica serovar Enteritidis DMST 17368, Pseudomonas aeruginosa ATCC 15442, P. aeruginosa ATCC 9027, Escherichia coli O157:H7 and E. coli ATCC 8739. KL-1X and -1Z inhibited only Gram-positive bacteria. KL-1X, KL-1Y and KL-1Z exhibited synergistic activity. The successful amino acid sequencing of KL-1Y had a hydrophobicity of approximately 30 % and no cysteine residues suggested its novelty, and it was designated "plantaricin KL-1Y". Plantaricin KL-1Y exhibited bactericidal activity against Bacillus cereus JCM 2152(T). Compared to nisin, KL-1Y displayed broad inhibitory activities of 200, 800, 1600, 800, 400 and 400 AU/mL against the growth of Bacillus coagulans JCM 2257(T), B. cereus JCM 2152(T), Listeria

innocua ATCC 33090(T), Staphylococcus aureus TISTR 118, E. coli O157:H7 and E. coli ATCC 8739, respectively, whereas nisin had similar activities against only B. coagulans JCM 2257(T) and B. cereus JCM 2152(T). Therefore, the novel plantaricin KL-1Y is a promising antimicrobial substance for food safety uses in the future.
Full text available by request to the author

Article title: Novel bacteriocins from lactic acid bacteria (LAB): Various structures and applications
Authors: Rodney Honrada Perez, Takeshi Zendo, Kenji Sonomoto
Publication title: Microbial Cell Factories 13 (Supplement I), August 2014

Abstract:
Bacteriocins are heat-stable ribosomally synthesized antimicrobial peptides produced by various bacteria, including food-grade lactic acid bacteria (LAB). These antimicrobial peptides have huge potential as both food preservatives, and as next-generation antibiotics targeting the multiple-drug resistant pathogens. The increasing number of reports of new bacteriocins with unique properties indicates that there is still a lot to learn about this family of peptide antibiotics. In this review, we highlight our system of fast tracking the discovery of novel bacteriocins, belonging to different classes, and isolated from various sources. This system employs molecular mass analysis of supernatant from the candidate strain, coupled with a statistical analysis of their antimicrobial spectra that can even discriminate novel variants of known bacteriocins. This review also discusses current updates regarding the structural characterization, mode of antimicrobial action, and biosynthetic mechanisms of various novel bacteriocins. Future perspectives and potential applications of these novel bacteriocins are also discussed.
Full text available by request to the author

Article title: Gene Cluster Responsible for Secretion of and Immunity to Multiple Bacteriocins, the NKR-5-3 Enterocins
Authors: Naoki Ishibashi, Kohei Himeno, Yoshimitsu Masuda, Rodney Honrada Perez, et al.
Publication title: Applied and Environmental Microbiology 80(21), August 2014

Abstract

Enterococcus faecium NKR-5-3, isolated from Thai fermented fish, is characterized by the unique ability to produce five bacteriocins, namely, enterocins NKR-5-3A, -B, -C, -D, and -Z (Ent53A, Ent53B, Ent53C, Ent53D, and Ent53Z). Genetic analysis with a genome library revealed that the bacteriocin structural genes (enkA [ent53A], enkC [ent53C], enkD [ent53D], and enkZ [ent53Z]) that encode these peptides (except for Ent53B) are located in close proximity to each other. This NKR-5-3ACDZ (Ent53ACDZ) enterocin gene cluster (approximately 13 kb long) includes certain bacteriocin biosynthetic genes such as an ABC transporter gene (enkT), two immunity genes (enkIaz and enkIc), a response regulator (enkR), and a histidine protein kinase (enkK). Heterologous-expression studies of enkT and ΔenkT mutant strains showed that enkT is responsible for the secretion of Ent53A, Ent53C, Ent53D, and Ent53Z, suggesting that EnkT is a wide-range ABC transporter that contributes to the effective production of these bacteriocins. In addition, EnkIaz and EnkIc were found to confer self-immunity to the respective bacteriocins. Furthermore, bacteriocin induction assays performed with the ΔenkRK mutant strain showed that EnkR and EnkK are regulatory proteins responsible for bacteriocin production and that, together with Ent53D, they constitute a three-component regulatory system. Thus, the Ent53ACDZ gene cluster is essential for the biosynthesis and regulation of NKR-5-3 enterocins, and this is, to our knowledge, the first report that demonstrates the secretion of multiple bacteriocins by an ABC transporter.

Full text available by request to the author

Article title: Monitoring of the multiple bacteriocin production by Enterococcus faecium NKR-5-3 through a developed liquid chromatography and mass spectrometry-based quantification system

Authors: Rodney Honrada Perez, Kohei Himeno, Naoki Ishibashi, Yoshimitsu Masuda, et al.

Publication title: Journal of Bioscience and Bioengineering 114(5), July 2012

Abstract:

Enterococcus faecium NKR-5-3 produces four antimicrobial peptides referred here as enterocins NKR-5-3A, B, C and D. A two-step electrospray ionization-liquid chromatography and mass spectrometry (ESI-LC/MS)-based quantification system was developed to monitor its multiple bacteriocin production profiles, which is essential in understanding the complex production regulation mechanism of strain

NKR-5-3. The developed ESI-LC/MS-based quantification system can easily monitor the multiple bacteriocin production of this strain. Using the developed system, the production of enterocin NKR-5-3B was found to be not as variable as those of the other enterocins in different cultivation media. Production of enterocin NKR-5-3B was also found to have a wider optimum incubation temperature (20-30°C) than enterocins NKR-5-3A, C and D (25°C). Furthermore, at least 2 nM of the bacteriocin-like inducing peptide, enterocin NKR-5-3D, regulated the production of NKR-5-3 enterocins except enterocin NKR-5-3B. These findings taken together suggest that enterocin NKR-5-3B has an independent production regulation mechanism from the other NKR-5-3 enterocins. The developed system could effectively pin-point the production profiles of the multiple bacteriocins of E. faecium NKR-5-3 under different fermentation conditions.

Full text available by request to the author

Article title: Purification and Characterization of Multiple Bacteriocins and an Inducing Peptide Produced by Enterococcus faecium NKR-5-3 from Thai Fermented Fish

Authors: Naoki Ishibashi, Kohei Himeno, Koji Fujita, Yoshimitsu Masuda, et al.

Publication title: Bioscience Biotechnology and Biochemistry 76(5), May 2012

Abstract:

Enterocins NKR-5-3A, B, C, and D were purified from the culture supernatant of Enterococcus faecium NKR-5-3 and characterized. Among the four purified peptides, enterocin NKR-5-3A (5242.3 Da) was identical to brochocin A, produced by Brochothrix campestris ATCC 43754, in mature peptides, and its putative synergistic peptide, enterocin NKR-5-3Z, was found to be encoded in ent53Z downstream of ent53A, encoding enterocin NKR-5-3A. Enterocin NKR-5-3B (6316.4 Da) showed a broad antimicrobial spectrum, and enterocin NKR-5-3C (4512.8 Da) showed high activity against Listeria. Enterocin NKR-5-3D (2843.5 Da), showing high homology to an inducing peptide produced by Lactobacillus sakei 5, induced the production of the enterocins. The enterocins showed different antimicrobial spectra and intensities. E. faecium NKR-5-3 concomitantly produced enterocins NKR-5-3A, B, C, and D which probably belong to different classes of bacteriocins. Furthermore, NKR-5-3 production was induced by enterocin NKR-5-3D.

Full text available by request to the author

Article title: Characterization and identification of weissellicin Y and weissellicin M, novel bacteriocins produced by Weissella hellenica QU 13
Authors: Yoshimitsu Masuda, Takeshi Zendo, N. Sawa, Rodney Honrada Perez, et al.
Publication title: Journal of Applied Microbiology 112(1), January 2012

Abstract:
To identify and characterize novel bacteriocins from Weissella hellenica QU 13. Weissella hellenica QU 13, isolated from a barrel used to make Japanese pickles, produced two novel bacteriocins termed weissellicin Y and weissellicin M. The primary structures of weissellicins Y and M were determined, and their molecular masses were determined to be 4925·12 and 4968·40 Da, respectively. Analysis of the DNA sequence encoding the bacteriocins revealed that they were synthesized and secreted without N-terminal extensions such as leader sequences or sec signal peptides. Weissellicin M showed significantly high and characteristic homology with enterocins L50A and L50B, produced by Enterococcus faecium L50, while weissellicin Y showed no homology with any other known bacteriocins. Both bacteriocins showed broad antimicrobial spectra, with especially high antimicrobial activity against species, which contaminate pickles, such as Bacillus coagulans, and weissellicin M showed relatively higher activity than weissellicin Y. Furthermore, the stability of weissellicin M against pH and heat was distinctively higher than that of weissellicin Y. Weissella hellenica QU 13 produced two novel leaderless bacteriocins, weissellicin Y and weissellicin M, and weissellicin M exhibited remarkable potency that could be employed by pickle-producing industry. This study is the first report, which represents a complete identification and characterization of novel leaderless bacteriocins from Weissella genus.
Full text available by request to the author

Article title: Production of acidophilus milk enriched with purees from colored sweet potato (Ipomea batatas Linn.) varieties
Authors: Rodney Honrada Perez and Julie Tan
Publication title: Annals of Tropical Research 28(1), January 2005

Abstract:

Probiotic foods and drinks are becoming more popular nowadays. Probiotic foods are foods that contain health-promoting microorganisms. The beneficial effects of probiotics may be mediated by a direct antagonistic effect against specific groups of organisms, resulting in a decrease in their metabolism or by stimulation of immunity. Acidophilus milk enriched with purees from kinampay and RC-2000 sweetpotato
varieties was developed.

Acidophilus milk is a probiotic drink, which is a product of milk fermentation by the bacteria Lactobacillus acidophilus.The fermented milk has been reported to have therapeutic value for suppressing toxin-producing organisms in the intestine of human.

The sugar level and product acceptability of the developed product was evaluated through sensory evaluation, and a proximate composition of the product was determined by proximate analysis.

It was found out that at 1% and 10% levels of inocula of the starter culture, the change in Total Titratable Acidity (TTA) of acidophilus milk was the same, hence, 1% inoculum was found practical in the production of acidophilus milk. Findings from previous experiments show that the maximum number of viable cells can be maintained at TTA and pH of 0.65% and 4.7 respectively (Reed, 1982). Basing on that research finding, those acidity values were used as the target optimum conditions. The optimumProduction of acidophilus milk enriched with purees from colored sweetpotato varieties incubation time was found to be at 16 hours at 37
0C for plain acidophilus milk and 14 hours for acidophilus milk enriched with
Kinampay and RC-2000 purees before incubation.

The developed acidophilus milk was found to be more acceptable using 6.25% sugar level.

The addition of sweet potato puree to the acidophilus milk generally improved the sensory qualities and proximate composition of the product. It reduced the moisture content and increased the ash and protein contents of the products.

Full text available by request to the author

Marlon T. Conato

Sex: Male

Education:

University of Houston, Doctor of Philosophy (Ph.D), 2012

Field of Specialization

Organic Chemistry

Analytical Chemistry

Mass Spectrometry

Nanotechnology

Gas Chromatography

UV/Vis Spectroscopy

Researches:

Article title: Synthesis and characterization of mordenite-type zeolites via hydrothermal method using silica gel and sodium aluminate as Si and Al sources at varying temperature

Authors: Mon Bryan Zambale Gili, Marlon T. Conato

Publication title: Journal of Physics Conference Series 1191:012038, March 2019

Abstract:

Mordenite-type zeolites were prepared via hydrothermal method using silica gel and sodium aluminate as Si and Al sources respectively. The temperature was varied from 150 °C up to 190 °C to determine the minimum temperature to obtain crystalline mordenite using a 23 mL Teflon-lined stainless-steel autoclave. The samples were characterized using XRD, FTIR and SEM. With the given experimental

conditions, mordenite-type zeolites with good crystallinity and excellent purity were produced at 190 °C. Amorphous materials with notable peaks that correspond to mordenite planes were produced at 170 °C. The sample produced at 150°C was completely amorphous. FTIR revealed that all the three samples contain bands associated to aluminosilicate vibrational groups. However, a significant decrease in the intensities of vibration bands associated to hydroxyl (HO^-) stretching and water bending were observed as the temperature is decreased. From the SEM, the sample treated at 190°C was composed of particles with strikingly linear edges having an average grain size of ~38.0 μm. Most particles are hexagonal in shape. Particle components of the samples synthesized at 170 °C and 150 °C have irregular sizes and shapes.

Full text available by request to the author

Article title: Adsorption uptake of Philippine natural zeolite for Zn 2+ ions in aqueous solution

Authors: Mon Bryan Zambale Gili, L. Olegario-Sanchez, Marlon T. Conato

Publication title: Journal of Physics Conference Series 1191-:012042, March 2019

Abstract:

The Philippine natural zeolite (PNZ) was characterized and subjected to Zn^{2+} adsorption tests in aqueous solutions to determine its adsorption uptake and to understand its adsorption behaviour. The PNZ was characterized using XRD, SEM, BET-analysis and TG-DTA. XRD showed significant peaks indexed to natural mordenite-type zeolite along with other natural zeolites and minerals. SEM micrographs revealed a rough and corrugated surface morphology of the sample. BET physisorption analysis showed a surface area of 222.63 m^2/g. From the analytical tests report given by the supplier, the Si/Al ratio (SAR) was computed to be equal to 4.29 based on the silica and alumina content of the PNZ. Adsorption kinetic and thermodynamic studies were done to determine the adsorption mechanism and adsorption capacity of PNZ for Zn^{2+} ions in aqueous solution. From the adsorption kinetic curve, the PNZ attained chemical equilibrium after 50 min. Pseudo-second-order kinetic model was the most applicable kinetic model providing the highest correlation with the data. Langmuir model better described the adsorption isotherm of the PNZ than Freundlich model. The theoretical maximum

cation exchange capacity of PNZ was computed as 27.17 mg Zn^{2+}/g according to the Langmuir model.

Full text available by request to the author

Article title: Facile Fabrication of a Potential Slow-Release Fertilizer Based on Oxalate-Phosphate-Amine Metal-Organic Frameworks (OPA-MOFs)

Authors: Ken Aldren Sumaya Usman, Salvador Buenviaje, Yasmin Edañol, Marlon T. Conato, et al.

Publication title: Materials Science Forum 936:14-19, October 2018

Abstract:

This work demonstrates a simple, reproducible and scalable method of producing a potential slow-release fertilizer material. In this study, oxalate-phosphate-amine metal organic frameworks (OPA-MOFs) powder was synthesized from the hydrothermal treatment of ferric chloride (FeCl 3 •6H 2 O), orthophosphoric acid (H 3 PO 4), oxalic acid dihydrate (H 2 C 2 O 4 •2H 2 O), and a common fertilizer, urea (CO(NH 2) 2). Being a structure directing agent (SDA)-type of MOF, the material is expected to slowly release urea via cation exchange, and eventually trigger the collapse of the framework, thus resulting to the subsequent release of the phosphates and iron-oxalate complexes. Elemental analysis revealed that the synthesized samples contains a promising amount of incorporated nitrogen and phosphorus. In this particular study, increasing in the amount of urea during the synthesis however revealed minimal change in the %N in the final product which tells us that maximum loading has already been achieved. P and N release experiments shall still be done both in vitro and in actual soil samples to monitor the release delivery kinetics and efficiency of the OPA-MOFs for fertilizer release applications.

Full text available by request to the author

Article title: Organic-Free Synthesis of a Highly Siliceous Faujasite Zeolite with Spatially-Biased Q 4 (n Al) Si Speciation

Authors: Matthew D. Oleksiak, Koki Muraoka, Ming-Feng Hsieh, Marlon T. Conato, et al.

Publication title: Angewandte Chemie International Edition 129(43), September 2017

Abstract:

Designing zeolites with tunable composition and acid siting is a significant challenge for applications in adsorption and catalysis. In their Communication (DOI: 10.1002/anie.201702672), W. Chaikittisilp, J. D. Rimer, and co-workers report on the synthesis of high-silica faujasite (HOU-3) with a Si/Al ratio of 3 and show that the Al locations within the structure are biased and not random.

Full text available by request to the author

Article title: Oxidative Coupling of Methane over Mixed Metal Oxide Catalysts: Steady State Multiplicity and Catalyst Durability

Authors: Geofrey Goldwin Jeba, Marlon T. Conato. Jeffrey D. Rimer, Michael P. Harold

Publication title: Chemical Engineering Journal 331, August 2017

Abstract:

Exothermic heat effects are a crucial factor in determining the performance and stability of catalysts for the oxidative coupling of methane (OCM). Fixed bed temperature rise, steady state multiplicity, and catalyst durability are investigated over a range of feed conditions for the mixed metal oxides Cs/Sr/MgO, Cs/Ba/MgO, Cs/Sr/La2O3, and Na2WO4-Mn/SiO2. A comparison with previous studies on doped metal oxides catalysts for OCM clearly indicates that doping not only improves the performance but also significantly improves the catalyst stability. We experimentally demonstrate for the first time hysteresis behavior for Cs/Sr/La2O3 powder catalyst. Our results show that the catalyst stability depends on the magnitude of temperature rise in the catalyst bed. At a lower space velocity of 3,600 cc/h/g, the catalysts exhibit moderate temperature rise (<50 °C) at complete O2 conversion and sustained activity for extended time-on-stream (50–72 h). The performance of Cs/Sr/MgO and Cs/Ba/MgO are comparable to Na2WO4-Mn/SiO2 (~19% C2+ yield). While Cs/Sr/La2O3 activates at lower temperature, its maximum C2+ yield (~14%) is lower. At a higher space velocity of 14,400 cc/h/g, a significant temperature rise of ~300 °C and ignition-extinction behavior is encountered. Under these demanding conditions, improved OCM performance is observed for Na2WO4-Mn/SiO2 (35% methane conversion, C2+ selectivity 60%) but the catalyst deactivates due to the high bed temperature (930 °C). In comparison, methane conversion of ~25% and C2+ selectivity of ~38% is observed for Cs/Sr/La2O3 at a feed temperature of 395 °C. Despite a bed temperature of 830 °C, the Cs/

Sr/La2O3 catalyst is stable for 50 h. The findings show the importance of heat effects in both promoting OCM catalyst performance and leading to deleterious catalyst deactivation.

Full text available by request to the author

Article title: Synthesis Strategies for Ultrastable Zeolite GIS Polymorphs as Sorbents for Selective Separations

Authors: Matthew D. Oleksiak, Arian Ghorbanpour, Marlon T. Conato, B. Peter McGrail, et al.

Publication title: Chemistry- A European Journal 22(45), October 2016

Abstract:

New approaches to tailor the synthesis of zeolite polymorphs can lead to breakthroughs in applications spanning from separations to adsorption. A comparison of small-pore zeolite GIS polymorphs P1 and P2 revealed marked differences in their thermal stability. Moreover, adsorption experiments and DFT studies collectively showed that GIS polymorphs are promising materials for selective separation of small molecules.

Full text available by request to the author

Article title: Nucleation of FAU and LTA Zeolites from Heterogeneous Aluminosilicate Precursors

Authors: Matthew D. Oleksiak, Jennifer Soltis, Marlon T. Conato, R. Lee Penn, Jeffrey D. Rimer

Publication title: Chemistry of materials 28(14), June 2016

Abstract:

The nucleation of many natural, biogenic, and synthetic crystals involves the initial formation of metastable precursors that provides a kinetic pathway for an amorphous-to-crystalline transformation. This nonclassical mechanism is believed to be the dominant crystallization pathway for microporous zeolites. Despite significant research on zeolite growth mechanisms, molecular level details regarding the assembly, physicochemical properties, and structural evolution of amorphous (alumino)silicate precursors remain elusive. Here we use a combination of diffraction, scattering, and microscopy techniques to characterize the amorphous precursors that assemble and evolve during the synthesis of zeolites FAU and LTA –

two materials that are widely used in commercial applications such as catalysis, adsorption, separations, and ion-exchange. Nucleation occurs by a two-step mechanism involving the initial formation of aggregates that serve as heterogeneous sites for nucleation. Using commercially-relevant colloidal silica as a reagent, we observe that precursors are comprised of heterogeneous silica and alumina domains due in part to the negligible dissolution of silica during room temperature aging. This indicates substantial Si-O-Si bond breakage must occur during hydrothermal treatment with concomitant exchange of soluble alumina species to achieve a final crystalline product with Si/Al ratio = 1.0 – 2.5. All syntheses were performed with molar compositions of Si/Al ≥ 2.0, which favors the formation of FAU; however, we observe that certain growth conditions are capable of creating a "false" environment (i.e., Al-rich regions) that favors LTA nucleation, followed by intercrystalline transformation to FAU. Time-resolved ex situ transmission electron microscopy of extracted solids during zeolite crystallization indicates that nucleation occurs on the exterior surface of precursors. This observation is consistent with our proposed hypothesis that posits exterior surfaces are more energetically favorable sites for nucleation compared to the particle interior on the basis of confinement effects. Given that numerous zeolite syntheses involve the initial formation of metastable precursors with heterogeneous composition, the pathway for nucleation proposed in this study may prove to be generalizable to other zeolite structures and related materials.

Full text available by request to the author

Article title: Framework Stabilization of Si-Rich LTA Zeolite Prepared in Organic-Free Media

Authors: Marlon T. Conato, Matthew D. Oleksiak, B. Peter McGrail, Radha Kishan Motkuri, et al.

Publication title: Chemical Communications 51(2), October 2014

Abstract:

Zeolite HOU-2 (LTA type) is prepared with the highest silica content (Si/Al = 2.1) reported for Na-LTA zeolites without the use of an organic structure-directing agent. The rational design of Si-rich zeolites has the potential to improve their thermal stability for applications in catalysis, gas storage, and selective separations.

Full text available by request to the author

Article title: Control of nucleation and crystal growth kinetics of MOF-5 on functionalized gold surfaces
Authors: Marlon T. Conato and Allan J. Jacobson
Publication title: Microporous and Mesoporous Materials 175, July 2013

Abstract:
Self-assembled monolayers (SAMs) on gold (Au) substrates have been used to prepare metal–organic framework (MOF) thin films. Both highly-oriented single crystals (~100 μm) and dense films of zinc terephthalate (MOF-5) were grown by room-temperature pretreatment of Au-SAM substrates with Zn2+ ions to control nucleation and crystal growth in MOF-5 synthesis solutions. The particle size distribution in the film samples (1 × 104–5 × 104 μm2) was determined by image analysis of optical micrographs collected at different times during crystallization in order to study the crystal growth kinetics. An induction period of 2–3 d was observed before the onset of crystal growth. The crystal sizes saturate at a mean cross sectional area of 2.0–2.5 × 104 μm2.
Full text available by request to the author

Article title: Synthesis and crystal structures of complexes based on the ligand meso-1,4-phenylenebis(hydroxyacetic acid)
Authors: Marlon T. Conato, Xiqu Wang, Allan J. Jacobson
Publication title: Inorganica Chimica Acta 401, May 2013

Abstract:
The syntheses and crystal structures of compounds based on the ligand 1,4-phenylenebis (hydroxyacetic acid) (H2L) are reported for the first time. Three chain structures based on H2L and divalent metal cations were synthesized and characterized and their structures determined by single-crystal X-ray diffraction. The compounds PbL (1), CoL(H2O)2·2H2O (2), and ZnL(H2O)2·2H2O (3) have similar infinite chains of metal centers bridged by 1,4-phenylenebis(hydroxyacetic acid). The coordination spheres of the transition metal ions are completed by coordinating water molecules in the isostructural compounds 2 and 3. The non-covalent secondary bonding requirement of Pb2+ in 1 and interchain hydrogen bonds in 2 and 3 lead to different packing of the chains.
Full text available by request to the author

Article title: Microporous, Homochiral Structures Containing Iron Oxo-Clusters Supported by Antimony(III) Tartrate Scaffolds
Authors: Qiang Gao, Xiqu Wang, Marlon T. Conato, Tatyana Makarenko, et al.
Publication title: Crystal Growth & Design 11(10), October 2011

Abstract:
A chiral cluster compd., dipotassium bis-(μ-tartrato)-diantimony(III), K2Sb2L2 (H4L = L-tartaric acid), was used as a secondary building unit to react with Fe(III) perchlorate and Fe(II) sulfate in H2O and DMF in the presence of NaN(CN)2 or 4,4'-bipyridine. Three distinct homochiral structures were obtained: H3Na7[Fe4Sb6(μ4-O)6(μ3-O)2(L-tartrate)6] ·14H2O (1), H5K3[Me2NH2]2[Fe7Sb6(μ4-O)6(μ3-O)2(L-tartrate)6]2 ·28H2O (2), and Na3K5[Me2NH2]4[Fe6Sb6(μ4-O)6(μ3-O)2(L-tartrate)6]2 ·30H2O (3). All of these compds. contain Fe oxo-clusters sandwiched by Sb3(μ3-O)(L-tartrate)3 SBUs. 1 Consists of isolated [Fe4Sb6(μ4-O)6(μ3-O)2(L-tartrate)6]10- clusters, which are interconnected by Na+ ions into 2-dimensional homochiral layers. The structure of 2 features [Fe7Sb6(μ4-O)6(μ3-O)2(L-tartrate)6]5- clusters. The clusters are further linked into neg. charged honeycomb layers. Both types of clusters are found in 3 and are also assembled into neg. charged honeycomb layers. The accessibility of the microporosity of 2 was demonstrated by adsorption of 2-butanol. The magnetic properties of the compds. were measured from 5 to 300 K and indicate predominantly antiferromagnetic exchange interactions. [on SciFinder(R)]
Full text available by request to the author

Article title: Amine-Templated Anionic Metal-Organic Frameworks with the 4,4 '-(Hexafluoroisopropylidene) Bis(benzoic acid) Ligand
Authors: Xiqu Wang, Lumei Liu, Marlon Conato, Allan J. Jacobson
Publication title: Crystal Growth & Design 11(6), July 2011

Abstract:
Three compds. with anionic metal-org. frameworks [M3(hfbba)4]2-, M = Mn2+ or Co2+, H2hfbba = 4,4'-(hexafluoroisopropylidene)bis(benzoic acid), were synthesized by solvothermal techniques in the presence of different amines. Their structures were detd. from single crystal x-ray data. All three structures are based on linear trimers of metal oxide polyhedra. (C6H11NH3)2Mn3(hfbba)4, 1, has a 3D structure with large

cages that are filled by pairs of cyclohexylammonium cations. ((C4H11)2NH2)2Co3(hfbba)4, 2, has a complex layered structure with intralayer lateral channels. One half of the dibutylammonium cations are located inside the channels and are orientationally disordered, while the other half of the dibutylammonium cations are located in the interlayer spaces and are ordered. (H2tdpip)Co3(hfbba)4,3, tdpip = 4,4'-trimethylenedipiperidine, also has a layered structure with the H2tdpip cations located between the layers. The magnetic properties of all compds. were detd. from 10 to 300 K.

Full text available by request to the author

Papers Presented

Title: Synthesis and characterization of zinc adeninate metal-organic frameworks (bioMOF1) as potential anti-inflammatory drug delivery material

Authors: Ken Aldren Sumaya Usman, Salvador Buenviaje, Joselito M. Razal, Marlon T. Conato, et al.

Conference title: AIP Conference Proceedings 1958(1), May 2018

Abstract:

Zn8(ad)4(BPDC)6O•2Me2NH2 (bioMOF1), a porous metal–organic framework with zinc-adeninate secondary building units (SBUs), interconnected via biphenyldicarboxylate linkers, shows great potential for drug delivery applications due to its non-toxic and biocompatible components (zinc and adenine). In this study, bioMOF1 crystals synthesized solvothermally at 130°C for 24 hours, were characterized thoroughly and loaded with a known anti-inflammatory drug, nimesulide (NIM). The crystalline nature of the material was confirmed using powder x-ray diffraction crystallography (PXRD) along with morphology assessment using focused-ion beam/field emission scanning electron microscopy (FIB/FESEM). NIM was introduced to the crystals via solvent exchange accompanied with vigorous stirring and quantified using thermogravimetric analysis (TGA) with loading saturation of ~30% attained during the 2nd to 3rd day of drug immersion. Drug release in phosphate buffer saline and in deionized water was done to monitor the kinetic of drug release in vitro. The drug release showed a controlled discharge profile which slowed down at the 24th and 48th hour of release. Drug release in buffer showed a faster release of drug from the material, which means that the presence of cations in the solution could further trigger the release of

drug. Slow drug release was observed for all of the set-ups with maximum % drug release of 24.47%, and 16.14% for the bioMOF1 in buffer and bioMOF1 in water respectively for the span of 48 hours.

Full text available by request to the author

Title: N/Fe-TiO2 doped nanoparticles loaded on bentonite for increased photocatalytic activity for the degradation of organic pollutants

Authors: Mel BryanL. Esprenilla, Ryan Carl Santos Magyaya, Marlon T. Conato

Conference title: 8th International Conference on Nanoscience and Nanotechnology 2017, May 2017

Abstract:

Photocatalyst materials based on Philippine bentonite-titanium oxide composites and their ability to degrade organic pollutants is reported. Nanosized-titanium dioxide (TiO2) was synthesized by sol-gel method from titanium tetraisopropoxide. This was then incorporated in the Philippine bentonite via hydrothermal methods. In order to shift the absorbance of the TiO2 to the visible region doping was done using iron and nitrogen ions. The hydrodynamic radius of the synthesized TiO2 was analyzed using a zeta-sizer and was found to be around 70 nm. The photocatalytic efficiency of the TiO2/bentonite, N-TiO2/bentonite, Fe-TiO2/bentonite and N-Fe-TiO2/bentonite was evaluated using a photocatalytic reactor. It was found out that the N-Fe-TiO2/bentonite to be the most efficient with 22% degradation of the model pollutant after 80 minutes. FT-IR analysis was done to determine the bonding of the different components. Scanning electron microscopy and atomic force microscopy analysis was also performed to characterize the products.

Full text available by request to the author

Title: Synthesis and characterization of 12-aminolauric acid-modified montmorillonite for catalytic application

Authors: Cris Angelo Manahan Pagtalunan, Florentino C. Sumera, Marlon T. Conato

Conference title: 8th International Conference on Nanoscience and Nanotechnology 2017, May 2017

Abstract:

The simple cation-exchange preparation of 12-aminolauric acid-modified montmorillonite (ALA-Mt), an aluminosilicate clay modified with the

alkylammonium surfactant, is reported. Different loadings of 12-aminolauric acid (12-ALA) from 100 to 400 times the cation exchange capacity (CEC) in montmorillonite (Mt) was prepared and studied. Successful intercalation of the organic surfactant was monitored by the increase in basal (d001) spacing of the organoclay compared to the pure Mt. The clay mineral composite have increased surfactant loading resulting to lower degradation temperatures, rougher surface morphology, increased particle size, and increased organophilicity of the organoclay compared to the native Mt. The improved properties of ALA-Mt present it as an attractive catalyst material for polymerization reactions.

Full text available by request to the author

Title: Hydrothermal synthesis, crystal structures, and enantioselective adsorption property of bis(L-histidinato)nickel(II) monohydrate

Authors: Christian Paul L. Ramos, Marlon T. Conato

Conference title: 8th International Conference on Nanoscience and Nanotechnology 2017, May 2017

Abstract:

Despite the numerous researches in metal-organic frameworks (MOFs), there are only few reports on biologically important amino acids, histidine in particular, on its use as bridging ligand in the construction of open-framework architectures. In this work, hydrothermal synthesis was used to prepare a compound based on Ni^{2+} and histidine. The coordination assembly of imidazole side chain of histidine with divalent nickel ions in aqueous condition yielded purple prismatic solids. Single crystal X-ray diffraction (XRD) analysis of the product revealed structure for $Ni(C6H8N3O2)2 \bullet H2O$ that has a monoclinic (C2) structure with lattice parameters, a = 29.41, b = 8.27, c = 6.31 Å, β = 90.01 ˚. Circular dichroism – optical rotatory dispersion (CD-ORD), Powder X-ray diffraction (PXRD) and Fourier transform – infrared spectroscopy (FT-IR) analyses are conducted to further characterize the crystals. Enantioselective adsorption analysis using racemic mixture of 2-butanol confirmed bis(L-histidinato)nickel(II) monohydrate MOF crystal's enantioselective property preferentially favoring the adsorption of (S)-2-butanol isomer.

Full text available by request to the author

Title: Synthesis of Zeolite Catalysts in the Absence of Organic Structure-Directing Agents

Authors: Matthew D. Oleksiak, Marlon Conato, Jeffrey D. Rimer
Conference title: AlChe Annual Meeting, November 2014

Title: Reaction Studies on Na2WO4-Mn/SiO2 Catalyst : Oxidative Coupling of Methane
Authors: Fnu Aseem, Geofrey Goldwin, Marlon T. Conato, Jeffrey D. Rimer , Michael P. Harold, Ken Blackmon
Conference title: AlChe Annual Meeting, November 2014

Title: Controlling Polymorphism in Organic-Free Syntheses of Zeolites
Authors: Matthew D. Oleksiak, Marlon T. Conato, Jeffrey D. Rimer
Conference title: AlChe Annual Meeting, November 2014

Emma K. Sales

Sex: Female

Description: Sales established the first tissue culture and biotechnology laboratory in Soccsksargen for developing diagnostic tools for the identification of durian, rubber, and mango varieties.

Researches:

Article title: Molecular Evaluation of the Philippine Best Rubber Clones using Genomic-based Simple Sequence Repeats

Authors: Aldrin Y. Cantila, Rene Rafael C. Espino, Emma K. Sales

Publication title: Journal of Advanced Applied Scientific Research 1(11):9-27, August 2017

Abstract

University of Southern Mindanao Agricultural Research Center, Philippines conserved 86 rubber clones in the field germplasm. Among rubber clones, only seven were commercially released and widely utilized by Filipino rubber farmers. Nineteen genomic-based simple sequence repeats (G-SSRs) provided enough data onto evaluating molecular information of Philippine best rubber clones (five PB, one RRIM and one Philippine or Phil derived clones) along with two RRIM and Phil check clones. G-SSRs derived 72 alleles in all with means N, Ne, Ho, and PIC of 3.789, 2.284, 0.569 and 0.508 per G-SSR, respectively. Nine G-SSRs however detected 16 private alleles across rubber clones and groups that led AMOVA result to 74.37% molecular variance within clones. Private alleles in best clones could be used as molecular reference to authenticate registered clones especially in nursery farm-producing planting materials. Genetic relationship was in a range of 0.184 to 0.487

proximities, having PB217 and SMRX1 as the closest. Bayesian structure analysis on the other hand distributed clones into two groups (group 1-RRIM600, RRIM712 and RRIM901; group 2-PB217, PB235, PB260, PB311, PB330, SMRX1, UPLBPlant1 and USM1); a reference for in-depth consideration of making crosses.

Full text available upon request to the author

Article title: Genetic variation and structure of rubber population based on microsatellites

Authors: Aldrin Y. Cantilla, Rene Rafael C. Espino, Emma K. Sales

Publication title: International Journal of Biosciences 10(3), March 2017

Abstract:

Information towards genetic variation and structure of rubber leads to a proper utility of rubber clones for a varietal development. Rubber population represented by nine Asian, 10 South American and nine West African clones was described by indices for genetic variation such as number of alleles (Na), number of effective alleles (Ne), observed heterozygosity (Ho), unbiased heterozygosity (uHe), fixation index (F), Shannon's information index (I) and gene diversity (GD); and population structure such as analysis of molecular variance (AMOVA), structure analysis and principal component analysis (PCA) based on 13 microsatellites. Microsatellites derived 60 alleles in all with means Na, Ne, Ho, uHe, F, I and GD of 4.615, 2.997, 0.619, 0.686, 0.051, 1.174 and 0.647 per microsatellite, respectively. AMOVA revealed 4%, 16% and 80% genetic variation among groups, among and within clones, respectively. The initial three groups based on geographical origin were reassigned into four based on the structure analysis.PCA supported the grouping through the distribution of clones on the scatterplot's projection. PCA also detectedPC1 clones: GW5, IAN873, IRCA22, PB311, RRIM600 and USM1 as the most variable clones based on squared cosines. Microsatellite data showed a rich genetic variation is within clones and confirmed rubber is genetically heterogenous. PCA result suggested PC1 clones can be effective parents while unbiased structure grouping will serve as heterotic groups as basis for the hybridization and development of new rubber varieties.

Full text available upon request to the author

Article title: Utilization of Simple Sequence Repeats Markers in the Genetic Characterization of Philippine Rubber, Hevea brasiliensis (Willd. ex A. Juss) Müell. Arg., Germplasm

Authors: Aldrin Y. Cantilla, Rene Rafael C. Espino, Emma K. Sales

Publication title: Philippine Journal of Crop Science 40(3), December 2015

Abstract:

Simple Sequence Repeats (SSRs) were utilized to genetically characterize rubber genotypes among 86 clones of rubber germplasm in the Philippines. Twenty-two out of 40 screened SSR primers were found to be informative with a mean of 99.09% polymorphic rate. These primers generated 119 bands with a mean of 5.41 bands per primer in a corresponding range of 100 to 491 base pairs (bp). From 119 alleles, 118 were polymorphic and 76.4 were effective. The resolving power of molecular markers measured as Polymorphism Information Content (PIC) had a mean value of 0.65. SSRs had detected a broad genetic base of 0.30 in Unweighted Pair Group Method with Arithmetic Mean (UPGMA) indicated by Jaccard's similarity coefficient. On the other hand, five ideal groups were computed by Ad hoc statistics for Bayesian grouping as determined using the Structure 2.3.4 program with high replications and iterations of Markov Chain Monte Carlo (MCMC) and admixture model/correlated allele frequencies, respectively. SSRs have provided efficient, reliable and useful derivation of allelic variations, polymorphism information and genetic similarities. The derived ideal groups showed potential use in the decision-making process as to what clones are to be bred.

Full text available upon request to the author

Article title: Molecular analysis of somaclonal variation in tissue culture derived bananas using MSAP and SSR markers

Authors: Emma K. Sales and Nilda G. Butardo

Publication title: International Journal of Biological, Veterinary, Agricultural and Food Engineering 8(6), 2014

Abstract:

The project was undertaken to determine the effects of modified tissue culture protocols eg age of culture and hormone levels (2, 4-D) in generating somaclonal variation. Moreover, the utility of molecular markers (SSR and MSAP) in sorting off

types/somaclones were investigated. Results show that somaclonal variation is in effect due to prolonged subculture and high 2, 4-D concentration. The resultant variation was observed to be due to high level of methylation events specifically cytosine methylation either at the internal or external cytosine and was identified by methylation sensitive amplification polymorphism (MSAP). Simple sequence repeats (SSR) on the other hand, was able to associate a marker to a trait of interest. These therefore, show that molecular markers can be an important tool in sorting out variation/mutants at an early stage.

Full text copy available upon request to the author

Article title: Marker-assisted introgression of opaque 2 gene into elite maize inbred lines

Authors: Efren E. Magulama and Emma K. Sales

Publication title: University of Southern Mindanao Research & Development (USM R&D) 17(2), 2009

Abstract:

Marker assisted backcrossing can greatly accelerate the introgression of modified opaque2 gene into elite inbred lines. This study aimed to transfer opaque 2 gene into elite maize inbred lines using SSR markers. Two backcross maize (white and yellow) populations were developed by crossing quality protein (QP) line with non-QP lines and subsequently backcrossed to non-QP lines until BC3 generation. Among the three SSR markers (phi 057, umc 1066, and phi 112) used for opaque2 gene selection, only SSR phi 057 marker was employed in segregating populations owing to its good discriminatory power in the survey of parental polymorphism. Using marker assisted selection, we transferred opaque 2 gene into USM elite breeding lines. Of the 26 converted QPM lines (16 white, 10 yellow) selected from the BC3F3 populations, seven lines (4 white, 3 yellow) were finally selected as quality protein inbred lines, having satisfied the minimum standard criteria for protein quality. These converted QPM lines could be used as parent lines in the development of QPM varieties.

Full text copy available upon request to the author

Article title: Improvement of bananas through gamma ray irradiation

Authors: Emma K. Sales, Jorge Lopez, R Espino, N. Butardo, et al.

Publication title: Philippine Journal of Crop Science 38(2), August 2013

Abstract:
Banana is the second most widely-grown fruit crop in the Philippines and considered as the number one dollar earner and export winner. Out of the diverse types and kinds of banana, cultivar 'Lakatan'is the most popular in the domestic and to some extent in the export market. However, no improvement and breeding activities for this crop in the Philippines has been done due to its long life cycle and sterility trait. In order to address this, mutation breeding through gamma irradiation can be an alternative solution. This research was conducted to determine the LD50 for 'Lakatan'(shoot tips) and two variants (embryo and cell suspension), and to develop a 'Lakatan'cultivar with improved postharvest trait. Radio sensitivity test on shoot tip cultures established that the LD50 is the 50Gy gamma ray. Mutation induction was carried out for 500 shoot tips using 50Gy gamma ray treatment. Gamma irradiated plants were evaluated for four generations. Mutations were observed in the bunch weight, number of hands per bunch, number of fingers per hand, and shelf life. Hence, the preliminary findings suggest the potential of induced mutation through gamma ray irradiation as an alternative technique in developing/ generating bananas with specific trait of interest.
Full text available upon request to the author

Article title: Assessment of ploidy and genome constitution of some Musa balbisiana cultivars using DArT markers
Authors: Emma K. Sales, Nilda G. Butardo, Humberto Gomez Paniagua, Hans Jansen, et al.
Publication title: Philippine Journal of Crop Science 36(1), April 2011

Abstract:
Musa cultivars. Likewise, dendrogram constructed by Mega version 4 clearly separated the BB/BBB cultivars from AA/AAA and AAB cultivars. Moreover, the dendrogram showed that most of these putative BBB cultivars grouped as a separate cluster from the AAA and AAB groups. Bootstrapping all the more enhanced these groupings, and strongly supported the existence of a pure Balbisiana group. These confirmed the Asian claims of the triploid B nature of the Philippine 'Saba'group. However, two cultivars namely 'Inambak'and 'Pondol'(assumed to be of the BBB type) formed a cluster with the AAB (cv 'Tindok and 'Latundan'). This suggests

therefore, that these two Phil. Musa cultivars could be AAB unlike the rest of the cultivars claimed to be triploid B.

Full text copy available upon request to the author

Article title: Durian marker kit for durian (Durio zibethinus Murr.) identity

Authors: Emma K. Sales

Publication title: International Journal of Biological, Biomolecular, Agricultural, Food and Biotechnological Engineering 9(5), 2015

Abstract:

Durian is the flagship fruit of Mindanao and there is an abundance of several cultivars with many confusing identities/ names. The project was conducted to develop procedure for reliable and rapid detection and sorting of durian planting materials. Moreover, it is also aimed to establish specific genetic or DNA markers for routine testing and authentication of durian cultivars in question. The project developed molecular procedures for routine testing. SSR primers were also screened and identified for their utility in discriminating durian cultivars collected. Results of the study showed the following accomplishments: 1. Twenty (29) SSR primers were selected and identified based on their ability to discriminate durian cultivars, 2. Optimized and established standard procedure for identification and authentication of Durian cultivars 3. Genetic profile of durian is now available at Biotech Unit Our results demonstrate the relevance of using molecular techniques in evaluating and identifying durian clones. The most polymorphic primers tested in this study could be useful tools for detecting variation even at the early stage of the plant especially for commercial purposes. The process developed combines the efficiency of the microsatellites development process with the optimization of non-radioactive detection process resulting in a user-friendly protocol that can be performed in two (2) weeks and easily incorporated into laboratories about to start microsatellite development projects. This can be of great importance to extend microsatellite analyses to other crop species where minimal genetic information is currently available. With this, the University can now be a service laboratory for routine testing and authentication of durian clones.

Full text copy available upon request to the author

Article title: SSR markers for mango (Mangifera indica L.) cultivar identification and genetic characterization.

Authors: Emma K. Sales and Nilda G. Butardo
Publication title: Philippine Journal of Crop Science 42(3), 2017

Abstract:
The study identified SSR markers that can discriminate the different mango cultivars in the Philippines. It was conducted to select markers that are specific for Philippine Carabao Mango that can be used as a diagnostic kit for true to type variety. Two hundred (200) mango samples were collected and evaluated while 49 SSR primers were screened for their utility in assessing the identity of the said mango cultivars. Out of these 49 primers, 29 primers were selected for further analysis. Based on the generated molecular data, e.g. allele size, fragments amplified, polymorphic information content (PIC) and power of discrimination, the 29 primers were able to discriminate carabao cultivars over that of other cultivars sampled. An arbitrary genotypic assignment was also established to further show the differences among the cultivars/samples evaluated. The results show that the primers selected can be used to validate the authenticity of the carabao strain as labelled.
Full text is available upon request to the author

Article title: Diversity analysis of maize inbred lines using SSR markers
Authors: Emma K. Sales, E.E. Magulama, N.G. Butardo, R.C. Cadungog, et al.
Publication title: Philippine Journal of Crop Science 29, 2004

Abstract:
With the assistance of the Asian Maize Biotechnology Network (AMBIONET) and DA-BAR, a molecular biology laboratory was established at the University of Southern Mindanao in 2002. National Staff was trained to strengthen the university's capability in the application of molecular techniques for crop improvement. The authors initiated the DNA fingerprinting of Philippine publicly derived maize inbred lines for local as well as region-wide diversity analyses. Initially, 87 Philippine inbred lines were fingerprinted using SSR markers and standard protocols from AMBIONET. Analysis at 21 SSR loci, however, revealed that most of the lines had 20% heterozygosity. These lines were recommended for further purification and are presently in the second selfing generation. In another study aimed at the introgression of the opaque 2 allele to elite local lines and development of quality protein maize (QPM) cultivars, 21 QPM lines (7 yellow and 14 white maize) were obtained from CIMMYT and analyzed using 40 SSR markers. SSR data of 8 QPM

lines, remaining after 13 white lines 20% heterozygosity were excluded, were merged with a data set of 16 QPM lines from AMBIONET-Vietnam and with a regional dataset of 102 inbred lines from the AMBIONET Service Lab that included 10 lines from the Philippines as well as lines from various tropical and temperate countries. Error rates (ER) were calculated between laboratories and marker data having less than 10% ER were combined. By cluster analysis, the 24 QPM lines were seen in at least 7 different groups of the regional dataset, which suggests that this set of QPM lines are genetically diverse. These results are useful as a guide for selecting crosses with potential superior combining ability. The authors continue to analyze the diversity of Philippine inbred lines and eventually combine it with data sets of other lines that are relevant to local breeders.

Full text is available upon request to the author

Article title: RAPD markers for genetic analysis and classification of Musa B genome
Authors: Emma K. Sales and RRC Espino
Publication title: Philippine Agricultural Scientist 87(2), 2004

Abstract:

Random amplified polymorphic deoxyribonucleic acid (RAPD) markers were determined to classify the B genome of Musa germplasm collections. Optimization of several parameters for DNA amplification and RAPD analysis was also done to determine RAPD reaction conditions applicable for Musa cultivars in the B genome. A reaction mixture of 35 ng DNA, 2.5 mM MgCl2, 1 unit/muL Taq DNA pol, 1muM dNTPs, 0.50 ng RAPD primer and 1X PCR buffer was found optimum for DNA amplification. The RAPD polymerase chain reaction (PCR) temperature cycle profile developed for rice was similarly found applicable for the Musa cultivars evaluated. Moreover, a random ten-mer primer with 60%-7076 G+C obtained good RAPD band pattern. Specifically, primers OPH-03 and OPI-16 detected three DNA markers which were present in all BB/BBB cultivars. These DNA markers (0.560 kb marker detected by primer OPH

Full text is available upon request to the author

Article title: Evaluation of USM Biotech DNA extraction method for selected agricultural crops in comparison with existing methods
Authors: Monalyn Marimpoong and Emma K. Sales

Publication title: Journal of Agricultural Research, Development, Extension and Technology 1(1), 2019

Abstract:

Different DNA extraction protocols have been used in plant DNA extraction. However, no comparative analysis has been done to determine their efficiency, cost effectiveness and time requirement for the extraction. Three (3) established protocols and the USM Biotech modified protocols were used in this study. It aimed to evaluate the efficiency of the four DNA extraction protocols in terms of DNA yield, purity and processing time; to determine and compare the cost of sample analysis per protocol and to assess which protocol is universally applicable in extracting DNA of selected agricultural crops (banana, cacao, durian, mango and rubber). The experiment was carried out in 4X5 factorial arranged in Complete Randomized Design (CRD), Factor A as protocols and Factor B as crops used. Results of the study showed that among four (4) protocols, the protocol developed by Ferdous et al. (2012) was the most cost effective. It was the least expensive and fastest method of extracting DNA resulting to high genomic DNA yield. Likewise, University of Southern Mindanao (USM) Biotech modified protocol was found to be another efficient, economical and effective method of extracting DNA with sufficient amount of DNA yields. The protocol developed by Ray et al.(2016) produced the highest DNA yield; however, it was the most time-consuming method among the four (4) protocols. The Diversity Array Technology (DArT) protocol on the other hand, was the most expensive method among the four protocols because it required the use of expensive reagents and liquid nitrogen.

Full text is available upon request to the author

Article title: Molecular Evaluation of the Philippine Best Rubber Clones using Genomic-based Simple Sequence Repeats

Authors: Aldrin Yanong Cantila, Rene C. Espino, Emma K. Sales

Publication title: Journal of Advanced Applied Scientific Research 1(11), 2017

Abstract:

To date there are only nine best rubber clones in the Philippines with little knowledge about its molecular information. Nineteen genomic-based simple sequence repeats'(G-SSRs) good genome coverage had provided enough data in evaluating the Philippine best rubber clones (five PB, three RRIM and one Philippine

or Phil derived clones) along with two Phil check clones. G-SSRs derived 72 alleles in all with means N, N e, H o, and PIC of 3.789, 2.284, 0.569 and 0.508 per G-SSR, respectively. Nine G-SSRs however detected 16 private alleles. AMOVA also revealed 6.37%, 19.26% and 74.37% molecular variance between groups, between and within clones, respectively, with corresponding F ST of 0.064. While genetic proximity had a range of 0.184 to 0.487 with corresponding neighborhood-joining tree suggested no similar clones, three groups (PB, RRIM and Phil groups) had delta K of two based on Bayesian structure analysis. Group 1 had RRIM600, RRIM712 and RRIM901 while group 2 had PB217, PB235, PB260, PB311, PB330, SMRX1, UPLBPlant1 and USM1. G-SSRs are suitable for extracting molecular information and distinct alleles, which can be used as reference to authenticate the best rubber clones in the Philippines. Bayesian structure analysis on the other hand assured better resampling strategy and found admixtures. Furthermore, rubber is highly structured on an individual level that indicates these clones should be utilized to broaden genetic variability of the Philippine rubber.

Full text available upon request to the author

Article title: Involvement of genomics in rubber breeding

Authors: Pascal Montoro, K. Annamalainathan, Thakurdas Saha, Sigit Ismawanto, et al.

Publication title: Agricultural Research for Development, 2017

Abstract:

The 5-year strategic plan of IRRDB has highlighted that studies on physiology, molecular biology and biotechnology are involved in a range of research areas dealing with the sustainable rubber production (productivity, adaptation, NR quality, development of new products and environmentally friendly practices), the preservation of natural resources (Hevea genetic resources, biodiversity in rubber plantation), and the reduction of greenhouse gas emissions (carbon sequestration). These researches have been leading to a better understanding of important agronomic traits and to develop new high yielding rubber clones with better tolerance to biotic and abiotic stress in a context of climate change. Molecular mechanisms involved in NR production and plant defence have complex regulations requiring global research approach through omics technologies. Application of these

technologies has led to decipher molecular bases of important agronomic traits and to assist breeding programmes.

The main objective of the CATAS-IRRDB workshop on Rubber genomics and molecular genetics was to share knowledge and experiences in genomics, transcriptomics, proteomics, metabolomics, molecular genetics and breeding among researchers and scientists especially from the IRRDB member countries. Updated information on genomics and transcriptomics in rubber and genome-based applications has been delivered by keynote speakers, and a round table discussion was conducted to identify topics for developing international initiatives.

Full text available upon request to the author

Article title: Potential Banana cv 'Lakatan' Somaclones Induced by Long Culture Period and High 2, 4-D Concentration

Authors: Emma K. Sales, Harem R. Roca, Nilda G. Butardo

Publication title: Philippine Journal of Science 145(2), June 2016

Abstract

Out of these 2,040 plants, 40 somaclones were selected based on their better performance compared to the untreated plants (control). Results showed that prolonged subculture and addition of high concentration of 2, 4-D produced both positive and negative variations. Positive variation was exhibited by heavier bunch weight, earlier flowering, longer shelf life and a larger number of hands, which translate into increased income. Negative variation, on the other hand, included dwarfism, delayed flowering and a lesser number of hands.

Full text available upon request to the author

Article title: Applications of in vitro methods for the multiplication of new planting material

Authors: Pascal Montoro, Keng See Chow, Philippe De Groote, Nor Mayati, et al.

Publication title: Agricultural Research for Development, 2014

Abstract:

Hevea clones are propagated by grafting scion clone on seedling rootstocks. Cutting and microcutting were long supposed to provide plant material with poor root system. Thanks to the French-Indonesian research collaboration and development in China, microcutting is now reconsidered as useful technology for Hevea clonal

propagation and production of rootstocks. Somatic embryogenesis is cost-effective clonal propagation method that has been maintained in China, India, France and Malaysia for more than 30 years. This long-term investment led to applications on genetic engineering and large-scale productions of in vitro plants in China by CATAS. In the recent somatic embryogenesis is an essential factor for successful horticultural multiplication and improving the vigour of planting material. Using rejuvenated in vitro plants from somatic embryogenesis, grafting and cutting led to the multiplication of thousands plants in Nigeria and Ivory Coast by CIRAD-Michelin-SIPH and University of Gand-Socfinco consortium, respectively. Effect of clonal root system and somaclonal variation must be taken into consideration. Evaluation of this new planting material remains necessary for further recommendations. Given the low rubber price, other latex by-products should also be considered to attract farmers to the cultivation of rubber. Natural organic compounds as well as new recombinant proteins could lead to a better attractiveness to stakeholders and a better acceptance of genetically modified rubber plants.(Texte intégral)

Full text available upon request to the author

Title: International rubber research and development board biotechnology group annual report 2010
Authors: Pascal Montoro, Keng See Chow, Zhe Li, Thitaporn Phumichai, et al.
Publisher: International Rubber Research and Development Board, 2011

Brief description:

The increasing demand for natural rubber calls for improved productivity and extension of rubber growing areas to non-traditional in most rubber growing countries. Biotechnologies play a role in breeding and also in understanding the various plant biological processes involved in plant development and defence against biotic and abiotic stresses. Research advances reported in 2010 confirm this trend

Article title: Improved postharvest technologies in marang
Authors: Emma K. Sales, N.A. Turnos, J.G. Tangonan, P.B. Barit
Publication title: Philippine Journal of Crop Science 36, 2011

Abstract:

The research was conducted to survey , assess, and improve current postharvest practices in marang, identify the right maturity indices, exploit existing strategies in regulating ripening, develop processing technologies and products to enhance the profitability of marang production through value-adding activities. A benchmark survey on the current postharvest practices was carried out to assess the gaps to reduce postharvest losses. Ripening of the fruits was manipulated using packaging materials, ehtylene inhibitors and ethylene inducers. Possible processing technologies were also explored to develop marang products (minimally-processed and processed). Results showed that the right stage of maturity for harvesting of the commercially-available 'Evergreen' and 'Brown' cultivars in the local markets is 80-90 days from fruit set. To minimize losses, harvesting should be done using modified tools. Storability and shelf life can be prolonged using appropriate packaging materials and cold storage. Regulation of ripening can be attained through the following: washing and covering the fruit with wet sack or cloth were found to be faster, easier and economical ripening techniques than using ripening agents e.g. calcium carbide, kakawati [Gliricidia sepium] leaves and other ripening materials. On the other hand, ethylene scrubber and packaging in a closed polyethylene bag or kept under modified atmosphere (MA) condition delayed the ripening. For minimally processed marang pulps, addition of an antioxidant, metabisulfite, when packed in either polyethylene bag (Ziploc),. vacuum sealed bags or styrofoam delays and minimizes browning. Moreover, with these treatments, taste was rated acceptable. Cold storage at 0 and 4 deg C also gave an acceptable appearance of the pulps. These results proved that it is possible to bring minimally processed and processed marang products from Mindanao to other parts of the Philippines without affecting its sensory quality. The following marang products were developed: frozen pulps or arils, puree, concentrates, jam, conserve, vacuum-fried, dehydrated, spray-dried, ice cream, and other by-products.

Full text available upon request to the author

Article title: A method of increasing the efficiency of finding productive crosses in maize

Authors: Efren E. Magulama and Emma K. Sales

Publication title: Maize for Asia: Emerging trends and technologies, 2008

Abstract:

Innovative methods in reducing the cost while increasing efficiency of breeding work are of great help to maize breeders. This study aimed to evaluate the usefulness of cluster-based mating using SSR and qualitative morphological markers in finding productive crosses (PC) in maize. In this study we used four datasets that consisted of 192 crosses derived from four sets of three diallel and a design II experiments in which three sets were inbred crosses and a set of variety crosses. The four sets of crosses including the check varieties were evaluated for yield in alpha lattice design with three replications. We used 39, 40, and 30 SSR markers to establish grouping of inbred lines in set A, B, and C, respectively. For set D, we used 19 agro-morphological traits in grouping the parent varieties. Using the four data sets, the results showed that inter-group crosses had greater number of PCs than those in intra-group crosses. Sixty-four percent (64%) of the PCs came from the inter-group crosses in set A. In set B, C, and D all the PCs were come from inter-group crosses. Further, clustered-based mating appeared more efficient in identifying productive crosses in maize by 12% than the non clustered-based mating, thereby reduced the cost of extensive field crosses and tests.

Full text available upon request to the author

Article title: Genome and ploidy confirmation of Phil. Musa balbisiana cultivars based on flow cytometry analysis and DArT markers

Authors: Emma K. Sales, N.G. Butardo, T.C. Solpot, J.B. Ranis

Publication title: Philippine Journal of Crop Science 2008

Abstract:

The major constraint in banana and plantain research is the problem on proper identification and classification due to the endless range of names and synonyms for cultivars. In terms of Musa balbisiana taxonomic classifications, there is an ongoing controversy regarding the existence of pure edible balbisiana cultivars endemic to the Philippines. Asian and Philippine Musa workers claimed that Philippine 'saba' group of the triploid B while American and European Musa workers denied the existence of such and consistently claimed that they are a hybrid of A and B genomes. The objective of the study was to determine if DArt analysis can efficiently verify the genome constitution of the Musa cultivars in question. To shed light on this, 24 Philippine Musa cultivars were subjected to flow cytometry analysis for ploidy confirmation and DArt analysis for molecular characterization. Results of the

flow cytometry confirmed the triploidy of the Philippine 'Saba' group while the molecular data showed that some DArt markers were specific for B genome such that these markers can identify the cultivars with B genome regardless of the presence of A genome. Hence these markers can be used to establish genome identity of the Musa cultivars. Likewise, dendrogram constructed by Mega version 4 clearly separated the BB/BBB cultivars from AA/AAA and AAB cultivars. Moreover, the dendrogram showed that most of these putative BBB cultivars, grouped as a separate cluster from the AAA and AAB groups. Bootstraping all the more enhanced supports the existence of pure Balbisiana group and might confirm the Asian claims of the triploid B nature of the Philippine 'Saba' group. However, two cultivars namely 'Inambak' and 'Pondol' (assumed to be of the BBB type) formed a cluster with the AAB (cv 'Tindok' and 'Latundan'). This suggests therefore, that these two Philippine Musa cultivars could be AAB unlike the rest of the cultivars claimed to be triploid B.

Full text available upon request to the author

Article title: Analyses of genetic diversity and heterotic patterns in maize inbred lines as revealed by SSR markers

Authors: Emma K. Sales, E.E. Magulama, Cotabato Philippines Kabacan, RC Cadungog, et al.

Publication title: Philippine Journal of Crop Science 30, 2004

Abstract:

Knowledge of genetic diversity combining ability, and heterotic patterns of maize germplasm is of great important to maize breeders. The study was undertaken to (a) assess the genetic diversity of 11 yellow maize inbred lines using SSR markers, and (b) determine the combining ability of the 11 yellow maize inbred lines and (c) select inbred lines that could b used as parent materials for heterosis breeding and for synthetic variety formation and (d) verify the grouping of inbred lines based on molecular markers with field performance of hybrid progeny. Eleven yellow maize inbred lines were used and crossed in diallel fashion to form 55 single crosses. The 55 crosses were tested in field and arranged in alpha lattice with three replications. Each entry was planted to three 3-m row plots. Recommended cultural management practices were strictly followed. Using a 39 informative SSR markers, cluster analysis classified 11 lines into four groups consisting of GI: 4 lines, GII- 2 lines, GIII- 3 lines,

and GIV-1 line. Of the 14 superior single crosses to hybrid check, 12 crosses were coming from crossing inbred lines belonging to different groups and only 2 crosses from the same group. Differences in crosses were mainly due to specific combining ability effects constituting 78% for yield, 81% for plant height, 69% for silking date, and 78% for moisture content, and 55% for kernel number per year. This indicates the non-additive effects conditioning the expression ofthese traits gathered. Five inbred lines were identified as possible parents for synthetic variety development, while ten single cross hybrids were identified as promising single hybrids. They gave a yield potential of 8 to 9 t/ha which were relatively better than the hybrid check variety. The study also showed that grouping the lines prior to making crosses using molecular markers and subsequent crossing using factorial mating design were more efficient than the conventional diallel mating in identifying and selecting superior hybrids. The results imply that the use of molecular markers can greatly help in reducing the number of crosses, thereby, reducing the cost and time in making crosses and field testing.

Full text available upon request to the author

Article title: RAPD [random amplified polymorphic deoxyribonucleic acid] markers for genetic analysis and classification of Musa B genome

Authors: Emma K. Sales, R.R.C. Espino

Publication title: Philippine Agricultural Scientist 87(2), 2004

Abstract:

Random amplified polymorphic deoxyribonucleic acid (RAPD) markers were determined to classify the B genome of Musa germplasm collections. Optimization of several parameters for DNA amplification and RAPD analysis was also done to determine RAPD reaction conditions applicable for Musa cultivars in the B genome. A reaction mixture of 35 ng DNA, 2.5 m MgCl2, 1 unit/u L Taq DNA pol, 1 microM dNTPs, 0.50 ng RAPD primer and 1XPCR buffer was found optimum for DNA amplification. The RAPD polymerase chain reaction (PCR) temperature cycle profile developed for rice was similarly found applicable for the Musa cultivars evaluated. Moreover, a random ten-over primer with 60%-70% G + C obtained good RAPD band pattern. Specifically, primers OPH-03 and OPI-16 detected three DNA markers which were present in all BB/BBB cultivars. These DNA markers (0.560 kb marker detected by primer OPH-03 and 0.836 and 0.690 kb markers detected by primer

OPI-16) were therefore used to determine the genome constitution of three Pinatubo collections and Palawan IX. Cluster analysis using the RAPD markers data showed that the balbisiana cultivars were different from acuminata cultivars as represented by `Bungulan' and `Lakatan', respectively. Furthermore, the Pinatubo collections were shown to be of the balbisiana group. However, the genome classification of the Palawan collections was not clear because of inconsistencies in clustering.
Full text available upon request to the author

Article title: Use of molecular markers for heterotic grouping of publicly developed maize inbred lines in the Philippines
Authors: Emma K. Sales, E.E. Magulama, N.G. Butardo
Publication title: Philippine Journal of Crop Science 28, 2003

Abstract:
Ninety-three maize inbred lines developed at USM, UPLB [Philippines Univ. Los Banos, Laguna, Philippines], and IES were assayed for polymorphism at 40 SSR [simple sequence repeats] marker loci using polyacrylamide gel electrophoresis (PAGE). The objectives were: to screen a set of stable and repetitive SSR markers for DNA fingerprinting or heterotic grouping and exploit the heterotic patterns among domestic inbred lines. Two hundred six alleles were identified and served as raw data for estimating genetic similarities among these lines. A cluster analysis placed the inbred lines in six clusters that is suggestive of the major heterotic group for Philippine maize. Specific alleles exclusive for certain lines were also detected. These can be used as a unique fingerprint for such inbred and therefore might be a useful marker to distinguish a character trait exhibited by that particular line. The study confirms the utility of polymerase chain reaction (PCR) based markers such as SSRs for measuring genetic diversity, for assigning lines to heterotic groups and for genetic fingerprinting
Full text available upon request to the author

Article title: Genetic diversity in the B genome of Musa germplasm assessed by RAPD [random amplified polymorphic DNA] technique
Authors: Emma K. Sales, A.A. Barrion, M.S. Mendioro, M.L.O. Cedo
Publication title: Philippine Journal of Crop Science 27, 2002

Abstract:

The genetic diversities and relationships among 19 Philippine Musa cultivars based on the DNA fingerprints were investigated. DNA of the 19 cultivars extracted through modified CTAB protocol were analyzed using random amplified polymorphic DNA(RAPD) technique. A total of 118 random primers were used in the analysis. Of these primers, 41 were identified useful in distinguishing the 19 Musa cultivars. Primers J-04, S-02, and AJ-01 clearly showed genetic divergence in the 19 cultivars as evidenced by the different band, detected three DNA markers, which are present in all the BB/BBB cultivars. Through these DNA markers (0.560 kb marker detected by primer OPH-03 and 0.836 kb markers detected by Primer OP1-16 the genomic sequence constitution of six Musa collections was determined. Cluster analysis at specific similarity coefficients revealed that the 11 M. balkesiana cultivars evaluated are different and distinct from M. acuminata cultivars as represented by 'Bungulan' and 'Lakatan'. It also suggests that the three Pinatubo collections are of the BB/BBB genome while the three Palawan collections might be of the AA/AAA type. Some degrees of variability were also detected among the BB/BBB cultivars. This study demonstrated that RAPD could be used for Musa germplasm characterization, identification and fingerprinting. It is useful in establishing phenetic and phytogenetic relationships as well as genomic constitution of Musa cultivars. It can also be used in detecting genetic diversities particularly in the B genome groups of Musa cultivars.

Full text available upon request to the author

Article title: Initiation of meristematic buds of benzyl amino purine on banana (Musa spp.) cultivars for somatic embryogenesis
Authors: Emma K. Sales, L.R. Carlos, R.R.C. Espino
Publication title: Philippine Agricultural Scientist 84(1), 2001

Abstract:

No abstract

Full text available upon request to the author

Article title: Assessing Genetic Diversity of Asian-based Rubber Populations using SSR and Multivariate Statistics in the Philippines
Authors: Aldrin Y. Cantila, Rene Rafael C. Espino, Emma K. Sales
Publication title: Journal of Biology, Agriculture and Healthcare 6(16), 2016

Abstract:
Assessing genetic diversity of rubber populations is important for the effective utilization of rubber genetic resources. Diversity indices such as number of alleles (Na), observed heterozygosity (Ho), gene diversity (GD), polymorphism information content (PIC) and power of discrimination (PD) along with multivariate statistics such as principal component analysis (PCA) and clustering analysis were used in the study. Twenty-two SSR markers had means 5.09 Na, 0.579 Ho, 0.677 GD, 0.643 PIC and 0.785 PD for 63 rubber clones comprised of 34 Indonesian and 29 Malaysian clones. Malaysian subpopulation had 3.59 Na per clone greater than Indonesian subpopulation of 2.97 Na per clone. PCA detected 66.08% total variation for eight principal components (PCs). PC1, PC2 and PC3 contributed 13.24% variation (v) with 2.91 eigenvalue (e), 10.2% v with 2.24 e and 8.86% v with 1.95 e, respectively. Clustering analysis revealed 0.237 genetic similarity and ten clusters for all clones. Clusters will be the basis for making more genetically diverse hybrids while PC1 member clones will be the basis for considering genetically broad base parent. The high genetic diversity found in the Asian-based rubber populations and complementing results of multivariate statistics can optimize the selection and breeding of rubber genetic resources in the Philippines.
Full text available upon request to the author

Papers Presented

Article title: Functional genomics-and bioinformatics-assisted gene marker development for economically important traits in cacao
Authors: E.A. Barlaan, Emma K. Sales, A.C. Laurena
Publication title: IV International Symposium on Molecular Markers in Horticulture 1203, 2017

Abstract:
Varietal improvement is needed in cacao for increased yield, resistance to pests and diseases, and other economically important traits. To facilitate marker-assisted breeding and selection programs, molecular markers are essential tools. Through functional genomics and bioinformatics, gene markers were generated using two approaches: genome filtering using methylation-sensitive restriction enzymes and gene mining in the cacao genome sequence database. In the genome-filtering method, genomic DNA of a number of cacao cultivars was digested with

methylation-sensitive restriction enzymes for ligation, amplification, cloning, sequencing and bioinformatics analysis. From 215 library samples, a total of 578 putative simple sequence repeat (SSR) loci were predicted from the sequences, with 271 perfect loci and 307 ambiguous. The unique and perfect SSRs with primers were subjected to homology and gene ontology analysis. These SSRs were involved in 11 molecular functions, 11 cellular components, and 25 biological processes. In the gene-mining approach, genome sequences were downloaded from the database for bioinformatics analysis. Sequences were analyzed for de novo annotation, SSR prediction and deduplication, SSR marker and primer development, homology and gene ontology. A total of 4897 putative SSR locus regions were predicted from the coding DNA sequence regions of the cacao genome, with 3423 perfect loci and 1474 ambiguous loci. The unique and perfect SSRs with primers were involved in seven molecular functions, six cellular components, and 17 biological processes. SSR markers for genes of interest from both approaches were selected for amplification to assess polymorphism among cacao cultivars.

Full text available upon request to the author

Article title: Functional Genomics and Bioinformatics-Assisted Gene Marker Development for Economically Important Traits in Rubber

Author: Emma K. Sales

Conference title: CRRI & IRRDB International Rubber Conference 2016, Siem Reap Cambodia

Abstract:

The increasing demand of natural rubber products by the automotive, industrial, construction and medical supplies industries has renewed interest in revitalizing rubber production in the Philippines. This can be achieved by increasing the hectarage planted to rubber and the use of clones with improved traits such as high yield and pest and disease resistance. Towards attaining such goals, research was carried out in the areas of functional genomics and bioinformatics to develop gene markers for important agronomic traits. A study was undertaken to (a) develop and establish gene markers and ESTs for a library database in Hevea brasiliensis,(b) sequence gene specific regions in rubber using NGS technology,(c) construct an exome database for at least two H. brasiliensis genotypes with extreme phenotypic traits,(d) search for genespecific markers from the exome database and (e) design

PCR primers for gene-specific sequences and validate these primers for trait association. Seven NSIC recommended varieties (PB260, RRIMM600, PB330, PB217, PB311, USM1, and PR107) were selected as test samples. Genomic DNAs of these samples were isolated for library preparation using rare cutter restriction enzymes for subsequent cloning. A total of 133 colonies were sequenced and subjected to BLAST and gene ontology analysis. DNA sequences were obtained that bore similarities to genes involved in 18 biological processes, 8 cellular components and 9 molecular functions. SSR primers were developed and selected for preliminary testing and utilization of differential banding patterns among the seven NSIC recommended clones.

Full text available upon request to the author

Article title: Mutation induction in Philippine bananas cv'Lakatan'thru gamma ray irradiation

Authors: Emma K. Sales and R.R.C. Espino

Publication title: International Symposium on Induced Mutation on Plants (ISIM), 2008

Abstract:

Banana is the most important crop grown in the Philippines. Among the cultivars grown, 'Lakatan' is the most popular and commands a higher price in the local market. Despite high production, losses due to over ripening, bruising and short shelf life is one of the major constraints in a successful banana industry. The use of chemicals for delayed ripening however, remains an issue of concern due to economic and organic products advocacy. Thus, development and generation of new improved 'Lakatan' cultivar through gamma ray irradiation was carried out. Mutation was induced in 'Lakatan', a popular Philippine cultivar using gamma ray irradiation. Radio sensitivity was established at 50Gy. Morphological, cytological and molecular analysis done showed significant variations between the irradiated samples and the non-irradiated plants. In terms of morphological parameters, gamma ray irradiation affected leaf traits resulting to increased leaf width, leaf length, and number of leaves. Stem girth on the other hand was significantly reduced. Cytological observations showed that gamma irradiation increased the epidermal width, leaf thickness and size of stomates but reduced the number of stomates. For post harvest attributes, gamma irradiation prolonged the shelf life of

banana fruits from 11 days to 14 days. Molecular analysis showed that some markers (RAPD and AFLP) were able to detect unique bands in samples irradiated with 50Gy while the SSR markers did not detect any band difference between the irradiated samples and the control.

Full text available upon request to the author

Article title: Application of DNA molecular markers to maize improvement in the Philippines

Authors: Emma K. Sales, P.S. Guzman, A.D. Manceras, E.E. Magulama, A.M. Salazar

Conference title: Annual Philippine Corn Symposium and Planning Workshop, Pansol, Calamba City (Philippines), 15-17 Jan 2003

Abstract:

The Molecular Biology Laboratory at USM [University of Southern Mindanao, Kabacan, Cotabato, Philippines] was established through the DA-BAR [Department of Agriculture - Bureau of Agricultural Research, Diliman, Quezon City, Philippines] IDG Fund in partnership with AMBIONET. This brings new technology to USM in reaching its goal of state-of-the art research. This project aims to: enhance the capability of public maize breeding institutions in the Philippines through biotechnology tools and develop maize germplasm through biotechnology for resource to assess the genetic diversity of publicity developed inbred lines in the country; develop quality protein maize (QPM) hybrids adapted in the Philippines; transfer the QPM allele (opaque 2) to an elite Philippine inbred through marker assisted backcrossing; contribute to the CIMMYT [Centro Internacional de Mejoramiento de Maiz y Trigo, Mexico] led drought tolerance mapping project by evaluating RILS under drought conditions. Training of USMARC research staff was conducted at USMARC Genetics and Molecular Biology Laboratory through AMBIONET for familiarization with different equipment and their uses. Likewise, lectures and demonstrations on DNA extraction, RNase treatment, DNA reprecipitation, DNA resuspension, agarose gel electrophoresis, Simple Sequence Repeats - Polymerase Chain Reaction (SSR-PCR), Denaturing Polyacrylamide Gel Electrophoresis (PAGE), Silver Staining, Scoring DNA bands and Data Analysis were also conducted. Diversity Analysis of 43 inbred lines from UPLB, 11 from Ilagan Experiment Station (IES) and 45 from USMARC, USM inbred lines is ongoing. Screening of CIMMYT drought parental lines and field evaluation of F1 segregating

population will be done. Moreover, development of QPM cultivars and molecular assisted (MAS) introgression of opaque alleles to an elite Philippine inbred line will be done. So far, 55 CML's and 5 QPM lines from CIMMYT Mexico have just arrived and are ready for planting. Likewise, incorporation of opaque 2 gene to a Philippine DMR line will also be done by using 2 markers in the backcrossing work.

Full text available upon request to the author

Article title: Optimization of the random amplified polymorphic DNA (RAPD) protocol for Musa cultivars in the B genome

Authors: Emma K. Sales, R.R.C. Espino, A.A. Barrion, M.S. Mendioro, et al.

Conference title: Asian Agriculture Congress, Manila (Philippines), 24-27 Apr 2001

Abstract:

Although RAPD band patterns are easily obtained, several parameters of the amplification reaction need to be optimized in order to produce reproductible results. Optimization of several parameters for DNA amplification and RAPD analysis was undertaken to determine RAPD reaction conditions applicable for Musa cultivars in the B genome. Overall, the results suggest that a combination of 35 ng DNA, 2.5 m MCl2, 1 unit uL Tag DNA pol, 1 uM dNTPs, .50 ng RAPD primer and 1X PCR buffer is optimum. Results also suggest that the RAPD PCR temperature cycle profile developed by Zeng et al. (1995) for rice is applicable in the Musa cultivars evaluated. Moreover, a random ten-mer primers with 60-70% G + C is needed to obtain good RAPD band pattern.

Full text available upon request to the author

Marissa A. Paglicawan

Sex: Female

Education:

Doctor of Philosophy in Polymer Science and Engineering, Gyeongsang National University, 2007

Master of Polymer Science and Composite Engineering, Katolieke Universitiet Leuven, Belgium, 1997

Bachelor of Science in Chemistry, Emilio Aguinaldo Rodriguez Institute of Science and Technology, 1981

Field of Specialization:

Physical Chemistry

Materials Chemistry

Polymer Chemistry

Researches:

Article title: Thermomechanical properties of woven abaca fiber–reinforced nanocomposites

Authors: Marissa Paglicawan, Marco P. Rodriguez, Josefina R. Celorico

Publication title: Polymer Composites 41(5), 2020

Abstract:

In this study, natural fiber–reinforced polymer nanocomposites were prepared from high–density polyethylene (HDPE), abaca fiber, and nanoprecipitated calcium carbonate (NPCC) using the hot press technique. The study investigated the influence of untreated and alkali–treated woven abaca fabric and NPCC hybrid

reinforcement on the thermomechanical behavior of the natural fiber composites. The HDPE with different amounts of NPCC was melt−blended in a twin−screw extruder followed by hot press to produce sheets. A lamination of composites containing alternating layers of HDPE sheets with different amounts of NPCC and layers of untreated and alkali−treated woven abaca fabric was produced using a hot press machine. The resulting material was composed of 20% weight ratio of woven abaca fibers. The tensile strength showed that the nanocomposite exhibited a high tensile value of 60.1 MPa with alkali−treated abaca and 1% NPCC. However, a further increase in the NPCC concentration beyond 1% reduced the mechanical strength of the nanocomposite. The thermal stability of the abaca fiber−reinforced nanocomposite improved with addition of NPCC. Scanning electron microscopic analysis demonstrated that alkali−treated abaca and 1% NPCC improved the adhesion and compatibility between the fiber and polymer matrix. The potential applications of this natural fiber−reinforced composite are for automotive and construction materials.

Full text available upon request to the author

Article title: Plasma-treated Abaca Fabric/Unsaturated Polyester Composite Fabricated by Vacuum-assisted Resin Transfer Molding

Authors: Marissa Paglicawan, Byung Sun Kim, Blessie Basilia, Carlo Emolaga, et al.

Publication title: International Journal of Precision Engineering and Manufacturing-Green Technology 1(3), June 2014

Abstract:

To improve the adhesion and wetting between the abaca fibers and matrix, the surface of abaca fabric was modified using plasma polymerization. Different plasma exposure times were conducted to determine the effect of plasma treatment on the properties of the composites. A combination of plasma and other surface modification processes was also investigated to determine whether double treatments could further enhance the properties of these composites. Combined treatments involve plasma polymerization of the fabric after pretreatment with one of the following surface-modification reagents: a) γmethacrylopropyltrimethylsilane, b) triethoxyvinylsilane, and c) 2%w/w NaOH (aq).The abaca fabric/unsaturated polyester composites were fabricated using the vacuum assisted resin transfer molding (VARTM) technique.SEM results showed that 10 to 20 seconds plasma

treatment gave the right amount of surface roughness for maximum fiber and matrix adhesion leading to improved mechanical properties of the composites. Longer plasma treatment time and double treatment however resulted in composites with lower mechanical properties. Although the composite with alkali and plasma-treated fabric showed the lowest mechanical properties it exhibited the lowest water uptake in both distilled water and brine solution.

Full text available upon request to the author

Article title: Water Uptake and Tensile Properties of Plasma Treated Abaca Fiber Reinforced Epoxy Composite

Authors: Marissa Paglicawan, Byung Sun Kim, Blessie Basilia

Publication title: Composites Research 26(3), June 2013

Abstract:

This work presents the tensile properties and water uptake behavior of plasma treated abaca fibers reinforced epoxy composites. The composites were prepared by vacuum assisted resin transfer molding. The effects of treatment on tensile properties and sorption characteristics of abaca fiber composites in distilled water and salt solution at room temperature were investigated. The tensile strength of the composites increased with plasma treatment. With plasma treatment, an improvement of 92.9% was obtained in 2.5 min exposure time in plasma. This is attributed to high fiber-matrix compatibility. Less improvement on tensile properties of hybrid treatment of sodium hydroxide and plasma was obtained. However, both treatments reduced overall water uptake in distilled water and salt solution. Hydrophilicity of the fibers decreased upon plasma and sodium hydroxide treatment, which decreases water uptake.

Full text available upon request to the author

Article title: Influence of Nanoclay on the Properties of Thermoplastic Starch/ Poly(lactic acid) Blends

Authors: Marissa Paglicawan, Blessie Basilia, Ma. Teresa V. Navarro, Carlo Emolaga

Publication title: Journal of Biobased Materials and Bioenergy 7(1), February 2013

Abstract:

Thermoplastic starch is a type of biodegradable material based on starch. However, this material has high water solubility and may lose their mechanical properties in humid conditions. To solve this, biodegradable blends were prepared by melt blending of thermoplastic starch (TPS) and synthetic polylactic acid. The thermoplastic starch with different amounts of locally produced nanoclay was prepared by mixing the 70% starch with glycerol and water in a single screw extruder. The blends were composed of TPS nanocomposites andpolylactic acid in the presence of maleic anhydride. The blend ratios of TPS with nanoclay and PLA were 70:30 and 30:70. The mechanical properties of the biodegradable blends, thermal characteristics, structural behavior, microstructures and water resistance were evaluated. The mechanical properties of PLA/TPS nanocomposite with maleic anhydride were higher than the physical blends of PLA/TPS without maleic anhydride and nanoclay. The XRD result showed that the biodegradable blend nanocomposites exhibited the intercalation of nanoclay within the blends matrix. The microstructure of the blends in the presence of maleic anhydride showed homogenous and smoother surface. The crystallization temperature of the biodegradable blends shifted to a lower temperature compared to the physical blend of TPS nanoclay/PLA. The blends showed better water resistance compared to the physical blend of TPS and PLA.

Full text available upon request to the author

Article title: Dielectric and thermal properties of thermoplastic elastomer gels in the presence of nanographite

Authors: Marissa Paglicawan and Jin Kuk Kim

Publication title: E-polymers 11(1), June 2011

Abstract:

In this work, the effect of different nanographite such as expandable graphite (EG) and exfoliated graphite nanoplatelets (xGnP) on the electrical and thermal properties of nanocomposite thermoplastic elastomer gels prepared from a poly(styrene-b-(ethylene-co-butylene)-b-styrene) (SEBS) imbibed with an EB-compatible paraffin oil was investigated. The electrical properties have been studied as a function of variation of nanoparticles in the frequency range of 52 to 107 Hz. For all the nanoparticles studied, the dielectric constant increases as the volume content of the nanoparticles in the TPE gels increases. The increase in dielectric constant was fairly

smooth with no clear dielectric singularity in the concentration range studied. However, the percolation threshold in the dielectric spectra was clearly seen. The incorporation of a small quantity of nanographite improved the thermal stability of the swollen midblock of TPEGS, since the particles dispersed in this region, thereby increasing the distinct region of oil degradation temperature but no improvement on SEBS matrix. The results showed that size, shape and agglomeration of the particles with high amount of oil in SEBS system played a role in the dielectric properties and thermal stability.

Full text available upon request to the author

Article title: Dispersion of Multiwalled Carbon Nanotubes in Thermoplastic Elastomer Gels: Morphological, Rheological, and Electrical Properties

Authors: Marissa Paglicawan, Jin Kuk Kim, Dae-Suk Bang

Publication title: Polymer Composites 31(2), February 2009

Abstract:

An investigation was reported here with an aim to prepare nanocomposite thermoplastic elastomer gels by dissolving polystyrene-b-poly(ethylene/butylene)-b-polystyrene (SEBS) triblock copolymer in selective hydrocarbon oils with the presence of multiwalled carbon nanotubes (MWCNTs). The properties related to morphology, viscoelasticity, electrical and mechanical properties, and thermal stability were explored and discussed. Dynamic rheological measurements of the resultant nanocomposite thermoplastic elastomer gels (NCTPEGs) confirmed that addition of MWCNTs affects the linear viscoelastic properties in which dynamic storage and loss moduli increase to some extent. At a temperature between 30°C and 40°C below the gel point the NCTPEGs have dynamic storage modulus greater than loss modulus (G′ and G″), thereby indicating that at room temperature a physical network is still present despite the addition of MWCNTs. The morphological properties revealed that MWCNTs were dispersed and exfoliated within the swollen TPE. The incorporation of small quantity of MWCNTs improved the thermal stability and mechanical properties of NCTPEGs. POLYM. COMPOS., 2010.

Full text available upon request to the author

Article title: Properties of new nanocomposite triblock copolymer gels based on expandable graphite

Authors: Marissa Paglicawan and Jin Kuk Kim

Publication title: Polymer Engineering and Science 48(9), September 2008

Abstract:
In this work, we investigated the effect of expandable graphite (EG) on the property of triblock copolymer prepared from a poly(styrene-b-(ethylene-co-butylene)-b-styrene) (SEBS) imbibed with an EB-compatible hydrocarbon oil. The rheological properties showed that at a temperature between 30 and 40°C below the gel point, the triblock copolymer gels had a dynamic storage modulus (G′) greater than loss modulus (G‵), thereby indicating that at ambient temperature, a physical network is still present in spite of the addition of nanoparticles. Dynamic rheological measurements of the resultant nanocomposite triblock copolymer gels confirmed that the addition of EG affects the linear viscoelastic properties and maximum operating temperature of the parent triblock copolymer gels. The mechanical properties showed only marginal increase, which can be attributed to the poor dispersion that leads to agglomeration of particle into micrometer size stacks, and thus the particles behave only as inorganic fillers. The morphology and X-ray diffraction revealed that the EG used to generate nanocomposite triblock copolymer gels is dispersed generally within the swollen copolymer and/or solvent. POLYM. ENG. SCI., 2008. © 2008 Society of Plastics Engineers.
Full text available upon request to the author

Article title: A Novel Ultrasonic Method of Preparation of Polyurethane Materials
Authors: Maridass Balasubramanian, Marissa Paglicawan, Jin Kuk Kim
Publication title: International Journal of Polymeric Materials 57(8), August 2008

Abstract:
The possibility of using ultrasonic waves in the reaction between methylene diphenyl diisocyanate (MDI) and polypropylene glycol (PPG) to create polyurethanes is described in this article. This normally slow reaction without chemical catalysts was found to occur to completion within minutes in the presence of ultrasonic waves. A commercially available ultrasonic apparatus was used and characterized for the ultrasonic power. The effect of varying the isocyanate/alcohol groups (NCO/OH) ratio in the presence of ultrasonic waves was also studied. These ratios were found to have a strong effect on the reaction time and mechanical properties of the materials. They also influence the thermal stabilities of the

products. Higher NCO/OH ratios lead to faster curing times and harder but brittle materials.

Full text available upon request to the author

Article title: The effect of inclusion of nanoparticles on the rheological and morphological properties of triblock copolymer gels
Authors: Marissa Paglicawan and Jin Kuk Kim
Publication title: TechConnect Briefs 1, June 2008

Abstract:

Nanocomposite materials were prepared by embedding nanosized particles into triblock copolymer gels. The properties related to morphology, viscoelasticity and thermal stability were explored and discussed. Dynamic rheological measurements of the resultant NCTPE gels showed that at temperature between 30 °C to 40 °C below the gel point, the nanocomposite thermoplastic elastomer gels (NCTPEGs) have dynamic storage modulus greater than loss modulus (G′ and G″), thereby indicating that at ambient temperature a physical network was still present despite the addition of nanoparticles. Storage modulus slightly increases as the nanoparticles increase. The morphology revealed that nanoparticles used to generate nanocomposite triblock copolymer gels are dispersed generally within the swollen copolymer and or solvent. Thermal degradation was improved with the addition of nanoparticles. This research hopefully gives new advancement in the field of nanocomposite polymer gels with wider application.

Full text available upon request to the author

Article title: Prediction and Optimization of Mechanical Properties of Polypropylene/Waste Tire Powder Blends using a Hybrid Artificial Neural Network-Genetic Algorithm (GA-ANN)
Authors: Maridass Balsubramanian, Marissa Paglicawan, Zhenxiu Zhang, Sung Hyo Lee, et al.
Publication title: Journal of Thermoplastic Composite Materials 21(1), January 2008

Abstract:

Blends of Polypropylene (PP) and waste ground rubber tire powder are studied with respect to the effect of ethylene—propylene—diene monomer (EPDM) and polypropylene grafted maleic anhydride (PP-g-MA) compatibilizer content by using

the Design of Experiments methodology, whereby the effect of the four polymers content on the final mechanical properties are predicted. Uniform design method is especially adopted for its advantages. Optimization is done using hybrid Artificial Neural Network-Genetic Algorithm technique. A rubber formulary with respect to the four ingredients are optimized having maximum tensile strength and then compared with a blend predicted to have maximum elongation at break. It is concluded that the blends show fairly good properties provided that it has a relatively higher concentration of PP-g-MA and EPDM content. SEM investigations also corroborates with the observed mechanical properties. A quantitative relationship is then shown between the material concentration and the mechanical properties as a set of contour plots, which are then tested and confirmed experimentally to conform to the optimum blend ratio.

Full text available upon request to the author

Article title: Waste PU/PP Blends with Improved Technological Properties

Authors: Marissa Paglicawan, Maridass Balusubramanian, Zhenxiu Zhang, Jin Kuk Kim

Publication title: Polymer Plastics Technology and Engineering 47(1), January 2008

Abstract:

An investigation is reported here which aims to study the possibility of recycling waste polyurethane powder by melt blending with polypropylene. Improvement in the technological properties is found to be possible by increasing the miscibility of the blend by using a series of maleic-anhydride based compatibilizers. Mechanical properties were found to increase with increase in the compatibilizer content. It is claimed that the explanations given in this paper are unique in that through the use of a series of maleic anhydride based compatibilizers with PU/PP blends, it is possible to get materials with high mechanical properties which is corroborated by morphological and contact angle studies.

Full text available upon request to the author

Article title: Influence of Hydrocarbon Oils on the Physical Gelation of Poly(styrene-b-(ethylene-co-butylene)-b-styrene) (SEBS) Triblock Copolymers

Authors: Jin Kuk Kim, Marissa Paglicawan, Sung Hyo Lee, Maridass Balasubramanian

Publication title: Journal of Elastomers and Plastics 39(2), April 2007

Abstract:
The physical gelation of triblock copolymer poly(styrene-b-(ethylene-co-butylene)-b-styrene) (SEBS) in different hydrocarbon oils with different concentrations is studied in this article. The linear viscoelastic behavior, thermal transitions, swelling behavior, and gel properties on physical gelation are presented. The linear viscoelastic behavior is highly dependent on the copolymer concentration and type of oils. The degree of moduli responses of SEBS gels increase with higher gelation temperature, thereby indicating the longer lifetime of gel junctions. Small amounts of aromatic content in the hydrocarbon oil decreases the thermal stability of micelle formation of the gel and increases the compatibility of the solvent with copolymer, thereby resulting in low gelation temperature, lower moduli, as well as gel strength. With an increase in paraffinic content and molecular weight of hydrocarbon oil, the gelation temperature, moduli, and gel properties show improvement. Differential scanning calorimetric results show phase separation of soft segment and hard segment. The glass transition temperature (Tg) of soft ethylene—butylene (EB) midblock is not dependent on the triblock copolymer concentration nor on the type of oil, whereas the Tg of hard segment styrene endblock is highly dependent on triblock copolymer concentration and type of oil. The molecular weight and paraffinic hydrocarbon content of the oils are found to contribute to the stability of micelles and the incompatibility of hydrocarbon oil in SEBS triblock copolymer.
Full text available upon request to the author

Article title: Study on Nanocomposite Thermoplastic Elastomer Gels
Authors: Marissa Paglicawan, Maridass Balasubramanian, Jin Kuk Kim
Publication title: Macromolecular Symposia 249-250(1), April 2007

Abstract:
The effect of several network-forming nanoscale materials such as two different types of graphite and multiwalled carbon nanotube on the property development of thermoplastic elastomer (TPE) gels prepared from microphase- ordered poly(styrene-b-(ethylene-co-butylene)-b-styrene) (SEBS) triblock copolymer dissolved in paraffin oil was studied. Dynamic rheological measurements of the resultant nanocomposite TPE (NCTPE) gels showed that at temperature between 30 °C to 40 °C below the gel point, the NCTPE gels have dynamic storage modulus

greater than loss modulus (G′ and G″), thereby indicating that at ambient temperature a physical network is still present despite the addition of nanoparticles. In general, the nanoparticles lower the gelation temperature. The X-ray diffraction of NCTPE gels showed that EG2 system exhibited intercalation, those with CNTs exhibited exfoliation and EG1 did not change at all.

Full text available upon request to the author

Article title: Effects of Extruder Parameters and Compositions on Mechanical Properties and Morphology of Maleic Anhydride Grafted Polypropylene/Waste Tire Blends

Authors: Jin Kuk Kim, Sung Hyo Lee, Marissa Paglicawan, Maridass Balasubramanian

Publication title: Polymer-Plastics Technology and Engineering 46(1), January 2007

Abstract:

A co-rotating twin screw extruder was used for blending thermoplastic elastomeric blends of ground rubber tire (GRT) and maleic anhydride grafted polypropylene (PP-g-MA). The dynamic reaction occurring between the blends necessitates a study of the processing parameters of the extruder. The effects of the extruder screw configurations, screw speed, compatabilizer and blend ratios on the mechanical properties, and morphology was studied. Out of the four different screw configurations A, B, C, and D, screw D with reverse flow elements was found to be highly efficient with respect to mechanical properties, particularly at 100 rpm screw speed. SEM studies revealed that GRT and PP-g-MA are thermodynamically miscible under optimized screw configuration and processing condition of 100 rpm screw speed. SEM studies also show that the addition of compatibilizer increases the miscibility and, consequently, the mechanical properties. Finally, a composition involving GRT/PP-g-MA/SEBS-g-MA as 65/35/10 by weight was found to be optimum.

Full text available upon request to the author

Article title: Viscoelastic and gelation studies of SEBS thermoplastic elastomer in different hydrocarbon oils

Authors: Jin Kuk Kim, Marissa Paglicawan, Maridass Balasubramanian

Publication title: Macromolecular Research 14(3), June 2006

Abstract:
Poly[styrene-b-(ethylene-co-butylene)-b-styrene] (SEBS) triblock copolymer was studied by dissolving the ethylene butylene midblock in selective hydrocarbon oils. These oils differ in their aromatic, paraffinic and naphthenic content. Dynamic rheological studies showed that the storage modulus (G′) exceeded the loss modulus (G″) for all the gels over the entire range of frequency, thereby confirming them as physical gels. However, the behavior ofG′ andG″ as a function of frequency depended primarily on the oil type. The gelation melting temperature decreased drastically with increased oil aromaticity. Small angle X-ray scattering studies revealed that the maximum interdomain interference shifted to a higher angle depending on the composition and type of hydrocarbon oil. Keywordsphysical gel–viscoelastic properties–triblock copolymer–SEBS
Full text available upon request to the author

Article title: Loofah Fiber as Reinforcement Material for Composite
Authors: Marissa Paglicawan, Ma. Susana Cabillon, Rosito P. Cerbito, Elizabeth O. Santos
Publication title: Philippine Journal of Science 134(2), December 2005

Abstract:
In this preliminary study, the potential of loofah fiber as reinforcement material for polymer-bonded composites was investigated. Tensile and flexural properties of loofah fiber reinforced plastic were characterized and evaluated. The mechanical properties of the composite have been determined as a function of different method of loofah fiber preparation. The fiber-matrix interaction and fiber/matrix volume were also determined using a stereomicroscope. Results of mechanical properties, at least in this study showed that loofah fiber reinforced with unsaturated polyester are typical anisotropic material since the loofah is generally controlled by the network of fibers in multi-directions. The concentration of fibers in the loofah itself has a significant effect on the mechanical properties as shown from the results of transverse and longitudinal direction. The tensile and flexural modulus varied depending on the sample preparation of the composite and the direction of loading.
Full text available upon request to the author

Article title: Natural weathering of polypropylene in a tropical zone

Authors: Elinor L. Bedia, Marissa Paglicawan, Cynthia V. Bernas, Severino T. Bernardo, et al.
Publication title: Journal of Applied Polymer Science 87(6), February 2003

Abstract:
Natural weathering of isotactic polypropylene (PP) plates (2 mm in thickness) was conducted for 15 months in the Philippines. Optical microscopy, scanning electron microscopy, and atomic force microscopy revealed that the surface layer (200–300 nm in thickness) was affected in the first month, and cracks are formed toward the deeper layer. On the basis of the microscopic observations along with FTIR, DSC, GPC, and tensile strength measurements, the following degradation mechanism of PP was proposed. At first, through oxygen introduced into the PP, only the surface layer seems to be affected. Gradually, the surface layer may be removed, exposing the inner layer. Then, molecular chains of the inner layer start to be degraded, accompanying a significant loss of tensile properties. Part of the degraded materials seems to be eroded, leading to the formation of cracks on the surface of the uncovered inner layer. Finally, the original surface layer may be totally eroded, making the structure of the inner layer (which should reflect the spherulitic texture) evident.
Full text available upon request to the author

Article title: Effect of Devulcanizer on the Properties of Natural Rubber Vulcanizates
Authors: Jin Kuk Kim and Marissa A. Paglicawan
Publication title: Philippine Journal of Science 133(2), December 2004

Abstract:
The effect of De-Link R on the properties of natural rubber vulcanizates was investigated. Different amounts of De-Link R were added to the base formulation of natural rubber compound. The tensile properties were determined and correlated with the results of cure characteristics and crosslink density. Results showed that the maximum torque, scorch time, and cure time increase with increasing De-Link R content. However, the tensile strength and elongation at break drop tremendously as the amount of De-Link R content increases; whereas the modulus at 100% and 300% elongation increase due to the formation of new crosslink as indicated in the increase of crosslink density.
Full text available upon request to the author

Artemio M. Salazar

Sex: Male

Education:

Doctor of Philosophy in Plant Breeding, Iowa State University, Ames Iowa

Master of Science in Plant Breeding, University of the Philippines Los Baños, Los Baños Laguna

Bachelor of Science in Agricultural Chemistry, University of the Philippines Los Baños, Los Baños Laguna

Field of Specialization

Plant Breeding

Researches:

Article title: Effect of partial substitution of improved grasses with corn (Zea Mays) or sorghum (Sorghum Bicolor) silages on milk production of Holstein-Friesian x Sahiwal cows

Authors: Renzen Marie B. Jamisola, Karla Joy S. Ty, Artemio M. Salazar, Ayn Kristina M. Beltran, et al.

Publication title: Philippine Journal of Veterinary and Animal Sciences 44(1), 2018

Abstract:

Effect of partially substituting improved grasses – Napier (*Pennisetum purpureum*) and Guinea grass (*Panicum maximum*) combination – with 50% corn or sorghum silages on dry matter intake (DMI), milk production and body condition scores of nine Holstein-Friesian x Sahiwal cows were determined in a 23-day feeding trial.

Cows were grouped and distributed following a 3x3 Latin Square Design based on 10-100, 101-200 and >200 days-in-milk (DIM.) No significant differences were observed on all of the response variables for 10-100 and 101-200 DIM fed with the three treatments. Morning DMI (7.07 kg) and total DMI (13.68 kg) of cows at >200 DIM was greatest (P =0.03) on animals fed 100% improved grass. Corn silage substitution at 50% of total DMI had the highest (P=0.05) afternoon milk yield (3.13 L/day) compared to the other two dietary treatments. In conclusion, corn or sorghum silage can replace improved grasses at 50% DM requirement without any general effect on milk production and body condition score.

Full text available upon request to the author

Article title: The use of Grifflin's Diallel Analysis in determining combining ability of Philippine Maize Inbred Lines for Yield under Biotic Stress of Bacterial Stalk Rot
Authors: Nuning A. Subekti and Artemio M. Salazar
Publication title: Penelitian Pertanian Tanaman Pangan 24(3), 2005

Abstract:

A Griffing's diallel analysis Model 1was employed to determine the genetic inheritance of yield in six maize inbred lines consisting of four resistant and two susceptible inbred lines to bacterial stalk rot. A complete cross combinations of the lines were made at the University of the Philippines Los Baños (UPLB), Philippines, during the 2002 wet season (October 2002-January 2003) and the 2003 dry season (February-June 2003). The parental lines, F1 crosses, and F1 reciprocals were then evaluated using a Randomized Complete Block Design (RCBD) with two replications at the Institute of Plant Breeding, Los Baños, Philippines, from November 2003 to February 2004. It was found that additive gene effects were more important than non-additive gene effects in the inheritance of yield. Estimates of general combining ability, specific combining ability, and reciprocal effects on yield were significant. S3YB 137-1-1-B and TUPI (S3) 5-1-B were two best general combiners. The best specific combining ability was performed by the cross S3YB 137-1-1-B x TUPI (S3) 15-2-B. The reciprocal effects were suspected due to extreme differences in yield between the survived genotypes and genotypes with 100% bacterial stalk rot infestation.

Full text available upon request to the author

Article title: Estimate of genetic effects in six native maize varieties.

Authors: Guzman, P. S. and Salazar, A. M.
Publication title: Philippine Journal of Crop Science 17(2), 1992

Abstract:
Data on 8 yield components from 6 *Zea mays* cultivars were subjected to analysis of variance. Additive and dominant gene effects were highly significant for yield, plant and ear heights, ear length and ear diameter. Highly significant dominance effects were also noted for days to silking and shelling percentage. Heterotic effects were significant for days to silking and ear height, and highly significant for plant height and ear diameter. Composites involving the cultivars Tiniguib, Silangan 2 and Sapnit 348 are recommended for high yields.
Full text available upon request to the author

Article title: Prediction of maize (*Zea mays* L.) yield under moderately waterlogged condition using agronomic traits measured prior to harvesting.
Authors: Paril, J. F., Sanchez, M. A. B., Salazar, A. M.
Publication title: Philippine Journal of Crop Science 40(3), 2015

Abstract:
Maize production in the Philippines is facing constraints brought about by more intense and frequent rainfall resulting to excess soil moisture stress or waterlogging. Identification and assessment of agronomic traits related to waterlogging are keys to the development of tolerant cultivars. S1 families from two high yielding open-pollinated maize cultivars, IPB VAR6 (high lysine and tryptophan contents, also known as a quality protein maize cultivar) and IPB VAR13 (hybrid maize alternative of poor Filipino farmers), were evaluated under normal field soil moisture and moderate waterlogging conditions. Yield was used as the indicator of stress tolerance. For each cultivar, 20 S1 families were selected based on best linear unbiased yield predictors, estimated from models accounting for treatment, S1 family, and interaction effects. Correlation analysis indicated that anthesis-silking interval and adventitious root growth were not significantly correlated with yield. Yield prediction models utilizing 10 agronomic traits measured prior to harvesting as explanatory variables, were used to complement the correlation analysis. The models showed 69.1% and 73.1% adjusted R2 under normal field soil moisture and moderate waterlogging conditions, respectively. These models have potential

applications in early yield prediction and in predicting yield when empirical yield data for some entries are lost due to inclement weather, pests, diseases and data mishandling.

Full text available upon request to the author

Article title: Assessment of genetic diversity of Philippine corn (*Zea mays* L.) germplasm set using nonparametric morphological characteristics.

Authors: Bon, S. G., Huelgas, V. C., Salazar, A. M.

Publication title: Philippine Journal of Crop Science 44(3), 2019

Abstract:

Three-hundred nineteen traditional and farmer's corn populations were characterized for 39 non-parametric traits to genetic diversity of Philippines corn germplasm collection set based on accession of assess. Analyses revealed intermediate to high H' values for most of the traits observed ranging from 0.40 to 0.98 in 31 of 39 traits of stem, leaf, ear, tassel, cob and kernel. Variation was expressed in terms of multiple morphotypes of traits and their relative frequencies. Cluster analysis based on similarity confirmed the high levels of genetic diversity with substantially high dissimilarity coefficient. Clustering was achieved at a low similarity coefficient of 0.39 where 10 groups can be identified and with 10 generally outlier accessions. Majority (70%) of the accessions generally fall within the first two large groups, Cluster 1 and Cluster 2. The closest two pairs of accessions were tied at maximum similarity of 0.82 and 0.85. Clustering was not found associated with the origin or provenances. However, pattern grouping was clear between old collections (collections mostly from 1980's to 2000s) and recent collections (collections from 2015-2016). Most of the recent collections were grouped at higher degree of similarity including the two closest pairs identified while old collections were grouped at lower degree of similarity. While the collection set was found generally diverse, results however showed that recently collected Philippine corn germplasm have reduced variability than the collections acquired about 20 to 30 yr ago. Results showed that the corn germplasm set conserved were still highly diverse despite rapid displacement, varietal homogenization and modernization of the corn agricultural landscape in the country.

Full text available upon request to the author

Article title: Patterns of variability in quantitative morpho-agronomic characteristics of Philippine traditional corn from selected provinces.

Authors: Bon, S. G., Huelgas, V. C., Roxas, G. R., Salazar, A. M.

Publication title: Philippine Journal of Crop Science 42(2), 2017

Abstract:

Two hundred recently collected traditional corn populations were characterized based on quantitative morpho-agronomic descriptors, aimed to assess the distribution and frequency of quantitative variation, determine the principal component of variation and similarity groupings of the collection. Data showed wide spread statistical range and high variance and standard deviation for kernel, tassel, plant and ear descriptors. Nine descriptors however, showed skewness, indicating aggregation of values towards either end of the range. Means indicated values closer to the unimproved corn types such as shorter plant heights, higher number of leaves, narrower stem diameter, lighter kernel weight, shorter ear length, early tasseling and silking, smaller kernel dimensions, smaller cob diameter, and non-synchronous flowering. As expected, collections were distributed over many classes ranging from 6 to all 10 frequency classes but generally falling within the 4 or 5 central classes. In general, values obtained indicated high variability of the collection having wide dispersion distributed to multiple class ranges. A cumulative 74.6% of sample variability was contributed by 11 PCs with the first 3 principal components explaining about 44.48% of the sample variation. PC1 was composed of 22 variables representing plant, tassel and ear characteristics. PC2 included tassel peduncle length and number of kernel rows while PC3 identified 100-kernel weight and kernel width. Number of primary branches of tassel and rachis diameter were not found significant in all primary axes. The collection clearly scattered over the biplot space but no clear pattern of provenance association can be identified. Weak groupings can be observed for some collections from Masbate, Oriental Mindoro and Agusan del Sur. Cluster analysis further confirmed inherent morpho-agronomic variability of the collection set where maximum clustering was achieved at 15.75 Euclidean distance coefficient. The collection can be grouped into two clusters with 9 outliers. Cluster II was the larger group with 3 sub-clusters while Cluster I was composed of 18 collections. Cluster II maybe sub-grouped into 3 smaller clusters IIA, IIB, IIC. No clear association to provenances was established but 21 of the Masbate collection clustered in IIA and 8 of 14 Aklan and 7 of 10 Agusan Del Sur collections

both clustered in IIC. Cluster analysis validated high degree of variability of the collection set. The present study therefore confirmed the presence of considerable genetic diversity, outlined distribution patterns of variations observed and identified the principal components among the local corn germplasm. Recommendations were forwarded.

Full text available upon request to the author

Article title: Genomic selection in Maize (Zea mays L.) population improvement for Waterlogging Tolerance

Authors: Jefferson F. Paril, Maria Alma B. Sanchez, Artemio M. Salazar, Antonio G. Lalusin, et al.

Publication title: Philippine Journal of Crop Science 42(1), 2017

Abstract:

Excess soil moisture stress or waterlogging in maize is increasingly becoming a serious problem in the Philippines as a result of climate change. Waterlogging tolerance is best expressed in terms of yield reduction. Yield is a quantitative and polygenic trait. Genomic selection promises a more efficient way of improving quantitative traits in crop plants. Genomic selection is a type of marker assisted selection which uses all available marker data, phenotype data and statistical models to predict performance.High variability was found in a population of 390 S1 families extracted from 39 Philippine traditional maize varieties in terms of yield under normal and excess soil moisture conditions. Genotyping-by-sequencing was implemented on 92 families sampled from the 390 S1 families tested for waterlogging tolerance. Genotype and phenotype data from 92 lines were used to gauge the feasibility of using genomic selection in these traditional maize varieties and to perform a preliminary genome-wide association study. The prediction accuracies of the three genomic selection models RR-BLUP, Bayesian RR and Bayesian LASSO were close to zero for crop yield susceptibility index and rangers 0.16-.44 for yield per se, under normal and stressed conditions. Larger population size should be used to improve prediction accuracies in maize genomic selections. Genome-wide association study detected 14 putative QTL for crop yield susceptibility index and two for yield under excess soil moisture stress, with significance level of 9.7 x 10-5to 1.4 x10-5, and power of 0.71 to 0.92. All the protein coding regions within 15kb upstream and downstream of the QTL are not yet

characterized except for GRMZM2G179270 (putative-S-locus receptor-like protein kinase family protein), GRMZM2G071986 (tetratricopeptide repeat-like superfamily) and GRMZM2G093705 (ATPase).

Full text available upon request to the author

Thesis title : Effects of mass selection for ear length in maize

Authors: Artemio M. Salazar

Abstract:

Iowa Long Ear Synthetic (BSLE) was developed in 1957 from 12 long-eared maize (Zea mays L.) inbred lines. After three generations of random mating, divergent mass selection for ear length was initiated in 1963 to determine the effects of selection on grain yield. The objectives of this study were to evaluate the effects of 15 cycles of mass selection on ear length, yield, and other agronomic traits and to estimate the genetic variability present in BSLE original population and in subpopulations after 15 cycles of divergent mass selection for ear length;Evaluation of original and advanced cycles of BSLE subpopulations showed significant but asymmetrical response for ear length and most of the other taits. Greater response was exhibited with selection for shorter ears. The asymmetrical response for ear length was probably due to genetic asymmetry and greater environmental sensitivity of long-ear subpopulation compared with the short-ear subpopulation. The effects of genes controlling ear length were also concluded to be small because the asymmetric response was not immediate. Heterosis was detected in the crosses of advanced cycles suggesting significant difference in gene frequencies in the short-ear and long-ear subpopulations with the expression of incomplete dominance for ear length;Genetic variation in the advanced populations, cycle 15 short-ear (BSLE C15S) and cycle 15 long-ear (C15L), was found to be similar to the original population (BSLE C0). Further progress was predicted and would continue to be asymmetrical in future cycles of divergent mass selection for ear length. Indirect selection, based on ear length, was not effective for increasing grain yield. Correlated effects for divergent mass selection were opposite for the short-ear and long-ear subpopulations.

Full text available upon request to the author

Article title: Classifying Farmer-Bred Maize (Zea mays L.) Varieties into Heterotic Groups using Broad-Based Testers

Authors: Tonette P. Laudel, John Paolo P. Nuñez , Rehel A. Diaz, Jerome S. Burgonio, et al.
Publication title: Philippine Journal of Crop Science 43(3), 2018

Abstract:
Through many decades of farmers' selection, the farmer-bred maize varieties (or native varieties) from the Philippines formed unique potential in adaptation and proven to be genetically-diverse. But its utilization in varietal improvement programs is less explored due to their low yield. Using broad-based elite maize populations as testers, the study aimed in classifying 70 farmer-bred varieties into heterotic groups. Testcross progenies were generated during the 2015 DS followed by field evaluation in replicated trials at Pangasinan, Isabela, and UPLB from 2016-2017. ANOVA revealed significant effects of native (farmer-bred variety), tester, and native x tester interaction for important traits like YIELD, EPP, EL, FW, and GW. Combining ability estimates based on YIELD were used in generating GGE biplots and dendrogram. Three clusters, which are also equivalent to the proposed heterotic groups, explained 61.2% of the variation in combining ability of farmer-bred varieties and testers. Broad-based testers representing each group are chosen and may be used to classify other farmer-bred varieties in the future. Farmer-bred varieties with high GCA are recommended for intra-population improvement, while testcrosses exhibiting high SCA may be directly considered as potential population hybrids. Traits from farmer-bred varieties will also be incorporated to further improve the elite maize populations (used as testers). The study is an effort to manage farmer-bred variety or germplasm through the proposed heterotic groupings, in order to utilize them in maize varietal improvement programs in the country. Further experimentation is needed to validate the proposed heterotic groupings.
Full text available upon request to the author

Article title: Genetic repeatability, phenotypic and genotypic coefficient of variability of whie maize (Zea mays L.) populations
Authors: Maria Lara B. Balingasa and Artemio M. Salazar
Publication title: Journal of BIMP-EAGA Regional Development 3(2), 2017

Abstract:

A plant breeder's success in executing any breeding program depends greatly in the presence and amount of genetic variation including the genetic repeatability of the traits of interest. Fifteen white maize populations available at the Institute of Plant Breeding (IPB), University of the Philippines Los BaÃ±os (UPLB) were grown and evaluated at the Central Mindanao University (CMU) and UPLB on July and December 2011 respectively, to assess the genetic repeatability and the estimates of genetic coefficient. Different maize characters such as yield, days to anthesis , days to silking, plant and ear height, stand count, number of ears, ear length, ear diameter and shelling percentage were studied. The results revealed that in terms of repeatability, yield (31%), plant height (34.88), ear height (41.84%), and shelling percentage (35.54%) obtained moderate values while the rest of the traits indicated low values. Estimates of phenotypic coefficient of variation (PCV) exhibited moderate values for yield, stand count and number of ears while low values were indicated by all of the traits for genotypic coefficient of variation (GCV). Low magnitude of GCV as well as moderate genetic repeatability for the traits being investigated suggests that these parameters were under the control of environmental effects.

Full text available upon request to the author

Article title: Views and suggestions for research collaboration among national maize programs in the Asian Region: perspective from the Philippines
Authors: Artemio M. Salazar
Publication title: Proceedings of the Asian Regional Maize Research Planning and Coordination Meeting, 1994

Abstract: No available
Full text available upon request to the author

Papers Presented

Article title: Insect Resistance Management: the Philippines Experience
Authors: B.F. Cayabyab, W.R. Cuaterno, E.P. Alcantara, S.C. Halos, J.M. Belen, M. Salazar
Publication title: Proceeding of the Tenth Asian Regional Maize Workshop, 2008

Abstract:

Bt corn is cultivated over about 300 000 ha in the Philippines, which ranks 13th among countries cultivating genetically modified (GM) crops over 50 000 ha or more. The Philippines was the first country in Asia to formulate biosafety rules and regulations on GM crops. Insect Resistance Management (IRM) is a major component of the measures prescribed by the Philippines government governing the cultivation of GM crops such as Bt corn. In this paper, we present an outline of the cooperative endeavors relating to Bt corn taken up by technology developers (Monsanto, Pioneer, Syngenta and academic institutions), regulators, farmers and scientists. So far, there has been no observed development of resistance by from Asian corn borer to Bt corn. The country services of the IRM Technical Advisory Team of the Department of Agriculture of the Government of the Philippines. This strategy has been incorporated into the requirements stipulated for the continued commercialization of Bt corn (MON 810) by Monsanto. Soon, RR soybean, Bt cotton, PRSV-resistant papaya, vitamin A-fortified rice and Bt eggplant will be commercially available in the country.

Full text available upon request to the author

Rody G. Sy, M.D.

Sex: Male

Education:

Doctor of Medicine, University of the Philippines, 1974

General Internship, UP-PGH Medical Center, 1974-1975

Residency in Internal Medicine, UP-PGH Medical Center, 1976-1979

Fellowship in Cardiology, Georgetown University Hospital, 1979-1982

Fellow and Diplomate, Philippine College of Physicians, 1983

Fellow and Diplomate, Philippine College of Cardiology, 1983

Fellow, American College of Cardiology, 1993

Fellow, Philippine Society of Cardiac Catherization and Intervention, 1995

Fellow, Asean College of Cardiology, 2008

Field of Specialization

Cardiogenomics

Cardiology

Epidemiology

Researches:

Article title: Gaps in beliefs and practice in dyslipidaemia management in Japan, Germany, Colombia and the Philippines: insights from a web-based physician survey

Authors: Philip J. Barter, Shizuya Yamashita, Ulrich Laufs, Alvaro J. Ruiz, et al.

Publication title: Lipids in Health and Disease 19(1), June 2020

Abstract:

Background: Implementing evidence-based management of dyslipidaemia is a challenge worldwide. Objectives: To understand physician beliefs and behaviour and identify uncertainties in dyslipidaemia management across four world regions. Methods: Web-based survey of 1758 physicians in Japan, Germany, Colombia and the Philippines who were selected randomly from existing databases. Key inclusion criteria were 1) for cardiologists and diabetes/endocrinology specialists: ≥50 dyslipidaemia patients examined in the last month; 2) for specialists in neurology/ neurosurgery/stroke medicine: ≥50 dyslipidaemia patients and ≥ 20 patients with a history of ischaemic stroke examined in the last month; and 3) for specialists in nephrology and general medicine: based at centres with ≥20 beds and ≥ 50 dyslipidaemia patients examined in the last month. The self-report survey covered dyslipidaemia management, target low-density lipoprotein cholesterol (LDL-C) levels in different patient groups, and statin safety. All physicians gave voluntary consent and all data were anonymised. Analysis was solely descriptive. Results: The survey highlighted key areas of uncertainty in dyslipidaemia management in the four countries. These related to LDL-C targets in different patient groups, the safety of low LDL-C levels, the safety of statins, especially for effects on cognitive, renal and hepatic function and for haemorrhagic stroke risk, and lipid management strategies in patients with chronic kidney disease, including those with concomitant hypertriglyceridaemia. Conclusions: This survey of physicians in Japan, Germany, Colombia and the Philippines has identified key gaps in knowledge about dyslipidaemia management. These relate to the safety of low LDL-C levels, the safety of statins, and lipid management of chronic kidney disease. The findings from this survey highlight the need for further education to improve the implementation of guideline recommendations for dyslipidaemia management.

Full text available upon request to the author

Article title: BAG6 Variant rs805303 is Nominally Associated with ACEi-induced Cough Among Filipinos

Authors: Paul Ferdinand M. Reganit, Rody G. Sy, Jezreel L. Taquiso, Charlene F. Agustin

Publication title: Philippine Journal of Science, 149(1), March 2020

Abstract:

Cough is a common side effect of angiotensin converting enzyme inhibitor (ACEi) therapy. The incidence of ACEi-induced cough has been shown to correlate with genetic variation among different populations. This study aimed to determine the association of candidate genetic polymorphisms with ACEi-induced cough among Filipinos. Two hundred twenty (220) participants on ACEi therapy pressure-lowering in an unmatched case-control study (82 cases with ACEi-induced cough and 138 controls). Genomic DNA samples were extracted and genotyped for selected genetic variants. The association of genetic variants and clinical factors with ACEi-induced cough was determined using regression analyses. Univariate logistic regression showed that the BAG6 variant rs805303 is nominally associated with ACEi-induced cough among Filipinos, at a per-comparison error rate (PCER) of 0.05 (OR 2.10, p = 0.016). The association of the variant with ACEi cough was statistically significant after multiple regression analysis (adjusted OR 2.09, p = 0.022) while adjusting for confounding clinical factors (sex, alcohol intake, and diastolic blood pressure). Further studies are needed to validate these findings.

Full text available upon request to the author

Article title: Prevalence of Metabolic Syndrome and Cardiovascular Risk Factors among Community Health Workers in Selected Villages in the Philippines

Authors: Olivia Sison, Nina Castillo-Carandang, Mary Ann Jucutan Ladia, Rody G. Sy, et al.

Publication title: Journal of ASEAN Federation of Endocrine Societies 34(2), November 2019

Abstract:

Objective. This study aimed to estimate the prevalence of cardiovascular risk factors and metabolic syndrome among community health workers (CHWs) in selected villages in the Philippines. It also determined the association of urbanization and socio-demographic characteristics with hypertension, diabetes mellitus and metabolic syndrome among CHWs.

Methodology. A cross-sectional study was conducted among CHWs who were actively rendering service from selected communities at the time of the study. Standardized interviews were conducted and clinical measurements were collected.

Results. Of the total of 457 CHWs who participated, 96% were females with a median age of 50 years. The prevalence of hypertension in this population was 32.4%. Hypertension was found to be associated with older age [adjusted odds ratio (aOR) 5.3, 95% CI: 3.2 to 8.8, p<0.001], obesity (aOR 2.4, 95% CI: 1.4 to 4.0, p=0.002) and alcohol consumption (aOR 1.7, 95% CI: 1.0 to 3.0, p<0.040). The prevalence of diabetes mellitus (DM) was 13.6%. It was found to be more prevalent among CHWs who were at least 50 years old (aOR 2.7, 95% CI: 1.4 to 5.1, p=0.002), and those who spent at least 5 hours a day in sedentary activities (aOR 3.8, 95% CI: 1.1 to 12.7, p<0.033). Borderline to high total cholesterol, low density lipoprotein cholesterol (LDL-c) and triglycerides (TG) were seen in 41%, 37% and 20%, respectively. Sixty percent had low high density lipoprotein cholesterol (LDL-c). The overall prevalence of metabolic syndrome was 52.3%.

Conclusion. Metabolic syndrome is prevalent among CHW participants, with obesity, hypertension and low LDL-c as the most common components present. The prevalence of cardiovascular risk factors in this population was not found to be signicantly dierent between rural and urban areas after adjusting for other factors.

Full text available upon request to the author

Article title: Effect of alirocumab on cardiovascular outcomes after acute coronary syndromes according to age: An ODYSSEY OUTCOMES trial analysis

Authors: Peter R. Sinnaeve, Gregory G. Schwartz, Daniel M. Wojdyla, Marco Alings, et al.

Publication title: European Heart Journal 41(24), November 2019

Abstract:

Aims: Lowering low-density lipoprotein cholesterol (LDL-C) reduces cardiovascular risk irrespective of age, but the evidence is less strong for older patients. Methods and results: This prespecified analysis from ODYSSEY OUTCOMES compared the effect of alirocumab vs. placebo in 18 924 patients with recent acute coronary syndrome (ACS) according to age. We examined the effect of assigned treatment on occurrence of the primary study outcome, a composite of coronary heart disease death, myocardial infarction, ischaemic stroke, or unstable angina requiring hospitalization [major adverse cardiovascular event (MACE)] and all-cause death. Relative risk reductions were consistent for patients ≥65 vs. <65 years for MACE [hazard ratio (HR) 0.78, 95% confidence interval (CI) 0.68-0.91 vs. 0.89, 0.80-1.00;

Pinteraction = 0.19] and all-cause death [HR 0.77, 0.62-0.95 vs. 0.94, 0.77-1.15; Pinteraction = 0.46], and consistent for MACE when dichotomizing at age 75 years (HR 0.85, 0.64-1.13 in ≥75 vs. 0.85, 0.78-0.93 in <75, Pinteraction = 0.19). When considering age as a continuous variable in regression models, advancing age increased risk of MACE, as well as the absolute reduction in MACE with alirocumab, with numbers-needed-to-treat for MACE at 3 years of 43 (25-186) at age 45 years, 26 (15-97) at age 75 years, and 12 (6-81) for those at age 85 years. Although adverse events were more frequent in older patients, there were no differences between alirocumab and placebo. Conclusion: In patients with recent ACS, alirocumab improves outcomes irrespective of age. Increasing absolute benefit but not harm with advancing age suggests that LDL-C lowering is an important preventive intervention for older patients after ACS.

Full text available upon request to the author

Article title: Recalibration of biochemistry measurements in a multinational cohort study: LIFE course study in CARdiovascular disease Epidemiology (LIFECARE)
Authors: Ei Ei Nang, Sheryl Hx Ng, Mahham Shafiq, Chuen Seng Tan, et al.
Publication title: (Preprint) - Undergoing Peer Review

Abstract:

Background

Various cardiovascular biomarkers are used to assess and compare the risk of cardiovascular diseases across populations. However, artefactual variations due to the use of different laboratories may make these comparisons invalid. This work describes the inter-laboratory variations in a multi-country cohort, LIFECARE, and the use of recalibration to a reference laboratory to minimise this variability.

Methods

LIFECARE is a cohort of 10,479 participants recruited from Indonesia, Malaysia, Philippines and Thailand between 2008 and 2011, with blood samples analysed at country-specific laboratories(n=4). Thailand was the designated reference laboratory. The measurements from each laboratory were compared against the reference laboratory using a common set of samples analysed at all laboratories, using the MethComp package in R. Laboratory values for cohort participants were recalibrated using the equation generated by the package, if large, statistically significant differences were observed during the comparison.

Results

Glucose, total cholesterol, HDL cholesterol, LDL cholesterol and triglyceride measurements were reported for all four countries. Cholesterol and HDL from all laboratories required recalibration while glucose did not. Recalibration altered the proportions of the population at risk substantially, with prevalence of high cholesterol changing from 56.3% to 75.0% in Malaysia, 52.1% to 37.5% in Indonesia and 31.3% to 22.7% in Philippines. Prevalence of low HDL was similarly altered.

Conclusion

There was significant variation in serum lipid levels measured by different laboratories, leading to variations in estimates of population at risk. Recalibration to a reference laboratory can overcome this variability and facilitate meaningful comparisons of laboratory data across countries.

Full text available upon request to the author

Article title: Effects of alirocumab on cardiovascular and metabolic outcomes after acute coronary syndrome in patients with or without diabetes: a prespecified analysis of the ODYSSEY OUTCOMES randomised controlled trial

Authors: G.G. Schwartz, P.G. Steg, M. Szarek, D.L. Bhatt, et al.

Publication title: The Lancet Diabetes & Endocrinology 7(8), July 2019

Abstract:

Background: After acute coronary syndrome, diabetes conveys an excess risk of ischaemic cardiovascular events. A reduction in mean LDL cholesterol to 1·4-1·8 mmol/L with ezetimibe or statins reduces cardiovascular events in patients with an acute coronary syndrome and diabetes. However, the efficacy and safety of further reduction in LDL cholesterol with an inhibitor of proprotein convertase subtilisin/kexin type 9 (PCSK9) after acute coronary syndrome is unknown. We aimed to explore this issue in a prespecified analysis of the ODYSSEY OUTCOMES trial of the PCSK9 inhibitor alirocumab, assessing its effects on cardiovascular outcomes by baseline glycaemic status, while also assessing its effects on glycaemic measures including risk of new-onset diabetes. Methods: ODYSSEY OUTCOMES was a randomised, double-blind, placebo-controlled trial, done at 1315 sites in 57 countries, that compared alirocumab with placebo in patients who had been admitted to hospital with an acute coronary syndrome (myocardial infarction or unstable angina) 1-12 months before randomisation and who had raised concentrations of atherogenic

lipoproteins despite use of high-intensity statins. Patients were randomly assigned (1:1) to receive alirocumab or placebo every 2 weeks; randomisation was stratified by country and was done centrally with an interactive voice-response or web-response system. Alirocumab was titrated to target LDL cholesterol concentrations of 0·65-1·30 mmol/L. In this prespecified analysis, we investigated the effect of alirocumab on cardiovascular events by glycaemic status at baseline (diabetes, prediabetes, or normoglycaemia)-defined on the basis of patient history, review of medical records, or baseline HbA1c or fasting serum glucose-and risk of new-onset diabetes among those without diabetes at baseline. The primary endpoint was a composite of death from coronary heart disease, non-fatal myocardial infarction, fatal or non-fatal ischaemic stroke, or unstable angina requiring hospital admission. ODYSSEY OUTCOMES is registered with ClinicalTrials.gov, number NCT01663402. Findings: At study baseline, 5444 patients (28·8%) had diabetes, 8246 (43·6%) had prediabetes, and 5234 (27·7%) had normoglycaemia. There were no significant differences across glycaemic categories in median LDL cholesterol at baseline (2·20-2·28 mmol/L), after 4 months' treatment with alirocumab (0·80 mmol/L), or after 4 months' treatment with placebo (2·25-2·28 mmol/L). In the placebo group, the incidence of the primary endpoint over a median of 2·8 years was greater in patients with diabetes (16·4%) than in those with prediabetes (9·2%) or normoglycaemia (8·5%); hazard ratio (HR) for diabetes versus normoglycaemia 2·09 (95% CI 1·78-2·46, p<0·0001) and for diabetes versus prediabetes 1·90 (1·65-2·17, p<0·0001). Alirocumab resulted in similar relative reductions in the incidence of the primary endpoint in each glycaemic category, but a greater absolute reduction in the incidence of the primary endpoint in patients with diabetes (2·3%, 95% CI 0·4 to 4·2) than in those with prediabetes (1·2%, 0·0 to 2·4) or normoglycaemia (1·2%, -0·3 to 2·7; absolute risk reduction pinteraction=0·0019). Among patients without diabetes at baseline, 676 (10·1%) developed diabetes in the placebo group, compared with 648 (9·6%) in the alirocumab group; alirocumab did not increase the risk of new-onset diabetes (HR 1·00, 95% CI 0·89-1·11). HRs were 0·97 (95% CI 0·87-1·09) for patients with prediabetes and 1·30 (95% CI 0·93-1·81) for those with normoglycaemia (pinteraction=0·11). Interpretation: After a recent acute coronary syndrome, alirocumab treatment targeting an LDL cholesterol concentration of 0·65-1·30 mmol/L produced about twice the absolute reduction in cardiovascular events among patients with diabetes as in those without diabetes. Alirocumab treatment did not

increase the risk of new-onset diabetes. Funding: Sanofi and Regeneron Pharmaceuticals.

Full text available upon request to the author

Article title: The Klotho Variant rs36217263 Is Associated With Poor Response to Cardioselective Beta-Blocker Therapy Among Filipinos

Authors: Rody G. Sy, Jose B. Nevado, Elmer Balasico Llanes, Jose Donato A. Magno

Publication title: Clinical Pharmacology & Therapeutics 107(1), July 2019

Abstract:

A common drug used for hypertension among Filipinos are beta−blockers. Variable responses to beta−blockers are observed, and genetic predisposition is suggested. This study investigated the association of genetic variants with poor response to beta−blockers among Filipinos. A total of 76 Filipino adult hypertensive participants on beta−blockers were enrolled in an unmatched case−control study. Genotyping was done using DNA from blood samples. Candidate variants were correlated with clinical data using chi−square and logistic regression analysis. The deletion of at least one copy of allele A of rs36217263 near Klotho showed statistically significant association with poor response to beta−blockers [dominant; odds ratio (OR)=3.89, p=0.017)], adjusted for diabetes and dyslipidemia. This association is observed among participants using cardioselective beta−blockers (crude OR=5.60, p=0.008), but not carvedilol (crude OR=2.56, p=0.67). The genetic variant rs36217263 is associated with poor response to cardioselective beta−blockers, which may become a potential marker to aid in the management of hypertension

Full text available upon request to the author

Article title: Rising rural body-mass index is the main driver of the global obesity epidemic in adults

Authors: BCD Risk Factor Collaboration (NCD-RisC)

Publication title: Nature 569(7755), May 2019

Abstract:

Body-mass index (BMI) has increased steadily in most countries in parallel with a rise in the proportion of the population who live in cities1,2. This has led to a widely reported view that urbanization is one of the most important drivers of the global rise in obesity3–6. Here we use 2,009 population-based studies, with measurements

of height and weight in more than 112 million adults, to report national, regional and global trends in mean BMI segregated by place of residence (a rural or urban area) from 1985 to 2017. We show that, contrary to the dominant paradigm, more than 55% of the global rise in mean BMI from 1985 to 2017—and more than 80% in some low- and middle-income regions—was due to increases in BMI in rural areas. This large contribution stems from the fact that, with the exception of women in sub-Saharan Africa, BMI is increasing at the same rate or faster in rural areas than in cities in low- and middle-income regions. These trends have in turn resulted in a closing—and in some countries reversal—of the gap in BMI between urban and rural areas in low- and middle-income countries, especially for women. In high-income and industrialized countries, we noted a persistently higher rural BMI, especially for women. There is an urgent need for an integrated approach to rural nutrition that enhances financial and physical access to healthy foods, to avoid replacing the rural undernutrition disadvantage in poor countries with a more general malnutrition disadvantage that entails excessive consumption of low-quality calories.

Full text available upon request to the author

Article title: Cohort Profile: LIFE course study in CARdiovascular disease Epidemiology (LIFECARE)
Authors: Mahham Sahfiq, Alan Yean Yip Fong, Ei Ei Nang, Rody G. Sy, et al.
Publication title: International Journal of Epidemiology, 2018

Abstract: No available

Full text available upon request to the author

Article title: Contributions of mean and shape of blood pressure distribution to worldwide trends and variations in raised blood pressure: a pooled analysis of 1018 population-based measurement studies with 88.6 million participants
Authors: Bin Zhou, James Bentham, Mariachiara Di Cesare, Rody G. SY, et al.
Publication title: International Journal of Epidemiology 47(3), 2018

Abstract:

Change in the prevalence of raised blood pressure could be due to both shifts in the entire distribution of blood pressure (representing the combined effects of public health interventions and secular trends) and changes in its high-blood-pressure tail (representing successful clinical interventions to control blood pressure in the

hypertensive population). Our aim was to quantify the contributions of these two phenomena to the worldwide trends in the prevalence of raised blood pressure.We pooled 1018 population-based studies with blood pressure measurements on 88.6 million participants from 1985 to 2016. We first calculated mean systolic blood pressure (SBP), mean diastolic blood pressure (DBP) and prevalence of raised blood pressure by sex and 10-year age group from 20-29 years to 70-79 years in each study, taking into account complex survey design and survey sample weights, where relevant. We used a linear mixed effect model to quantify the association between (probit-transformed) prevalence of raised blood pressure and age-group- and sex-specific mean blood pressure. We calculated the contributions of change in mean SBP and DBP, and of change in the prevalence-mean association, to the change in prevalence of raised blood pressure.In 2005-16, at the same level of population mean SBP and DBP, men and women in South Asia and in Central Asia, the Middle East and North Africa would have the highest prevalence of raised blood pressure, and men and women in the high-income Asia Pacific and high-income Western regions would have the lowest. In most region-sex-age groups where the prevalence of raised blood pressure declined, one half or more of the decline was due to the decline in mean blood pressure. Where prevalence of raised blood pressure has increased, the change was entirely driven by increasing mean blood pressure, offset partly by the change in the prevalence-mean association.Change in mean blood pressure is the main driver of the worldwide change in the prevalence of raised blood pressure, but change in the high-blood-pressure tail of the distribution has also contributed to the change in prevalence, especially in older age groups.

Full text available upon request to the author

Article title: The association of the dietary approach to stop hypertension (DASH) diet with blood pressure, glucose and lipid profiles in the Malaysian and Philippines populations

Authors: Xunting Tiong, A. Nursara Shahirah, V.C. Pun, Rody G. Sy, et al.

Publication title: Nutrition, metabolism and cardiovascular diseases: NMCD 28(8), 2018

Abstract:

Background and aim: Despite a growing body of evidence from Western populations on the health benefits of Dietary Approaches to Stop Hypertension (DASH) diets,

their applicability in South East Asian settings is not clear. We examined cross-sectional associations between DASH diet and cardio-metabolic risk factors among 1837 Malaysian and 2898 Philippines participants in a multi-national cohort. Methods and results: Blood pressures, fasting lipid profile and fasting glucose were measured, and DASH score was computed based on a 22-item food frequency questionnaire. Older individuals, women, those not consuming alcohol and those undertaking regular physical activity were more likely to have higher DASH scores. In the Malaysian cohort, while total DASH score was not significantly associated with cardio-metabolic risk factors after adjusting for confounders, significant associations were observed for intake of green vegetable [0.011, standard error (SE): 0.004], and red and processed meat (-0.009, SE: 0.004) with total cholesterol. In the Philippines cohort, a 5-unit increase in total DASH score was significantly and inversely associated with systolic blood pressure (-1.41, SE: 0.40), diastolic blood pressure (-1.09, SE: 0.28), total cholesterol (-0.015, SE: 0.005), low-density lipoprotein cholesterol (-0.025, SE: 0.008), and triglyceride (-0.034, SE: 0.012) after adjusting for socio-demographic and lifestyle groups. Intake of milk and dairy products, red and processed meat, and sugared drinks were found to significantly associated with most risk factors. Conclusions: Differential associations of DASH diet and dietary components with cardio-metabolic risk factors by country suggest the need for country-specific tailoring of dietary interventions to improve cardio-metabolic risk profiles.

Full text available upon request to the author

Article title: Cardiac events occurred commonly among apparently healthy Filipinos with the Brugada ECG pattern in the LIFECARE cohort

Authors: Giselle G. Gervacio, Jaime Manalo Aherrera, Rody G. Sy, Lauro Lim Abrahan IV, et al.

Publication title: Heart Asia 10(2), May 2018

Abstract:

Background Brugada syndrome is the mechanism for sudden unexplained death. The Brugada ECG pattern is found in 2% of Filipinos. There is a knowledge gap on the clinical outcome of these individuals. The clinical profile and 5-year cardiac event rate of individuals with the Brugada ECG pattern were determined in this cohort. Methods This is a sub-study of LIFECARE (Life Course Study in Cardiovascular

Disease Epidemiology), a community based cohort enrolling healthy individuals 20 to 50 years old conducted in 2009–2010. ECGs of all enrollees were screened independently by three cardiologists. The prevalence of the coved Brugada ECG pattern was ascertained, and the 5-year cardiac event rate was determined among those individuals with this pattern. The participants were contacted to determine the occurrence of cardiac events, which included syncope, presyncope, seizures, cardiac arrest and unexplained vehicular accidents. Results A total of 3072 ECGs were reviewed, and 14 subjects (0.4%) with the coved Brugada ECG pattern were identified. Four had a cardiac event on follow-up at 5 years, but all remained alive. Most of these 14 coved Brugada individuals were healthy and asymptomatic at baseline. Conclusion Cardiac events occurred commonly among initially asymptomatic Filipinos with the coved Brugada ECG pattern. Such patients need to be followed up closely.

Full text available upon request to the author

Article title: Contributions of mean and shape of blood pressure distribution to worldwide trends and variations in raised blood pressure: A pooled analysis of 1018 population-based measurement studies with 88.6 million participants
Authors: Bin Zhou, James Bentham, Mariachiara Di Cesare, Rody G. Sy, et al.
Publication title: International Journal of Epidemiology 47(3), March 2018

Abstract:
Background: Change in the prevalence of raised blood pressure could be due to both shifts in the entire distribution of blood pressure (representing the combined effects of public health interventions and secular trends) and changes in its high-blood-pressure tail (representing successful clinical interventions to control blood pressure in the hypertensive population). Our aim was to quantify the contributions of these two phenomena to the worldwide trends in the prevalence of raised blood pressure. Methods: We pooled 1018 population-based studies with blood pressure measurements on 88.6 million participants from 1985 to 2016. We first calculated mean systolic blood pressure (SBP), mean diastolic blood pressure (DBP) and prevalence of raised blood pressure by sex and 10-year age group from 20-29 years to 70-79 years in each study, taking into account complex survey design and survey sample weights, where relevant. We used a linear mixed effect model to quantify the

association between (probit-transformed) prevalence of raised blood pressure and age-group- and sex-specific mean blood pressure. We calculated the contributions of change in mean SBP and DBP, and of change in the prevalence-mean association, to the change in prevalence of raised blood pressure. Results: In 2005-16, at the same level of population mean SBP and DBP, men and women in South Asia and in Central Asia, the Middle East and North Africa would have the highest prevalence of raised blood pressure, and men and women in the high-income Asia Pacific and high-income Western regions would have the lowest. In most region-sex-age groups where the prevalence of raised blood pressure declined, one half or more of the decline was due to the decline in mean blood pressure. Where prevalence of raised blood pressure has increased, the change was entirely driven by increasing mean blood pressure, offset partly by the change in the prevalence-mean association. Conclusions: Change in mean blood pressure is the main driver of the worldwide change in the prevalence of raised blood pressure, but change in the high-blood-pressure tail of the distribution has also contributed to the change in prevalence, especially in older age groups.

Full text available upon request to the author

Article title: Establishing validity of EQ-5D-3L (Tagalog) to measure health-related quality of life states among adult Filipinos (20-50 years old)
Authors: Nina Castillo-Carandang, Olivia Sison, Rody G. Sy, et al.
Publication title: Acta Medica Philippina 52(5):397-403, January 2018

Abstract:
To establish the validity of EQ-5D-3L in Tagalog language in assessing health-related quality of life states among adult Filipinos 20-50 years old. Methods. A face-to-face cross-sectional community survey of apparently healthy adult Filipinos (20-50 years old) in Metro Manila and in 4 nearby provinces (Bulacan, Batangas, Quezon, Rizal) was conducted. Trained interviewers administered the Tagalog language versions of EuroQoL 5-Dimension 3 Levels (EQ-5D-3L), Short-Form 36 version 2 (SF-26v2®), and a socio-economic questionnaire. All questionnaires were pre-tested for cultural appropriateness. Concurrent validity (against the SF-36v2®) and known group validity of the EQ-5D-3L were evaluated. Results. Complete data from 3,056 participants were analyzed. Almost half of the participants reported perfect health

on EQ-5D-3L and had higher scores on all SF-36v2® domains compared to those who reported some problems on EQ-5D-3L. Compared to participants who reported some problems on EQ-5D-3L mobility (or anxiety/depression), participants who reported no problem on EQ-5D-3L mobility (or anxiety/depression) reported lower SF-36v2® Physical Functioning (or Mental Health) scores (differences of 7.1 and 10 points, respectively) that were minimally important (i.e. exceeds 5 points). Participants with poorer self-reported health had considerably lower EQ-5D index scores and EQ-5D VAS scores ($p < 0.05$) irrespective of their socio-demographic characteristics. Conclusion. EQ-5D-3L (Tagalog) demonstrated construct and known groups validity among adult Filipinos (20-50 years old)

Full text available upon request to the author

Article title: Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128.9 million children, adolescents, and adults

Authors: Majid Ezzati, James Bentham, Mariachiara Di Cesare, Rody G. Sy, et al.

Publication title: The Lancet 390, December 2017

Abstract:

Underweight, overweight, and obesity in childhood and adolescence are associated with adverse health consequences throughout the life-course. Our aim was to estimate worldwide trends in mean body-mass index (BMI) and a comprehensive set of BMI categories that cover underweight to obesity in children and adolescents, and to compare trends with those of adults.

Full text available upon request to the author

Article title: Psychosocial stress and major cardiovascular events in patients with stable coronary heart disease

Authors: Emil Hagstrom, Frederika Norlund, Amanda Stebbins, Rody G. Sy, et al.

Publication title: Journal of Internal Medicine 283(1), September 2017

Abstract:

Objectives: Assess the risk of ischemic events associated with psychosocial stress in patients with stable coronary heart disease (CHD). Methods: Psychosocial stress was assessed by a questionnaire in 14,577 patients (median age 65.0, IQR 59, 71; 81.6% males) with stable CHD on optimal secondary preventive therapy in the prospective

randomised STABILITY clinical trial. Adjusted Cox regression models were used to assess associations between individual stressors, baseline cardiovascular risk factors, and outcomes. Results: After 3.7 years of follow-up, depressive symptoms, loss of interest, and financial stress were associated with increased risk (hazard ratio, 95% confidence interval) of CV death (1.21, 1.09-1.34; 1.15, 1.05-1.27; and 1.19, 1.08-1.30, respectively) and the primary composite endpoint of CV death, non-fatal MI, or non-fatal stroke (1.21, 1.13-1.30; 1.19, 1.11-1.27; and 1.17, 1.10-1.24, respectively). Living alone was related to higher risk of CV death (1.68, 1.38-2.05) and the primary composite endpoint (1.28, 1.11-1.48), whereas being married as compared with being widowed, was associated with lower risk of CV death (0.64, 0.49-0.82) and the primary composite endpoint (0.81, 0.67-0.97). Conclusions: Psychosocial stress, such as depressive symptoms, loss of interest, living alone, and financial stress, was associated with increased CV mortality in patients with stable CHD despite optimal medical secondary prevention treatment. Secondary prevention of CHD should therefore focus also on psychosocial issues both in clinical management and in future clinical trials.

Full text available upon request to the author

Article title: World Heart Federation Cholesterol Roadmap

Authors: Adrianna Murphy, Jose Rocha Faria-Neto, Khalid Al-Rasadi, Rody G. Sy, et al.

Publication title: Global Heart 12(3), July 2017

Abstract:

The World Heart Federation has undertaken an initiative to develop a series of Roadmaps. Objectives: The aim of these is to promote development of national policies and health systems approaches and identify potential roadblocks on the road to effective prevention, detection and management of cardiovascular disease (CVD) in low-and middle-income countries (LMIC), and strategies for overcoming these. This Roadmap focuses on elevated blood cholesterol, a leading risk factor for myocardial infarction, stroke, and peripheral arterial disease. Methods: Through a review of published guidelines and research papers, and consultation with a committee composed of experts in clinical management of cholesterol and health systems research in LMIC, this Roadmap identifies (1) key interventions for primordial, primary and secondary prevention of CVD through detection, treatment,

and management of elevated cholesterol and familial hypercholesterolemia (FH); (2) gaps in implementation of these interventions (knowledge-practice gaps); (3) health system roadblocks to treatment of elevated cholesterol in LMIC; and (4) potential strategies for overcoming these. Results: Despite strong evidence of the importance of cholesterol levels in primary or secondary prevention of CVD, and the effectiveness of statin therapy for cholesterol lowering and reduction of CVD risk, gaps exist in the detection, treatment, and management of high cholesterol globally. Some potential roadblocks include poor access to laboratory facilities or trained professionals for cholesterol management, low awareness of FH among the general population and health professionals, unaffordability of statins for patient households, and low awareness of the importance of persistent adherence to lipid-lowering medication. Potential solutions include point-of-care testing, provision of free or subsidized lipid-lowering medication, and treatment adherence support using text message reminders. Conclusions: Known effective strategies for detection, treatment, and management of elevated cholesterol and FH exist, but there are barriers to their implementation in many low-resource settings. Priorities for health system intervention should be identified at the national level, and the feasibility and effectiveness of proposed solutions should be assessed in specific contexts. Many solutions proposed in this Roadmap may apply to other cardiovascular conditions and present opportunities for integration of CVD care in LMIC.

Full text available upon request to the author

Article title: Worldwide trends in blood pressure from 1975 to 2015 : a pooled analysis of 1479 population-based measurement studies with 19.1 million participants

Authors: Bin Zhou, James Bentham, Mariachiara Di Cesare, Rody G. Sy, et al.

Publication title: The Lancet 389(10064), January 2017

Abstract:

Raised blood pressure is an important risk factor for cardiovascular diseases and chronic kidney disease. We estimated worldwide trends in mean systolic and mean diastolic blood pressure, and the prevalence of, and number of people with, raised blood pressure, defined as systolic blood pressure of 140 mm Hg or higher or diastolic blood pressure of 90 mm Hg or higher. Methods: For this analysis, we pooled national, subnational, or community population-based studies that had

measured blood pressure in adults aged 18 years and older. We used a Bayesian hierarchical model to estimate trends from 1975 to 2015 in mean systolic and mean diastolic blood pressure, and the prevalence of raised blood pressure for 200 countries. We calculated the contributions of changes in prevalence versus population growth and ageing to the increase in the number of adults with raised blood pressure. Findings: We pooled 1479 studies that had measured the blood pressures of 19·1 million adults. Global age-standardised mean systolic blood pressure in 2015 was 127·0 mm Hg (95% credible interval 125·7-128·3) in men and 122·3 mm Hg (121·0-123·6) in women; age-standardised mean diastolic blood pressure was 78·7 mm Hg (77·9-79·5) for men and 76·7 mm Hg (75·9-77·6) for women. Global age-standardised prevalence of raised blood pressure was 24·1% (21·4-27·1) in men and 20·1% (17·8-22·5) in women in 2015. Mean systolic and mean diastolic blood pressure decreased substantially from 1975 to 2015 in high-income western and Asia Pacific countries, moving these countries from having some of the highest worldwide blood pressure in 1975 to the lowest in 2015. Mean blood pressure also decreased in women in central and eastern Europe, Latin America and the Caribbean, and, more recently, central Asia, Middle East, and north Africa, but the estimated trends in these super-regions had larger uncertainty than in high-income super-regions. By contrast, mean blood pressure might have increased in east and southeast Asia, south Asia, Oceania, and sub-Saharan Africa. In 2015, central and eastern Europe, sub-Saharan Africa, and south Asia had the highest blood pressure levels. Prevalence of raised blood pressure decreased in high-income and some middle-income countries; it remained unchanged elsewhere. The number of adults with raised blood pressure increased from 594 million in 1975 to 1·13 billion in 2015, with the increase largely in low-income and middle-income countries. The global increase in the number of adults with raised blood pressure is a net effect of increase due to population growth and ageing, and decrease due to declining age-specific prevalence. Interpretation: During the past four decades, the highest worldwide blood pressure levels have shifted from high-income countries to low-income countries in south Asia and sub-Saharan Africa due to opposite trends, while blood pressure has been persistently high in central and eastern Europe. Funding: Wellcome Trust.

Full text available upon request to the author

Article title: PS 02-19 Apolipoprotein levels in patients with Acute Coronary Syndrome: a pioneer study

Authors: Elleen Cunanan, Mariel Barcelon-Cruz, Felix Eduardo Punzalan, Rody G. Sy, et al.

Publication title: Journal of Hypertension 34(Supplement I): e109-e110, September 2016

Abstract:

Department of Medicine, Philippine General Hospital, Philippines Abstract Objective: To determine the baseline apolipoprotein level among patients with Acute Coronary Syndrome. Design and Method: This is a Cross-sectional study involving 58 patients admitted at the Philippine General Hospital with Acute Coronary Syndrome (ACS) from October 2015 to January 2016. We measured concentrations of apolipoprotein B, apolipoprotein A-1, lipoprotein a, total cholesterol, triglyceride, LDL, HDL and calculated TC/HDL, TG/HDL and apoB:apoA-1 ratio within 24 hours upon admission. Results: 48% percent was diagnosed with NSTE-ACS, 32.8% had STEMI and 19% had Unstable Angina. The mean age was 60.28 +10.363 and majority were males (67.2%). Majority have high levels of apolipoprotein B (> 90 mg/dl) at 63.8% followed by elevated levels of non-HDL (> 130 mg/dl) in 56.9%, elevated LDL levels (> 100 mg/dl) in 41.4% and elevated levels of lipoprotein (a) (> 35 mg/dl) in 37.9%. Elevated levels of total cholesterol (> 200 mg/dL) and triglyceride (> 150 mg/dl) were found in only 20.7% and 29% respectively. Low levels of HDL (< 40 mg/dl) and apolipoprotein A-1 (< 120 mg/dl) were found in 73% and 63.8% respectively. There was no significant difference between all lipid profile parameters and ACS classification. The apolipoprotein A-1 levels were significantly low in alcoholic patients and apolipoprotein B: apolipoprotein A-1 ratio were significantly elevated in diabetics. Conclusions: Elevated levels of apolipoprotein B, LDL, non-HDL and apoB:apoA1 ratio and low levels of apolipoprotein A-1 were highly prevalent in patients with ACS. Apolipoprotein B:Apolipoprotein A-1 ratio might be of greater value in assessing cardiovascular risk and treatment of patients especially in the diabetic population. Image Tools Image Tools

Full text available upon request to the author

Article title: A century of trends in adult human height

Authors: James Bentham, Mariachiara Di Cesare, Gretchen A. Stevens, Rody G. Sy, et al.
Publication title: eLife Sciences 5, July 2016

Abstract:
Being taller is associated with enhanced longevity, and higher education and earnings. We reanalysed 1472 population-based studies, with measurement of height on more than 18.6 million participants to estimate mean height for people born between 1896 and 1996 in 200 countries. The largest gain in adult height over the past century has occurred in South Korean women and Iranian men, who became 20.2 cm (95% credible interval 17.5-22.7) and 16.5 cm (13.3-19.7) taller, respectively. In contrast, there was little change in adult height in some sub-Saharan African countries and in South Asia over the century of analysis. The tallest people over these 100 years are men born in the Netherlands in the last quarter of 20th century, whose average heights surpassed 182.5 cm, and the shortest were women born in Guatemala in 1896 (140.3 cm; 135.8-144.8). The height differential between the tallest and shortest populations was 19-20 cm a century ago, and has remained the same for women and increased for men a century later despite substantial changes in the ranking of countries.
Full text available upon request to the author

Article title: Worldwide trends in diabetes since 1980: a pooled analysis of 751 population-based studies with 4·4 million participants
Authors: Bin Zhou, Yuan Lu, Kaveh Hajifathalian, Rody G. Sy, et al.
Publication title: The Lancet 387(10027), April 2016

Abstract:
One of the global targets for non-communicable diseases is to halt, by 2025, the rise in the age-standardised adult prevalence of diabetes at its 2010 levels. We aimed to estimate worldwide trends in diabetes, how likely it is for countries to achieve the global target, and how changes in prevalence, together with population growth and ageing, are affecting the number of adults with diabetes. Methods: We pooled data from population-based studies that had collected data on diabetes through measurement of its biomarkers. We used a Bayesian hierarchical model to estimate trends in diabetes prevalence-defined as fasting plasma glucose of 7.0 mmol/L or higher, or history of diagnosis with diabetes, or use of insulin or oral hypoglycaemic

drugs-in 200 countries and territories in 21 regions, by sex and from 1980 to 2014. We also calculated the posterior probability of meeting the global diabetes target if post-2000 trends continue. Findings: We used data from 751 studies including 4,372,000 adults from 146 of the 200 countries we make estimates for. Global age-standardised diabetes prevalence increased from 4.3% (95% credible interval 2.4-7.0) in 1980 to 9.0% (7.2-11.1) in 2014 in men, and from 5.0% (2.9-7.9) to 7.9% (6.4-9.7) in women. The number of adults with diabetes in the world increased from 108 million in 1980 to 422 million in 2014 (28.5% due to the rise in prevalence, 39.7% due to population growth and ageing, and 31.8% due to interaction of these two factors). Age-standardised adult diabetes prevalence in 2014 was lowest in northwestern Europe, and highest in Polynesia and Micronesia, at nearly 25%, followed by Melanesia and the Middle East and north Africa. Between 1980 and 2014 there was little change in age-standardised diabetes prevalence in adult women in continental western Europe, although crude prevalence rose because of ageing of the population. By contrast, age-standardised adult prevalence rose by 15 percentage points in men and women in Polynesia and Micronesia. In 2014, American Samoa had the highest national prevalence of diabetes (>30% in both sexes), with age-standardised adult prevalence also higher than 25% in some other islands in Polynesia and Micronesia. If post-2000 trends continue, the probability of meeting the global target of halting the rise in the prevalence of diabetes by 2025 at the 2010 level worldwide is lower than 1% for men and is 1% for women. Only nine countries for men and 29 countries for women, mostly in western Europe, have a 50% or higher probability of meeting the global target. Interpretation: Since 1980, age-standardised diabetes prevalence in adults has increased, or at best remained unchanged, in every country. Together with population growth and ageing, this rise has led to a near quadrupling of the number of adults with diabetes worldwide. The burden of diabetes, both in terms of prevalence and number of adults affected, has increased faster in low-income and middle-income countries than in high-income countries. Funding: Wellcome Trust.

Full text available upon request to the author

Article title: Trends in adult body-mass index in 200 countries from 1975 to 2014: A pooled analysis of 1698 population-based measurement studies with 19·2 million participants

Authors: Mariachiara Di Cesare, James Bentham, Gretchen A. Stevens, Rody G. Sy, et al.

Publication title: The Lancet 387(10026), April 2016

Abstract:

Underweight and severe and morbid obesity are associated with highly elevated risks of adverse health outcomes. We estimated trends in mean body-mass index (BMI), which characterises its population distribution, and in the prevalences of a complete set of BMI categories for adults in all countries. Methods We analysed, with use of a consistent protocol, population-based studies that had measured height and weight in adults aged 18 years and older. We applied a Bayesian hierarchical model to these data to estimate trends from 1975 to 2014 in mean BMI and in the prevalences of BMI categories (<18·5 kg/m2 [underweight], 18·5 kg/m2 to <20 kg/m2, 20 kg/m2 to <25 kg/m2, 25 kg/m2 to <30 kg/m2, 30 kg/m2 to <35 kg/m2, 35 kg/m2 to <40 kg/m2, ≥40 kg/m2 [morbid obesity]), by sex in 200 countries and territories, organised in 21 regions. We calculated the posterior probability of meeting the target of halting by 2025 the rise in obesity at its 2010 levels, if post-2000 trends continue. Findings We used 1698 population-based data sources, with more than 19·2 million adult participants (9·9 million men and 9·3 million women) in 186 of 200 countries for which estimates were made. Global age-standardised mean BMI increased from 21·7 kg/m2 (95% credible interval 21·3–22·1) in 1975 to 24·2 kg/m2 (24·0–24·4) in 2014 in men, and from 22·1 kg/m2 (21·7–22·5) in 1975 to 24·4 kg/m2 (24·2–24·6) in 2014 in women. Regional mean BMIs in 2014 for men ranged from 21·4 kg/m2 in central Africa and south Asia to 29·2 kg/m2 (28·6–29·8) in Polynesia and Micronesia; for women the range was from 21·8 kg/m2 (21·4–22·3) in south Asia to 32·2 kg/m2 (31·5–32·8) in Polynesia and Micronesia. Over these four decades, age-standardised global prevalence of underweight decreased from 13·8% (10·5–17·4) to 8·8% (7·4–10·3) in men and from 14·6% (11·6–17·9) to 9·7% (8·3–11·1) in women. South Asia had the highest prevalence of underweight in 2014, 23·4% (17·8–29·2) in men and 24·0% (18·9–29·3) in women. Age-standardised prevalence of obesity increased from 3·2% (2·4–4·1) in 1975 to 10·8% (9·7–12·0) in 2014 in men, and from 6·4% (5·1–7·8) to 14·9% (13·6–16·1) in women. 2·3% (2·0–2·7) of the world's men and 5·0% (4·4–5·6) of women were severely obese (ie, have BMI ≥35 kg/m2). Globally, prevalence of morbid obesity was 0·64% (0·46–0·86) in men and 1·6% (1·3–1·9) in women. Interpretation If post-2000 trends continue, the probability of meeting the global obesity target is virtually zero. Rather, if these trends continue, by 2025, global obesity prevalence will reach 18% in men and surpass 21% in women; severe obesity

will surpass 6% in men and 9% in women. Nonetheless, underweight remains prevalent in the world's poorest regions, especially in south Asia. Funding Wellcome Trust, Grand Challenges Canada

Full text available upon request to the author

Article title: Effects of diabetes definition on global surveillance of diabetes prevalence and diagnosis: A pooled analysis of 96 population-based studies with 331 288 participants

Authors: Goodarz Danael, Saman Fahimi, Yuan Lu, Rody G. Sy, et al.

Publication title: The Lancet Diabetes & Endocrinology 3(8), June 2015

Abstract:

Diabetes has been defined on the basis of different biomarkers, including fasting plasma glucose (FPG), 2-h plasma glucose in an oral glucose tolerance test (2hOGTT), and HbA1c. We assessed the effect of different diagnostic definitions on both the population prevalence of diabetes and the classification of previously undiagnosed individuals as having diabetes versus not having diabetes in a pooled analysis of data from population-based health examination surveys in different regions. Methods: We used data from 96 population-based health examination surveys that had measured at least two of the biomarkers used for defining diabetes. Diabetes was defined using HbA1c (HbA1c ≥6·5% or history of diabetes diagnosis or using insulin or oral hypoglycaemic drugs) compared with either FPG only or FPG-or-2hOGTT definitions (FPG ≥7·0 mmol/L or 2hOGTT ≥11·1 mmol/L or history of diabetes or using insulin or oral hypoglycaemic drugs). We calculated diabetes prevalence, taking into account complex survey design and survey sample weights. We compared the prevalences of diabetes using different definitions graphically and by regression analyses. We calculated sensitivity and specificity of diabetes diagnosis based on HbA1c compared with diagnosis based on glucose among previously undiagnosed individuals (ie, excluding those with history of diabetes or using insulin or oral hypoglycaemic drugs). We calculated sensitivity and specificity in each survey, and then pooled results using a random-effects model. We assessed the sources of heterogeneity of sensitivity by meta-regressions for study characteristics selected a priori. Findings: Population prevalence of diabetes based on FPG-or-2hOGTT was correlated with prevalence based on FPG alone (r=0·98), but was higher by 2-6 percentage points at different prevalence levels. Prevalence based on

HbA1c was lower than prevalence based on FPG in 42·8% of age-sex-survey groups and higher in another 41·6%; in the other 15·6%, the two definitions provided similar prevalence estimates. The variation across studies in the relation between glucose-based and HbA1c-based prevalences was partly related to participants' age, followed by natural logarithm of per person gross domestic product, the year of survey, mean BMI, and whether the survey population was national, subnational, or from specific communities. Diabetes defined as HbA1c 6·5% or more had a pooled sensitivity of 52·8% (95% CI 51·3-54·3%) and a pooled specificity of 99·74% (99·71-99·78%) compared with FPG 7·0 mmol/L or more for diagnosing previously undiagnosed participants; sensitivity compared with diabetes defined based on FPG-or-2hOGTT was 30·5% (28·7-32·3%). None of the preselected study-level characteristics explained the heterogeneity in the sensitivity of HbA1c versus FPG. Interpretation: Different biomarkers and definitions for diabetes can provide different estimates of population prevalence of diabetes, and differentially identify people without previous diagnosis as having diabetes. Using an HbA1c-based definition alone in health surveys will not identify a substantial proportion of previously undiagnosed people who would be considered as having diabetes using a glucose-based test. Funding: Wellcome Trust, US National Institutes of Health.

Full text available upon request to the author

Article title: Association of ECG Abnormalities with Metabolic Syndrome and Socio-demographic Factors in the Philippine LIFECARE Cohort
Authors: Alric V. Mondragon, EJB Llanes, Olivia Sison, Rody G. Sy, et al.
Publication title: Journal of Atherosclerosis and Thrombosis 21, August 2014

Abstract:
With the increasing incidence of cardiovascular diseases and metabolic syndrome, studies have now focused into the relationship between ECG abnormalities and metabolic syndrome and its components. 1-3 ! ! Resting electrocardiography (ECG) has proven to be a valuable diagnostic and prognostic test for cardiovascular diseases. 4 Several studies have found ischemic ECG abnormalities to be associated with increased cardiovascular and coronary death risk even for asymptomatic, apparently healthy individuals. 5-8 ! ! One study has looked into the prevalence of ECG abnormalities in the Philippines. This study by Tirona and colleagues focused on the prevalence of left ventricular hypertrophy (LVH), atrial fibrillation (AF), and

Q wave myocardial infarction (MI) in the Filipino population. 9 On the other hand, several studies done internationally, have recognized the value of looking into other abnormalities in the ECG, like QT prolongation, ST segment depression, T-wave inversion, and other nonspecific ST-T wave changes. 8,10-12 ! ! To our knowledge, there are no studies that have correlated these ECG abnormalities to metabolic syndrome among the Filipino population. Our study aims to determine the prevalence of various ECG abnormalities among apparently healthy adult Filipinos in the Life Course Study in Cardiovascular Disease Epidemiology (LIFECARE) Study and correlate it to metabolic syndrome, its components, and sociodemographic factors. ! The study participants were drawn from the LIFE course study in CARdiovascular disease Epidemiology (LIFECARE) cohort recruited from both rural and urban areas in Metro Manila and four nearby provinces. The cohort study included apparently healthy participants aged 20-50 years old. Data on the socio-demographic profile, medical history and physical examination of the participants were gathered. Blood tests were taken after a 10-12 hour fast. Analysis of fasting blood glucose (FBG), total cholesterol (TC), triglyceride (TG), low density lipoprotein cholesterol (LDL), and high density lipoprotein cholesterol (HDL).! ! Resting ECG! A resting 12-lead standard supine ECG was performed using the Norav machines, model 1200M. All ECGs were manually read by one of three cardiologists using standard diagnostic criteria. Presence of various abnormalities was noted and any number of diagnoses could be recorded. ECG abnormalities noted were also grouped into: Rhythm abnormalities, Conduction abnormalities, Morphological abnormalities, Axis abnormalities, ST wave changes, and Myocardial Injury.! ! Statistical Analysis! Univariate analysis using Chi-square test was done. A 95% confidence interval performed.

Full text available upon request to the author

Article title: Who we are: Demographic and stress profile of the Philippine LIFECARE cohort

Authors: Olivia Sison, Queenie G. Ngalob, Felix Eduardo Punzalan, Rody G. Sy, et al.

Publication title: Acta Medica Philippina 48(0001-6071, April 2014

Abstract:

To describe the demographic and stress profile of the participants in the LIFECARE cohort. Methods. The Life Course Study in Cardiovascular Disease Epidemiology (LIFECARE) is a community-based prospective cohort of apparently healthy individuals aged 20 to 50 years old with no preexisting cardiovascular disease. The second phase out of four phases of study involves collection of baseline socio-demographic, anthropometric, biochemical and cardiovascular parameters and stress profiles. It was conducted via face-to-face interview using a survey questionnaire. Results and Conclusion. A total of 3072 participants from Metro Manila and 4 provinces in Luzon were recruited. The female to male ratio was 1.3:1. Majority of the participants were aged 30 years old and above. Most were married, employed and literate. Majority attained at least high school level of education. Loss of job was the most common stressor experienced in the past year. Majority of the cohort reported occasional experience of general stress and moderate level of financial stress. Occurence of general stress within the past year was higher among females ($p < 0.001$), younger age-group ($p=0.006$), and among those who reached college level of education ($p<0.001$). Furthermore, level of current financial stress was high to severe among older age-group ($p=0.004$), and among widow/widower/ separated ($p<0.0001$). While the relationship between psychosocial stress and physical illness had not been established in this study, there is a need to investigate demographics and psychosocial stress, and their implications in increasing adverse health outcomes in general, and cardiovascular risk in particular.

Full text available upon request to the author

Article title: "You Are What You Eat:" Self-Reported Preferences for Food Taste and Cooking Methods of Adult Filipinos (20-50 years old)
Authors: Nina Castillo-Carandang, Olivia Sison, Felicidad V. Velandria, Rody G. Sy, et al.
Publication title: Acta Medica Philippina 48(2), April 2014

Abstract:

To describe the self-reported preferences for food taste and cooking methods of adult Filipinos (20-50 years old). Methods. This is a cross-sectional community survey of 3,072 adults from Metro Manila, Bulacan, Batangas, Quezon, Rizal. Results and Conclusion. There were differences in preferred tates of males (food that tated "just right", spicy) vs. females (salty); younger adults (sweet, salty, spicy) vs. those with

less schooling who liked food which tasted "just right." Smokers preferred spicy taste vs. non-smokers who liked sweet-tasting food. Adults who reported having had alcohol intake preferred spicy food. Those who reported feeling stressed liked savoury taste (sweet, salty) while those who were not stressed liked food which tasted "just right." Cooking with oil was the usual and the most preferred cooking method. Younger adults and smokers liked to use oil in cooking. Food which tasted "just right"/moderate was most preferred by adult Filipinos with hpertension or MeTS. Diabetics did not prefer sweet tasting food. More diabetics (p=0.05) and those with MeTS (p=0.003) usually use other cooking methods instead of frying. Eliciting self-reported taste preferences as well as the usual and preferred cooking methods is important for nutritional management and relevant lifestyle advice which healthcare providers should incorporate in their management of patients, specially those with hypertension, diabetes, and metabolic syndrome.

Full text available upon request to the author

Article title: Where We Are: Socio-Ecological and Health Profile of the Philippine Life Course Study in Cardiovascular Disease Epidemiology (LIFECARE) Study Sites
Authors: Elmer Balasico Llanes, Paulette D. Nacpil-Dominguez, Rody G. Sy, et al.
Publication title: Acta Medica Philippine 48(2), April 2014

Abstract:

This study aims to describe the socio-ecological and health profile of the Philippine LIFECARE study sites, its health care services and leading causes of mortality and morbidity. Methods. This is a prospective cohort study that recruited participants aged 20-50 years from Metro Manila and four provinces (Bulacan, Batangas, Quezon, Rizal). Study sites were characterized according to their geographical area, terrain and environmental profile, and available health care system. Results. 3,072 subjects were included, with male-to-female ratio of 1:1.3 and majority aged 30-50 years. Metro Manila was the most congested site. Two-thirds of the 62 villages (barangays) were rural, outside the town proper, and in lowlands. One-fourth were along coastal area. Almost all were accessible by public transportation. Majority have reduced forest cover, but were relatively safe from environmental hazards. Rural health units, hospitals, and professional health care workers were concentrated in Metro Manila. Leading cause of morbidity was respiratory tract infection, while cardiovascular diseases caused most of mortalities. Conclusion. Study sites were mainly rural,

outside the town proper and in lowlands, with available public transportation. There is an unequal distribution of health resources. Cardiovascular diseases is still the leading cause of mortality. The disparities in geographical access to health care play an important role in shaping human health.

Full text available upon request to the author

Article title: Prevalence of Cardiovascular Risk Factors in relation to Socio-demographic Profile of the Life Course Study in Cardiovascular Disease Epidemiology Study (LIFECARE) Philippine Cohort

Authors: Felix Eduardo Punzalan, Rody G. Sy, Olivia Sison, Nina Castillo-Carandang, et al.

Publication title: Acta Medica Philippina 48(2), April 2014

Abstract:

To describe the distribution of the clinical cardiovascular risk profile of the LIFECARE Philippine cohort in relation to its socio-demographic factors. Methods. We recruited a total of 3,072 apparently healthy participants from Manila and nearby provinces of Rizal, Batangas, Bulancan and Quezon. Face-to-face interview was done to obtain socio-demographic data. Baseline clinical parameters and biochemical tests were obtained. Prevalence of cardiovascular risk factors was determined by sex, place of residence, level of education and employment. Results. Overall prevalence of diabetes mellitus was at 5%, similar between sexes, area class, educational attainment and employment status. More smokers were male, employed or with an elementary level of education. Prevalence of hypertension was at 14.5% and was seen more in males, urban dwellers, employed or with an elementary level of education. Dyslipdemia was seen more in males, living in the rural areas, employed or with a college level of education. Lastly, obese participants were seen more in females, living in urban areas, employed with a college level of eduction. Conclusion. Older, male and employed participants who are living in the urban areas have more cardiovascular risk factors.

Full text available upon request to the author

Article title: Official document of the International Society of Atherosclerosis: general recommendations for treatment of dyslipidemia. Executive summary

Authors: Scott M. Grundy, Hidenori Arai, Philip Barter, Thomas P. Bersot, Rody G. Sy, et al.

Publication title: Clinica e Investigacion en Arteriosclerosis 26(1), February 2014

Abstract:

No abstract available

Full text available upon request to the author

Article title: An International Atherosclerosis Society Position Paper: global recommendations for the management of dyslipidemia–full report
Authors: Scott M. Grundy, Hidenori Arai, Philip Barter, Rody G. Sy, et al.
Publication title: Atherosclerosis 232(2), February 2014

Abstract:

An international panel of the International Atherosclerosis Society has developed a new set of recommendations for the management of dyslipidemia. The panel identifies non high-density lipoprotein cholesterol as the major atherogenic lipoprotein. Primary and secondary prevention are considered separately. Optimal levels for atherogenic lipoproteins are derived for the two forms of prevention. For primary prevention, the recommendations emphasize lifestyle therapies to reduce atherogenic lipoproteins; drug therapy is reserved for subjects at greater risk. Risk assessment is based on estimation of lifetime risk according to differences in baseline population risk in different nations or regions. Secondary prevention emphasizes use of cholesterol-lowering drugs to attain optimal levels of atherogenic lipoproteins. Published by Elsevier Inc. on behalf of National Lipid Association.

Full text available upon request to the author

Article title: Residual macrovascular risk in 2013: What have we learned?
Authors: Jean-Charles Fruchart, Jean Davignon, Michel P. Hermans, Rody G. Sy, et al.
Publication title: Cardiovascular Diabetology 13(1), January 2014

Abstract:

Cardiovascular disease poses a major challenge for the 21st century, exacerbated by the pandemics of obesity, metabolic syndrome and type 2 diabetes. While best standards of care, including high-dose statins, can ameliorate the risk of vascular complications, patients remain at high risk of cardiovascular events. The Residual Risk Reduction Initiative (R3i) has previously highlighted atherogenic

dyslipidaemia, defined as the imbalance between proatherogenic triglyceride-rich apolipoprotein B-containing-lipoproteins and antiatherogenic apolipoprotein A-I-lipoproteins (as in high-density lipoprotein, HDL), as an important modifiable contributor to lipid-related residual cardiovascular risk, especially in insulin-resistant conditions. As part of its mission to improve awareness and clinical management of atherogenic dyslipidaemia, the R3i has identified three key priorities for action: i) to improve recognition of atherogenic dyslipidaemia in patients at high cardiometabolic risk with or without diabetes; ii) to improve implementation and adherence to guideline-based therapies; and iii) to improve therapeutic strategies for managing atherogenic dyslipidaemia. The R3i believes that monitoring of non-HDL cholesterol provides a simple, practical tool for treatment decisions regarding the management of lipid-related residual cardiovascular risk. Addition of a fibrate, niacin (North and South America), omega-3 fatty acids or ezetimibe are all options for combination with a statin to further reduce non-HDL cholesterol, although lacking in hard evidence for cardiovascular outcome benefits. Several emerging treatments may offer promise. These include the next generation peroxisome proliferator-activated receptoralpha agonists, cholesteryl ester transfer protein inhibitors and monoclonal antibody therapy targeting proprotein convertase subtilisin/kexin type 9. However, long-term outcomes and safety data are clearly needed. In conclusion, the R3i believes that ongoing trials with these novel treatments may help to define the optimal management of atherogenic dyslipidaemia to reduce the clinical and socioeconomic burden of residual cardiovascular risk.

Full text available upon request to the author

Article title: Socio-Demographic Factors and the Prevalence of Metabolic Syndrome Among Filipinos from the LIFECARE Cohort

Authors: Rody G. Sy, Elmer Balasico Llanes, Paul Ferdinand M. Reganit, Nina Castillo-Carandang, et al.

Publication title: Journal of Atherosclerosis and Thrombosis 21(Suppl 1), January 2014

Abstract:

Metabolic syndrome(MetS) is an aggregation of multiple metabolic risk factors shown to lead to the development of cardiovascular disease. The International

Diabetes Federation(IDF) and the modified National Cholesterol Education Program Adult Treatment Panel III(mNCEP) criteria are used in identifying MetS. This report will determine the prevalence of MetS and its component risk factors of the Philippine cohort of the LIFE course study in CARdiovascular disease Epidemiology(LIFECARE). Methods: Our study recruited 3,072 participants aged 20-50 years old from Metro Manila and four nearby provinces. Baseline anthropometric and clinical parameters were measured. Prevalence of MetS and its component factors were determined. Associations with socio-demographic factors were determined. Results: The prevalence of MetS was 19.7% and 25.6% by IDF and mNCEP, respectively(kappa 0.83). Both were associated with increasing age, urban residence, and employed status. It was higher in females by IDF and in males by mNCEP. IDF missed 40% of males and 10% of females identified with MetS by mNCEP. More males were identified by the mNCEP as MetS despite relatively normal waist circumference. Conclusion: MetS is common in the Philippines among older, educated, and urban residents. The mNCEP criteria identified more MetS than the IDF criteria.

Full text available upon request to the author

Article title: A Community-Based Validation Study of the Short-Form 36 Version 2 Philippines (Tagalog) in Two Cities in the Philippines

Authors: Nina Castillo-Carandang, Olivia Sison, Mary Lenore Grefal, Rody G. Sy, et al.

Publication title: PLoS ONE 8(12), December 2013

Abstract:

To evaluate the validity and reliability of the Philippines (Tagalog) Short Form 36 Health Survey version 2 (SF-36v2(®)) standard questionnaire among Filipinos residing in two cities. The official Philippines (Tagalog) SF-36v2 standard (4-week recall) version was pretested on 30 participants followed by formal and informal cognitive debriefing. To obtain the feedback on translation by bilingual respondents, each SF-36v2 question was stated first in English followed by Tagalog. No revisions to the original questionnaire were needed except that participants thought it was appropriate to incorporate "po" in the instructions to make it more polite. Face-to-face interviews of 562 participants aged 20-50 years living in two barangays

(villages) in the highly urbanized city of Makati City (Metro Manila) and in urban and rural barangays in Tanauan City (province of Batangas) were subsequently conducted. Content validity, item level validity, reliability and factor structure of the SF-36v2 (Tagalog) were examined. Content validity of the SF-36v2 was assessed to be adequate for assessing health status among Filipinos. Item means of Philippines (Tagalog) SF-36v2 were similar with comparable scales in the US English, Singapore (English and Chinese) and Thai SF-36 version 1. Item-scale correlation exceeded 0.4 for all items except the bathing item in PF (correlation: 0.31). In exploratory factor analysis, the US two-component model was supported. However, in confirmatory factor analysis, the Japanese three-component model fit the Tagalog data better than the US two-component model. The Philippines (Tagalog) SF-36v2 is a valid and reliable instrument for measuring health status among residents of Makati City (Metro Manila) and Tanauan City (Province of Batangas).

Full text available upon request to the author

Article title: IAS Panel for Global Recommendations for the Management of Dyslipidemia

Authors: Scott M. Grundy, Hidenori Arai, Philip Barter, Rody G. Sy, et al.

Publication title: Journal of Clinical Lipidology, January 2013

Abstract:

An international panel of the International Atherosclerosis Society has developed a new set of recommendations for management of dyslipidemia. The panel identifies non-high density lipoprotein cholesterol (non-HDL-C) as the major atherogenic lipoprotein. Primary and secondary prevention are considered separately. Optimal levels for atherogenic lipoproteins are derived for the two forms of prevention. For primary prevention, the recommendations emphasize lifestyle therapies to reduce atherogenic lipoproteins; drug therapy is reserved for higher risk subjects. Risk assessment is based on estimation of lifetime risk according to differences in baseline population risk in different nations or regions. Secondary prevention emphasizes use of cholesterol-lowering drugs to attain optimal levels of atherogenic lipoproteins.

Full text available upon request to the author

Article title: Prevalence of Atherosclerosis-Related Risk Factors and Diseases in the Philippines
Authors: Rody G. Sy, Dante Morales, Antonio Dans, Elizabeth Paz Pacheco, et al.
Publication title: Journal of Epidemiology 22(5), July 2012

Abstract:
We conducted a survey in 2008 to measure the prevalence of lifestyle-related diseases and risk factors in Philippine adults. Methods Stratified multistage sampling was used to cover the entire Philippine population of adults aged 20 years or older. Using health questionnaires, anthropometric measurements, and blood examinations, the prevalences of atherosclerosis-related risk factors and diseases were determined. Survey results were compared with those obtained in 2003. Results Out of 7700 eligible subjects, 64% to 93.7% responded to different survey items. Age-adjusted hypertension prevalence was 24.6% at a single visit and 20.6% when corrected for true prevalence. The prevalence of diabetes was 3.9% on the basis of fasting blood glucose (FBG), 5.2% by FBG and history, and 6.0% when 2-hour post-load plasma glucose level was determined. The prevalence of dyslipidemia was 72.0% and the prevalence of smoking was 31%. The prevalence of obesity was 4.9% by body mass index (BMI), and 10.2% and 65.6% by waist-hip ratio (WHR) in men and women, respectively. The prevalences of coronary, cerebrovascular, and peripheral arterial diseases were 1.1%, 0.9%, and 1.0%, respectively. Conclusions The prevalences of risk factors for atherosclerosis were higher in 2008 than in 2003, although the increase in diabetes was not significant and smoking decreased. These findings indicate a need for active collaborative intervention by all government agencies and medical societies in the Philippines.
Full text available upon request to the author

Article title: The incidence of type 2 diabetes mellitus in the Philippines: A 9-year cohort study
Authors: Maria Luz B. Soria, Rody G. Sy, Bernard S. Vega, Tommy Ty-Willing
Publication title: Diabetes Research and Clinical Practice 86(2), September 2009

Abstract:
Currently, there are no available data on the incidence of type 2 diabetes mellitus (T2DM) in the Philippines. A cohort derived from a national study population (FNRI-NNS, 1998) was revisited after 9 years to yield valuable data on glucose

homeostasis among Filipinos. Six out of 13 national regions were included in the cohort. There were 1749 out of 2122 respondents (82.4%). 1386 (95.9%) consented to a fasting blood glucose (FBG) test, and 1275 (88.2%) completed the 2h post-glucose (2HPG) load determination using whole blood capillary samples. We observed a significant increase of mean FBGs (91.5mg/dL to 103.3mg/dL) from 1998 to 2007. The 9-year incidence of T2DM was 16.3%. The prevalence of T2DM was 28.0%. The prevalence of pre-diabetes, i.e., combined impaired fasting glucose (IFG) and impaired glucose tolerance (IGT) was 31.3%; IFG was 17.5% and IGT was 23.9%. The study shows the alarming growth of diabetes, IFG, and IGT in our country that warrants early aggressive intervention for prevention and management. We encourage the use of 2h post-glucose load aside from FBG in screening for true diabetics, IFGs, and IGTs.

Full text available upon request to the author

Article title: An update on cardiovascular disease epidemiology in South East Asia. Rationale and design of the LIFE course study in CARdiovascular disease Epidemiology (LIFECARE)

Authors: E-Shyong Tai, Richie Poulton, Julian Thumboo, Rody G. Sy, et al.

Publication title: CVD Prevention and Control 4(2), June 2009

Abstract:

The burden of cardiovascular disease (CVD) is likely to increase dramatically in Asia over the next several decades. In this paper, we review the existing data on CVD epidemiology in Asia, with a focus on the INTERHEART study and the Asia Pacific Cohort Studies Collaboration. Existing data suggests that much of CVD may be preventable through reduction in the levels of well-established CVD risk factors and that these findings are likely to be relevant to Asian populations. However, these studies have several important limitations. These include a lack of longitudinal studies with collection of repeated measures of CVD risk factors and the environmental factors that may result in the age-related increase in the levels of these risk factors. As such, the natural history of the development of CVD risk factors such as obesity, diabetes, hypertension and dyslipidemia in Asia, and their relationship in terms of duration and timing of exposure to various environmental influences is currently unknown. In addition, there is a paucity of data related to psychosocial factors that may be involved in the pathogenesis of CVD, either directly or through

effects on other CVD risk factors. Finally, little data is available with regards to the impact of CVD and its attendant risk factors on health related quality of life and health care utilization. This information is crucial for the design and evaluation of evidence based programs for primary prevention. We have designed a LIFE Course Study in CARdiovascular disease Epidemiology (LIFECARE) involving 12,000 individuals in four South East Asian countries to address these data needs.

Full text available upon request to the author

Article title: The Residual Risk Reduction Initiative: a call to action to reduce residual vascular risk in dyslipidaemic patient

Authors: Rody G. Sy, Jean-Charles Fruchart, Frank M. Sacks, Michel P. Hermans, et al.

Publication title: Diabetes & Vascular Disease Research 5(4), December 2008

Abstract:

Despite current standards of care aimed at achieving targets for low-density lipoprotein (LDL) cholesterol, blood pressure and glycaemia, dyslipidaemic patients remain at high residual risk of vascular events. Atherogenic dyslipidaemia, specifically elevated triglycerides and low levels of high-density lipoprotein (HDL) cholesterol, often with elevated apolipoprotein B and non-HDL cholesterol, is common in patients with established cardiovascular disease, type 2 diabetes, obesity or metabolic syndrome and is associated with macrovascular and microvascular residual risk. The Residual Risk Reduction Initiative (R3I) was established to address this important issue. This position paper aims to highlight evidence that atherogenic dyslipidaemia contributes to residual macrovascular risk and microvascular complications despite current standards of care for dyslipidaemia and diabetes, and to recommend therapeutic intervention for reducing this, supported by evidence and expert consensus. Lifestyle modification is an important first step. Additionally, pharmacotherapy is often required. Adding niacin, a fibrate or omega-3 fatty acids to statin therapy improves achievement of all lipid risk factors. Outcomes studies are evaluating whether these strategies translate to greater clinical benefit than statin therapy alone. In conclusion, the R3I highlights the need to address with lifestyle and/or pharmacotherapy the high level of residual vascular risk among dyslipidaemic patients who are treated in accordance with current standards of care.

Full text available upon request to the author

Article title: Metabolic syndrome in the Philippine general population: Prevalence and risk for atherosclerotic cardiovascular disease and diabetes mellitus
Authors: Dante Morales, Felix Eduardo Punzalan, Elizabeth Paz-Pacheco, Rody G. Sy, et al.
Publication title: Diabetes & Vascular Disease Research 5(1), March 2008

Abstract:
The objectives of this study were to determine the prevalence of metabolic syndrome (MS) and its component risk factors among Filipinos using three sets of criteria and to evaluate the association between MS and atherosclerotic cardiovascular disease and diabetes mellitus. The study utilised a multi-staged cluster sampling design. The prevalence of MS was found to be 11.9% by National Cholesterol Education Program/Adult Treatment Panel (NCEP/ATP III) criteria, 14.5% by International Diabetes Federation (IDF) criteria and 18.6% by NCEP/ATP III criteria modified by the American Heart Association/National Heart, Lung and Blood Institute (NCEP/ATP III-AHA/NHLBI) criteria. Low levels of high-density lipoprotein cholesterol (HDL-C) occurred in 60.2% of men and 80.9% of women. Abdominal obesity was noted in 17.7% of men and 35.1% of women. Blood pressure (BP) > or = 130/85 mmHg was seen in 33.3%, hypertriglyceridaemia in 20.6% and fasting blood sugar > or = 100 mg/dL (5.55 mmol/L) in 7.1%. Age-adjusted odds ratios showed that MS, by all three definitions, predisposed an individual to diabetes mellitus (DM) and stroke while MS by the IDF definition predisposed an individual to myocardial infarction (MI). Individuals with MS did not have a significant predisposition to angina and peripheral artery disease (PAD). Thus, the metabolic syndrome is common in Filipinos, with low HDL-C as the most prevalent component. The metabolic syndrome predisposes to diabetes mellitus and stroke, with a tendency to MI using the IDF criteria.
Full text available upon request to the author

Article title: Human Cholestryl Ester Transfer Protein (TaqIB) Polymorphism among Filipinos with Cardiovascular Risk Factors
Authors: Rody G. Sy, Eva Maria C. Cutiongco, Felix Eduardo Punzalan, Ronald S. Santos
Publication title: Journal of Atherosclerosis and Thrombosis 14(3), July 2007

Abstract:

HDL-C has emerged as an important independent predictor of cardiovascular disease. The FNRI-HDL and NNHes Study Group in the Philippines reported that there was a high prevalence of low HDL among Filipinos. Most cases of low HDL-C are associated with secondary causes like Metabolic Syndrome. A primary cause of reduced HDL-C such as increase Cholesteryl Ester Transfer Protein activity has been identified. Objectives: 1. To determine the phenotype and frequency of Cholesteryl Ester Transfer Protein (TaqIB) polymorphism among Filipinos with cardiovascular risk factors. 2. To determine the association of TaqIB polymorphism with HDL-C levels among Filipinos with cardiovascular risk factors. Design: Cross-sectional Study. Setting: University of the Philippines-Philippine General Hospital. Statistical analysis: Descriptive statistics, Chi square test and Fisher's correlation test using Stata version 6. Methods: Fifty patients were included in this pilot study and were examined with respect to genotype, lipid profiles, blood sugar and other cardiovascular risk factors. Polymerase Chain Reaction (PCR), Restriction Fragment Length Polymorphism (RFLP) and Agarose Gel Electrophoresis techniques were used to determine the CETP TaqIB Polymorphism. Results: Out of 50 patients, 66% were females and 34% were males with a mean age of 55 y/o and a BMI of 27 kg/m(2). The following risk factors were identified: hypertension (92%), dyslipidemia (88%), obesity (68%), smoking (50%), diabetes mellitus type 2 (18%) and family history of premature CAD (14%). The genotype frequencies of B1B1; B1B2; B2B2 were 40%; 50% 10% respectively. The B1B1 homozygote was associated with lower HDL-C levels (45.35 +/- 8.82 mg/dL) compared to B1B2 (48.96 +/- 10.10 mg/dL) and B2B2 (48.99 +/- 10.13 mg/dL)). Conclusions: Cholesteryl Ester Transfer Protein (TaqIB) Polymorphisms exist among Filipinos with cardiovascular risk factors. The frequency of TaqIB polymorphism among Filipinos with cardiovascular risk factors were B1B1 (40%), B1B2 (50%) and B2B2 (10%). B1B1 polymorphism is more common than B2B2 and associated with low HDL-C.

Full text available upon request to the author

Article title: Low Density Lipoprotein - Receptor (LDL-R) Gene Mutations among Filipinos with Familial Hypercholesterolemia

Authors: Felix Eduardo Punzalan, Rody G. Sy, Ronald S. Santos, Eva Maria Cutiongco, et al.

Publication title: Journal of Atherosclerosis and Thrombosis 12(5), October 2005

Abstract:

Familial Hypercholesterolemia (FH) is an autosomal dominant disease resulting from mutations of the LDL (LDLR) receptor gene leading to a diminished catabolism and elevated level of LDL cholesterol (LDL-C). It is associated with an increased risk for cardiovascular disease (CVD). The MEDPED (Make Early Diagnosis-Prevent Early Death) program, an initiative cited by the WHO Human Genetics Programme in their report on FH, initiated international collaboration to identify and follow-up patients with FH globally. From Asia-Pacific, only 6 countries are participating and no data among Filipinos particularly on genetic profiles is available at present. This study attempts to initiate data collection and participation in the global initiative.Objectives:Primary: 1. To describe the phenotype of Filipino patients with FH. 2. To determine and characterize the LDL-R gene mutations among Filipino patients with clinical features of FH. Secondary: To determine the association of the clinical characteristics of FH with the presence of LDLR gene mutations. Cross-Sectional Study. Multicenter, Outpatient Clinic. 60 unrelated patients, 18 y/o and above from UP-PGH, Manila Doctors Hospital and Cardinal Santos Medical Center. FH was diagnosed according to the Dutch Lipid Clinic Network Criteria cited by WHO which is based on a history of premature CVD, family history, tendon xanthoma, arcus cornealis, and LDL C levels.Methods: With informed consent, clinical history, physical examination and lipid profile data were determined. Blood samples were extracted, processed to isolate DNA specimens at the National Institutes of Health, Institute of Human Genetics, and sent to Canterbury Health Laboratories at Christchurch, New Zealand for DNA analysis. Descriptive statistics, Fisher's exact test and Student's t-test using Stata version 6.0 software. Sixty patients with a mean age of 55 y/o were included, including 39 (65%) females. The mean LDL level was 227 mg/dl. Cardiovascular Disease and a family history of dyslipidemia were present in 55 & 60% of the samples, respectively. Twenty percent had documented LDL-R gene mutations. Six of the mutations were considered novel. A family history of dyslipidemia, an elevated LDL-C level, and a high FH score exhibited a statistically significant association with mutations. The study population has a high prevalence of CVD at an average age of 55 years with a strong family history of dyslipidemia and very high average LDL-C levels. One out of every 5 patients had LDL-R gene mutations, 6 of which were considered novel. LDL-R gene mutation was significantly associated with family history of dyslipidemia,

LDL-C Level and FH score. CLINICAL AND RESEARCH IMPLICATION: This is the first international collaborative genetic study among Filipinos with FH. Data could allow the country to participate in the WHO/MEDPED global program. Collaborative efforts will lead to more effective detection, treatment and prevention of CV events. Novel mutations were discovered and further analysis of these genes will be done.

Full text available upon request to the author

Article title: National Nutrition and Health Survey (NNHeS): Atherosclerosis-related diseases and risk factors

Authors: Antonio Dans, Dante Morales, Felicidad Velandria, Maria Teresa Bacnis Abola, Rody G. Sy., et. al.

Publication title: Philippine Journal of of Internal Medicine 43, June 2005

Abstract:

No abstract available

Article title: Prevalence of metabolic syndrome among adult Filipinos

Authors: Felix Eduardo Punzalan, Rody G. Sy, Tommy Ty-Willing

Publication title: International Congress Series 1262, May 2004

Abstract:

Metabolic syndrome is a common condition worldwide. Until recently, there is no universal definition for metabolic syndrome. Its prevalence in the Philippines has never been studied before. Objectives: To determine the prevalence of metabolic syndrome among adult Filipino population. Sample Population: 4541 individuals aged ≥20 years. Methods: Nationwide survey using two-stage stratified sampling design was done in 1998. Measurement of risk factors was done by blood pressure and waist circumference determination; and laboratory testing for lipid profile and fasting blood sugar using Cholestech LDX machine. Metabolic syndrome was defined based on NCEP and International Atherosclerosis Society (IAS) criteria. For IAS criteria, the waist circumference was based on Asia Pacific criterion (>90 and 80 cm, for male and female, respectively). Results: Based on NCEP criteria, the prevalence of metabolic syndrome is 14.2% (95% CI: 13.2–15.2). Using the IAS criteria, the prevalence is 19.3% (95% CI: 18.1–20.4). Stratifying the prevalence based on age revealed a prevalence of 6.6%, 17.7%, and 18.3% for ages 20–39, 40–59, 60 years and older, respectively, by NCEP criteria. IAS criteria showed a prevalence of

10.0%, 23.6%, and 24.1% for ages 20–39, 40–59, 60 years and older, respectively. Conclusion: Metabolic syndrome is common among Filipino adult population. There is an increasing prevalence with age. Using NCEP criteria instead of the IAS with waist circumference criterion adjusted for Asia Pacific population may underestimate the prevalence of metabolic syndrome.

Full text available upon request to the author

Article title: Comparing the efficacy and safety of atorvastatin and simvastatin in Asians with elevated low-density lipoprotein-cholesterol - A multinational, multicenter, double-blind study

Authors: Rody G. Sy, Chau-Chung Wu, Vichai Tanphaichitr, Arthur Tan Teow Hin

Publication title: Journal of Formosan Medical Association 101(7), August 2002

Abstract:

There have been few reports on the efficacy and safety of statins in the Asian population. The study objectives were to compare the efficacy and safety of atorvastatin and simvastatin in Asian people. This was a 16-week, double-blind, double-dummy, randomized, multicenter study involving eight medical centers in six Asian countries or areas. After a 6-week, diet-controlled, placebo lead-in period, 157 patients with low-density lipoprotein cholesterol (LDL-C) of between 160 and 250 mg/dL and serum triglyceride (TG) of less than 400 mg/dL were randomized to receive 10 mg of either atorvastatin (n = 79) or simvastatin (n = 78). After 8 weeks of treatment, all patients had the dose of study medication increased to 20 mg, irrespective of LDL-C concentration. Data obtained by monitoring lipid profiles, adverse events, and laboratory tests during the 16 weeks of study were used to assess the efficacy and safety of both treatments. After 8 weeks of treatment, LDL-C concentrations were reduced by 42.5% from baseline in patients receiving atorvastatin and 34.8% in those receiving simvastatin (p = 0.0006). Patients treated with atorvastatin also had a significantly greater reduction in very-low-density lipoprotein cholesterol (VLDL-C), TG, and total cholesterol (TC) after 8 weeks of treatment. The significantly greater reductions in LDL-C, VLDL-C, TG, and TC from baseline achieved with atorvastatin were still observed after an additional 8 weeks of treatment with 20 mg study medication. Both drugs increased high-density lipoprotein cholesterol (HDL-C) concentrations after 16 weeks of treatment, with no significant difference between the two treatments. After 16 weeks of treatment, 93%

of atorvastatin and 85% of simvastatin patients had achieved their National Cholesterol Education Program LDL-C goals. No deaths occurred in the study population and the incidence of treatment-emergent adverse events was the same in the two groups (28%). Only one patient who was treated with simvastatin had a transaminase or creatine phosphokinase concentration that was more than three-fold the upper limit of normal. Asian people with primary hypercholesterolemia treated with atorvastatin had lower LDL-C, VLDL-C, TG, and TC after 8 weeks and 16 weeks of treatment than those treated with simvastatin. Both drugs demonstrated acceptable safety profiles.

Full text available upon request to the author

Article title: Hypertension and stroke in Asia: Prevalence, control and strategies in developing countries for prevention

Authors: Ram Kushal Singh, I. L. Suh, V. P. Singh, Rody G. Sy, et al.

Publication title: Journal of Human Hypertension 14(10-11), October 2000

Abstract:

Reliable statistics related to the prevalence, incidence and mortality of hypertension and stroke are not available from Asia. The data may be in national or institutional reports or journals published in the local language only. The mortality rate for stroke has been on the decline since the mid 1960s in the developed countries of Asia, such as Australia, New Zealand, and Japan, with some improvement in Singapore, Taiwan and Hong Kong, some areas of China and Malaysia about 15 years later. In India, China, Philippines, Thailand, Sri Lanka, Iran, Pakistan, Nepal, there has been a rapid increase in stroke mortality and prevalence of hypertension. The prevalence of hypertension according to new criteria (>140/90 mm Hg) varies between 15-35% in urban adult populations of Asia. In rural populations, the prevalence is two to three times lower than in urban subjects. Hypertension and stroke occur at a relatively younger age in Asians and the risk of hypertension increases at lower levels of body mass index of 23-25 kg/m2. Overweight, sedentary behaviour, alcohol, higher social class, salt intake, diabetes mellitus and smoking are risk factors for hypertension in most of the countries of Asia. In Australia, New Zealand and Japan, lower social class is a risk factor for hypertension and stroke. Population-based long-term follow-up studies are urgently needed to demonstrate the association of risk factors with

hypertension in Asia. However prevention programmes should be started based on cross-sectional surveys and case studies without waiting for the cohort studies.

Full text available upon request to the author

Article title: Efficacy and Tolerability of Amlodipine in the General Practice Treatment of Essential Hypertension in an Asian Multinational Population

Authors: Stanley H. Taylor, Ming-Fong Chen, Simon Jong Koo Lee, Banhan Koanantakul, Rody G. Sy, et al.

Publication title: Clinical Drug Investigation 16(3), September 1998

Abstract:

To evaluate the efficacy and tolerability of once-daily amlodipine (Pfizer Pharmaceuticals Inc.) alone or in combination with other antihypertensive drugs in an Asian population with essential hypertension. Patients: An open study was undertaken in 165 male and 158 female patients with uncomplicated hypertension (diastolic blood pressure 95 to 115mm Hg). Patients were recruited from 41 general practices in seven Asian countries and received amlodipine 5mg daily for 4 weeks and then 10mg once daily for a further 4 weeks if the target diastolic blood pressure of </=90mm Hg or a reduction from baseline by >/=10mm Hg had not been achieved. This one-step dose-adjustment period was followed by a 4-week maintenance period on a constant dose. Amlodipine was the sole medication in 284 patients and was added to other antihypertensive drugs in 39 patients uncontrolled on previous medication. Results: 263 patients, including 131 males, were evaluated for efficacy at the final treatment visit. 166 (63%) patients achieved the target reduction in diastolic blood pressure with amlodipine 5mg once daily, while 84 patients achieved the target reduction with 10mg once daily. Systolic and diastolic blood pressure reductions were similar irrespective of gender or age, and there were no significant changes in resting heart rate in any subgroup. In 68 patients who underwent ambulatory monitoring, the systolic and diastolic blood pressures were reduced by once-daily amlodipine throughout the 24-hour period without change in the intrinsic circadian pattern. Amlodipine was well tolerated in all patient subgroups; adverse events accounted for less than 1% of treatment discontinuations, and there were no hospitalisations or deaths during the study. Investigators rated both the antihypertensive efficacy and tolerability of amlodipine as excellent or good in 93% of patients. Conclusion: In 263 Asian patients with uncomplicated essential

hypertension treated in general practice, once-daily amlodipine in a dose of 5 or 10mg provided significant antihypertensive efficacy either as monotherapy or in combination with other antihypertensive drugs while maintaining a favourable tolerability profile regardless of gender or age.

Full text available upon request to the author

Article title: Serum cholesterol and coronary artery disease in populations with low cholesterol levels: The Indian paradox

Authors: Ram Kushal Singh, Vipul Rastogi, Afzal Niaz, Sanjay Kumar Ghosh, Rody G. Sy, et al.

Publication title: International Journal of Cardiology 65(1), June 1998

Abstract:

To examine the relation between serum cholesterol and coronary artery disease prevalence below the range of cholesterol values generally observed in developed countries. Cross-sectional survey of two randomly selected villages from Moradabad district and 20 randomly selected streets in the city of Moradabad. 3575 Indians, aged 25-64 years including 1769 rural (894 men, 875 women) and 1806 urban (904 men, 902 women) subjects. The survey methods were questionnaires, physical examination and electrocardiography. The overall prevalences of coronary artery disease were 9.0% in urban and 3.3% in rural subjects and the prevalences were significantly ($P<0.001$) higher in men compared to women in both urban (11.0 vs. 6.9%) and rural subjects (3.9 vs. 2.6%). The average serum cholesterol concentrations were 4.91 mmol/l in urban and 4.22 mmol/l in rural subjects without any sex differences. The prevalences of coronary artery disease were significantly higher among subjects with low and high serum cholesterol concentration compared to subjects with very low cholesterol and showed a positive relation with serum cholesterol within the range of serum cholesterol level studied in both rural and urban in both sexes. Among subjects with low serum cholesterol, there was a higher prevalence of coronary risk factors, hypertension, diabetes, obesity and sedentary lifestyle. Serum cholesterol level showed a significant positive relation with low density lipoprotein cholesterol and triglycerides in all the four subgroups. Logistic regression analysis after pooling of data from both rural and urban, with adjustment of age showed that low serum cholesterol level (odds ratio: men 0.96, women 0.91) had a positive strong relation with coronary artery disease and there was no

evidence of any threshold. Diabetes mellitus (men 0.73, women 0.74) and sedentary lifestyle (men 0.86, women 0.74) were significant risk factors of coronary disease in both sexes. Hypertension (men 0.82, women 0.64) and smoking (men 0.81, women 0.52) were weakly associated with coronary disease in men but not in women. Serum cholesterol level was directly related to prevalence of coronary artery disease even in those with low cholesterol concentration (<5.18 mmol/l). It is possible that some Indian populations may benefit by increased physical activity and decline in serum cholesterol below the range of desired serum cholesterol in developed countries.
Full text available upon request to the author

Article title: Recommendations for the prevention of coronary artery disease in Asians: A scientific statement of the International College of Nutrition
Authors: Rody G. Sy, Ram Kushal Singh, Hideki Mori, Junshi Chen, et al.
Publication title: Journal of Cardiovascular Risk 3(6), January 1997

Abstract:
There has been a rapid increase in coronary artery disease (CAD) in most Asian countries in association with rapid economic development; however, there is no consensus of opinion on diet and lifestyle guidelines and desirable levels of risk factors for prevention of CAD in these countries. The proportion of deaths due to cardiovascular diseases in Asians may be about 15% but there are wide variations. In view of the lower fat intake of the low-risk rural populations of India, the People's Republic of China, Indonesia, Korea, Thailand and Japan compared with that of urban subjects, the limit for total energy from fat intake in an average should be 21% (7% each from saturated, polyunsaturated and mono-unsaturated fatty acids). The n-6: n-3 fatty acids ration should be < 5.0. The carbohydrates intake should be > 65% and mainly from complex carbohydrates (> 55%). A body mass index of 21 kg/m2 may be safe but the range may be 18.5-23.0 kg/m2 and someone with a body mass index > 23 kg/m2 should be considered overweight. A waist: waist:hip ratio > 0.88 for men and > 0.85 for women should be considered to define central obesity. The desirable limit for serum total cholesterol may be 170 mg/dl, the borderline high level may be 170-199 mg/dl and the high level 200 mg/dl or above. The corresponding values for low-density lipoprotein cholesterol may be 90, 90-109 and 110 mg/dl or above. Fasting serum triglycerides may be < 150 mg/dl and high-density lipoprotein cholesterol > 35 mg/dl, which are close to the levels in low-risk

rural populations. Fasting blood glucose > 140 mg/dl and postprandial blood glucose > 200 mg/dl may be considered conditions for diabetes, and 140-200 mg/dl, glucose intolerance. An intake of 400 g/day fruit, vegetables and legumes, mustard or soybean oil (25 g/day) instead of hydrogenated fat, coconut oil or butter in conjunction with moderate physical activity (1255 kJ/day), cessation of tobacco consumption and moderation of alcohol intake may be an effective package of remedies for prevention of CAD in Asians.

Full text available upon request to the author

Article title: Efficacy of slow-release oral isradipine in moderate-to-severe hypertension with add-on spirapril

Authors: R. F. Abarquez, Rody G. Sy, R. R. Castillo

Publication title: American Journal of Hypertension 6(3), March 1993

Abstract:

The new slow-release oral formulation (SRO) of isradipine, a dihydropyridine calcium antagonist, was evaluated in 57 patients who had moderate-to-severe hypertension following a 2-week wash-out period and a 2-week placebo period. The angiotensin-converting enzyme (ACE) inhibitor spirapril, at a dose of 6 mg/day, was added to the treatment of those not responding to 5 mg/day isradipine SRO alone. After 4 weeks of active treatment, isradipine alone normalized blood pressure (diastolic blood pressure < or = 90 mm Hg) in 38 (66.6%) patients whereas a further 4 weeks of treatment with the combination of isradipine and spirapril led to normalization in 14 of the 19 (73.7%) patients with partial or nil blood pressure responses. Side-effects were mild and transient and were observed in nine patients (15.8%). Isradipine SRO is an effective and well-tolerated antihypertensive agent and combination with spirapril appears to enhance its efficacy without an increase in side-effects.

Full text available upon request to the author

Gay Jane P. Perez

Education:

Doctor of Philosophy in Physics, University of the Philippines, 2009

Master of Science in Physics, University of the Philippines, 2005

Bachelor of Science in Applied Physics, University of the Philippines 2003

Field of Specialization

Physics

Satellites

Microsatellites

Researches:

Article title: Determination of Cloud-top Height through Three-dimensional Cloud Reconstruction using DIWATA-1 Data

Authors: Castro Ellison, Ishida Tetsuro, Yukihiro Takahashi, Kubota Hisayuki, et al.

Publication title: Scientific Reports (Nature Publisher Group) 10(1), May 2020

Abstract:

Cloud-top height is a useful parameter with which to elucidate cloud vertical growth, which often indicates severe weather such as torrential rainfall and thunderstorms; it is widely used in meteorological research. However, general cloud-top height estimation methods are hindered by observational and analytical constraints. This study used data from DIWATA-1, the Philippines' first microsatellite, to overcome these limitations and successfully produce sophisticated three-dimensional cloud models via stereo-photogrammetry. High-temporal snapshot 200-ms-interval imaging of clouds over Iloilo, Philippines, is performed.

Two types of telescopes were used to capture 30 stereoscopic cloud images at ~60- and ~3-m ground sampling resolutions; these were used to construct three-dimensional cloud models with 40- and 2-m vertical resolutions, respectively. The imaged clouds have heights of 2.0 to 4.8 km, which is below freezing level for the Philippines and typical of stratocumulus and cumulus clouds. The results are validated using cloud-edge heights determined by measuring the distance from the clouds to their ground shadows. An RMSE of 0.32 km and a maximum difference of 0.03 km are found for the low- and high-resolution telescopes, respectively. For further validation, the results are compared with cloud-top heights estimated from HIMAWARI-8 images captured on the same day, yielding an average vertical difference of 0.15 km and a maximum difference of 1.7 km.

Full text available upon request to the author

Article title: Reforestation and Deforestation in Northern Luzon, Philippines: Critical Issues as Observed from Space

Authors: Gay Jane Perez, Josefino C Comiso, Lemnuel V Aragones, Harry C Merida, et al.

Publication title: Forests 11(10), October 2020

Abstract:

Among the richest in biodiversity globally has been the Philippine rainforest, which used to cover about 90% of the country's land area. During the last few decades, the forest cover has been reduced to less than 10% of the original, only a fraction of which is old-growth forest. The negative impacts of deforestation led to the launching of the National Greening Program (NGP) that involved the planting of more than a billion seedlings over a few million hectares of land from 2011 to 2016. To assess the success of the NGP, satellite data from Landsat and the Moderate Resolution Imaging Spectroradiometer (MODIS) were analyzed before, during, and after the NGP. Reforestation in the NGP sites was examined concurrently with observed deforestation in Luzon using forest loss data derived from Landsat for the period 2001 to 2018. The results show that losses declined from 2011 to 2015 but increased from 2016 to 2018. Because of such losses, the net effect is a balance of reforestation and deforestation or no significant gain from the NGP. Case studies were done in three sites in the Sierra Madre forest, where half of the remaining old-growth forest is located, using a combination of Landsat and Very High Resolution

(VHR) data. The Landsat data were classified into closed forest, open forest, and other vegetation cover types. The conversion from one vegetation cover type to another was evaluated through the use of the Sankey Diagram. While some non-forest types became open or closed forests, the loss of open or closed forests is more pronounced. VHR data reveal critical issues happening within the NGP sites during the NGP period. More comprehensive data from MODIS also confirm that there was no significant increase in the forest cover in Luzon, Sierra Madre, and Cordillera from 2001 to 2018.

Full text available upon request to the author

Article title: A novel approach for vegetation classification using UAV-based hyperspectral imaging

Authors: Tetsuro Ishida, Junichi Kurihara, Fra Angelico Malicdin, Gay Perez, et al.

Publication title: Computers and Electronics in Agriculture 144, January 2018

Abstract:

The use of unmanned aerial vehicle (UAV)-based spectral imaging offers considerable advantages in high-resolution remote-sensing applications. However, the number of sensors mountable on a UAV is limited, and selecting the optimal combination of spectral bands is complex but crucial for conventional UAV-based multispectral imaging systems. To overcome these limitations, we adopted a liquid crystal tunable filter (LCTF), which can transmit selected wavelengths without the need to exchange optical filters. For calibration and validation of the LCTF-based hyperspectral imaging system, a field campaign was conducted in the Philippines during March 28–April 3, 2016. In this campaign, UAV-based hyperspectral imaging was performed in several vegetated areas, and the spectral reflectances of 14 different ground objects were measured. Additionally, the machine learning (ML) approach using a support vector machine (SVM) model was applied to the obtained dataset, and a high-resolution classification map was then produced from the aerial hyperspectral images. The results clearly showed that a large amount of misclassification occurred in shaded areas due to the difference in spectral reflectance between sunlit and shaded areas. It was also found that the classification accuracy was drastically improved by training the SVM model with both sunlit and shaded spectral data. As a result, we achieved a classification accuracy of 94.5% in vegetated areas.

Full text available upon request to the author

Article title: Positive Trend in the Antarctic Sea Ice Cover and Associated Changes in Surface Temperature
Authors: Josefino C. Comiso, Robert A. Gersten, Larry V. Stock, Gay Perez, et al
Publication title: Journal of Climate 30(6), March 2017

Abstract:
The Antarctic sea ice extent has been slowly increasing contrary to expected trends due to global warming and results from coupled climate models. After a record high extent in 2012 the extent was even higher in 2014 when the magnitude exceeded 20 × 106 km2 for the first time during the satellite era. The positive trend is confirmed with newly reprocessed sea ice data that addressed inconsistency issues in the time series. The variability in sea ice extent and ice area was studied alongside surface ice temperature for the 34-yr period starting in 1981, and the results of the analysis show a strong correlation of –0.94 during the growth season and –0.86 during the melt season. The correlation coefficients are even stronger with a one-month lag in surface temperature at –0.96 during the growth season and –0.98 during the melt season, suggesting that the trend in sea ice cover is strongly influenced by the trend in surface temperature. The correlation with atmospheric circulation as represented by the southern annular mode (SAM) index appears to be relatively weak. A case study comparing the record high in 2014 with a relatively low ice extent in 2015 also shows strong sensitivity to changes in surface temperature. The results suggest that the positive trend is a consequence of the spatial variability of global trends in surface temperature and that the ability of current climate models to forecast sea ice trend can be improved through better performance in reproducing observed surface temperatures in the Antarctic region.
Full text available upon request to the author

Article title: Forest Cover Dynamics in the Philippines from LandSAT-Derived Global Forest Cover Dataset (2000-2012)
Authors: Brent Fallarcuna and Gay Perez
Publication title: Journal of the Philippine Geoscience and Remote Sensing Society, 2016

Abstract:

Tropical deforestation still pervades in the developing countries despite the conservation and development programs implemented by national agencies and international community. Its effects are mostly felt not only by forest dependent rural communities, but also by other people across the globe in line with the changing climate. In relation to this, up to date and reliable estimates of forest cover is necessary in order to guide the policy makers and forest managers in implementing relevant policies and programs for sustainable forest management and conservation. However, as other tropical countries like the Philippines, forest cover maps and statistics is hampered by multiple imagery sources, varying scale and resolutions, undisclosed methods of mapping and use of different forest classes and definitions. In this study, global and freely available Landsat processed data were used in order to quantify the rates of forest loss on the provincial level and to determine its level of accuracy in the Philippines. The Landsat processed data was enhanced by defining a threshold on percent tree cover that represents forest. However, by applying previously published forest maps, non-forest features were masked out. This data was then analyzed to produce net change ranking and annual forest loss trends and correlations. This was done per forest cover type to provide more detailed insights on forest cover change. Results showed that at least 53,620.20 hectares of forest was lost in the country from year 2000-2012. Overall accuracy indicates high reliability for both loss (86.48%, kappa statistic = 0.86) and gain (92.26%, kappa statistic = 0.92). Mindanao provinces such as Zamboanga Sibugay (-11.30%), Zamboanga del Norte (-5.42%) and Basilan (-4.06) topped the provinces with negative aggregate net changes. Provinces like Surigao del Sur (r = 0.77), Surigao del Norte (r = 0.65) and Ilocos Sur (r = 0.61) had the highest increasing trend of forest loss (p-value at ¡ 0.05). For open forest alone, all Zamboanga provinces showed high aggregate net change while forest cover loss correlations with positive trend were significant in Agusan del Sur (r = 0.70), Tarlac (r = 0.69) and Davao Oriental (r = 0.69). Among the forest cover types analyzed, the open forest (secondary) type exhibited the highest aggregate net change, implying that it was most dynamic and vulnerable to deforestation. This study showed that forest cover changes could be quantified consistently given a globally available platform such as the Landsat processed data.

Full text available upon request to the author

Article title: Enhanced Pacific Ocean Sea Surface Temperature and Its Relation to Typhoon Haiyan

Authors: Gay Perez, Josefino C. Comiso, Larry V. Stock
Publication title: Journal of Environmental Science and Management 18(1), June 2015

Abstract:
Typhoon Haiyan, which devastated the Visayan Islands in the Philippines on November 8, 2013 was recorded as the strongest typhoon ever-observed using satellite data. Typhoons in the region usually originate from the mid-Pacific region that includes the Warm Pool, which is regarded as the warmest ocean surface region globally. Two study areas were considered: one in the Warm Pool Region and the other in the West Pacific Region near the Philippines. Among the most important factors that affect the strength of a typhoon are sea surface temperature (SST) and water vapor It is remarkable that in November 2013 the average SST in the Warm Pool Region was the highest observed during the 1981 to 2014 period while that of the West Pacific Region was among the highest as well. Moreover the increasing trend in SST was around 0.20 degrees C per decade in the warm pool region and even higher at 0.23 degrees C per decade in the West Pacific region. The yearly minimum SST has also been increasing suggesting that the temperature of the ocean mixed layer is also increasing. Further analysis indicated that water vapor, clouds, winds and sea level pressure for the same period did not reveal strong signals associated with the 2013 event. The SST is shown to be well-correlated with wind strength of historically strong typhoons in the country and the observed trends in SST suggest that extremely destructive typhoons like Haiyan are likely to occur in the future.
Full text available upon request to the author

Article title: Prior Individual Training and Self-Organized Queuing during Group Emergency Escape of Mice from Water Pool
Authors: Caesar Saloma, Gay Perez, Catherine M. Gavile, et al.
Publication title: PLoS ONE 10(2), February 2015

Abstract:
We study the impact of prior individual training during group emergency evacuation using mice that escape from an enclosed water pool to a dry platform via any of two possible exits. Experimenting with mice avoids serious ethical and legal issues that arise when dealing with unwitting human participants while minimizing

concerns regarding the reliability of results obtained from simulated experiments using 'actors'. First, mice were trained separately and their individual escape times measured over several trials. Mice learned quickly to swim towards an exit-they achieved their fastest escape times within the first four trials. The trained mice were then placed together in the pool and allowed to escape. No two mice were permitted in the pool beforehand and only one could pass through an exit opening at any given time. At first trial, groups of trained mice escaped seven and five times faster than their corresponding control groups of untrained mice at pool occupancy rate ϱ of 11.9% and 4%, respectively. Faster evacuation happened because trained mice: (a) had better recognition of the available pool space and took shorter escape routes to an exit, (b) were less likely to form arches that blocked an exit opening, and (c) utilized the two exits efficiently without preference. Trained groups achieved continuous egress without an apparent leader-coordinator (self-organized queuing)-a collective behavior not experienced during individual training. Queuing was unobserved in untrained groups where mice were prone to wall seeking, aimless swimming and/or blind copying that produced circuitous escape routes, biased exit use and clogging. The experiments also reveal that faster and less costly group training at ϱ = 4%, yielded an average individual escape time that is comparable with individualized training. However, group training in a more crowded pool (ϱ = 11.9%) produced a longer average individual escape time.

Full text available upon request to the author

Article title: Allelomimesis as escape strategy of pedestrians in two-exit confinements

Authors: Gay Perez and Caesar Saloma

Publication title: Physica A: Statistical Mechanics and its Applications 388(12), June 2009

Abstract:

We study the efficacy of allelomimesis as an escape strategy of mobile agents (pedestrians) that aim to leave a two-exit room within the shortest possible time. Allelomimesis is the act of copying one's kindred neighbors. To escape, an agent employs one of the following strategies: (1) It chooses its own route independently (non-copying, α=0), (2) It imitates the actions of its neighbors at all times (blind copying, α=1), or (3) It either copies or acts independently according to a certain

probability that is set by the copying parameter α(0α1). Not more than one agent could occupy a given room location. An agent's knowledge of the two exit locations is set by its information content β(0≤β≤1). When left alone, an agent with complete knowledge of the exit whereabouts (β=1) always takes the shortest possible path to an exit. We obtain plots of the (group) evacuation time T and exit throughput Q as functions of α and β for cases where the two exits are near (on same room side) and far (on opposite sides of room) from each other. For an isolated agent, T is inversely proportional to β. The chances of escape for an isolated agent with β≤0.2 are higher with adjacent exits. However, for an agent with β>0.4 the chance is better with opposite exits. In a highly occupied room (occupancy rate R=80%) with adjacent exits, agents with β>0.8 escape more quickly if they employ a mixed strategy of copying and non-copying (0.4α0.6). On the other hand, blind copying (α≈1) gives agents with β0.1 a better chance of escaping from the same room. For the same α and R values, opposite exits allow faster evacuation for agents with β0.1 due to the likelihood of streaming and the lower probability of exit clogging. Streaming indicates an efficient utilization of an exit and it happens when the arcs that are formed are smaller and arch interference is less likely. Allelomimesis provides a simple yet versatile mechanism for studying the egress behavior of confined crowds in a multi-exit room.

Full text available upon request to the author

Article title: Self-Organized Queuing and Scale-Free Behavior in Real Escape Panic
Authors: Caesar Saloma, Gay Perez, Giovanni Tapang, May T. Lim, et al.
Publication title: Proceedings of the National Academy of Sciences 100(21), November 2003

Abstract:

Numerical investigations of escape panic of confined pedestrians have revealed interesting dynamical features such as pedestrian arch formation around an exit, disruptive interference, self-organized queuing, and scale-free behavior. However, these predictions have remained unverified because escape panic experiments with real systems are difficult to perform. For mice escaping out of a water pool, we found that for a critical sampling rate the escape behavior exhibits the predicted features even at short observation times. The mice escaped via an exit in bursts of different sizes that obey exponential and (truncated) power-law distributions

depending on exit width. Oversampling or undersampling the mouse escape rate prevents the observation of the predicted features. Real systems are normally subject to unavoidable constraints arising from occupancy rate, pedestrian exhaustion, and nonrigidity of pedestrian bodies. The effect of these constraints on the dynamics of real escape panic is also studied.

Full text available upon request to the author

Article title: Streaming, disruptive interference and power-law behavior in the exit dynamics of confined pedestrians

Authors: Gay Perez, Giovanni Tapang, May T. Lim, Caesar Saloma

Publication title: Physica A: Statistical Mechanics and its Applications. September 2002

Abstract:

We analyze the exit dynamics of pedestrians who are initially confined in a room. Pedestrians are modeled as cellular automata and compete to escape via a known exit at the soonest possible time. A pedestrian could move forward, backward, left or right within each iteration time depending on adjacent cell vacancy and in accordance with simple rules that determine the compulsion to move and physical capability relative to his neighbors. The arching signatures of jamming were observed and the pedestrians exited in bursts of various sizes. Power-law behavior is found in the burst-size frequency distribution for exit widths w greater than one cell dimension (w>1). The slope of the power-law curve varies with w from −1.3092(w=2) to −1.0720(w=20). Streaming which is a diffusive behavior, arises in large burst sizes and is more likely in a single-exit room with w=1 and leads to a counterintuitive result wherein an average exit throughput Q is obtained that is higher than with w=2,3, or 4. For a two-exit room (w=1), Q is not greater than twice the yield of a single-exit room. If the doors are not separated far enough (<4w), Q becomes even significantly less due to a collective slow-down that emerges among pedestrians crossing in each other's path (disruptive interference effect). For the same w and door number, Q is also higher with relaxed pedestrians than with anxious ones.

Full text available upon request to the author

Papers Presented

Title: Validation of the separability measure for Rhizophoraceae and Avicenniaceae using point density distribution from lidar
Authors: Regine Anne Faelga, Enrico C. Paringit, Gay Perez, et al.
Conference title: SPIE Asia-Pacific Remote Sensing, May 2016

Abstract:
The extent at which mangrove forest characterization can be done through utilization of Light Detection and Ranging (LiDAR) data is investigated in this paper. Particularly, the ability of LiDAR parameters, such as its point density to provide height and structural information was explored to supplement manual field surveys which are time-consuming and requires great effort. Point cloud information was used to produce separability measure within a mangrove forest. The study aims to validate the point density distribution curves (PDDC) that were established to characterize the structural attributes between Rhizophoraceae and Avicenniaceae. The applicability of the PDDC was applied to fifteen (15) 5x5 sample plots of pure Rhizophoraceae and fifteen (15) 5x5 sample plots of pure Avicenniaceae in a one hectare (1ha) natural riverine mangrove forest. 15 out of 15 plots were correctly discriminated as Rhizophoraceae; however, Avicenniaceae plots were not correctly discriminated using the established separability measure. This study had determined that the two mangrove families are difficult to separate in terms of point density distribution alone. Enhancement of the PDDC as a separability measure should be improved to pave way for a more sensitive and robust way to separate the two families.
Full text available upon request to the author

Title: Quantifying forest cover changes in the Philippines from 2000-2012 from landsat-derived global forest cover dataset
Authors: Brent Fallarcuna and Gay Perez
Conference title: 36th Asian Conference on Remote Sensing, October 2015

Abstract:
Updated information of forest resources is vital in proper management and policy formulation from local to national scale. However, data generation regarding forest maps and statistics in the Philippines is hampered by multiple imagery sources, varying scale and resolutions, undisclosed methods of mapping and different forest classes and definitions used. In this study, processed Landsat forest cover data was

analyzed to quantitatively measure the rates of forest loss on the regional level, to analyze its level of applicability and to validate forest changes through various geospatial and other forestry data. Raw data consists of forest tree cover, loss, gain and loss year layers. Five forest vectors were used to extract forest areas from the main data rasters before subsetting them regionally. A forest tree cover threshold of 85 percent and above was used to isolate densely forested rasters. These rasters were further analyzed to produce gain, loss and aggregate net change ranking; annual forest loss and annual forest cover trends, with their corresponding maps and statistics. Among the regions, Zamboanga Peninsula had the highest aggregate net change (-7.18%) followed by CALABARZON (-3.41%) and CARAGA (-3.16%) from 2000-2012. CARAGA had the highest average annual forest loss of-147.53 ha and a correlation of 0.7. On the other hand, Zamboanga and CALABARZON had average annual forest loss which were less than hundred hectares (-73.10 ha and-31.4 ha; r = 0.34 and r = 0.13, respectively). However, only CARAGA had a significant correlation, with p value < 0.05 (0.0098). In terms of annual forest tree cover, CARAGA had the highest average annual forest cover increment of-1,238.16 ha, followed by Zamboanga Peninsula (-830.12 ha) and CALABARZON (-527.61 ha). Forest cover increments exhibited negative values since forest recovery is always outweighed by forest extraction. Error matrix of loss, gain and no change registered an overall accuracy of 86.48% and 92.26%, for loss and gain respectively. Yet, the assessment had lower user accuracy values compared to that of producers'. This might be affected by inadequate high resolution images (mainly Google Earth and Landsat) used in the satellite based validation. The research showed that freely available forest global datasets could be used to pinpoint significant areas where forest loss is occurring. Correlation analysis with other forestry data and field validation through group discussions and interviews may also illustrate insights regarding the drivers of forest loss on a particular area.

Full text available upon request to the author

Title: Dynamic Contact Angle Measurements on Various Fabric Surfaces Using a Simple Optical Vision System

Authors: Hernando Siy Salapare III, Jamaica Palay, Gay Perez, et al.

Conference title: Proceedings of the 25th Samahang Pisika ng Pilipinas Physics Congress, October 2007

Abstract:

A contact angle measuring device was developed for undergraduate Physics laboratory experiments. The new device was tested on determining the wettability of waterproof fabrics. Intel® Play™ QX3™ Computer Microscope was used in determining the changes in time of the contact angles of different waterproof fabrics washed in different conditions. At contact angles between 80 to 90 degrees, the untreated samples changed its wettability from being hydrophobic to being hydrophilic. For washed sam-ples it was determined that the change in wettability occurred at contact angles between 40 to 70 degrees. The rate of recession of the contact angle of the water droplet was related to the rate of absorbance of the waterproof fabric. It was found that high temperature of water used for washing increases the rate of recession. Measurements of the contact angle in time were able to show the dynamic behavior of the water droplet on the fabric surface.

Full text available upon request to the author

Charissa M. Ferrera

Education:

Doctor of Philosophy in Mechanical and Environmental Informatics, Tokyo Institute of Technology, 2016

Master of Science in Marine Science, University of the Philippines, Diliman, 2012

Bachelor of Science in Chemistry, University of the Philippines, Diliman, 2004

Fields of Specialization

Water Quality Assessment

Environmental Pollution

Environmental Analysis

Aquatic Pollution

Water Chemistry

Researches:

Article title: Organic Carbon Concentrations in High-and Low-Productivity Areas of the Sulu Sea

Authors: Charissa M. Ferrera, Gil S. Jacinto, Chen-Tung Arthur Chen, Hon-Kit Lui

Publication title: Sustainability 10(6), June 2018

Abstract:

The sequestration of anthropogenic carbon dioxide in the form of organic carbon and its eventual deposition in the sediments is an important component of the marine carbon cycle. In the Sulu Sea, Philippines, organic carbon contents in the sediments have been relatively well studied, but the processes that describe the organic carbon distributions in the water column have not been elucidated. Dissolved and particulate organic carbon (DOC, POC) concentrations were measured at several

stations in the Sulu Sea during the northeast monsoon of 2007/2008 to understand the dynamics of organic carbon in this unique internal sea. Analyses of primary productivity estimates, beam attenuation coefficient (at 660 nm) profiles, and correlation coefficients among DOC, POC and other parameters (e.g., apparent oxygen utilization) at different layers of the water column indicate that surface primary productivity, upwelling, bottom intensified flows across sills, and ventilation from shallow sills, which may contain semi-labile DOC that is estimated to largely contribute to microbial respiration in the bathypelagic layer, are the major processes that affect the DOC and POC distributions in the Sulu Sea. The variability of these processes should be taken into consideration when assessing the sustainability of internal and marginal seas as carbon sinks.

Full text available upon request to the author

Article title: Carbonate parameters in high and low productivity areas of the Sulu Sea, Philippines

Authors: Charissa M. Ferrera, Gil S. Jacinto, Chen-Tung Arthur Chen, Maria Lourdes San Diego-McGlone, et al.

Publication title: Marine Chemistry 195, October 2017

Abstract:

To further understand dissolved carbon dioxide (CO2) dynamics and the link between surface productivity and carbon content in the sediments of the Sulu Sea, seawater samples were obtained from high and low productivity areas during the northeast monsoon of December 2007/January 2008, which also corresponded to a period of weak La Niña. CO2 concentrations in surface waters of the Sulu Sea are mostly governed by productivity, while sub-surface CO2 concentrations are influenced by physical processes including vertical mixing and bottom-intensified flow southwest of Mindoro and Panay Straits (central Philippines), and upwelling off the west coast of Zamboanga in Mindanao (south Philippines). These physical processes are manifested in the downward sloping isolines of carbonate parameters near the straits and weak upwelling of waters saturated with respect to atmospheric CO2. Deep waters ventilated from the Sulu Sea have lower dissolved inorganic carbon (DIC) and total alkalinity (TA), and higher pHT (pH in the total scale) and carbonate ion concentrations ($CO3^{2-}$) than the deep waters of the South China Sea. Nevertheless, TA in the deep waters of the Sulu Sea increases below 2000m at almost

twice the rate as DIC, suggesting possible dissolution of sedimentary CaCO3. A small positive "excess" alkalinity signal is observed in the South China Sea but negative values in the Sulu Sea may reflect the possible contribution of organic acids. This study suggests that the upwelling area within the Sulu Sea, albeit limited in size, could be a source of CO2 to the atmosphere especially during the stronger northeast monsoon periods. Other processes such as dissolution of CaCO3 in the sediments and possible organic acidity should be considered in understanding the Sulu Sea's CO2 sink capacity for the coming years.

Full text available upon request to the author

Article title: Phosphorus as a driver of nitrogen limitation and sustained eutrophic conditions in Bolinao and Anda, Philippines, a mariculture-impacted tropical coastal area

Authors: Charissa M. Ferrera, Atsushi Watanabe, Toshihiro Miyajima, Maria Lourdes San Diego-McGlone, et al.

Publication title: Marine Pollution Bulletin 105(1), April 2016

Abstract:

The dynamics of nitrogen (N) and phosphorus (P) was studied in mariculture areas around Bolinao and Anda, Philippines to examine its possible link to recurring algal blooms, hypoxia and fish kills. They occur despite regulation on number of fish farm structures in Bolinao to improve water quality after 2002, following a massive fish kill in the area. Based on spatiotemporal surveys, coastal waters remained eutrophic a decade after imposing regulation, primarily due to decomposition of uneaten and undigested feeds, and fish excretions. Relative to Redfield ratio (16), these materials are enriched in P, resulting in low N/P ratios (~ 6.6) of regenerated nutrients. Dissolved inorganic P (DIP) in the water reached 4 μM during the dry season, likely exacerbated by increase in fish farm structures in Anda. DIP enrichment created an N-limited condition that is highly susceptible to sporadic algal blooms whenever N is supplied from freshwater during the wet season.

Full text available upon request to the author

Article title: Variation in oxygen isotope ratio of dissolved orthophosphate induced by uptake process in natural coral holobionts

Authors: Charissa M. Ferrera, Toshihiro Miyajima, Atsushi Watanabe, Yu Umezawa, et al.

Publication title: Coral Reefs 35(2), June 2016

Abstract:
A model incubation experiment using natural zooxanthellate corals was conducted to evaluate the influence of phosphate uptake by coral holobionts on oxygen isotope ratio of dissolved PO43– (δ18Op). Live coral samples of Acropora digitifera, Porites cylindrica, and Heliopora coerulea were collected from coral reefs around Ishigaki Island (Okinawa, Japan) and Bolinao (northern Luzon, Philippines) and incubated for 3–5 d after acclimatization under natural light conditions with elevated concentrations of PO43–. Phosphate uptake by corals behaved linearly with incubation time, with uptake rate depending on temperature. δ18Op usually increased with time toward the equilibrium value with respect to oxygen isotope exchange with ambient seawater, but sometimes became higher than equilibrium value at the end of incubation. The magnitude of the isotope effect associated with uptake depended on coral species; the greatest effect was in A. digitifera and the smallest in H. coerulea. However, it varied even within samples of a single coral species, which suggests multiple uptake processes with different isotope effects operating simultaneously with varying relative contributions in the coral holobionts used. In natural environments where concentrations of PO43– are much lower than those used during incubation, PO43– is presumably turned over much faster and the δ18Op easily altered by corals and other major primary producers. This should be taken into consideration when using δ18Op as an indicator of external PO43– sources in coastal ecosystems.
Full text available upon request to the author

Article title: Salt-plug estuarine circulation in Malampaya Sound, Palawan, Philippines
Authors: Olivia C. Cabrera, Cesar L. Villanoy, Gil S. Jacinto, Lawrence Patrick C. Bernardo, et al.
Publication title: Philippine Science Letters 7(2), 2014

Abstract:
Malampaya Sound is an enclosed bay in Palawan, Philippines. A salinity maximum or salt plug was discovered in the middle of the Sound by a field survey in May 2005 and successfully simulated using a Delft3D numerical model of the sound, forced with tide and freshwater discharge at the lateral boundaries, and evaporation at the

surface. Different conditions to simulate the major monsoonal regimes of 2005 (dry inter-monsoon, southwest-wet, and northeast-dry) indicate that the salt plug persists, although its relative position changes with the magnitude of freshwater discharge. The salt plug effectively limits the exchange of water between the Inner and the Outer Sound, which may account for differences in nutrient levels and the phytoplankton assemblage during the same survey. Such a thermohaline circulation has important consequences for sediment transport, phytoplankton bloom formation, and accumulation of pollutants in the Sound.

Full text available upon request to the author

Melbourne R. Talactac

Sex: Male

Education:

Doctor of Philosophy in Veterinary Medicine, Yamaguchi University, 2018

Master of Science in Veterinary Preventive Medicine, Chungnam National University, 2012

Bachelor of Science in Veterinary Medicine, University of the Philippines Los Baños, 2007

Field of Specialization

Emerging infectious diseases

Microbiology

Immunology

Vaccination

Innate Immunity

Biotechnology

Researches:

Article title: Molecular Detection of Rickettsia Spp. and Coxiella Burnetii in Cattle, Water Buffalo, and Rhipicephalus (Boophilus) Microplus Ticks in Luzon Island of the Philippines

Authors: Melbourne R. Talactac, Remil Linggatong Galay, Maureen M. Dawn, et al.

Publication title: Tropical Medicine and Infectious Diseases 5(2), April 2020

Abstract:

Rickettsia and Coxiella burnetii are zoonotic, tick-borne pathogens that can cause febrile illnesses with or without other symptoms in humans, but may cause

subclinical infections in animals. There are only a few reports on the occurrence of these pathogens in cattle and water buffalo in Southeast Asia, including the Philippines. In this study, molecular detection of Rickettsia and C. burnetii in the blood and in the Rhipicephalus (Boophilus) microplus ticks of cattle and water buffalo from five provinces in Luzon Island of the Philippines was done. A total of 620 blood samples of cattle and water buffalo and 206 tick samples were collected and subjected to DNA extraction. After successful amplification of control genes, nested PCR was performed to detect gltA of Rickettsia and com1 of C. burnetii. No samples were positive for Rickettsia, while 10 (cattle = 7, water buffaloes = 3), or 1.6% of blood, and five, or 1.8% of tick samples, were C. burnetii-positive. Sequence analysis of the positive amplicons showed 99-100% similarity to reported C. burnetii isolates. This molecular evidence on the occurrence of C. burnetii in Philippine ruminants and cattle ticks and its zoonotic nature should prompt further investigation and surveillance to facilitate its effective control.

Full text available upon request to the author

Article title: The case for oxidative stress molecule involvement in the tick–pathogen interactions—an omics approach

Authors: Emmanuel Hernandez, Melbourne R. Talactac, Kozo Fujisaki, et al.

Publication title: Developmental & Comparative Immunology 100, June 2019

Abstract:

The blood-feeding behavior of ticks has resulted in them becoming one of the most important vectors of disease-causing pathogens. Ticks possess a well-developed innate immune system to counter invading pathogens. However, the coevolution of ticks with tick-borne pathogens has adapted these pathogens to the tick's physiology and immune response through several mechanisms including transcriptional regulation. The recent development in tick and tick-borne disease research greatly involved the "omics" approach. The omics approach takes a look en masse at the different genes, proteins, metabolomes, and the microbiome of the ticks that could be differentiated during pathogen infection. Data from this approach revealed that oxidative stress-related molecules in ticks are differentiated and possibly being exploited by the pathogens to evade the tick's immune response. In this study, we review and discuss transcriptomic and proteomic data for some oxidative stress molecules differentially expressed during pathogen infection. We also discuss

metabolomics and microbiome data as well as functional genomics in order to provide insight into the tick-pathogen interaction.

Full text available upon request to the author

Article title: A Continuing Exploration of Tick–Virus Interactions Using Various Experimental Viral Infections of Hard Ticks

Authors: Melbourne R. Talactac, Emmanuel Hernandez, Kozo Fujisaki, et al.

Publication title: Frontiers in Physiology 9, December 2018

Abstract:

To fully unravel the ixodid ticks' role as vectors of viral pathogens, their susceptibility to new control measures, and their ability to develop acaricide resistance, acclimatization of ticks under laboratory conditions is greatly needed. However, the unique and complicated feeding behavior of these ticks compared to that of other hematophagous arthropods requires efficient and effective techniques to infect them with tick-borne viruses (TBVs). In addition, relatively expensive maintenance of animals for blood feeding and associated concerns about animal welfare critically limit our understanding of TBVs. This mini review aims to summarize the current knowledge about the artificial infection of hard ticks with viral pathogens, which is currently used to elucidate virus transmission and vector competence and to discover immune modulators related to tick–virus interactions. This review will also present the advantages and limitations of the current techniques for tick infection. Fortunately, new artificial techniques arise, and the limitations of current protocols are greatly reduced as researchers continuously improve, streamline, and standardize the laboratory procedures to lower cost and produce better adoptability. In summary, convenient and low-cost techniques to study the interactions between ticks and TBVs provide a great opportunity to identify new targets for the future control of TBVs.

Full text available upon request to the author

Article title: Induction of intracellular ferritin expression in embryo-derived Ixodes scapularis cell line (ISE6)

Authors: Emmanuel Hernandez, Kodai Kusakisako, Melbourne R. Talactac, et al.

Publication title: Scientific Reports 8(1), November 2018

Abstract:

Iron is a very important nutrient for cells; however, it could also cause fatal effects because of its capability to trigger oxidative stress. Due to high exposure to iron from their blood diet, ticks make use of several mechanisms to cope up with oxidative stress. One mechanism is iron sequestration by ferritin and its control protein (IRP). Since the IRP activity is dependent on the ferrous iron concentration, we tried to induce intracellular ferritin (FER1) protein expression by exposing Ixodes scapularis embryo-derived cell line (ISE6) to different concentrations of ferrous sulphate at different time points. We were able to induce FER1 protein after exposure to 2 mM of ferrous sulphate for 48 h, as observed in both Western blotting and indirect immunofluorescent antibody tests. This could indicate that the FER1 produced could be a product of the release of IRPs from the FER1 mRNA leading to its translation. The RNA interference of FER1, through the transfection of dsRNA, led to an increase in mortality and decrease in the cellular proliferation of ISE6 cells. Overall, ISE6 cells could be a good tool in further understanding the mechanism of FER1 action, not just in Ixodes ticks but in other tick species as well.

Full text available upon request to the author

Article title: Glutathione S-transferases play a role in the detoxification of flumethrin and chlorpyrifos in Haemaphysalis longicornis

Authors: Emmanuel Hernandez, Kodai Kusakisako, Melbourne R. Talactac, et al.

Publication title: Parasites & Vectors 11(1), August 2018

Abstract:

Haemaphysalis longicornis is a tick of importance to health, as it serves as a vector of several pathogens, including Theileria orientalis, Babesia ovata, Rickettsia japonica and the severe fever with thrombocytopenia syndrome virus (SFTSV). Presently, the major method of control for this tick is the use of chemical acaricides. The glutathione S-transferase (GST) system is one mechanism through which the tick metabolizes these acaricides. Two GSTs from H. longicornis (HlGST and HlGST2) have been previously identified. Results: Enzyme kinetic studies were performed to determine the interaction of acaricides with recombinant H. longicornis GSTs. Recombinant HlGST activity was inhibited by flumethrin and cypermethrin, while recombinant HlGST2 activity was inhibited by chlorpyrifos and cypermethrin. Using real-time RT-PCR, the upregulation of the HlGST gene was observed upon exposure to sublethal doses of flumethrin, while the HlGST2 gene was upregulated when

exposed to sublethal doses of chlorpyrifos. Sex and strain dependencies in the induction of GST gene expression by flumethrin were also observed. Knockdown of the HlGST gene resulted in the increased susceptibility of larvae and adult male ticks to sublethal doses of flumethrin and the susceptibility of larvae against sublethal doses of chlorpyrifos was increased upon knockdown of HlGST2. Conclusions: HlGST could be vital for the metabolism of flumethrin in larvae and adult male ticks, while HlGST2 is important in the detoxification of chlorpyrifos in larval ticks.

Full text available upon request to the author

Article title: Hemolymph defensin from the hard tick Haemaphysalis longicornis attacks Gram-positive bacteria

Authors: Yurika Yada, Melbourne R. Talactac, Kodai Kusakisako, et al.

Publication title: Journal of Invertebrate Pathology 156, July 2018

Abstract:

Ticks are key vectors of some important diseases of humans and animals. Although they are carriers of disease agents, the viability and development of ticks are not harmed by the infectious agents due to their innate immunity. Antimicrobial peptides directly protect hosts against pathogenic agents such as viruses, bacteria, and parasites. Among the identified and characterized antimicrobial peptides, defensins have been considerably well studied. Defensins are commonly found among fungi, plants, invertebrates, and vertebrates. The sequence of the tick hemolymph defensin (HEdefensin) gene from the hard tick Haemaphysalis longicornis was analyzed after identification and cloning from a cDNA library. HEdefensin has a predicted molecular mass of 8.15 kDa including signal peptides and a theoretical isoelectric point of 9.48. Six cysteine residues were also identified in the amino acids. The synthetic HEdefensin peptide only showed antibacterial activity against Gram-positive bacteria such as Micrococcus luteus. A fluorescence propidium iodide exclusion assay also showed that HEdefensin increased the membrane permeability of M. luteus. Additionally, an indirect fluorescent antibody test showed that HEdefensin binds to M. luteus. These results suggested that HEdefensin strongly affects the innate immunity of ticks against Gram-positive bacteria.

Full text available upon request to the author

Article title: Vector competence of Haemaphysalis longicornis ticks for a Japanese isolate of the Thogoto virus

Authors: Melbourne Talactac, Kentaro Yoshii, Emmanuel Hernandez, Kodai Kusakisako, et al.

Publication title: Scientific Reports 8(1), June 2018

Abstract:

Thogoto virus (THOV), a tick-borne arbovirus not previously reported in East Asia, was recently isolated from Haemaphysalis longicornis in Kyoto, Japan. In this study, we investigated the vector competence of H. longicornis ticks for a Japanese isolate of the Thogoto virus using anal pore microinjection and experimental virus acquisition. Our results showed that anal pore microinjection can readily infect adult ticks, and THOV-infected ticks can successfully transmit the virus to mice. Blood feeding was also critical in the distribution of the virus in tick organs, most especially in the salivary glands. Furthermore, co-feeding between an infected adult and naïve nymphs can also produce infected molted adults that can horizontally transmit THOV to mice. Altogether, our results suggest that H. longicornis is a competent vector for the Japanese THOV isolate and could be the primary tick vector of the virus in Japan.

Full text available upon request to the author

Article title: Peroxiredoxins are important for the regulation of hydrogen peroxide concentrations in ticks and tick cell line

Authors: Kodai Kusakisako, Emmanuel Hernandez, Melbourne Talactac, Kentaro Yoshii

Publication title: Ticks and tick-borne diseases 9(4), March 2018

Abstract:

Ticks are obligate hematophagous ectoparasites, as they need to feed blood from vertebrate hosts for development. Host blood contains high levels of iron. Host-derived iron may lead to high levels of reactive oxygen species (ROS), including hydrogen peroxide (H2O2). Since a high concentration of H2O2 causes serious damage to organisms, this molecule is known to be a harmful chemical compound for aerobic organisms. On the other hand, the transparent method is compatible with chemical fluorescent probes. Therefore, we tried to establish the visualizing method for H2O2in unfed tick tissues. The combination method of a chemical fluorescent

probe (BES-H2O2-Ac) with the transparent method, Scale, demonstrated in unfed tick tissues that H2O2and paraquat could induce oxidative stress in the tissues, such as the midgut and ovary. In addition, an H2O2 detection method using BES-H2O2-Ac was established in Ixodes scapularis embryo-derived cell line (ISE6) in vitro to evaluate the antioxidant activity of peroxiredoxins (PRXs), H2O2 scavenging enzymes, against H2O2in the cells. The effects of paraquat in ISE6 cells were also observed in the PRXs gene-silenced ISE6 cells. A high intensity of H2O2 fluorescence induced by paraquat was observed in the PRX gene-knock downed cells. These results suggest that H2O2and paraquat act as an H2O2inducer, and PRX genes are important for the regulation of the H2O2 concentration in unfed ticks and ISE6 cells. Therefore, this study contributes to the search for H2O2 visualization in ticks and tick cell line and furthers understanding of the tick's oxidative stress induced by H2O2.

Full text available upon request to the author

Article title: Characterization and expression analysis of a newly identified glutathione S-transferase of the hard tick Haemaphysalis longicornis during blood-feeding

Authors: Emmanuel Hernandez, Kodai Kusakisako, Melbourne R. Talactac, et al.

Publication title: Parasites & Vectors 11(1), February 2018

Abstract:

Ticks are obligate hematophagous parasites important economically and to health. Ticks consume large amounts of blood for their survival and reproduction; however, large amounts of iron in blood could lead to oxidative stress. Ticks use several molecules such as glutathione S-transferases (GSTs), ferritins, and peroxiredoxins to cope with oxidative stress. This study aimed to identify and characterize the GSTs of the hard tick Haemaphysalis longicornis in order to determine if they have a role in coping with oxidative stress. Methods: Genes encoding GSTs of H. longicornis were isolated from the midgut CDNA library. Genes have been cloned and recombinant GSTs have been expressed. The enzymatic activities, enzyme kinetic constants, and optimal pH of the recombinant GSTs toward 1-chloro-2,4-dinitrobenzene (CDNB) were determined. The gene transcription and protein expression profiles were determined in the whole ticks and internal organs, and developmental stages using real time RT-PCR and Western blotting during blood feeding. The localization of

GST proteins in organs was also observed using immunofluorescent antibody test (IFAT). Results: We have isolated two genes encoding GSTs (HlGST and HlGST2). The enzymatic activity toward CDNB is 9.75 ± 3.04 units/mg protein for recombinant HlGST and 11.63 ± 4.08 units/mg protein for recombinant HlGST2. Kinetic analysis of recombinant HlGST showed K m values of 0.82 ± 0.14 mM and 0.64 ± 0.32 mM for the function of CDNB and GSH, respectively. Meanwhile, recombinant HlGST2 has K m values of 0.61 ± 0.20 mM and 0.53 ± 0.02 mM for the function of CDNB and GSH, respectively. The optimum pH of recombinant HlGST and recombinant HlGST2 activity was 7.5-8.0. Transcription of both GSTs increases in different developmental stages and organs during blood-feeding. GST proteins are upregulated during blood-feeding but decreased upon engorgement in whole ticks and in some organs, such as the midgut and hemocytes. Interestingly, salivary glands, ovaries, and fat bodies showed decreasing protein expression during blood-feeding to engorgement. Varying localization of GSTs in the midgut, salivary glands, fat bodies, ovaries, and hemocytes was observed depending on the feeding state, especially in the midgut and salivary glands. Conclusions: In summary, a novel GST of H. longicornis has been identified. Characterization of the GSTs showed that GSTs have positive correlation with the degree and localization of oxidative stress during blood-feeding. This could indicate their protective role during oxidative stress.
Full text available upon request to the author

Article title: Evaluation of vaccine potential of 2-Cys peroxiredoxin from the hard tick Haemaphysalis longicornis
Authors: Kodai Kusakisako, Takeshi Miyata, Masashi Tsujio, Melbourne R. Talactac, et al.
Publication title: Experimental and Applied Acarology 74(1), January 2018

Abstract:
Ticks require blood feeding on vertebrate animals throughout their life cycle, and also concentrate the iron-containing blood, resulting in a high concentration of hydrogen peroxide (H2O2). High concentrations of H2O2 are harmful to organisms, due to their serious damage of macromolecules. Ticks have antioxidant enzymes, such as peroxiredoxins (Prxs), that scavenge H2O2. Prxs may have important roles in regulating the H2O2 concentration in ticks during blood feeding and oviposition. Moreover, Prxs are considered potential vaccine candidates in other parasites, such

as Leishmania and Fasciola. In the present study, the efficacy of a tick Prx (HlPrx2) as a vaccine candidate antigen was evaluated. First, recombinant HlPrx2 (rHlPrx2) was expressed in Escherichia coli, and then, its purity and endotoxin levels were confirmed prior to administration. The rHlPrx2 proteins were of high purity with acceptably low endotoxin levels. Second, the ability of rHlPrx2 administration to stimulate mouse immunity was evaluated. The rHlPrx2 protein, with or without an adjuvant, could stimulate immunity in mice, especially the IgG1 of Th2 immune response. Using Western blot analysis, we also observed whether rHlPrx2-immunized mice sera could recognize native HlPrx2 protein in crude tick midgut proteins. Western blot analysis demonstrated that rHlPrx2-administrated mouse sera could detect the native HlPrx2. Finally, the effects of rHlPrx2 immunization in mice were studied using nymphal ticks. Although the challenged ticks were not affected by rHlPrx2 immunization, rHlPrx2 still might be considered as a vaccine candidate against ticks because of its high immunogenicity.

Full text available upon request to the author

Article title: Immunofluorescent detection in the ovary of host antibodies against a secretory ferritin injected into female Haemaphysalis longicornis ticks

Authors: Remil Linggatong Galay, Melbourne R. Talactac, Tomohide Matsuo, et al.

Publication title: Parasitology International 67(2), October 2017

Abstract:

Due to the continuous threat of ticks and tick-borne diseases to human and animal health worldwide, and the drawbacks of chemical acaricide application, many researchers are exploring vaccination as an alternative tick control method. Earlier studies have shown that host antibodies can circulate in the ticks, but it has not been confirmed whether these antibodies can be passed on to the eggs. We previously reported that ticks infesting rabbits immunized with a recombinant secretory ferritin of Haemaphysalis longicornis (HlFER2) had reduced egg production and hatching. Here we attempted to detect the presence of antibodies against HlFER2 in the ovary and eggs of female ticks through immunofluorescent visualization. Purified anti-HlFER2 antibodies or rabbit IgG for control was directly injected to engorged female H. longicornis. Ovaries and eggs after oviposition were collected and prepared for an indirect immunofluorescent antibody test. Positive fluorescence was detected in ovaries one day post-injection of anti-HlFER2 antibodies. Through silencing of

Hlfer2 gene, we also determined whether the injected antibodies can specifically bind to native HlFER2. Immunofluorescence was observed in the oocytes of dsLuciferase control ticks injected with anti-HlFER2 antibodies, but not in the oocytes of Hlfer2-silenced ticks also injected with anti-HlFER2 antibodies. Our current findings suggest that host antibodies can be passed on to the oocytes, which is significant in formulating a vaccine that can disrupt tick reproduction.

Full text available upon request to the author

Article title: Transcriptional activities of two newly identified Haemaphysalis longicornis tick–derived promoter regions in the Ixodes scapularis tick cell line (ISE6)

Authors: Kodai Kusakisako, Akiko Ido, Tatsunori Masatani, Melbourne R. Talactac, et al.

Publication title: Insect Molecular Biology 27(5), September 2017

Abstract:

Ticks are obligate hematophagous ectoparasites considered to be second to mosquitoes as vectors of human diseases and the most important vector for animals. Despite efforts to control tick infestations, they remain a serious health problem. Gene manipulation has been established in mosquitoes and led to the control of mosquito population and mosquito–borne pathogens. Therefore, gene manipulation could be useful for controlling ticks and tick–borne pathogens. To investigate effective gene expression vectors for ticks, the promoter activities of commercial plasmids were evaluated in a tick cell line (ISE6). The dual luciferase assays revealed that pmirGLO showed the highest activity in ISE6 cells among the tested plasmids. Moreover, we identified the promoter regions of the Haemaphysalis longicornis actin (HlAct) and the intracellular ferritin (HlFer1) genes. To construct a more effective expression vector for ticks, these promoter regions were inserted to the pmirGLO (pmirGLO–HlAct pro and pmirGLO–HlFer1 pro). The pmirGLO–HlAct pro showed significantly higher promoter activity than pmirGLO, while the pmirGLO–HlFer1 pro vector demonstrated significantly lower promoter activity than pmirGLO in ISE6 cells. The HlAct promoter region could have high promoter activity in ISE6 cells. The present study can contribute to the development of a genetic modification system in ticks.

Full text available upon request to the author

Article title: Synchronous Langat Virus Infection of Haemaphysalis longicornis Using Anal Pore Microinjection
Authors: Melbourne R. Talactac, Kentaro Yoshii, Emmanuel Hernandez, et al.
Publication title: Viruses 9(7), July 2017

Abstract:

The tick–borne encephalitis virus (TBEV) serocomplex of flaviviruses consists of arboviruses that cause important diseases in animals and humans. The transmission of this group of viruses is commonly associated with tick species such as Ixodes spp., Dermacentor spp., and Hyalomma spp. In the case of Haemaphysalis longicornis, the detection and isolation of flaviviruses have been previously reported. However, studies showing survival dynamics of any tick–borne flavivirus in H. longicornis are still lacking. In this study, an anal pore microinjection method was used to infect adult H. longicornis with Langat virus (LGTV), a naturally attenuated member of the TBEV serocomplex. LGTV detection in ticks was done by real–time PCR, virus isolation, and indirect immunofluorescent antibody test. The maximum viral titer was recorded at 28 days post-inoculation, and midgut cells were shown to be the primary replication site. The tick can also harbor the virus for at least 120 days and can successfully transmit LGTV to susceptible mice as confirmed by detection of LGTV antibodies. However, no transovarial transmission was observed from the egg and larval samples. Taken together, our results highly suggest that anal pore microinjection can be an effective method in infecting adult H. longicornis, which can greatly assist in our efforts to study tick and virus interactions.
Full text available upon request to the author

Article title: Characterization and antiviral activity of a newly identified defensin-like peptide, HEdefensin, in the hard tick Haemaphysalis longicornis
Authors: Emmanuel Hernandez, Melbourne R. Talactac, Yurika Yada, et al.
Publication title: Developmental and Comparative Immunology 68, November 2016

Abstract:

Tick defensins are antimicrobial peptides that play a major role in the innate immunity of ticks by providing a direct antimicrobial defense. In this study, we identified and characterized a defensin-like encoding gene, HEdefensin, from the expressed sequence tags (EST) database of hemolymph from the hard tick

Haemaphysalis longicornis. Expression of the gene in whole adult ticks and in different organs was upregulated during blood feeding, though not after Langat virus (LGTV) challenge. A synthetic HEdefensin peptide demonstrated significant virucidal activity against LGTV but not against an adenovirus in co-incubation virucidal assays. Moreover, the RNAi-mediated gene silencing of HEdefensin did not significantly affect the virus titer as compared to the control group. The data reported here have established the in vitro virucidal activity of the peptide against LGTV. However, its role in the innate antiviral immunity of H. longicornis remains to be explored, and further studies are needed to fully evaluate the potential biological activities of the peptide against bacteria, fungi or parasites.
Full text available upon request to the author

Article title: 2-Cys peroxiredoxin is required in successful blood-feeding, reproduction, and antioxidant response in the hard tick Haemaphysalis longicornis
Authors: Kodai Kusakisako, Remil Linggatong Galay, Melbourne R. Talactac, et al.
Publication title: Parasites & Vectors 9(1), August 2016

Abstract:
Ticks are obligate hematophagous arthropods that feed on vertebrate blood that contains iron. Ticks also concentrate host blood with iron; this concentration of the blood leads to high levels of iron in ticks. The host-derived iron reacts with oxygen in the tick body and this may generate high levels of reactive oxygen species, including hydrogen peroxide (H2O2). High levels of H2O2 cause oxidative stress in organisms and therefore, antioxidant responses are necessary to regulate H2O2. Here, we focused on peroxiredoxin (Prx), an H2O2-scavenging enzyme in the hard tick Haemaphysalis longicornis. Methods The mRNA and protein expression profiles of 2-Cys peroxiredoxin (HlPrx2) in H. longicornis were investigated in whole ticks and internal organs, and developmental stages, using real-time PCR and Western blot analysis during blood-feeding. The localization of HlPrx2 proteins in tick tissues was also observed by immunostaining. Moreover, knockdown experiments of HlPrx2 were performed using RNA interference to evaluate its function in ticks. ResultsReal-time PCR showed that HlPrx2 gene expression in whole ticks and internal organs was significantly upregulated by blood-feeding. However, protein expression, except in the midgut, was constant throughout blood-feeding. Knockdown of the HlPrx2 gene caused significant differences in the engorged body

weight, egg weight and hatching rate for larvae as compared to the control group. Finally, detection of H2O2 after knockdown of HlPrxs in ticks showed that the concentration of H2O2 significantly increased before and after blood-feeding. Conclusion Therefore, HlPrx2 can be considered important for successful blood-feeding and reproduction through the regulation of H2O2 concentrations in ticks before and after blood-feeding. This study contributes to the search for a candidate target for tick control and further understanding of the tick's oxidative stress coping mechanism during blood-feeding.

Full text available upon request to the author

Article title: Induction of gene silencing in Haemaphysalis longicornis ticks through immersion in double-stranded RNA

Authors: Remil Linggatong Galay, Melbourne R. Talactac, Hiroki Maeda, et al.

Publication title: Ticks and Tick-borne Diseases 7(5), April 2016

Abstract:

The continuous emergence of tick-borne diseases and chemical acaricide-resistant tick strains necessitates the development of new and more effective control strategies. RNA interference through the injection of double-stranded RNA (dsRNA) has been a very useful tool in tick research for evaluating gene function. However, this technique can be sophisticated due to the required equipment and technique. Here we studied the feasibility of an immersion technique to induce gene silencing in Haemaphysalis longicornis ticks. We targeted the Hlfer1 gene, previously shown to be crucial in successful blood feeding and reproduction. Larval, nymphal, and adult female H. longicornis ticks were immersed in Hlfer1 or Luciferase dsRNA for control. The dsRNA dissolving medium, incubation temperature and time were varied to establish the optimum conditions. RT-PCR was performed to confirm gene silencing. It was found that immersing the ticks in dsRNA dissolved in nuclease-free water at 15°C for 12h resulted in clear gene silencing. The phenotypes of adult ticks immersed in dsRNA were then compared with those of adult ticks injected with dsRNA. Similar to dsRNA injection, the post-blood meal weight of ticks immersed in Hlfer1 dsRNA was significantly lower than the control group. Moreover, high post-blood meal mortality and low egg output was observed both from ticks injected with and immersed in Hlfer1 dsRNA. Our results here suggest that immersion in dsRNA

can effectively induce gene silencing and not only offers an alternative method to dsRNA injection but also opens the possibility of applying dsRNA for tick control.
Full text available upon request to the author

Article title: Virucidal activity of Haemaphysalis longicornis longicin P4 peptide against tick-borne encephalitis virus surrogate Langat virus
Authors: Melbourne Talactac, Kentaro Yoshii, Hiroki Maeda, Kodai Kusakisako, et al.
Publication title: Parasites & Vectors 9(1), February 2016

Abstract:
Longicin is a defensin-like peptide, identified from the midgut epithelium of hard tick Haemaphysalis longicornis. Several studies have already shown the antimicrobial and parasiticidal activities of longicin peptide and one of its synthetic partial analogs, longicin P4. In this study, longicin peptides were tested for potential antiviral activity against Langat virus (LGTV), a tick-borne flavivirus. Longicin P1 and P4 peptides were chemically synthesized. Antiviral activity of the longicin peptides against LGTV was evaluated through in vitro virucidal assays, wherein the antiviral efficacy was determined by reduction in number of viral foci and virus yield. Additionally, longicin P4 was also tested for its activity against human adenovirus, a non-enveloped virus. Lastly, to assess the importance of longicin on the innate antiviral immunity of H. longicornis ticks, gene silencing through RNAi was performed. Longicin P4 produced significant viral foci reduction and lower virus yield against LGTV, while longicin P1 failed to demonstrate the same results. Conversely, both longicin partial analogs (P1 and P4) did not show significant antiviral activity when tested on adenovirus. In addition, longicin-silenced ticks showed significantly higher virus titer after 7 days post-infection but a significantly lower titer was detected after an additional 14 days of observation as compared to the Luc dsRNA-injected ticks. Mortality in both groups did not show any significant difference. Our results suggest that longicin P4 has in vitro antiviral activity against LGTV but not against a non-enveloped virus such as adenovirus. Likewise, though most cationic antimicrobial peptides like longicin act directly on target membranes, the exact mechanism of membrane targeting of longicin P4 in enveloped viruses, such as LGTV, requires further investigation. Lastly, while the in vitro virucidal capacity of longicin P4 was confirmed in this study, the role of the endogenous tick

longicin in the antiviral defense of H. longicornis against LGTV still remains to be demonstrated.

Full text available upon request to the author

Article title: Impaired cellular immune response to injected bacteria after knockdown of ferritin genes in the hard tick Haemaphysalis longicornis
Authors: Remil Linggatong Galay, Rie Takechi, Melbourne R. Talactac, et al.
Publication title: Parasitology International 65(3), January 2016

Abstract:
Iron is an indispensable element for most microorganisms, including many pathogenic bacteria. Iron-withholding is a known component of the innate immunity, particularly of vertebrate hosts. Ticks are vectors of multiple pathogens and reports have shown that they naturally harbor several bacterial species. Thus, tick innate immunity must be crucial in limiting bacterial population to tolerable level that will not cause adverse effects. We have previously characterized two types of the iron-binding protein ferritin (HlFER) in the hard tick Haemaphysalis longicornis, known to be a vector of some protozoan parasites and rickettsiae, and showed their antioxidant function and importance in blood feeding and reproduction. Here we examined the possible role of HlFERs in tick immunity against bacterial infection. After silencing Hlfer genes, adult ticks were injected with live enhanced green fluorescence protein-expressing Escherichia coli, and then monitored for survival rate. Hemolymph that included hemocytes was collected for microscopic examination to observe cellular immune response, and for E. coli culture to determine bacterial viability after injection in the ticks. The expression of some antimicrobial peptides in whole ticks was also analyzed by RT-PCR. Hlfer-silenced ticks had a significantly lower survival rate than control ticks after E. coli injection. Greater number of bacteria inside and outside the hemocytes and higher bacterial colony counts after culture with hemolymph were also observed in Hlfer-silenced ticks. However, no difference on the expression of antimicrobial peptides was observed. These results suggest that ferritin molecules might be important in the cellular immune response of ticks to some bacteria.

Full text available upon request to the author

Article title: A novel C-type lectin with triple carbohydrate recognition domains has critical roles for the hard tick Haemaphysalis longicornis against Gram-negative bacteria
Authors: Hiroki Maeda, Melbourne R. Talactac, Takeshi Miyata, et al.
Publication title: Developmental and Comparative Immunology 57, December 2015

Abstract:
C-type lectins (CLecs) play an important role in innate immunity against invaders. In this study, a novel CLec was identified from *Haemaphysalis longicornis* ticks (HlCLec). HlCLec contains a signal peptide and a transmembrane region. Interestingly, HlCLec possesses three dissimilar carbohydrate recognition domains (CRDs). Each CRD contains the mutated motif of Ca2+-binding site 2. *HlCLec* mRNA was up-regulated during blood feeding, and had highest expression in the midgut and ovary. HlCLec localization was also confirmed by immunofluorescent antibody test (IFAT). HlCLec was found on the cell membrane and basal lamina of midgut and ovary. In addition, the recombinant HlCLec and individual CRDs demonstrated direct binding activity to *Escherichia coli* and *Staphylococcus aureus*; however, no growth inhibition activity was observed. Furthermore, *E. coli* injection after silencing of *HlCLec* caused drastic reduction in survival rate of ticks. These results strongly suggest the key role of HlCLec in tick innate immunity against Gram-negative bacteria.
Full text available upon request to the author

Article title: Functional analysis of recombinant 2-Cys peroxiredoxin from the hard tick Haemaphysalis longicornis
Authors: T. Miyata, Melbourne R. Talactac, Remil Linggatong Galay, et al.
Publication title: Insect Molecular Biology 25(1), October 2015

Abstract:
Ticks are obligate haematophagous arthropods that feed on vertebrate blood containing high levels of iron. The host-derived iron reacts to oxygen in the tick's body, and then high levels of reactive oxygen species, including hydrogen peroxide (H2 O2), may be generated. High levels of H2 O2 cause oxidative stress to aerobic organisms. Therefore, antioxidant responses are necessary to control H2 O2 . We focused on peroxiredoxins (Prxs), H2 O2 -scavenging enzymes. The sequence of Haemaphysalis longicornis 2-Cys Prx (HlPrx2) was identified from fat body cDNA libraries of this tick and recombinant HlPrx2 was then prepared using Escherichia

coli. By comparison with the 2-Cys Prxs of other organisms, we found two conserved cysteines in HlPrx2, Cys51 and Cys172. We examined the antioxidant activity of HlPrx2 and mutant proteins produced by a single base substitution, converting one or both of these cysteines into serines. The assays revealed that proteins containing Cys51 showed antioxidant activity when H2 O2 was removed. Sodium dodecyl sulphate polyacrylamide gel electrophoresis and size-exclusion chromatography demonstrated that only the wild-type HlPrx2 formed homodimers and that all of the proteins that we made had a high molecular weight peak. These results indicate that both Cys51 and Cys172 are essential for the dimerization of HlPrx2, whereas only the Cys51 residue is necessary for antioxidant activity.

Full text available upon request to the author

Article title: Role of the tumor necrosis factor receptor-associated factor-type zinc finger domain containing protein 1 (TRAFD1) from the hard tick *Haemaphysalis longicornis* in immunity against bacterial infection

Authors: Rie Takechi, Hiroki Maeda, Melbourne R. Talactac, et al.

Publication title: Ticks and Tick-borne Diseases 7(1), August 2015

Abstract:

A tumor necrosis factor receptor-associated factor-type zinc finger domain containing protein 1 (TRAFD1) is a negative feedback regulator that controls excessive immune responses in vertebrates. The sequence of tick hemolymph TRAFD1 from the hard tick *Haemaphysalis longicornis* (HlTRAFD1) was analyzed after identification and cloning from the expressed sequence tag database. RT-PCR and Western blot analyses showed that HlTRAFD1 transcript and protein levels after blood feeding were present in all developmental stages, and the transcript level was consistently high in all organs examined from adult female ticks upon engorgement. Knockdown of *HlTRAFD1* gene by RNA interference did not affect blood feeding or oviposition. However, *HlTRAFD1* silencing affected the expression of the *longicin* gene, a defensin-like molecule, but not the lysozyme gene. Moreover, the survival rate of *HlTRAFD1*-silenced ticks was lower, and the number of *E. coli* was higher in the hemolymph and plasmatocytes after *E. coli* injection compared to the control group. These results suggested that HlTRAFD1 strongly affected both the humoral and cellular immunity of ticks.

Full text available upon request to the author

Article title: Antiviral Effects of Novel Herbal Medicine KIOM-C, on Diverse Viruses
Authors: Melbourne Talactac, Mohammed Y. E. Chowdhury, Min-Eun Park, Prasanna Weeratunga, et al.
Publication title: PLoS ONE 10(5), May 2015

Abstract:
In order to identify new potential antiviral agents, recent studies have advocated thorough testing of herbal medicines or natural substances that are traditionally used to prevent viral infections. Antiviral activities and the mechanism of action of the total aqueous extract preparation of KIOM-C, a novel herbal medicine, against diverse types of viruses were investigated. In vitro antiviral activity against A/Puerto Rico/8/34 (H1N1) (PR8), vesicular stomatitis virus (VSV), and Newcastle disease virus (NDV) through the induction of type-I interferon related protein phosphorylation and up-regulation of pro-inflammatory cytokines in murine macrophage cells (RAW264.7) were determined. In vivo, KIOM-C-treated BALB/c mice showed higher survivability and lower lung viral titers when challenged with A/Aquatic bird/Korea/W81/2005 (H5N2), A/PR/8/34(H1N1), A/Aquatic bird/Korea/W44/2005(H7N3) or A/Chicken/Korea/116 /2004(H9N2) influenza subtypes in contrast with the non-treated group. The present study revealed that total aqueous extract preparation of KIOM-C stimulates an antiviral state in murine macrophage cells and in mice leading to inhibition of viral infection and protection against lethal challenges.
Full text available upon request to the author

Article title: Identification of the Babesia-responsive leucine-rich repeat domain-containing protein from the hard tick Haemaphysalis longicornis
Authors: Hiroki Maeda, Koshi Kurisu, Melbourne R. Talactac, et al.
Publication title: Parasitology Research 114(5), February 2015

Abstract:
Haemaphysalis longicornis is a tick known for transmitting Babesia parasites, including Babesia gibsoni, in East Asian countries. The vector tick must have

strategies to control Babesia parasites, while Babesia parasites are also considered to establish an evasive mechanism from the tick's innate immunity. Due to this mutual tolerance, H. longicornis is considered to be a vector of Babesia parasites. Recent studies have shown the important roles of leucine-rich repeat (LRR) domain-containing proteins in innate immunity in many living organisms. Some LRR domain-containing proteins were identified in ticks; however, their functions are still unknown. In this study, a novel LRR domain-containing protein was identified from H. longicornis (HlLRR). HlLRR contains two LRR domains, and the expression levels of mRNA and proteins were upregulated during blood feeding, particularly in the salivary glands and midgut. In addition, recombinant HlLRR (rHlLRR) demonstrated growth inhibition activity against B. gibsoni in vitro without a hemolytic effect at any concentration used. Moreover, the diameters of Babesia merozoites treated with rHlLRR were significantly larger than those of the control group. These results strongly indicate the key roles of HlLRR in the tick's innate immunity against Babesia parasites. Furthermore, HlLRR might be a potential alternative drug to treat babesiosis.

Full text available upon request to the author

Article title: The Antiviral Effect of High-Molecular Weight Poly-Gamma-Glutamate against Newcastle Disease Virus on Murine Macrophage Cells

Authors: Melbourne R. Talactac, Jong-Soo Lee, Hojin Moon, et al.

Publication title: Advances in Virology 2014(2), December 2014

Abstract:

This study demonstrates the capacity of HM-γ-PGA treatment to significantly protect murine macrophage cells (RAW 264.7 cells) against NDV infection. Such protection can be explained by the induction of antiviral state of HM-γ-PGA in RAW 264.7 cells via TLR4-mediated IRF-3, IRF-7, IFN-β, and IFN-related gene induction as shown in time-dependent changes in mRNA expression confirmed by polymerase chain reaction (PCR). Moreover, the present research also showed that HM-γ-PGA can induce proinflammatory cytokine secretion in RAW 264.7 as measured by enzyme-linked immunosorbent assay (ELISA). Therefore, our findings suggest that HM-γ-PGA can be a potential antiviral substance that can inhibit NDV infection through its

stimulation of antiviral state on RAW 264.7 cells. These results have been consistent with the previous studies showing that HM-γ-PGA can protect RAW 264.7 cells and mice against influenza infection. However, it should be noted that although murine macrophage cells are susceptible to NDV, they are not the natural host cells of the virus; thus further in vivo and in vitro studies involving chicken and chicken immune cells are needed to fully assess the efficacy and applicability of HM-γ-PGA in the poultry industry.

Full text available upon request to the author

Article title: Induction of type I interferon by high-molecular poly-γ-glutamate protects B6.A2G-Mx1 mice against influenza A virus

Authors: Hojin Moon, Jong-Soo Lee, Melbourne Talactac, et al.

Publication title: Antiviral Research 94(1), February 2012

Abstract:

In addition to development of vaccines and synthetic antiviral drugs, recent studies have advocated the use of natural substances that inhibit or prevent viral infections. High-molecular-weight poly-γ-glutamate (HM-γ-PGA) produced by Bacillus subtilis chungkookjang was evaluated for anti-influenza virus activity. HM-γ-PGA induced type I interferons (IFNs), which in turn stimulated expression of Myxovirus resistant 1 protein and IFN-related proteins in vitro. In the B6.A2G-Mx1 mouse model, which mimics the innate immune system of humans, treatment with HM-γ-PGA enhanced the antiviral state of mice and protected them against highly pathogenic influenza A virus. Naturally synthesized HM-γ-PGA has potent anti-influenza activity and may be a useful means for control of influenza virus.

Full text available upon request to the author

Article title: The Highly Conserved HA2 Protein of the Influenza A Virus Induces a Cross Protective Immune Response.

Authors: Jong-Soo Lee, Mohammed Ye Chowdhury, Hojin Moon, Melbourne Talactac, et al.

Publication title: Journal of Virological Methods 194(1-2), September 2013

Abstract:

Existing influenza vaccines protect mostly homologous subtypes and acted most effectively only when well matched to the circulating strain. Immunization with an

updated vaccine is therefore necessary to maintain long-term protection and the development of a broadly protective influenza vaccine against the threat of pandemic outbreak. The highly conserved HA2 glyco-polypeptide (HA2 gp) is a promising new candidate for such an influenza vaccine. Helical domain and the fusion peptide (residues 15-137) of surface antigen from influenza A subtype A/EM/Korea/W149/06 (H5N1) was used to assess the potentiality of HA2 vaccination against multiple subtypes of the influenza viruses. The construct, named H5HA2 was expressed in Escherichia coli and allowed to refold from inclusion bodies. Purified proteins were used to investigate the immunogenicity of H5HA2 and its potential for cross protection. The immunization of mice with H5HA2 induced HA2 antibodies, HA2 specific T-cell responses, and protection against homologous A/EM/Korea/W149/06 (H5N1) influenza. Immunized mice were also protected from two distinct heterosubtypes of influenza: A/Puerto Rico/1/34(H1N1) and bird/Korea/w81/2005(H5N2). Results suggest that recombinant proteins based on the highly conserved residues within HA2 are candidates for the development of vaccines against pandemic outbreaks of emergent influenza variants.

Full text available upon request to the author

Article title: Hemolymph defensin from the hard tick Haemaphysalis longicornis attacks Gram-positive bacteria

Authors: Yurika Yada, Melbourne R. Talactac, Kodai Kusakisako, et al.

Publication title: Journal of Invertebrate Pathology 156, July 2018

Abstract:

Ticks are key vectors of some important diseases of humans and animals. Although they are carriers of disease agents, the viability and development of ticks are not harmed by the infectious agents due to their innate immunity. Antimicrobial peptides directly protect hosts against pathogenic agents such as viruses, bacteria, and parasites. Among the identified and characterized antimicrobial peptides, defensins have been considerably well studied. Defensins are commonly found among fungi, plants, invertebrates, and vertebrates. The sequence of the tick hemolymph defensin (HEdefensin) gene from the hard tick Haemaphysalis longicornis was analyzed after identification and cloning from a cDNA library. HEdefensin has a predicted molecular mass of 8.15 kDa including signal peptides and a theoretical isoelectric point of 9.48. Six cysteine residues were also identified in

the amino acids. The synthetic HEdefensin peptide only showed antibacterial activity against Gram-positive bacteria such as Micrococcus luteus. A fluorescence propidium iodide exclusion assay also showed that HEdefensin increased the membrane permeability of M. luteus. Additionally, an indirect fluorescent antibody test showed that HEdefensin binds to M. luteus. These results suggested that HEdefensin strongly affects the innate immunity of ticks against Gram-positive bacteria.

Full text available upon request to the author

Argel Bandala

Sex: Male

Education:

Doctor of Philosophy in Electronics and Communication Engineering, De La Salle University, 2015

Master of Science in Electronics and Communication Engineering, De La Salle University, 2011

Bachelor of Science in Electronics and Communications Engineering, Polytechnic University of the Philippines, 2008

Field of Specialization

Pattern Recognition

Image Recognition

Computational Intelligence

Mobile Robotics

Electronic Engineering

Artificial Neural Networks

Artificial Intelligence

Researches:

Article title: Swarming Algorithm for Unmanned Aerial Vehicle (UAV) Quadrotors: Swarm Behavior for Aggregation, Foraging, Formation, and Tracking

Authors: Argel Bandala, Elmer P. Dadios, Ryan Rhay P. Vicerra, Laurence A. Gan Lim

Publication title: Journal of Advanced Computational Intelligence and Intelligent Informatics 18(5):745-751, September 2014

Abstract:
This paper presents the fusion of swarm behavior in multi robotic system specifically the quadrotors unmanned aerial vehicle (QUAV) operations. This study directed on using robot swarms because of its key feature of decentralized processing amongst its member. This characteristic leads to advantages of robot operations because an individual robot failure will not affect the group performance. The algorithm emulating the animal or insect swarm behaviors is presented in this paper and implemented into an artificial robotic agent (QUAV) in computer simulations. The simulation results concluded that for increasing number of QUAV the aggregation accuracy increases with an accuracy of 90.62%. The experiment for foraging revealed that the number of QUAV does not affect the accuracy of the swarm instead the iterations needed are greatly improved with an average of 160.53 iterations from 50 to 500 QUAV. For swarm tracking, the average accuracy is 89.23%. The accuracy of the swarm formation is 84.65%. These results clearly defined that the swarm system is accurate enough to perform the tasks and robust in any QUAV number.
Full text available upon request to the author

Article title: Lettuce growth stage identification based on phytomorphological variations using coupled color superpixels and multifold watershed transformation
Authors: Ronnie Concepcion II, Jonnel Alejandrino, Sandy C. Lauguico, Rogelio Ruzcko Tobias, et al.
Publication title: International Journal of Advances in Intelligent Informatics 6(3): 261-277, November 2020

Abstract:
Identifying the plant's developmental growth stages from seed leaf is crucial to understand plant science and cultivation management deeply. An efficient vision-based system for plant growth monitoring entails optimum segmentation and classification algorithms. This study presents coupled color-based superpixels and multifold watershed transformation in segmenting lettuce plant from complicated background taken from smart farm aquaponic system, and machine learning models used to classify lettuce plant growth as vegetative, head development and for harvest based on phytomorphological profile. Morphological computations were employed by feature extraction of the number of leaves, biomass area and perimeter, convex area, convex hull area and perimeter, major and minor axis lengths of the

major axis length the dominant leaf, and length of plant skeleton. Phytomorphological variations of biomass compactness, convexity, solidity, plant skeleton, and perimeter ratio were included as inputs of the classification network. The extracted Lab color space information from the training image set undergoes superpixels overlaying with 1,000 superpixel regions employing K-means clustering on each pixel class. Six-level watershed transformation with distance transformation and minima imposition was employed to segment the lettuce plant from other pixel objects. The accuracy of correctly classifying the vegetative, head development, and harvest growth stages are 88.89%, 86.67%, and 79.63%, respectively. The experiment shows that the test accuracy rates of machine learning models were recorded as 60% for LDA, 85% for ANN, and 88.33% for QSVM. Comparative analysis showed that QSVM bested the performance of optimized LDA and ANN in classifying lettuce growth stages. This research developed a seamless model in segmenting vegetation pixels, and predicting lettuce growth stage is essential for plant computational phenotyping and agricultural practice optimization.
Full text available upon request to the author

Article title: Gabor-enhanced histogram of oriented gradients for human presence detection applied in aerial monitoring
Authors: Anton Louise De Ocampo, Argel Bandala, Elmer P. Dadios
Publication title: International Journal of Advances in Intelligent Informatics 6(3):223, November 2020

Abstract:
In UAV-based human detection, the extraction and selection of the feature vector are one of the critical tasks to ensure the optimal performance of the detection system. Although UAV cameras capture high-resolution images, human figures' relative size renders persons at very low resolution and contrast. Feature descriptors that can adequately discriminate between local symmetrical patterns in a low-contrast image may improve a human figures' detection in vegetative environments. Such a descriptor is proposed and presented in this paper. Initially, the acquired images are fed to a digital processor in a ground station where the human detection algorithm is performed. Part of the human detection algorithm is the GeHOG feature extraction, where a bank of Gabor filters is used to generate textured images from the original. The local energy for each cell of the Gabor images is calculated to identify the

dominant orientations. The bins of conventional HOG are enhanced based on the dominant orientation index and the accumulated local energy in Gabor images. To measure the performance of the proposed features, Gabor-enhanced HOG (GeHOG) and other two recent improvements to HOG, Histogram of Edge Oriented Gradients (HEOG) and Improved HOG (ImHOG), are used for human detection on INRIA dataset and a custom dataset of farmers working in fields captured via unmanned aerial vehicle. The proposed feature descriptor significantly improved human detection and performed better than recent improvements in conventional HOG. Using GeHOG improved the precision of human detection to 98.23% in the INRIA dataset. The proposed feature can significantly improve human detection applied in surveillance systems, especially in vegetative environments.
Full text available upon request to the author

Article title: Metaheuristic Optimization of Ammonia Factor as a Eutrophication Pollution Emission Descriptor for Trophic State Stability
Authors: Ronnie Concepcion II, Sandy C. Lauguico, Argel Bandala, Jonnel Alejandrino, et al.
Publication title: International Journal of Environmental Science and Development 11(10):460-470, October 2020

Abstract:
Aquaponic toxicity relies on the combinations of its pollution parameters that are dissolved in water and emitted in air. Ammonia is considered as an important indicator affecting aquaculture species, water nutrient imbalance and air pollution. Trophic state of aquatic body is measured by ammonia. In this study, the suitability of metaheuristic models, namely, genetic algorithm, simulated annealing, water cycle algorithm, enhanced vibrating particles system and particle swarm optimization, in determining the optimum condition of ammonia factor for providing minimal toxicity and oligotrophication was determined by varying its corresponding hyperparameters. The parameters that were optimized are water temperature and pH level. These parameters significantly affect ammonia factor that is an essential contributor to eutrophication. The optimized genetic algorithm yielded the practical-ideal fitness function value for ammonia factor as to compare with other optimized metaheuristics based on optimizing time. It selected the 50 fittest individuals based on their fitness score with the rate of 0.2 and proceeds to

recombination process to extract characteristics from parent chromosomes with crossover rate of 0.8. The mutation rate of 0.01 was injected to form diversity and to test if the global solution was attained. The tournament size is 4 and the reproduction elite count is 2.5. The best condition of the ammonia factor was extracted when the number of generations has been reached. The GA results showed that the optimum condition for ammonia factor that will prevent eutrophication and provide ecological balance in aquaponic system needs a temperature of 29.254 °C and pH of 7.614.

Full text available upon request to the author

Article title: A Machine Learning Approach of Lattice Infill Pattern for Increasing Material Efficiency in Additive Manufacturing Processes

Authors: Argel Bandala, Jonnel Alejandrino, Ronnie Concepcion II, Sandy C. Lauguico, Rogelio Ruzcko Tobias, et al.

Publication title: International Journal of Mechanical Engineering and Robotics Research 9(9), September 2020

Abstract:

Additive Manufacturing (AM) has become ubiquitous in manufacturing three-dimensional objects through 3D printing. Traditional analytical models are still widely utilized for low – cost 3D Printing, which is deficient in terms of process, structure, property and performance relationship for AM. This paper focuses on the introduction of a new infill pattern – the lattice infill to increase material efficiency of 3D prints, coupled with Machine Learning (ML) technique to address geometric corrections in modelling the shape deviations of AM. Encompassed by ML algorithms, the neural network (NN) is used to handle the large dataset of the system. The 3D coordinates of the proposed infill pattern are extracted as the input of the NN model. The optimization technique of scaled conjugate gradient (SCG) is the algorithm used to train the feedforward ANN, and sigmoidal function was used as the activation type for output neurons. There is 0.00776625 cross-entropy (CE) performance and 98.8% accuracy during network training. The trained network is implemented to STL file for geometric corrections of the lattice infill pattern then made in a 3D printer slicing software. Conventional designs such as the cubic and grid infill pattern were also made for comparison. Engineering simulation software were used to simulate all three infill patterns, to measure approximate product

weight, stress performance and displacement, given that there is an external force applied. Comparisons showed that the new infill pattern is more efficient than conventional infill patterns saving material up to 61.3%. Essentially increasing the amount of prints produced per spool by 2.5 times. The structure of the proposed design can also resist up to 1.6kN of compressive load prior to breaking.
Full text available upon request to the author

Article title: Prediction of Cultivation Period and Canopy Area in Lettuce Using Multi- Temporal Visible RGB-Based Vegetation Indices and Computational Intelligence
Authors: Ronnie Concepcion II, Elmer P. Dadios, Argel Bandala, Edwin Sybingco
Publication title: International Journal of Advanced Science and Technology 29(7):12600-12625, July 2020

Abstract:
Crop growth monitoring is a manifestation of precision cultivation that demands efficient nondestructive computational phenotyping. Vegetation index (VI) plays important role in addressing the issue of vision-based crop phenotyping as the color transformation it exhibits correspond to pattern of phytomorphological descriptors of crops by enhancing vegetation properties. This study deals with predicting the cultivation period in terms of weeks after germination (WAG) and photosynthetic canopy area in mm2 based on extracted RGB-based vegetation indices from digital imagery. In this paper, computational phenotyping was employed through combined machine learning and deep learning models. The morphotype used in this study is loose-leaf lettuce and the employed complete crop life cycle is ten weeks from germination to harvesting that all happens inside a close environment microclimatic chamber with aquaponics as the cultivation technology. Multi-temporal approach of image collection was performed by capturing 30 sample lettuces every week for ten consecutive weeks using digital camera that is oriented directly downward over 12 inches stand. 15 RGB-based VIs were extracted from each image and subjected to multidimensional reduction to avoid overfitting using hybrid neighborhood component analysis (NCA), principal component analysis (PCA) and classification tree (CT). ResNet101, InceptionV3 and MobileNetV2 deep learning models, and Naïve Bayes (NB), linear discriminant analysis (LDA) and K-nearest neighbors (KNN) machine learning models were experimented to predict cultivation

period. Bayesian regression neural network, regression tree and ensemble regression machine learning models were used to predict canopy area using selected RGB-based indices, namely normalized difference index (NDI), color index of vegetation extraction (CIVE), excess green minus excess red index (ExGR), vegetative index (VEG), combined indices 1 (COM1) and green minus blue index (GBI). The optimized models showed that ResNet101 with RGB color space yield the best results in cultivation period prediction with accuracy of 86.04% and coefficient of determination of 0.9211. The regression tree model with combination of NDI, CIVE, ExGR, VEG, COM1 and GBI vegetation indices in predicting canopy area resulted to a percentage difference of 0.48% and coefficient of determination of 0.8178. Thus, the developed model is highly practical and efficient for visible RGB-based imagery in crop phenotyping

Full text available upon request to the author

Article title: Environmental impact prediction of microalgae to biofuels chains using artificial intelligence: A life cycle perspective

Authors: Andres Philip Mayol, Argel Bandala, Jayne Lois San Juan, Edwin Sybingco, et al.

Publication title: IOP Conference Series Earth and Environmental Science 463:012011, April 2020

Abstract:

Biofuels derived from microalgae is an emerging technology that can supply fuel demand and alleviate greenhouse gas emissions. However, exclusively producing biofuels from microalgae remains to be commercially unsustainable because of its high investment and operating costs. A promising opportunity to address this are algal bio-refineries. Nonetheless, there is still a need to verify the environmental sustainability of this system along its entire process chain, from raw material acquisition to end-of-life. This study utilizes a life-cycle perspective approach to assess the sustainability of the algal bio-refinery and developed environmental impact prediction model using artificial intelligence, particularly adaptive neuro fuzzy inference system. Results will indicate the environmental impacts of a bio-refinery system identifying its major hotspots on different environmental impact categories. Results show that in the investigated proposed algal bio-refinery, the transesterification process had a huge contribution on the overall environmental

impact having over 51.5 % of the total weight. In addition, ANFIS results showed the correlation of input parameters with respect to the environmental impact of the system. The model also indicated that there is a perfect correlation between the two parameters. The model and its accuracy should be further validated with the use of real data.

Full text available upon request to the author

Article title: Tomato Growth Stage Monitoring for Smart Farm Using Deep Transfer Learning with Machine Learning-based Maturity Grading
Authors: Robert de Luna, Elmer P. Dadios, Argel Bandala, Ryan Rhay P. Vicerra
Publication title: Agrivita 42(1), February 2020

Abstract:

The tomato farming industry needs to adopt new ideas in applying the technology for its growth monitoring and main. Machine vision and image processing techniques have become useful in the increasing need for quality inspection of fruits, particularly, tomatoes. This paper deals with the design and development of a computer-vision monitoring system to assess the growth of tomato plants in a chamber by detecting the presence of flowers and fruits. The system also provides maturity grading for the tomato fruit. Two pre-trained deep transfer learning models were used in the study for the detection of flowers and fruits, namely, the Regional-based Convolutional Neural Network (R-CNN) and the Single Shot Detector (SDD). Maturity classification of tomato fruits are implemented using the Artificial Neural Network (ANN), K-Nearest Neighbors (KNN), and the Support Vector Machine (SVM). Evaluation results show that for the detection of flowers and fruits, the over-all accuracy of the R-CNN is 1.67% for flower detection and 19.48% for the fruit detection while SSD registered 100% and 95.99% for flower and fruit detection respectively. In the machine learning for maturity grading, SVM produced the training-testing accuracy rate of 97.78%-99.81%, KNN with 93.78%-99.32%, and ANN with 91.33%-99.32%.

Full text available upon request to the author

Article title: Object Detection in X-ray Images Using Transfer Learning with Data Augmentation
Authors: Reagan L. Galvez, Elmer P. Dadios, Argel Bandala, Ryan Rhay P. Vicerra

Publication title: International Journal on Advanced Science and Engineering and Information Technology9(6):2147-2153, December 2019

Abstract:
Object detection in X-ray images is an interesting problem in the field of machine vision. The reason is that images from an X-ray machine are usually obstructed with other objects and to itself, therefore object classification and localization is a challenging task. Furthermore, obtaining X-ray data is difficult due to an insufficient dataset available compared with photographic images from a digital camera. It is vital to easily detect objects in an X-ray image because it can be used as decision support in the detection of threat items such as improvised explosive devices (IED's) in airports, train stations, and public places. Detection of IED components accurately requires an expert and can be achieved through extensive training. Also, manual inspection is tedious, and the probability of missed detection increases due to several pieces of baggage are scanned in a short period of time. As a solution, this paper used different object detection techniques (Faster R-CNN, SSD, R-FCN) and feature extractors (ResNet, MobileNet, Inception, Inception-ResNet) based on convolutional neural networks (CNN) in a novel IEDXray dataset in the detection of IED components. The IEDXray dataset is an X-ray image of IED replicas without the explosive material. Transfer learning with data augmentation was performed due to limited X-ray data available to train the whole network from scratch. Evaluation results showed that individual detection achieved 99.08% average precision (AP) in mortar detection and 77.29% mAP in three IED components.
Full text available upon request to the author

Article title: Size Classification of Tomato Fruit Using Thresholding, Machine Learning, and Deep Learning Techniques
Authors: Robert de Luna, Elmer P. Dadios, Argel Bandala, Ryan Rhay P. Vicerra
Publication title: Agrivita 41(3), October 2019

Abstract:
The size of tomato fruits is closely related to the market segment and price. Manual sorting in tomato is very dependent on human interpretation and thus, very prone to error. The study presents thresholding, machine learning, and deep learning techniques in classifying the tomato as small, medium, and large based from a single

tomato fruit image implemented using Open CV libraries and Python programming. Tomato images with different sizes are gathered where features like area, perimeter, and enclosed circle radius are extracted. The experiment shows that using thresholding, a classification accuracy of 85.83%, 65.83%, and 80% was achieved for area, perimeter, and enclosed circle radius, respectively. For machine learning, the training accuracy rates were recorded as 94.00%-95.00% for SVM, 97.50-92.50% for KNN and 90.33-92.50% for ANN. Comparison of models revealed that SVM is the most model without over fitting. The deep learning approach, regardless of the algorithm, produced low performances with 82.31%-78.21%-55.97% training-validation-testing accuracy for VGG16, 48.17%-41.44%-37.64% for InceptionV3, and 56.05%-44.96%-22.78% for ResNet50 models. Comparative analysis showed that machine learning technique bested the performance of the thresholding and deep learning techniques in classifying the tomato fruit size in terms of accuracy performance.

Full text available upon request to the author

Article title: Computer vision performance metrics evaluation of object detection based on Haar-like, HOG and LBP features for scale-invariant lettuce leaf area calculation

Authors: Pocholo James Loresco, Argel Bandala, Alvin B. Culaba, Elmer P. Dadios

Publication title: International Journal of Engineering and Technology 7(4):4866-4872, February 2019

Abstract:

Leaf area can be used as a growth parameter as such it increases as the stage of lettuce progresses. Consideration of scale invariance in estimating the area poses challenging machine vision problems in a smart farm setup. To address this, a marker with a known area is utilized for the system for normalizing area measurements. This study proposes an automated object detection (marker) using Viola-Jones algorithm that uses Haar-like, HOG and LBP features. Performances of the system using each feature at varying illuminations and distances are then compared. Based on the result of this study, the highest performance in general, based on accuracy, precision, and false positive rate is achieved using HOG features.

Full text available upon request to the author

Article title: Utilization of the Physicomimetics Framework for Achieving Local, Decentralized, and Emergent Behavior in a Swarm of Quadrotor Unmanned Aerial Vehicles (QUAV)
Authors: Argel Bandala, Reiichiro Christian S. Nakano, Ryan Rhay P. Vicerra, Laurence A. Gan Lim, et al.
Publication title: Journal of Advanced Computational Intelligence and Intelligent Informatics 21(2): 181-188, March 2017

Abstract:
This paper presents the implementation of the physicomimetics framework in governing the behavior of a swarm of quadrotors. Each quadrotor uses only local information about itself and the neighboring quadrotors to determine its own movement by applying the principles of physicomimetics. Through these localized and relatively simple interactions, the swarm of quadrotors was able to organize itself into various structures and exhibit different swarm behaviors such as aggregation, obstacle avoidance, lattice formation, and dispersion.
Full text available upon request to the author

Article title: Smoothed Particle Hydrodynamics Approach to Aggregation of Quadrotor Unmanned Aerial Vehicle Swarm
Authors: Argel Bandala, Jose Martin Maningo, Ryan Rhay P. Vicera, Laurence A. Gan Lim, et al.
Publication title: Journal of Advanced Computational Intelligence and Intelligent Informatics 21(2):181-188, March 2017

Abstract:
This paper uses a fluid mechanics approach to perform swarming aggregation on a quadrotor unmanned aerial vehicle (QUAV) swarm platform. This is done by adapting the Smoothed Particle Hydrodynamics (SPH) technique. An algorithm benchmarking is conducted to see how well SPH performs. Simulations of varying set-ups are experimented to compare different algorithms with SPH. The position error of SPH is 30% less than the benchmark algorithm when a target enclosure is introduced. SPH is implemented using Crazyflie quadrotor swarm. The aggregation behavior exhibited successfully in the said platform.
Full text available upon request to the author

Article title: Implementation of Swarm Social Foraging Behavior in Unmanned Aerial Vehicle (UAV) Quadrotor Swarm
Authors: Argel Bandala, Gerard Ely Ucab Faelden, Ryan Rhay P. Vicerra, Laurence A. Gan Lim, et al.
Publication title: Journal of Advanced Computational Intelligence and Intelligent Informatics 21(2): 197-204, March 2017

Abstract:
One of the novel approaches in multiple quadrotor control is swarm robotics. It aims to mimic social behaviors of animals and insects. This paper presents the physical implementation of the swarm social foraging behavior in unmanned aerial vehicle quadrotors. To achieve this, it first explores the basic behavior of aggregation. It is implemented over a quadrotor swarm test-bed that makes use of external motion capture cameras. The completed algorithm makes use of the artificial potential function model combined with the environment resource profile model. Results show successful demonstration of the social foraging algorithm with minimal error in position. Also, the proposed algorithm's performance presents an increase in aggregation speed and time as the number of swarm member increases.
Full text available upon request to the author

Article title: Development of a flexible serpentine robot for disaster surveillance operations
Authors: Argel Bandala, John William F. Orillo
Publication title: Jurnal Teknologi 78(5-9), May 2016

Abstract:
This paper presents the development of a snake robot with vision system. This can be used for disaster aid and lessen the danger that the rescuers may encounter. The design of the snake robot considers the use of its own body segments for motion using rectilinear motion rather than using wheels. The use of segments enables the snake to move on flat and uneven terrain. Servo motors will be used for the movement of each joint and it will be powered by a lithium-polymer battery. Accelerometers and gyroscopes will serve as the input and orientation sensors, a head-mounted camera will be used to detect its location and where it is moving. An Arduino Pro Mini will be used for the controller and will be configured to receive commands from an XBee wireless transmission transceiver from the base computer.

A graphical user interface in a base computer will serve as the interface of the robot's operator and the robot. Its main movement will be based on a biological snake's rectilinear motion which is embedded in the robot's control system.
Full text available upon request to the author

Article title: Dynamic Aggregation Method for Target Enclosure Using Smoothed Particle Hydrodynamics Technique – An Implementation in Quadrotor Unmanned Aerial Vehicles (QUAV) Swarm –
Authors: Argel Bandala and Elmer P. Dadios
Publication title: Journal of Advanced Computational Intelligence and Intelligent Informatics XX(1):84-91, January 2016

Abstract:
This paper presents an aggregation behavior derived from fluid characteristics by adapting Smoothed Particle Hydrodynamics (SPH) Technique. The most basic behavior in a swarm-like system is aggregation. The essential requirement of a swarm is to aggregate or collect itself in proximity to a singular point in order to execute higher level swarm behaviors. The aggregation behavior is further put into use by initiating a near convergence status in a single target enclosing it by the swarm with a given specific distance by using different fluid containers. In this paper, there are three fluid containers each is introduced with different characteristics. These containers are plane, spherical and toroidal containers. Using computer simulations with different trials, the proponents were able to determine the accuracy of containing the swarm elements in a desirable area. Furthermore, the ability of the swarm to maintain collectiveness is tested. The experiment results showed that the plane fluid container yielded an accuracy of 84.88%. A spherical fluid container displayed an accuracy of 95.23%. And using toroidal particle container showed an accuracy of 92.44%.
Full text available upon request to the author

Article title: Dynamic Rate Allocation Algorithm Using Adaptive LMS End-to-End Distortion Estimation for Video Transmission over Error Prone Network
Authors: Argel Bandala, Angelo Rejaba dela Cruz, Ryan Rhay P. Vicerra, Elmer P. Dadios
Publication title: Journal of Advanced Computational Intelligence and Intelligent Informatics XX(1):106-110

Abstract:
Because of the inherent trade-off between source distortion and channel distortion in video transmission systems, joint optimization between bit-rate and distortion is still a challenging task. In this paper, we propose a method where the bit-rate allocation between source and channel encoder is controlled by the estimated end-to-end distortion at the encoder. The distortion estimation scheme is based on the adaptive forward linear predictor using least-mean square (LMS) algorithm. The forward predictor used the past values of actual end-to-end distortion to estimate the current distortion. The results show good estimate of end-to-end distortion and the proposed scheme improves video quality as compared to a standard rate control of H.264/AVC. The proposed scheme dynamically allocates the source encoder bits based on the estimated distortion.
Full text available upon request to the author

Article title: Swarm Robot System for Underwater Communication Network
Authors: Argel Bandala, Ryan Rhay P. Vicerra, Elmer P. Dadios, Laurence A. Gan Lim
Publication title: Journal of Advanced Computational Intelligence and Intelligent Informatics 18(5):769-775, September 2014

Abstract:
This paper presents a swarm robot simulator for implementing underwater wireless communication network. Swarm intelligence is based on the collective behavior of social insects and animals such as ants, bees and others. In this paper, swarm was applied to overcome the challenges of transmitting data in a large underwater environment. A robot considered to be a member of the swarm acts as a simple "physical" carrier of the data, it moves until they converge and manage to form a link connecting the data transmitter and receiver. The system is developed, simulated and tested using a coded simulator.
Full text available upon request to the author

Article title: Synchronized Dual Camera Vision System for Locating and Identify Highly Dynamic Objects
Authors: Noel Gunay, Argel Bandala, Elmer P. Dadios, Ryan Rhay P. Vicerra, et al.

Publication title: Journal of Advanced Computational Intelligence and Intelligent Informatics 18(5): 776-783, September 2014

Abstract:
This paper presents machine vision for locating and identifying 23 highly dynamic objects on 4.4 meters by 2.8 meters micro robot soccer playing field. The approach is based from the idea that the two camera vision subsystems should be synchronized and well informed in real time of the combined vision data and a selection of objects to track under each other's camera view. A measure of effectiveness on using incremental tracking for two-camera operation is developed and is used to evaluate the introduced approach through experimentation. A real-time visualization of the whole playfield containing the 22 micro robots and a golf ball is also provided for the system operator to validate the objects' actual poses with the vision system's measurements. Results show that the proposed technique is very fast, accurate, reliable, and robust to external disturbances
Full text available upon request to the author

Papers Presented:

Article title: Tomato Septoria Leaf Spot Necrotic and Chlorotic Regions Computational Assessment Using Artificial Bee Colony-Optimized Leaf Disease Index
Authors: Ronnie Concepcion II, Sandy C. Lauguico, Elmber P. Dadios, Argel Bandala, et al.
Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:
Visual inspection of plant health status and disease severity may yield subjective assessments due to error-prone sphere of colors and textures as affected by angular photosynthetic light source and the complexity of chlorosis. Quantification of damages on leaves due to destructive diseases is paramount for plant and pathogen interactions. To address this challenge, the proposed solution is the integration of computer vision and computational intelligence for tomato Septoria leaf spot necrotic and chlorotic region computational assessment. Dataset contains healthy and diseased tomato leaves that were captured individually. Non-vegetation pixels removal was done using CIELab color space. RGB color components and five

Haralick texture features were extracted from the segmented leaf. Hybrid neighborhood component analysis and ReliefF algorithm were employed to select the important predictors resulting to RGB-entropy vector. A new tomato leaf disease index (tomLDI) optimized using artificial bee colony (ABC) was developed by normalizing visible red reflectance, and introducing red-green and red-blue reflectance ratios to enhance Septoria leaf spots pixels and reducing sensitivity to healthy green pixels. KNN bested classification tree, linear discriminant analysis and Naïve Bayes in detecting Septoria leaf disease with accuracy of 97.46%. Deep transfer image regression was tested using raw infected leaf images and the tomLDI transformed colored channels through MobileNetV2, ResNet101 and InceptionV3. Using tomLDI channel, MobileNetV2 and ResNet101 bested other networks in estimating leaf diseased region percentage and number of Septoria spots with R 2 values of 0.9930 and 0.9484 respectively. tomLDI channel proved to be more accurate than using raw images for regression.

Full text available upon request to the author

Article title: Genetic Algorithm-Based Visible Band Tetrahedron Greenness Index Modeling for Lettuce Biophysical Signature Estimation

Authors: Ronnie Concepcion II, Sandy C. Lauguico, Rogelio Ruzcko Tobias, Argel Bandala, Elmer P. Dadios, et al.

Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:

Lightness signal and color reflectance constitute the reflected luminance spectra from camera captured image to camera lenses. The intensity of lightness and visible RGB signals deviates as the camera distance to object varies. The presence of uneven distribution of photosynthetic light causes angular light effect of shadowing on the focal object and light emitting objects placed on the visually noisy background added a challenge in materializing an efficient greenness index for crop phenotyping. The proposed method in this study compensates excessive relative brightness on the image by introducing lightness rectification coefficient and employing genetic algorithm to derive a novel visible tetrahedron greenness index (gvTeGI) based on normalized green waveband. Hybrid neighborhood component analysis and Pearson's correlation coefficient approach for feature selection resulted to retaining photosynthetic canopy area, and correlation and homogeneity texture

features as highly important descriptors for biophysical signatures considered in this study which are lettuce fresh weight, height and number of spanning leaves. The selection, crossover and mutation rates used to optimize the genetic algorithm model are 0.2, 0.8 and 0.01 respectively. Indoor and outdoor aquaponic system was deployed for 6-week full crop life cycle cultivation. Regression machine learning models were used to estimate biophysical signatures from extracted gvTeGI channels. Optimized Gaussian processing regression model bested regression support vector machine and regression tree in estimating fresh weight, height and number of spanning leaves with R 2 values of 0.7939, 0.7662 and 0.7446. The proposed gvTeGI proved to be more accurate than previously published greenness index for the estimation of biophysical signatures of lettuce using consumer-grade RGB camera.

Full text available upon request to the author

Article title: Adaptive Compensator of Magnetic Levitation System using Symbolic Regression

Authors: Maria Gemel B. Palconit, Rizaldo B. Fuentes, Wilen Melsedec Oficiar Narvios, Argel Bandala, et al.

Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:

The tuning process for a magnetic levitation to control the object's gap from the electromagnet is laborious and demands immense effort to obtain an adaptive PID compensator. Hence, this study has schemed an unexplored adaptive feedforward compensator for a 1-DOF maglev system using equation search based on a symbolic regression through an evolutionary algorithm. Results have shown an exceptional accuracy with an r 2 of 0.9997, almost zero root mean square error (RMSE) and mean absolute error (MAE). The approach has paved the way for an adaptive nonlinear system requiring a highly accurate model with a baseline dataset containing few modifiable parameters.

Full text available upon request to the author

Article title: Towards Tracking: Investigation of Genetic Algorithm and LSTM as Fish Trajectory Predictors in Turbid Water

Authors: Maria Gemel B. Palconit, Vincent Jan Dela Cruz Almero, Marife Rosales, Edwin Sybingco, Argel Bandala, et al.

Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:
Monitoring the dynamics of fish behavior is impactful both in the research for fisheries and aquaculture production. One of the most explored approaches to monitor the fish is tracking-by-detection along with computer vision. Presently, there are several challenges in this field, including underwater environment conditions and fish movement complexity. This study presents an initial investigation towards tracking the fish by predicting the trajectory 2D coordinates of fish from the sequential sampled frames in underwater videos. Here, the authors explored the Genetic Algorithm based on natural evolution selection and the Long Short-Term Memory (LSTM) algorithm. Results have shown tolerable trajectory prediction inaccuracies using the GA and LSTM. Specifically, it obtained the Mean Absolute Percentage Error at 2.8% to 30.5% and 3.33% to 17.74% for GA and LSTM, respectively. These results have allowed the authors and researchers to extend its study towards tracking the fish using these approaches.
Full text available upon request to the author

Article title: Hybrid Tree-Fuzzy Logic for Aquaponic Lettuce Growth Stage Classification Based on Canopy Texture Descriptors
Authors: Rogelio Ruzcko Tobias, Matt Ervin Gatchalian Mital, Ronnie Concepcion II, Argel Bandala, et al.
Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:
Lettuce is one of the most popular crops for urban farming because it is easy to grow and it has high nutritional value. Moreover, it is adaptable and can be combined with other food options, or it can be eaten alone without too much preparation. Predicting lettuce growth can be crucial to find the optimum maturity and harvest time. This paper proposed to use a model of a hybrid tree-fuzzy logic approach, the classification tree was used to select the most significant features from the texture features then the fuzzy inference system was utilized in predicting the lettuce growth stage classification. The hybrid system produced accurate results with low percentage error and correct classifications. Based on these results, the most accurate prediction can be observed in the head development growth stage; the harvest growth stage has a slight variance, while the vegetative stage has the most variance.

Overall, the trained hybrid system is reliable in predicting and identifying lettuce growth stage classification.
Full text available upon request to the author

Article title: Design of A Nutrient Film Technique Hydroponics System with Fuzzy Logic Control
Authors: John Carlo Velasco Puno, Jenskie Jerlin I. Haban, Jonnel Alejandrino, Argel Bandala, et al.
Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:
This study presents the design and development of a nutrient film technique hydroponics system for lettuce. Hydroponics is a method of cultivating crops with the use of water with nutrient solutions as medium. This nutrient film technique hydroponics system was built as an alternative to traditional farming that requires a lot of space. This system can produce a good number of crops without consuming large land area. The system also features monitoring of the key parameters needed for by the crop to survive. A fuzzy logic control will also be used to maintain the level of the parameters. Data from the sensors for measuring electrical conductivity, pH, and as well as the water level of the mixing tank will be the input of the fuzzy logic and will control the pumps of fresh water and nutrient concentrate reservoir, and the drain of the mixing tank. The optimum values for electrical conductivity, pH, water flow rate, and temperature were all based on the existing studies that also cultivate lettuce as their primary crop.
Full text available upon request to the author

Article title: Fuzzy Irrigation System with Rain Detection and Fertilizer Control
Authors: Michael Pareja and Argel Bandala
Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:
Irrigation is essential for growing crops and leads to gradual growth in the economy. This research proposal aims to resolve the issue of scarcity and proper water management in the tank system through the Fuzzy Irrigation System. Fuzzy logic improves the irrigation system that includes three input parameters, such as soil moisture, soil temperature, and the water level. The combinations of these

parameters will produce the time duration to have an efficient flow of water to the crop fields. Likewise, the Rain Detection Model (RDM) and the Fertilizer Control Model (FCM) are other features that support, strengthen, and innovate the system. The pilot test conducted by the researcher through MATLAB simulations were performed to check the effectiveness of the proposed system before its actual implementation.

Full text available upon request to the author

Article title: Grape Leaf Multi-disease Detection with Confidence Value Using TransfLearning Integrated to Regions with Convolutional Neural Networks

Authors: Sandy C. Lauguico, Ronnie Concepcion II, Argel Bandala, Rogelio Ruzcko Tobias, et al.

Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:

Identifying variant diseases in leaves is a significant method for optimizing food production. As the global population continues to arise and agricultural space continues to decline, every possible way of increasing the supply of food in any given condition and limited resources will address the above-mentioned problems. This study proposes a way for detecting three different diseases from grape leaves apart from the healthy leaves and considers the confidence value of the system in correctly identifying the classes. The diseases are namely: Black Rot, Black Measles, and Isariopsis. The system conducted a comparative analysis to determine which among the three pre-trained networks, AlexNet, GoogLeNet, and ResNet-18 will be the most suitable network to be integrated with Regions with Convolutional Neural Networks (RCNN) in performing multiple object detection in a given image. The data used in training the models comprised of annotated image data represented as a ground truth table with image files and their corresponding bounding boxes coordinates. The models evaluated resulted to AlexNet being the best pre-trained network to be working on the RCNN with an accuracy of 95.65%. The other two models from GoogLeNet and ResNet-18 only obtained accuracies of 92.29% and 89.49% respectively.

Full text available upon request to the author

Article title: Vision-based Shrimp Feed Type Classification using Fuzzy Logic

Authors: Rex Paolo C. Gamara, Argel Bandala, Pocholo James Loresco

Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:
Shrimp farming is a major industry covering 23% of Philippine annual aquaculture production, which requires performing better management practices (BMPs) including growth monitoring and feed management. Traditionally, growth is monitored manually using analog weighing scale and caliper; but the manual measurement is a tedious task for large-scale farming. Feed management entails providing the most suitable feed type based on the shrimp's current growth stage; furthermore, it addresses issues of underfeeding and overfeeding. The limitations of manual method led to the implementation of computer vision applications for growth measurement. However, existing vision-based measurement studies are not yet applied for feed management. This paper presented a fuzzy-logic based shrimp feed type classification system utilizing Mamdani's methodology. The output classes are Starter, Grower, and Finisher based onthe three inputs: pixel area, length, and weight. The system was developed using the FIS feature of the MATLAB Fuzzy Logic toolbox. The classification system was evaluated and resulted to 93.33% correct classification accuracy. Based on these results, it can be concluded that fuzzy logic can be utilized to determine the suitable shrimp feed type corresponding to the input features.
Full text available upon request to the author

Article title: Soil Fertilizer Recommendation System using Fuzzy Logic
Authors: Jenskie Jerlin I. Haban, John Carlo Velasco Puno, Argel Bandala, Robert Kerwin Dela Cruz Billones, et al.
Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:
Soil nutrients and season have direct impact on the growth and yield of a crop. Deficiency on the nutrient level of the soil may result to plant disease while applying excessive amount of soil fertilizer on the other hand, may also cause negative results to the development of the crop. Nutrients on the soil also changes as the season changes from wet season to dry season. This study aims to develop a fuzzy logic-based program that will provide an appropriate amount of fertilizer to soil. The parameters such as season, nitrogen, phosphorus and potassium level are the inputs used on the fuzzy logic system. The researchers proposed four kinds of fertilizer to

use in this paper such as Complete, Urea, Solophos and Muriate of Potash. Combination and amount of these fertilizers will be based on the input parameters and fuzzy rules. These soil fertilizer recommendations can be used for rice in an inbred light soil.

Full text available upon request to the author

Article title: Implementation of Automated Annotation through Mask RCNN Object Detection model in CVAT using AWS EC2 Instance

Authors: Marielet Guillermo, Robert Kerwin Dela Cruz Billones, Argel Bandala, Ryan Rhay Vicerra, et al.

Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:

With machine learning-based innovations becoming a trend, practical resolutions of its implementation to large-scale data and computing problems must be able to cope up as well. Currently, Graphic Processing Units (GPUs) are being chosen over other available physical devices due to its powerful computing capability and easier handling. Several cloud service providers also made it possible for these to be accessible online allowing higher serviceability and lower cost upfront for businesses. With this said, the proponent would implement a common machine learning-based application, automated annotation through Mask RCNN Object Detection Model in CVAT, using AWS instance. The key purpose is to showcase the viability of deploying data and computing intensive system on the cloud.

Full text available upon request to the author

Article title: A Smart Space with Music Selection Feature Based on Face and Speech Emotion and Expression Recognition

Authors: Jose Martin Maningo, Argel Bandala, Ryan Rhay P. Vicerra, Elmer P. Dadios, et al.

Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:

The technological capabilities of computers in today's time continues to improve in ways that seemed impossible before. It is common knowledge that most people use computers to make everyday lives easier. Therefore, it is vital to bridge the gap between humans and computers to provide more suitable aid to the user. One way

to do this is to use emotion recognition as a tool to make the computer understand and analyze how it can help its user on a much deeper level. This paper proposes a way to use both face and speech emotion recognition as a basis for selecting an appropriate music that can improve or relieve one's emotion or stress. To accomplish this, Support Vector Machine with different kernels are used to create the models for validation and testing on both the face and speech emotion recognition. The final integrated system yielded an accuracy rate of 78.5%.

Full text available upon request to the author

Article title: Prediction of Total Body Water using Scaled Conjugate Gradient Artificial Neural Network

Authors: Marife Rosales, Maria Gemel B. Palconit, Argel Bandala, Ryan Rhay P. Vicerra, et al.

Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:

The study aims to design an intelligent total body water measuring device which will help to determine the total body water level or percentage of an individual using ultrasonic sensor, load cell and bioelectric impedance analysis (BIA). The system utilized the Scaled Conjugate Gradient Artificial Neural Network (ANN) as the machine learning algorithm. The system used the dataset splitting of 70%-15%15% for training, validation and testing. Different hidden neurons were used and compared during neural network training and found out that using 10 neurons will provide the lowest mean square error (MSE) with best value of Pearson's correlation (R). Based on the results, using 10 neurons, Scaled Conjugate Gradient algorithm has better performance as compared to Levenberg-Marquardt algorithm with MSE equal to 0.180033, 0.118954, 0.529157 while the R value is equal to 0.997887, 0.997488, 0.99644 for training, validation and testing.

Full text available upon request to the author

Article title: Transfer Learning Approach for the Classification of Conidial Fungi (Genus Aspergillus) Thru Pre-trained Deep Learning Models

Authors: Matt Ervin Gatchalian Mital, Rogelio Ruzcko Tobias, Herbert Villaruel, Argel Bandala, et al.

Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:
The Aspergillus genus is deemed relevant for distinction and classification in the field of food, agriculture and medicine. As there are harmful and useful ones, it adds to the necessity of correct classification. Categorization of this conidial fungi is usually done through manual microscopical procedures which apparently has a degree of subjectiveness. In order to classify Aspergillus samples faster and more accurately, technology, specifically image processing and machine learning are incorporated in this study. Pre-trained deep learning models are employed in classifying 9 kinds of Aspergillus. The methodology is generally comprised of preprocessing, deep-learning (training) and performance evaluation. Performance evaluation pertains to the validation accuracy and running times of the system after training through visual display of graphs and tabulation of acquired data. This study achieved a 93.3333% testing accuracy proving that the transferred knowledge is accurate, compatible and reliable.
Full text available upon request to the author

Article title: Fuzzy Power Control for Non-linear Distortion Suppression in MIMO-OFDM Systems
Authors: Genesis Marr N. Principe, Ryan Rhay R. Vicerra, Argel Bandala
Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:
The hybridization of MIMO-OFDM systems became one of the most used wireless communication model for broadband, mobile, and multimedia applications because of its high bandwidth efficiency, bandwidth capacity, and robustness to fading. However, it suffers from the underlying disadvantage of OFDM system which is having a high peak-to-average-power ratio (PAPR) due to large envelope variations. These variations cause non-linear distortion when the OFDM signal is amplified for transmission. Hence, in order to eliminate the non-linear distortion effects of the high power amplifier in MIMO-OFDM systems, the input signal power must have an appropriate power level to satisfy an optimal input back off (IBO) value that also contributes to an amplifier's maximum efficiency. A Fuzzy Logic Controller is used to control the IBO of the system as well as the signal power level. Results shows that using the proposed Single-Input Single-Output (SISO) Fuzzy Power Controller reduces the bit error rate (BER) significantly compared to the traditional scheme.

Full text available upon request to the author

Article title: Identification of Corn Plant Leaf Diseases through Web Server using Image Processing and Artificial Neural Network
Authors: Dailyne Macasaet, Edwin Sybingco, Argel Bandala, Ana Antoinette Cabantug Illahi, et al.
Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:
This study centers on the design and development of a microcontroller based hardware interface that connects the serial camera, the processor, the WiFi module, and the LCD screen and identification software for corn plant diseases through web-server using image processing and artificial neural network. This is done by capturing and displaying the image of the leaf inside the box and transmits it to the web server as an input image; process, analyze and interpret the data through image processing. The result of the processed image will be sent to the displaying microcontroller based hardware interface through the web-server and display the Pest Management Recommendations.
Full text available upon request to the author

Article title: Visual Classification of Lettuce Growth Stage based on Morphological Attributes using Unsupervised Machine Learning models
Authors: Jonnel Alejandrino, Ronnie Concepcion II, Sandy C. Lauguico, Rogelio Ruzcko Tobias, Argel Bandala, et al.
Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:
Food shortage is a serious problem facing the world and is prevalent in urban areas. The scarcity of food is mainly caused by crop failure. Environmental factors offered by the rural areas determine the condition of crops to be produced. This scenario pomps, the explication of urban farming. However, urban farming requires all-out monitoring and control. This study specifically solves the predicament of identifying the developmental growth of plants from seed leaf to amend the techniques of plant science and cultivation management. With a view to this, the paper shows coupled color-based superpixels and multifold watershed transformation in segmenting the lettuce image from the background. To fathom it out, a comparative analysis of three

unsupervised machine learning algorithms: Self Organizing Map (SOM), Hierarchical, and K - means algorithms were conducted. These were done by modeling each algorithm from the features extracted from morphological computations of the lettuce images raised in a smart aquaponics setup. Each of the models was optimized to increase cross and hold-out validations. The results showed that K – means algorithm having the parameters of algorithm = 'auto', copyx= 'True', init = 'K- means++', maxiter = '1000', nclusters = '3', ninit = '15', n_jobs = '1', precompute_distance = 'auto', random_state = '10', tol = '0.000001', verbose = '1', leaf_size = '10' was the most effective model for the given dataset, yielding a high precision and recall unsupervised clustering percentage of 91%.
Full text available upon request to the author

Article title: Battery Management System with Temperature Monitoring Through Fuzzy Logic Control
Authors: Hilario Calinao, Argel Bandala, Reggie Gustilo, Elmer P. Dadios, et al.
Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:
Batteries are very important in many different applications. In the solar energy system, the batteries are used as power storage when solar energy is not available especially during night time. Batteries need to be maintained and closely monitor their condition. Battery management systems are normally used for this application but many of them are not monitoring the battery's temperature. This study will use a fuzzy logic-controlled system to manage the operation of the battery. This system will maintain the operation of the battery in the allowed operating temperature to prevent it from damaged caused by excessive internal temperature.
Full text available upon request to the author

Article title: Crack Detection With 2D Wall Mapping For Building Safety Inspection
Authors: Jose Martin Maningo, Argel Bandala, Then Anjerome Bedruz, Elmer P. Dadios
Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:
In the Philippines, the number of earthquakes occurring has risen to an alarming rate. 'The Big One' is one of the biggest expected catastrophes that is undoubtedly

going to occur in the next decade as said by various experts. Buildings that were able to withstand the upcoming earthquakes, are to be inspected by engineers without knowing if the safety of the building is compromised. Thus, there is a need for a system that can inspect the cracks on the wall for faster and safer inspection. The objective of this study is to develop a crack detecting system capable of analyzing physical characteristics of cracks and mapping the surface of the wall. The model to be used for classifying and determining what cracks are, was trained with the use of Faster R-CNN machine learning architecture. Trained using the SDNET2018 combined with actual data generated by the proponents, the resulting system can detect cracks with an accuracy of 90% and classify the cracks according to the shape. The system also calculates its physical properties and has a recommender system that provides remarks on what necessary actions can be done.

Full text available upon request to the author

Article title: Human Presence Detection using Ultra Wide Band Signal for Fire Extinguishing Robot

Authors: Argel Bandala, Edwin Sybingco, Jose Martin Maningo, Elmer P. Dadios, et al.

Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:

Fire incidents often result to associated deaths, injuries, and losses occurring structures and properties, particularly in homes every year. In this study, the researchers proposed a 4-wheeled fire extinguishing robot with the ability to detect human presence in the area even when there is fire. Multiple sensors are utilized in this study to detect nearby flame, smoke, temperature and humidity, and obstacles through integration with Arduino and Raspberry Pi. The proposed robot is remotely controlled by the user over Wi-Fi through the graphical user interface created by the researchers in Python for easy monitoring of data and control. A camera is also mounted to the robot for surveillance purposes. The human detection system of the robot is implemented through using ultra-wide band radar (UWB) by utilizing the X4M300 presence sensor, which could detect human presence based on their respiration movement. Initial testing and four experiments were conducted to test the radar sensor's capabilities compared to the existing methods of human detection.

The researchers yielded an accuracy of 97.29% in the testing of human detection system, proving that the implementation of UWB radar sensor is successful.
Full text available upon request to the author

Article title: Particle Swarm Optimization-based Dark Channel Prior Parameters Selection for Single Underwater Image Dehazing
Authors: Vincent Jan Dela Cruz Almero, Jonnel Alejandrino, Ronnie Concepcion II, Argel Bandala, et al.
Conference title: The 9th International Symposium on Computational Intelligence and Industrial Applications (ISCIIA 2020), November 2020

Abstract:
Underwater images are confronted with blurriness and poor color consistency due to the haze produced by the absorption and scattering effects of the turbid water. Dark Channel Prior (DCP) is the state-of-the-art and the algorithmic basis to solve underwater image restoration. However, the default parameters of DCP may not be applicable to underwater images with different levels of degradation. The selection of the appropriate DCP parameters for each underwater image is considered as an optimization problem and can be solved using Particle Swarm Optimization (PSO). The proposed PSO-based selection algorithm is defined by its operators: objective function, swarm size, inertial weights and acceleration coefficients. Obtaining appropriate combination of these ope rators are elaborated. The qualitative and quantitative evaluations observed acceptable visual improvements and measurements to underwater images applied with DCP at optimally selected parameters, in comparison to underwater images applied with DCP at default parameters. Hence, the proposed algorithm provides good adaptability and effectivity to the exhaustive search of appropriate DCP parameters.
Full text available upon request to the author

Article title: Segmentation of Aquaculture Underwater Scene Images based on SLIC Superpixels Merging-Fast Marching Method Hybrid
Authors: Vincent Jan Dela Cruz Almero, Jonnel Alejandrino, Argel Bandala, Elmer P. Dadios
Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:

Segmentation is a challenging task for the complex and low-quality underwater images, as this is prerequisite to advanced tasks in fish monitoring such as fish detection and classification. A demand exists for underwater image segmentation algorithms that can robustly segment fish from its background. A competitive approach is the integration of states-of-the-art image segmentation algorithms: SLIC superpixels merging by KAZE Keypoints clustering and Fast Marching Method (FMM) to a single framework. The combination of these established methods offers robustness towards underwater images of different visual qualities. First, a locally acquired underwater image is represented as superpixels. Then, the KAZE features of an underwater image is extracted. Such features are utilized by the k-means clustering to group superpixels which contains fish pixels into a region. Lastly, the merged region is further segmented with Fast Marching Method and corresponding morphological processes. The study presents the viability of the integration of different image segmentation techniques for localized application. The number of superpixels, KAZE Keypoint score threshold and FMM threshold are identified to affect the performance of the proposed algorithm. Qualitative observations and quantitative measures validate the robustness of this generated algorithm to address this difficult and persistent task.

Full text available upon request to the author

Article title: Genetic Algorithm-based Dark Channel Prior Parameters Selection for Single Underwater Image Dehazing

Authors: Vincent Jan Dela Cruz Almero, Ronnie Concepcion II, Jonnel Alejandrino, Argel Bandala, et al.

Conference title: 2020 IEEE Region 10 Conference (TENCON), November 2020

Abstract:

Dehazing through Dark Channel Prior (DCP), originally developed for land-based images, has translated its potential for improving the quality of underwater images. However, the DCP default parameters, which are just adapted from land-based applications, may not be applicable for underwater images. Such constraint limits the capability of this restoration algorithm to improve the quality of an underwater image; the values of these parameters must be searched for each underwater image. A proposed approach on the parameter values assignment problem is to conduct an optimized search based on Genetic Algorithm. The presentation of this proposed

approach focuses on the Genetic Algorithm processes: chromosome encoding, fitness function development, and selection, mutation, and crossover, to perform an effective search of the best solution out of a pool of possible solutions. Qualitative and quantitative evaluations show that utilization of optimized combination of DCP parameters, achieves images of higher quality in comparison to the utilization of established default DCP parameters.

Full text available upon request to the author

Article title: Estimation of Photosynthetic Growth Signature at the Canopy Scale Using New Genetic Algorithm-Modified Visible Band Triangular Greenness Index

Authors: Ronnie Concepcion II, Sandy C. Lauguico, Rogelio Ruzcko Tobias, Elmer P. Dadios, Argel Bandala, et al.

Conference title: 2020 International Conference on Advanced Robotics and Intelligent Systems, August 2020

Abstract:

Greenness index has been proven sensitive to vegetation properties for multispectral and hyperspectral imaging. However, most controlled microclimatic cultivation chambers are equipped with low-cost RGB camera for crop growth monitoring. The lack of camera credentials specially the wavelength sensitivity of visible band provides added challenge in materializing greenness index. The proposed method in this study compensates the unavailability of generic camera peak wavelength sensitivities by employing genetic algorithm (GA) to derive a visible band triangular greenness index (TGI) based on green waveband signal normalized TGI model called gvTGI. The selection, mutation and crossover rates used in configuring the GA model are 0.2, 0.01 and 0.8 respectively. Lettuce images are captured from an aquaponic cultivation chamber for 6-week crop life cycle. The annotated and extracted gvTGI channels are inputted to deep learning models of MobileNetV2, ResNet101 and InceptionResNetV2 for estimation of photosynthetic growth signatures at canopy scale. In predicting cultivation period in weeks after germination, MobileNetV2 bested other image classification models with accuracy of 80.56%. In estimating canopy area, MobileNetV2 bested other image regression models with R 2 of 0.9805. The proposed gvTGI proved to be highly accurate on estimation of photosynthetic growth signatures by using generic RGB cameras, thus providing a low-cost alternative for crop phenotyping.

Full text available upon request to the author

Article title: Android Application for Chest X-ray Health Classification From a CNN Deep Learning TensorFlow Model
Authors: Rogelio Ruzcko Tobias, Luigi Carlo De Jesus, Matt Ervin Gatchalian Mital, Argel Bandala, et al.
Conference title: 2020 IEEE 2nd Global Conference on Life Sciences and Technologies, March 2020

Abstract:
One of the problems in the medical field is incorrect diagnosis, particularly over-diagnosis and under diagnosis. One of the illnesses that is currently researched upon is pneumonia. Several methodologies are employed to further validate this diagnosis. Often, to achieve the goal, medical experts rely on an x-ray image. In this study, the basis is still x-ray images with the incorporation of image processing and machine learning. MobileNetV2 is utilized as the convolution neural network model. The produced frozen graph is injected to Android Studio to produce an android mobile application which will serve as a diagnostic tool. The mobile application has high accuracy and considered reliable because of testing and validation results. This study generally aims to provide a reliable low-cost aid for medical professionals in diagnosing pneumonia.
Full text available upon request to the author

Article title: Faster R-CNN Model With Momentum Optimizer for RBC and WBC Variants Classification
Authors: Rogelio Ruzcko Tobias, Luigi Carlo De Jesus, Matt Ervin Gatchalian, Argel Bandala, et al.
Conference title: 2020 IEEE 2nd Global Conference on Life Sciences and Technologies, March 2020

Abstract:
Since many diseases and infections are dependent on the count and type of Red Blood Cells (RBCs) and White Blood Cells (WBCs) present in the blood stream, detection and classification pertaining to them is necessary and relevant. Based from existing related literature, ordinary Neural Networks are usually employed. Also, in

existing researches, RBC types are the main focus. Hence, after observing research gaps, a Faster Region-based Convolutional Neural Network (Faster R-CNN) was utilized for this study, focusing not only on RBCs but also on the variants of WBCs. The aim is to have a fast and reliable system in order to achieve the goal of aiding the medical field in the classification of RBCs and WBCs.

Full text available upon request to the author

Article title: Utilization of Genetic Algorithm in Classifying Filipino and Korean Music through Distinct Windowing and Perceptual Features

Authors: Matt Ervin Gatchalian Mital, Rogelio Ruzcko Tobias, Argel Bandala, Robert Kerwin Dela Cruz Billones, et al.

Conference title: 2019 International Conference on Contemporary Computing and Informatics, December 2019

Abstract:

Classification of songs or music in terms of genre, era and any other categories has been sought to be one of the most common yet significant research fields in digital signal processing. Usually, the aim to distinguish musical patterns is only limited to one general type (e.g. American Music). The objective of this study is to perceive the differences and similarities between two general categories namely: OPM (Original Pilipino Music), the apparent representative music of the Philippines and one of the fastest growing music industries K-POP, a general term for contemporary Korean Music. Through the features acquired from jAudio and aid of a genetic algorithm model constructed in Python with the accompaniment of the TPOT library, this research is successful in classifying the music under various settings and desired outputs.

Full text available upon request to the author

Article title: Throat Detection and Health Classification Using Neural Network

Authors: Rogelio Ruzcko Tobias, Luigi Carlo De Jesus, Matt Ervin Gatchalian Mital, Argel Bandala, Sandy C. Lauguico, et al.

Conference title: 2019 International Conference on Contemporary Computing and Informatics, December 2019

Abstract:

In some instances, physicians' diagnosis may not be accurate; they may over or under diagnose a patient with throat conditions resulting to improper medications and antibiotics. In order to aid them, a vision system that focused on Histogram of Gradients (HOG) and later on integrated in a neural network is implemented. The system made is in accordance to what is desired with accurate values for testing and validation. Pre-processing of images are done by employing Cascade Trainer; on the other hand, the main training, detection, and classification are implemented in MATLAB.

Article title: Dynamic Peloton Formation Configuration Algorithm of Swarm Robots for Aerodynamic Effects Optimization
Authors: Rhen Anjerome Bedruz, Jose Martin Maningo, Arvin Fernando, Argel Bandala, et al.
Conference title: 2019 7th International Conference on Robot Intelligence Technology and Applications, November 2019

Abstract:
This paper presents a flocking and formation algorithm adapted from the flocking behavior of cycling team or pelotons. Several multi agent applications require efficient positioning of the agents in static and dynamic tasks. It was verified physically that an optimal distance in a peloton formation, the agents take reduced drag due to the inherent drag resistant characteristic of the formation. The said conditions were implemented in an algorithm in a swarm of wheeled robots. Experiment results show that the optimal distance between agents were attained. It was shown that the adaptation of peloton behavior in artificial agents brought efficient formation and foraging trajectories and behaviors.
Full text available upon request to the author

Article title: Longitudinal Wheel Slip Regulation using Nonlinear Autoregressive-Moving Average (NARMA-L2) Neural Controller*
Authors: Ryan Christopher R. Dajay, Jason Española, Argel Bandala, Then Anjerome Bedruz, et al.
Conference title: 2019 7th International Conference on Robot Intelligence Technology and Applications, November 2019

Abstract:
In this study, the implementation of a nonlinear autoregressive-moving average model (NARMA-L2) neural network controller to maximize the traction of tires during braking scenarios was explored. The proposed controller and system dynamics was done in Simulink. All in all, the neural network controller shows good stability and good response in following the reference trajectory or desired slip ratio. It has experienced the peak worst error of around 2%, its best performance was reached after 89 epochs and it can reach around 99.5% of the reference trajectory or desired slip ratio. Further research should focus on hardware implementation, integration with slip estimation techniques , and, better sets of training data to make the controller more adaptive to different environment and road surface characteristics.
Full text available upon request to the author

Article title: Design of a Robot Controller for Peloton Formation Using Fuzzy Logic
Authors: Rhen Anjerome Bedruz, Argel Bandala, Ryan Rhay P. Vicerra, Ronnie Concepcion II, et al.
Conference title: 2019 7th International Conference on Robot Intelligence Technology and Applications, November 2019

Abstract:
This paper presents a controller for the optimization of flocking and formation algorithm adapted from the flocking behavior of cycling team or pelotons. The controller developed is a fuzzy-logic controller for each of the robotic agent in order for them to perform a peloton formation. Results from the simulation shows that the developed fuzzy logic controller is slightly better than the mathematical models in maintaining a small and optimal position for the peloton formation which results to a more efficient and robust swarm system.
Full text available upon request to the author

Article title: Development of Leap Motion Capture Based - Hand Gesture Controlled Interactive Quadrotor Drone Game
Authors: Argel Bandala, Jose Martin Maningo, Edwin Sybingco, Ryan Rhay P. Vicerra, et al.
Conference title: 2019 7th International Conference on Robot Intelligence Technology and Applications, November 2019

Abstract:

This paper presents an interactive drone game which is controlled by bare hand gestures. A typical handheld or gamepad remote controller bids inconvenience due to unnatural hand movements of the pilot. This study removes the use of handheld controllers and instead employ a contact less hand gesture device for drone control. Several applications can be explored like task designation in a multi-drone system for construction, inspection and relief operations. The drone is controlled using a PID controller which maintains a given trajectory which is determined by the hand gesture of the controller. The platform chosen by this research is an interactive game of two drones which fire IR lasers. The objective of the game is to hit the opponent with the laser emission. This platform showcases the accurateness and reliability of the hand gesture control system by controlling a real time drone application. The accuracy and precision of the movements based on the gesture of the pilot will be tested through simulations and actual implementations.

Full text available upon request to the author

Article title: Innovating Academic Writing through Flipped Classroom Instruction

Authors: Dylyn A. Junio and Argel Bandala

Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:

Flipped Classroom Instruction has become a trend and a popular instructional model of the recent time in which the typical lecture and homework features of a course are inverted. This method transforms classroom pedagogy into dynamic and interactive manner where the teacher guides and facilitates students' learning process. The present study investigates the students' perceptions on flipped classroom instruction in academic writing class in contrast to traditional teaching. To achieve this, an instructional design infused with multimedia tools in writing lessons were provided and implemented in writing classes. The mixed method was used to collect qualitative and quantitative data. The results revealed a positive impact of flipped learning to students which also indicate their improved academic writing skills in certain ways.

Full text available upon request to the author

Article title: Design of Controller and PWM-enabled DC Motor Simulation using Proteus 8 for Flipper Track Robot
Authors: Cyrus Lawrence Camancho Bual, Rachel D. Cunanan, Argel Bandala, Then Anjerome Bedruz
Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:
The developed tracked mobile robot such as flipper track robot increases its ability and capability in overcoming more challenges in urban environment context and rough terrains. In addition, flippers are its support in dealing with this circumstances. The configuration of flipper tracked robots came from the extended version of conventional two-tracked mobile robot such as two and four-tracked robots. Then, the study aims to create a dedicated controller for the modified flipper track robot. Correspondingly, the target instruments, display and analog control are identified for adept monitoring of the robot status while doing its intended function. Afterwards, using Proteus 8 Professional simulation software, the Arduino UNO controller as main MCU, 16x2 LCD, analog joysticks in terms of analog resistors, and virtual terminal for serial print monitoring are attached and wired accurately. The nine speed level is established and paralleled to the required PWM output for the fine movement of flipper track robot and also the map function of Arduino IDE for degree manipulation of servo motor of two flipper arms. Finally, the results are shown in LCD which matches the established logical conditions of nine speed level as well as the status movement of the flipper track robot. The functionality and feasibility of the controller is verified and exhibited.
Full text available upon request to the author

Article title: Detection of Gas Harmful Effect using Fuzzy Logic System
Authors: Ana Antoniette Cabantug Illahi, Argel Bandala, Elmer P. Dadios
Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:

The researcher focuses on determining the harmful effect of gases in human. Using fuzzy logic is the core process of the study. It has an ability to turn the computer to think as a human because of the rules that is embedded in the whole system. Carbon Monoxide, Cyanide, Formaldehyde, Ammonia, and Hydrogen Sulfide was use as a sample of harmful gases. There are certain level of concentration and length of time a human can tolerate the harmful gas. Without any detection of it a person will suffer a bad effect of the gas. The system can tell if the gas in certain level and time is harmful or not. The result of the system is correct in correlation with the rules set in the system and the graph that proves the validity of the system.

Full text available upon request to the author

Article title: Development of a Fuzzy Logic Controller for a Smart RGB Lighting System

Authors: Neil Oliver M. Velasco, Jay Robert Rosario, Argel Bandala

Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:

The smart RGB lighting system is a smart lighting system built on a fuzzy logic controller that adjusts the RGB lighting to suit the environment. The concept aims to make lighting systems more efficient in power, and intelligent with the color adjustment from the fuzzy system. This research aims to develop a fuzzy logic controller that aims to control the output RGB light intensity based on the current luminance of the environment and the activity color classification within the room. The membership functions and rules in the system were designed in MATLAB Fuzzy Logic Designer. The system was tested with test inputs into the system.

Full text available upon request to the author

Article title: Classification of Confusion Level Using EEG Data and Artificial Neural Networks

Authors: Claire Receli Morales Renosa, Argel Bandala, Ryan Rhay P. Vicerra

Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:
The purpose of this study is to create an artificial neural network (ANN) that can classify a person's level of confusion using Electroencephalography (EEG) data, more specifically, using the power spectrum of all the brain wave frequencies. This could help people in understanding the complicated mechanisms present in the brain, including the role that each specific brain wave signal plays in the formation of different cognitive activities in one's mind such as confusion and workload. This study is categorized as a cognitive-affective state research, inspired by its current possible application to different existing societal fields such as education and gaming industries. The processing platforms used to process and interpret the dataset used in this research are Microsoft Excel and MATLAB software, applying frequency-based analysis and standard averaging methods fit for EEG data classification and artificial neural network modeling.
Full text available upon request to the author

Article title: A Fuzzy Logic-Based Stock Market Trading Algorithm Using Bollinger Bands
Authors: Sandy C. Lauguico, Ronnie Concepcion II, Jonnel Alejandrino, Argel Bandala, et al.
Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:
Stock market price forecasting with the use of Technical Analysis is not precise Mathematics. Mostly, prediction is only based on probabilities supported by historical data and patterns. With these, several technical strategies were made by traders to produce signals on trading execution. This study proposes an algorithm that undergoes a certain trading strategy using three fuzzy logic controllers. Technical indicators such as candlestick parameters and Bollinger Bands (BB) were used for triggering the strength of buy, hold, and sell signals. Stock price data were gathered from a certain stock company. These data contain the opening and closing prices that are utilized for computing the BB. The raw and the computed values are the crisp input parameters for the Fuzzy Inference System (FIS). The membership functions were classified to very low, low, high, and very high levels depending on

the input default parameters used by traders. Sets of rules were created fuzzy logically to produce signals indicating the strength of an execution recommendation. The system is implemented using NI LabVIEW and MATLAB, proving that the tests are yielding acceptable result of about 94.44%.

Full text available upon request to the author

Article title: Neural Network Modeling for Fuel Consumption Base on Least Computational Cost Parameters

Authors: Ana Antoniette Cabantug Illahi, Argel Bandala, Elmer P. Dadios

Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:

Fuel consumption are important in every vehicle. This study investigates the performance of fuel usage in an engine. The investigation is done through a combination of experimental data analysis and artificial neural network (ANN) modeling. Back propagation neural network was used to determine the optimized fuel consumption. There is a lot of factor which has an effect to fuel consumption in conventional drive procedure, however in this study the factors affecting the fuel consumption are the distance, time, acceleration, and velocity of a car. These parameters are used as input information for the neural network training and fuel consumption prediction as output. This study shows the ANN capability to predict the fuel consumption using MATLAB neural fitting tool. The result demonstrated that the system using neural network is efficient for predicting fuel consumption of an engine.

Full text available upon request to the author

Article title: A Bi-Objective Optimization Model for a Retail Inventory System with Perishable Products

Authors: Phoebe Lim Ching, Dennis Cruz, John Anthony Cheng Jose, Argel Bandala, et al.

Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:
For perishable inventories, cost alone is not a sufficient performance indicator. Minimizing costs can yield scenarios where demand is serviced with older units to allow for less frequent orders and maximize the utility of available inventories. This is contrary to the customers' needs, as perishables may have a tendency to deteriorate over time. This study proposes a bi-objective model for managing perishables, with cost and freshness as the system objectives. The proposed model may be used to develop policies for ordering and issuance, which directly affect quality. These would allow for the purposeful movement of inventory units across the system. When the results of the single-objective and bi-objective models were run, it was found that a cost-centric model had a tendency to accumulate older inventory, which could be used to service periods with low demand. This allowed it to work within its capacity constraints while negating the need to order during periods with low demand. The introduction of a quality objective removed this tendency, resulting in fresher inventory and lower inventory levels on the average. The model serves as a base model for further studies, to determine how new policies and technology may be employed to achieve higher quality as well as minimal costs.
Full text available upon request to the author

Article title: YOLO-based Threat Object Detection in X-ray Images
Authors: Reagan L. Galvez, Elmer P. Dadios, Argel Bandala, Ryan Rhay P. Vicerra
Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:
Manual detection of threat objects in an X-ray machine is a tedious task for the baggage inspectors in airports, train stations, and establishments. Objects inside the baggage seen by the X-ray machine are commonly occluded and difficult to recognize when rotated. Because of this, there is a high chance of missed detection, particularly during rush hour. As a solution, this paper presents a You Only Look Once (YOLO)based object detector for the automated detection of threat objects in an X-ray image. The study compared the performance between using transfer learning and training from scratch in an IEDXray dataset which composed of scanned Xray images of improvised explosive device (IED) replicas. The results of this research

indicate that training YOLO from scratch beats transfer learning in quick detection of threat objects. Training from scratch achieved a mean average precision (mAP) of 45.89% in 416×416 image, 51.48% in 608×608 image, and 52.40% in a multi-scale image. On the other hand, using transfer learning achieved only an mAP of 29.54% while 29.17% mAP in a multi-scale image.

Full text available upon request to the author

Article title: Physiological-Based Smart Stress Detector using Machine Learning Algorithms

Authors: Marife Rosales, Argel Bandala, Ryan Rhay P. Vicerra, Elmer P. Dadios

Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:

This paper is focused on the development of an intelligent system to identify if one person is stress or not stress using physiological parameters through machine learning. In this study, the dataset was acquired from three hundred (300) male and female participants ages 18 to 25. The gathered dataset is composed of five (5) features (i.e. heart rate, systolic blood pressure, diastolic blood pressure, galvanic skin response and gender). An intelligent system was developed using machine learning algorithms for classification such as Linear Regression (LR), K-Nearest Neighbor (KNN), and Support Vector Machine (SVM) using Python IDE with sci-kit learn machine learning libraries. Google Colaboratory (Colab) was utilized to perform optimization using Gridsearch to identify the best parameters of each algorithm. Feature selection methods are implemented to identify the most significant features related to stress condition of one person. After optimization, the results showed that SVM has the best performance to classify if one person is stress or not stress with optimized training-testing accuracy score of 95.00% - 96.67%.

Full text available upon request to the author

Article title: Genetic Algorithm Based 3D Motion Planning for Unmanned Aerial Vehicle

Authors: Maverick C. Rivera, Jay Robert Del Rosario, Argel Bandala

Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:
Development of Unmanned Aerial Vehicle (UAV) is now a popular field in research. In most of its applications, a pathfinding algorithm is needed in order to find the optimal path and avoid obstacles. In this paper, a genetic algorithm is implemented in order to determine the optimal path for a UAV that will avoid obstacles along the way. The genetic algorithm implemented uses variable-length chromosomes to solve the problem. The results of the simulation of the system yield an average of 29 generations and avoided 53, 500 collisions to find the best path.
Full text available upon request to the author

Article title: A Soft Robotic Tentacle Robot Arm for Inspection Sytem on Manufacturing Lines
Authors: Tristan Joseph C. Limchesing, Then Anjerome Bedruz, Argel Bandala, Nilo T. Bugtai, et al.
Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:
With the emerging sector of new industrial age is a foot, innovations are made every day in order to cope with new technologies. Maintenance and regular repairs are key roles in keeping the industry as efficient as possible. With maintenance, safety is paramount in order to prevent accidents and further delays in production. In order to tackle issues for inspecting hazardous and tight spaces, this study utilizes soft robotics technology in aiming to achieve an efficient and cost-effective means to safely inspect tight and hazardous spaces. Soft Robotics is a field in robotics that specializes in materials that are flexible and elastic. Their movements mimic movements that are often found in nature. The soft robotic arm that will be accomplished in this study is a soft robotic tentacle arm with a mounted camera for inspection. This is especially good in reaching places that have limited spaces. The soft robotic arm will be actuated pneumatically and will have an electronic pneumatic microcontroller for its activation. A minicamera will also be mounted on

the tip of the robotic arm for the inspection system. With the results and data gathered, it shows that this system can effectively maneuver using its electronic pneumatic controllers. The soft robot arm is also stable enough for the mini camera to be mounted on.

Full text available upon request to the author

Article title: Optimization of Vehicle Classification Model using Genetic Algorithm
Authors: Cyril Dale L. Cero, Edwin Sybingco, Allysa Kate M. Brillantes, Argel Bandala, et al.
Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:
This paper focuses on classifying vehicle types into car, van, motorcycle, bus, light truck, multi-axle truck and determine its class based on the Philippine Toll Regulatory Board's vehicle classification. This study utilized DEvol, an open-source tool that uses genetic algorithm for evolving number of filters and nodes, optimizer, activation, dropout rate. The model attained the best accuracy with 78.53% using 9000 images from MIO-TCD dataset.

Full text available upon request to the author

Article title: Blended Learning Approach to Teaching Oral Communication: Video Blogging in ESL Classroom
Authors: Dylyn A. Junio and Argel Bandala
Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:
With the rapid advancement of modern technology, the restructuring of pedagogical teaching is necessitated. Blended learning is one of the recent approaches to teaching which gained massive popularity. In recent years, many studies have been conducted in English teaching instruction; however, research on its application to English as a second language (ESL) oral communication instruction is scarce. The present study reports on the effectiveness of blended learning using video blogs to

ESL's oral communication skills. The mixed-methods design was used to collect quantitative and qualitative data. To determine the impact of a blended learning model to ESL's oral communication ability, pretest and posttest were administered to measure improvement. The results of the quantitative data revealed that the implementation of blended learning using video blogs improved students' oral proficiency in terms of pronunciation, fluency, syntax, lexical range and general use of the English language. The qualitative data, on the other hand, indicated the positive attitude of students toward the blended learning experience.

Full text available upon request to the author

Article title: Hazard Classification of Toluene, Methane and Carbon Dioxide for Bomb Detection Using Fuzzy Logic

Authors: Dailyne Macasaet, Argel Bandala, Ana Antoniette Cabantus Illahi, Elmer P. Dadios, et al.

Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:

This paper intends to explore bomb detection technology by employing fuzzy logic in classifying Toluene, Carbon dioxide and Methane which are commonly used gases in bombs and other flammables. This research uses Matlab Fuzzy Logic toolbox in classifying gases into three hazard classifications- Safe, Hazardous, and Deadly based on gas concentration and exposure time. Provided in this paper are the standard gas levels which are considered safe to human with respect to exposure time. The output of the classification will help develop a more improved and accurate bomb detection system which is of great importance in today's world.

Full text available upon request to the author

Article title: Analysis of Big Data Technologies for Policy Building in the Philippines

Authors: Rhen Anjerome Bedruz, Ronnie Concepcion II, Argel Bandala, Ryan Rhay P. Vicerra, et al.

Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:
Big data is one of the rising technologies in the world today. This is due to the fact that data in general is very useful because there are tons of information to be obtained out of it. This paper analyzes and discusses the rise of big data as one of the most important technologies today and actions that the Philippines can do about it. Current trends in the global scale and in the Philippines are also discussed. Subsequently, the general applications of big data and the how the Philippines adapt the technology are analyzed. Most importantly, its impact to the society, economy and the industry is examined. From this, policy recommendations are given which would help the nation adapt this technology for nation building.
Full text available upon request to the author

Article title: A Fuzzy Logic Approach for Fish Growth Assessment
Authors: Jo-Ann Magsumbol, Vincent Jan Dela Cruz Almero, Marife Rosales, Argel Bandala, et al.
Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:
Smart aquaculture is making a name these days due to an ever-increasing demand for an alternative source of protein, fatty acids, vitamins, minerals and essential nutrients, which make it superior over animal meat. To address the rising demand for healthy source of meat, aqua farmers adapt methods wherein they can increase the fish supply all year round. This paper makes use of the fuzzy logic system to identify the current growth stage of carp fish in the pond. The output of the system will be used as an actuator for the feeder system in the aquafarm. Results show that the system successfully identified the current status of the fish in the study.
Full text available upon request to the author

Article title: An Aquaculture-Based Binary Classifier for Fish Detection using Multilayer Artificial Neural Network
Authors: Vincent Jan Dela Cruz Almero, Ronnie Concepcion II, Marife Rosales, Ryan Rhay P. Vicerra

Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:
Fish detection, a specific task in computer vision system for fish monitoring, is challenging due to the complex characteristics of the captured images. A proposed approach in tackling this challenging task was to incorporate a multilayer artificial neural network to a computer vision system algorithm, implemented in aquaculture. This computer vision system algorithm captured the images from the aquaculture setup. Then, these captured images were processed. After that, the features out of these processed images were extracted and utilized to develop this multilayer artificial neural network. The best configuration, which is trained with the least learning time and tested with least mean square error and highest accuracy, was determined by adjusting the number of neurons in the two hidden layers. The multilayer artificial neural network with 50 neurons in the first hidden layer and 10 neurons in the second layer was considered the best configuration; it has achieved learning time of 3.374 ms, mean square error of 0.2315, and accuracy of 79.00%, hence, proving the competitiveness of this approach.
Full text available upon request to the author

Article title: Fuzzy Classification Approach on Quality Deterioration Assessment of Tomato Puree in Aerobic Storage using Electronic Nose
Authors: Ronnie Concepcion II, Argel Bandala, Then Anjerome Bedruz, Elmer P. Dadios
Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:
Food safety heavily deals with food spoilage that may yield food poisoning. Tomato-based dishes have different shelf-life leading to unique acceptable standards for a person in determining the food condition, and sometimes misclassification due to confusion. To address this problem, a proposed solution is the development of an intelligent electronic nose (eNose) system that will discriminate the condition of tomato puree using fuzzy logic. This system is composed of two sections: the

development of electronic nose using Gizduino microcontroller and Mĭngăn Qĭ lai (MQ) gas sensors, and the implementation of fuzzy logic system for classification of food condition. Fuzzy logic resembles human reasoning that yields definite output based on ambiguous input. The collection data rate was set to 2 Hz for tomato puree-emitted gas samples with varying shelf life considering outdoor aerobic storage. Combined Min-Max method and Mamdani inference system was used for the inference engine, and centroid method for defuzzification. The system classifies the tomato puree sample as not spoiled, partially spoiled, and spoiled. The smellprint of each food condition was generated and the tomato puree-spoilage determinant parameters were characterized. Through embedded fuzzy logic, an accuracy of 90.00 % was yielded for tomato puree quality deterioration classification. The developed mechanism is a potential application in domotics.

Full text available upon request to the author

Article title: Motion Planning of a Robotic Arm using an Adaptive Linear Interpolation Crossover and Variable-Length Move Sequence Genome

Authors: Dino Dominic Forte Ligutan, Jason Española, Argel Bandala, Alexander Co Abad, et al.

Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:

The ability to perform robotic arm motion planning is a necessity in the design of autonomous and intelligent robotic systems. Motion planning allows the autonomous robotic arm to maneuver its end-effector in an unstructured environment whilst avoiding obstacles on the workspace. This ability is particularly important in processes with pick-and-place operations and varying object positions. In this study, a genetic algorithm-based motion planning for a 4-DOF robotic arm was developed. The developed genetic algorithm operates on a variable-length genome that consists of changes in joint angles. These changes in joint angles represent the end-effector's move sequence. The results show that adaptive linear interpolation crossover (ALIX) improves the convergence of the motion path towards minimization of end-effector error and path length. On average, the end-effector error is 1.4 mm with a maximum path length deviation from a straight line

of about 50.4 mm tested on extreme target points. Testing with obstacles present in the workspace shows the ability of the algorithm to generate solution paths to avoid them as well.

Full text available upon request to the author

Article title: Soil Nutrient Detection using Genetic Algorithm

Authors: John Carlo Velasco Puno, Then Anjerome Bedruz, Allysa Kate M. Brillantes, Argel Bandala, et al.

Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:

Genetic Algorithm is the method used in this study in classifying the qualitative level of the soil nutrients. The data set includes images coming from the result of the soil testing. The extracted features were the HSV values and the LAB values color space. Out of the six extracted features from the data set, the B from LAB color space is the most linear so with that, it is the input of genetic algorithm in identifying the qualitative level of the soil nutrients. For the run of the program using python programming language and pyCharm CE as IDE, the values of each parameters follow: the population size is 10, mutation rate is 0.01, the number of cross over points is 2 and the maximum number of generations is 1000. The population's final best fitness has 98.2609% that proves that Genetic Algorithm is an effective method in classifying the qualitative level of the soil nutrients.

Full text available upon request to the author

Article title: Philippine License Plate Character Recognition using Faster R-CNN with InceptionV2

Authors: Mari Christine E. Amon, Allysa Kate M. Brillantes, Ciprian D. Billones, Robert Kerwin Dela Cruz Billones, Argel Bandala, et al.

Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:

This research proposes a method for automatic license plate recognition (ALPR) using the Faster R-CNN with InceptionV2 feature extractor that works in the Philippines. While there exist character recognition systems, there still remains difficulty in recognition due to different variations of Philippine license plates. By training a deep neural network in the extraction of the features in images of the different types of Philippine license plates - 1981, 2003, 2014, and others - our proposed multi-class detection system can recognize the alphanumeric characters in the license plate images. The system was tested on actual traffic images in the Philippines that contains different types of license plates, and achieved the detection rate of 90.011%, recognition rate of 93.21% and an overall accuracy of 83.895%.

Article title: Neural Network Utilization for Flagged Words Detection thru Distinct Audio Features

Authors: Matt Ervin Gatchalian Mital, Herbert Villaruel, Rommel Lim, Rogelio Ruzcko Tobias, Argel Bandala, et al.

Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:

This research paper employed a method of detecting a given flagged word that would possibly trigger a machine and at the same time, being able to separate such sound source in a given real world environment. As part of the experimentation done, the flagged words were recorded by 3 different individuals. To make sure that only the flagged words would be detected by the robot's auditory signal processor, the 3 individuals were also asked to record random words that would be used to test whether the robot's detector responds even in random words being heard. By utilizing the neural networks concepts and processes, detection of flagged words was made possible. After the results has been produced, the researchers arrived to a conclusion that even in the middle of a noisy and reverberant surroundings and situations, the robot can capture the flagged words coming from the crowd by allowing the neural network to perform its function.

Full text available upon request to the author

Article title: Solving 3D Coverage Problem using Genetic Algorithms in Wireless Camera-Based Sensor Network Modelling
Authors: Neil Oliver M. Velasco, Jay Robert Del Rosario, Argel Bandala
Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:

Wireless camera sensor networks are used mostly in research today. However, the camera location in a space of study is a problem in maximizing the coverage of the camera. Instead of being a 2D computation, this computation is modeled in 3D projected to 2D walls. This research makes use of Genetic Algorithms - a search optimization algorithm to find the best placement of camera which will yield to a maximum coverage ratio. The results of the experiment show the length of time the algorithm computed, and the obtained the least number of cameras needed for the most coverage.
Full text available upon request to the author

Article title: Unmanned Aerial Vehicle (UAV) Attitude Estimation Using Artificial Neural Network Approach
Authors: Marc Francis Q. Say, Edwin Sybingco, Argel Bandala, Ryan Rhay P. Vicerra, et al.
Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:
There is a growing interest in Unmanned Aerial Vehicles (UAV) which are used in various applications such as cinematography, security, entertainment, and research and development. For a UAV to be able to these applications, stability is a vital aspect. Inertial Measurement Unit (IMU) which is composed of accelerometers, and gyroscopes, and separate magnetometer give data for the attitude position of the UAV to be known and maintain a steady flight. Attitude estimation can be done by various techniques such as using an Extended Kalman Filter (EKF) to predict and estimate angular positions based on the sensor data. In this paper, an Artificial

Neural Network (ANN) approach is used to estimate the angular positions as an option for the EKF. A nonlinear autoregressive with exogenous inputs (NARX) is used to create the attitude estimation to investigate the performance compared to the EKF.

Full text available upon request to the author

Article title: Estimation of Triangular Greenness Index for Unknown PeakWavelength Sensitivity of CMOS-acquired Crop Images

Authors: Anton Louise De Ocampo, Argel Bandala, Elmer P. Dadios

Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:

Notable works on the use of the triangular greenness index (TGI) to estimate vegetation fraction of croplands or chlorophyll content of crops, proved that relevant metrics on crop health monitoring can be derived from images at the visible spectrum. However, the performance of the TGI-based metric in crop health monitoring greatly depends on knowledge of wavelength sensitivities of the CMOS sensors used to obtain the RGB images of the crop. This becomes a problem when generic digital cameras are used and the specifications of the CMOS sensors are not available. The proposed method in this study compensates for the lack of information on the peak wavelength sensitivities of generic CMOS sensors by performing a parametric sweep on the proportions of 670nm-, 550nm-, and 480nm-peak wavelengths to derive a TGI equation normalized by the green signal. This allows the use of any available digital cameras even without prior knowledge of the wavelength sensitivity at the visible spectrum of the installed CMOS sensors.

Full text available upon request to the author

Article title: Moving Particle Semi-Implicit Method for Control of Swarm Robotic Systems

Authors: Joseph Aldrin Chua, Laurence A. Gan Lim, Gerardo Lumagbas Augusto, Argel Bandala, et al.

Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:
The advancements of Multiple Robot Systems (MRS) have shown advantages over single robot systems. Generally, the motivations for the development of MRS are task flexibility, time efficiency, and single-point failure resiliency. The challenge in MRS, however, is the control and coordination of all the members in the system when performing tasks. Swarm robotics is a branch of MRS that deals with groups of homogeneous robots. The goal of swarm robotics is to produce systems that are scalable, flexible, and robust. The control of swarm robotic systems, however, looks to be one of the main challenges. These control concepts are inspired by biological swarms and, more recently, physics concepts. The success of the swarm's control algorithm will also lead to the swarm's ability to perform cooperative tasks. The use of homogeneous robots in swarm systems makes it advantageous to model the swarm robots as particles in a fluid. The Moving Particle Semi-Implicit (MPS) Method, a particle-based method in fluid dynamics, is proposed to be used as a control algorithm for swarm robotics.
Full text available upon request to the author

Article title: Implementation of a Closed Loop Control System for the Automation of an Aquaponic System for Urban Setting
Authors: Alec Zandra Mae H. Ambrosio, Lanz Harvey M. Jacob, Lea Anne R. Rulloda, Argel Bandala, et al.
Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:
An aquaponic system addressing the limited farming space available in condominiums by using a 43cm by 60cm by 80cm stackable design was implemented. The aquaponic system performs the monitoring and control of environmental parameters and data display. The monitoring system also observes the air and water temperature, humidity, pH, and water level. Based on the data gathered from these parameters, Arduino microcontroller determines the necessary output response such as lighting, fish feeding, mist making, and water circulation. Moreover, LED grow lights are used for faster growth rate of plants. Lastly, The data

from the sensors, actuators, and growth monitoring system are logged in a micro sd card through a micro sd card module for further analysis.
Full text available upon request to the author

Article title: Use of Artificial Neural Network in the Estimation of Detonation Velocity for Tetranitromethane-Nitrobenzene Mixture
Authors: Danielle Grace Evangelista, Ryan Rhay P. Vicerra, Argel Bandala
Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:
Detonation velocity or rate of energy release is an important property to consider when rating an explosive. It is a critical parameter used for estimating explosive performance as it can indicate the intensity of detonation. The purpose of this research study is to propose an artificial neural network model that would aid in the estimation of detonation velocities of a high explosive specifically, tetranitromethane-nitrobenzene (TNM/NB) mixture, with varying parameters.
Full text available upon request to the author

Article title: Performance Comparison of Classification Algorithms for Diagnosing Chronic Kidney Disease
Authors: Justin De Guia, Ronnie Concepcion II, Argel Bandala, Elmer P. Dadios
Conference title: 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), November 2019

Abstract:
Chronic kidney disease (CKD) is one of the diseases with high mortality rate. It is a disease resulted from kidney function loss over a long period of time. The disease shows no symptoms during initial stage. When left not medicated, a person may suffer from other complications such as high blood pressure, anemia, malnutrition, increased risk of cardiovascular disease, cognitive impairment and impaired physical function. Automated diagnosis by using classification algorithms has been an interest of researchers. In this study, six machine learning algorithms were used for classification and its prediction performance was compared based on training

time and F1 score, with and without hypertuning the parameters. Of all the six algorithms, KNN has the best F1 score of 0.992248 and minimal training time of 46.999ms. The performance of decision trees was improved with hypertuning, having a F1 score from 0.96 to 0.99. Overall, machine learning algorithms are significant tool to assess chronic kidney disease.

Full text available upon request to the author

Article title: Implementation of Inverse Kinematics for Crop-Harvesting Robotic Arm in Vertical Farming

Authors: Sandy C. Lauguico, Ronnie Concepcion II, Dailyne Macasaet, Argel Bandala, et al.

Conference title: 2019 IEEE 11th International Conference on Cybernetics and Intelligent Systems (CIS) and IEEE Conference on Robotics, Automation and Mechatronics (RAM), November 2019

Abstract:

The world population is expected to increase to 9.8 billion in 2050 according to United Nations. With this, scarcity of food and space will further be a major concern. This study proposes a framework which used initializing, processing, and directing applied to an inverse kinematics based robotic arm. An automatized approach in addressing the foreseeable problem on providing nutritional plant-based food considering that cities are becoming highly-urbanized was developed. Wall gardening used for vertical farming or urban farming is a technique by which there are sets of rows and columns of pockets installed over a wall. These pockets are filled with soil or other planting bases (i.e. water for hydroponics) for the seedlings to grow. A robotic arm is manually set to point on a specific pocket where a crop has grown. Using inverse kinematics, the set points determine the joint angles. This then targets the pockets and the end-effector of the robot arm performs a grip to the roots of the crops. The robotic arm then moves to its initial point, technically pulling up the crop. After positioning to the initial point, the arm directs to the side of the wall, where a container is located. The end-effector opens to drop the crop carefully into the container. The research study is simulated using MATLAB and Universal Robots. The results show that it can only yield 85.42% of the crops.

Full text available upon request to the author

Article title: Quality Assessment of Mangoes using Convolutional Neural Network

Authors: John Carlo Velasco Puno, Robert Kerwin Dela Cruz Billones, Argel Bandala, Elmer P. Dadios, et al.
Conference title: 2019 IEEE 11th International Conference on Cybernetics and Intelligent Systems (CIS) and IEEE Conference on Robotics, Automation and Mechatronics (RAM), November 2019

Abstract:
The Philippines is one of the countries in the world known for exporting good quality crops. Mangoes in the Philippines are very popular for its good sweet taste and considerably one of the best. Hence, ensuring the quality of the crop to be exported is essential. The study focused on utilizing convolutional neural network in determining the quality of carabao mango (Mangifera Indica). To make sure that all sides of the mango is going to be considered for the quality assessment, a mechanical system that uses conveyor belt, rollers, and camera was used to gather videos for training and validation of the model. The videos were extracted into frames and gone through image processing to remove the background and retain the mango only. The dataset is composed of different mangoes having both good and bad qualities. The implemented model used a total of 5550 training samples with 94.99% accuracy and a total of 2320 samples used for validation with an accuracy of 97.21%.
Full text available upon request to the author

Article title: Optimization of Extracted Features from an Explosive-Detecting Electronic Nose Using Genetic Algorithm
Authors: Jason Española, Argel Bandala, Ryan Rhay P. Vicera, Elmer P. Dadios
Conference title: 2019 IEEE 11th International Conference on Cybernetics and Intelligent Systems (CIS) and IEEE Conference on Robotics, Automation and Mechatronics (RAM), November 2019

Abstract:
The use of an electronic nose in detecting explosives has gained attention among researchers. This paper aims to optimize the extraction of features generated from a predetermined explosive-detecting electronic nose setup by using a genetic algorithm. A genetic algorithm (GA) is used to minimize the errors such as the mean error within explosive types, the mean error between explosive types and the classification error. The GA optimization program is implemented for each feature extraction technique, namely, principal component analysis (PCA) and linear

discriminant analysis (LDA). As a result, the proponents were able to optimize the extracted features into a single point that can truly classify each explosive type. PCA is more preferred than LDA for practical purposes.

Full text available upon request to the author

Article title: Tomato Fruit Image Dataset for Deep Transfer Learning-based Defect Detection

Authors: Robert de Luna, Elmer P. Dadios, Argel Bandala, Ryan Rhay P. Vicerra

Conference title: 2019 IEEE 11th International Conference on Cybernetics and Intelligent Systems (CIS) and IEEE Conference on Robotics, Automation and Mechatronics (RAM), November 2019

Abstract:

Tomato is considered as one of the vegetable crops with highest demand in the Philippines. Job of the farmers does not end after harvesting since the harvested tomatoes needed to be sorted according to its size. Manual sorting is the most widely recognized strategy in sorting but is very dependent on human interpretation and thus, very prone to error. This research proposed a solution that provides sorting of tomato fruit by detection of presence of defect. The study presented the generation of image dataset for a deep learning approach detection of defects based from a single tomato fruit image. Models were implemented using OpenCV libraries and Python programming. A total of 1200 tomato images classified as no defect and with defect are gathered using the improvised image capturing box. These images are used for the training, validation, and testing of the three deep learning models namely; VGG16, InceptionV3, and ResNet50. From this, 240 images are used as testing images to assess independently the performance of the trained models using accuracy and F1-score as performance metrics. Experiment results shown that VGG16 has 95.75-95.92-98.75 training-validation-testing accuracy percentage performance, 56.38-59.24-58.33 for the InceptionV3 model, and 90.58-58.46-64.58 for the ResNet50. Comparative analysis revealed that VGG16 is the best deep learning model to be used in the detection of presence of defect in the tomato fruit based from the dataset gathered.

Full text available upon request to the author

Article title: A Vision-Based Detection and Tracking Algorithm for a Child Monitoring Robot

Authors: John Anthony Cheng Jose, Justine Veronica Basco, Jomar Kenneth Jolo, Argel Bandala, et al.
Conference title: 2019 4th Asia-Pacific Conference on Intelligent Robot Systems, July 2019

Abstract:
Accidents have been found to be one of the leading causes of both fatal and non-fatal injuries to children. Though some accidents that occur are often unavoidable, more often than not these injuries can be prevented by giving the child proper attention. The researchers intend to address certain gaps in stationary monitoring solutions by adding abilities such as an insured way of continuously monitoring the test subject and a real time notification feature to a mobile spherical robot. This research presents the software division of a technological solution to child monitoring by developing a computer vision algorithm for following and monitoring children indoors utilizing an RGB-D camera. This algorithm will work hand in hand with a hardware design of a spherical robot that utilizes microcontrollers, RFID technology and GSM system. An Android application will also be created to provide the users the means of manually overriding the spherical robot, color calibration and location indicator as a part of the robot's notification system. The detection and tracking ability of the algorithm is tested by using objects with varying characteristics. The autonomous navigation testing of the robot is performed at two controlled test setups: living room and child's playroom.
Full text available upon request to the author

Article title: Spherical Mobile Robot for Monitoring and Tracking Children Indoors
Authors: John Anthony Cheng Jose, Justine Veronica Basco, Jomar Kenneth Jolo, Argel Bandala, et al.
Conference title: 2019 4th Asia-Pacific Conference on Intelligent Robot Systems, July 2019

Abstract:
Families around the world continue to suffer the loss of a child due to unintentional injuries caused by accidents that could have been prevented. Stationary monitoring solutions are widely used to aid in the prevention of such situations. However, these technologies present certain gaps that the researchers would like to address by adding a real time notification ability and an ensured way of continuously

monitoring by making sure that the test subject will never be lost by the intended solution. This research paper presents the hardware division of a technological solution to child monitoring by developing a semi-autonomous spherical robot to follow a child as the subject moves throughout the room. The spherical robot would have the ability to manually navigate around two controlled test setups: living room and child's playroom. The robot would also be able to distinguish designated safe zones and danger zones with the help of the RFID technology. The real time notification ability will be highlighted by giving the robot the feature of sending SMS messages to the subject's parent or guardian indicating the time and place of where the child last exited. The manual navigation was tested with the use of two controlled test setups and the notification system utilizing the RFID technology was tested thirty times in six various places having different signal strengths ranging from -50 dBm to -120 dBm.

Full text available upon request to the author

Article title: Categorizing License Plates Using Convolutional Neural Network with Residual Learning

Authors: Argel Bandala, John Anthony Cheng Jose, Jose Martin Maningo, et al.

Conference title: 2019 4th Asia-Pacific Conference on Intelligent Robot Systems, July 2019

Abstract:

Like other countries, the Philippines uses various license plate standards wherein some purely text while some are hybrid graphic-text plates. And to harness its generalizability, this study developed a classification algorithm utilized as a pre-processing scheme for the multi-standard license plate. With an input image captured at a different perspective, it was feed into the neural network and classify as Rizal monument series (2001 base and 2003 base), 2014 series and conduction sticker for new vehicles. In total, there are 303 different images captured for this study. Around 100 conduction sticker images, 103 Rizal Monument images, 100 black and white images. Furthermore, this study focused on using transfer learning technique, wherein a trained network utilized, then only the last layer was reset and retrained on the new dataset. To measure the performance of the classification model and optimized it cross-entropy and stochastic gradient descent was employed respectively at a learning rate of 0.001 and reduced by 10 for every seven (7) epochs.

The progression of accuracy results in increasing the epochs, and for the 25 epochs, the training completed in 4 minutes and 7 seconds with the best validation accuracy of 82.61%.

Full text available upon request to the author

Article title: Control and Mechanical Design of a Multi-diameter Tri-Legged In- Pipe Traversing Robot

Authors: Argel Bandala, Jose Martin Maningo, Arvin Fernando, et al.

Conference title: 2019 IEEE/SICE International Symposium on System Integration (SII), January 2019

Abstract:

In this paper a versatile and adaptive in-pipe robot is designed and tested The existing problem of versatility and adaptability of in pipe inspection robots are addressed in this study. The robot is equipped with a screw type assembly, which uniformly contracts and retracts a tri-arm assembly of wheels connected to it. This mechanism ensures that the robot grips the pipe walls when the arms are expanded. The dynamic model of the robot is derived and implemented in a proportional integral controller. The robot can maintain vertical position by maintaining the force exerted on the screw system Simulations and experiments were conducted to determine the robustness and stability of the robot system In addition, the robot is also capable of rust mapping, which enables easier pipe monitoring. The rust mapping yielded an S3.2% success rate.

Full text available upon request to the author

Article title: Formation-based 3D Mapping of Micro Aerial Vehicles

Authors: Mark Lester F. Padilla, Pakpong Chirarattananon, Argel Bandala, et al.

Conference title: 2019 IEEE/SICE International Symposium on System Integration (SII), January 2019

Abstract:

Micro Aerial Vehicles have brought tremendous interests to the research community, particularly in localization and mapping. While there are many commercially available sensors, such as Laser Range Finders (LRF) and RGBD cameras, that provide accurate 3D maps, they usually have significant power and payload requirements. This means, small flying robots are unable to handle such sensors.

This study explores the possibility of collaborative mapping using formations from multiple simple cameras to obtain an accurate map similar to that of the LRF and RGBD cameras. By using multiple small robots and integrating them as one, we have created a platform for 3D reconstruction in which formations can be incorporated. Thus, the proposed method can be used with a low-cost system for surveying, disaster management, and surveillance in the future.

Full text available upon request to the author

Article title: DeepTronic: An Electronic Device Classification Model using Deep Convolutional Neural Networks

Authors: Argel Bandala, Rodolfo C. Salvador, Irister M. Javel, et al.

Conference title: 2018 IEEE 10th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract:

This paper presents a novel and straightforward way of classifying discrete and surface-mount electronic components found on electronic prototypes using transfer learning and deep convolutional neural networks (DCNN). The goal of this study is to precisely classify images of electronic components into six classes: resistor, capacitor, inductor, transformer, diode, or integrated circuit. Each class of electronic components has over 100 images which are augmented and preprocessed to match the input layer requirements of the deep learning models used. The dataset was divided into a ratio of 70:30, where 70% was used for training and 30% was used for testing and validation. Transfer Learning (TL) was done using three pre-trained deep learning models that are available on MATLAB's Neural Network Toolbox: Inception-v3, GoogleNet, and Resnet101. Using this approach provides faster deployment and only requires fewer lines of coding compared to typical deep learning classification methods which make use of Python, Tensorflow, and Keras. The results of the experiment showed that Inception-v3 has the highest validation accuracy of 94.64% in classifying electronic components.

Full text available upon request to the author

Article title: Vehicle-Pedestrian Classification with Road Context Recognition Using Convolutional Neural Networks

Authors: Robert Kerwin Dela Cruz Billones, Argel Bandala, et al.

Conference title: 2018 IEEE 10th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract:
In road traffic scene analysis, it is important to observe vehicular traffic and how pedestrian foot traffic affects the over-all traffic situation. Road context is also significant in proper detection of vehicles and pedestrians. This paper presents a vehicle-pedestrian detection and classification system with road context recognition using convolutional neural networks. Using Catch-All traffic video data sets, the system was trained to identify vehicles and pedestrians in four different road conditions such as low altitude view T-type road intersection (DS0), mid-altitude view bus stop area in day-time (DS4-1) and night-time (DS43) condition, and high-altitude view wide intersection (DS31). In the road context recognition, the system was first tasked to identify in which of the four road conditions the current traffic scene belongs. This is designed to ensure a high detection rate of vehicles and pedestrians in the mentioned road conditions. Road context recognition has 98.64% training accuracy with 2800 sample images, and 100% validation accuracy with 1200 sample images. After road context recognition, a detection algorithm for vehicle and pedestrians was trained for each condition. In DS0, the training accuracy is 97.75% with 1200 image samples, while validation accuracy is 94.75% with 400 image samples. In DS3-1, the training accuracy is 98.63% with 1400 image samples, while validation accuracy is 98.29% with 600 image samples. In DS4-1, the training accuracy is 99.43% with 1400 image samples, while validation accuracy is 99.83% with 600 image samples. In DS4-3, the training accuracy is 97.77% with 1400 image samples, while validation accuracy is 98.29% with 600 image samples.
Full text available upon request to the author

Article title: Smart Wound Dressing with Arduino Microcontroller
Authors: Argel Bandala
Conference title: 2018 IEEE 10th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract:

Wound dressing are necessity in wound management and quick healing. Commonly used dressings are simple and affordable, but healing may not result to optimum healing. Moisture must be maintained and should be replaced when moisture is no longer present. This paper designed a moisture monitoring wound dressing using Arduino microcontroller since there is no cost effective, biocompatible, and mass manufacturable wound dressing that can monitor conditions continuously while keeping foreign pathogens out at the same time [1]. Using biocompatible materials to make sensors, physicians will able to track the status of the wound through one or many variables including temperature, pH, moisture level, oxygen level etc. The status could be accessed through mobile phones using wireless connectivity through Bluetooth.

Full text available upon request to the author

Article title: A Robotic Model Approach of an Automated Traffic Violation Detection System with Apprehension

Authors: Argel Bandala, Then Anjerome Bedruz, et al.

Conference title: 2018 IEEE 10th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract:

This study suggests a robotic model approach to create a sample traffic violation detection system with apprehension scenario before such system can be implemented in a real road. The model used two robots, one for the moving object which will be detected by the camera and one for the robot that will follow the moving object if its speed reaches a certain limit. The captured images from the camera were fed to an algorithm which detects the centroid of the moving object to track its speed, thereby deciding if it is moving beyond the reference speed. The result of this algorithm was fed to the tracker robot, which then mobilizes and follows the moving object when the moving object exceeds the speed limit.

Full text available upon request to the author

Article title: Application of Artificial Neural Networks in prediction of pyrolysis behavior for algal mat (LABLAB) biomass

Authors: Argel Bandala, Andres Philip Mayol, et al.

Conference title: 2018 IEEE 10th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract:
Pyrolysis kinetics is one way to produce bio-oil and biochar from a biomass product. It is a method to harvest clean energy from a biomass product. Moreover, kinetics and thermal composition of the biomass product is essential for pyrolysis design and optimization. However, industrial pyrolysis process is up to 200°C/min and lab scale pyrolysis temperature is up to 100°C/min. In this study, data from thermogravimetric analysis (TGA) has been utilized and gathered to provide data on algal pyrolysis kinetics. To predict the pyrolysis kinetics at a heating rate of 200°C/min, artificial neural networks (ANN) has been utilized. Results show that ANN predicted the outcome of pyrolysis kinetics which had a correlation with heating rates (10°C, 25°C, and 50°C) of the sample. This is quantified by the correlation coefficient during training which is 0.9972. The average fit quality of the derived model with respect to the experimental data is 98.51%. This work can be improved by considering other hyperparameters for the neural network. This work can also be extended to other compounds besides lablab biomass.
Full text available upon request to the author

Article title: Threat Object Classification in X-ray Images Using Transfer Learning
Authors: Argel Bandala, Reagan L. Galvez, Elmer P. Dadios, et al.
Conference title: 2018 IEEE 10th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract:
Automatic classification of threat objects in X-ray images is important because of terrorist incidents happening in every country especially in the Philippines. Manual inspection using X-ray machine is prone to human error due limited amount of time given to the operator to check the baggage. This task is also stressful because there are lots of objects to be identified and needs full attention. Over long period of time, the performance of human inspector decreases and the chance of missed detection increases. As a solution to the problem, this paper used the concept of transfer learning in classification of threat objects. The threat objects used in the experiment

consists of 4 classes such as blade, gun, knife and shuriken. The dataset came from the GDXray database, a public database of X-ray images. Experiment results showed that by using the concept of transfer learning with data augmentation and fine-tuning, threat objects can be classified at 99.5% accuracy.

Full text available upon request to the author

Article title: Characterization And Effect Of Enhanced Flipped Classroom Implementation

Authors: Argel Bandala and Dylyn A. Junio

Conference title: 2018 IEEE 10th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract:

The advent of digital technology paves the way for the innovative classroom pedagogy, one such innovation in is the use of flipped learning. In the recent years, many researches have been conducted to prove its effectiveness however few studies have been done in the practice of teaching English as a second language in the Philippines. The current study explores flipped classroom instruction to teach oral communication skills to senior high school students. To achieve this, a 6-week flipped classroom instruction was designed to provide students with technology enhanced lessons. The mixed method was used to collect quantitative and qualitative data. Findings of the study revealed the positive impact of flipped classroom instruction to the teaching and learning of oral communication in senior high school.

Full text available upon request to the author

Article title: Design of the Philippine Jeepney for Crashworthiness Analysis: A Finite Element Analysis Approach

Authors: Argel Bandala

Conference title: 2018 IEEE 10th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract:

In this study, the crashworthiness analysis of the Philippine jeepney was successfully demonstrated using the finite element analysis approach. The Philippine jeepneys, or sometimes-called jeeps, are the most popular means of public transportation in the country. They are often known in the country as "King of the Road." Though commuting via jeepney is the cheapest option, there are a lot of cons. Jeepneys are often mechanically unsound due to their balding tires, crabbing and yawing from distorted subframes with poor emission. The FEA Design Center Facility of the Metals Industry Research and Development Center (MIRDC) of the Department of Science and Technology was able to evaluate the vehicle crashworthiness using computer-aided design (CAD) and FEA models developed in SIEMENS NX. From the simulated impact analysis results, the current jeepney design is not well designed to absorb such crash impact. Thus, resulting in fatal injuries that may cause harm to its passengers.

Full text available upon request to the author

Article title: Coding-based Traffic Warning System Using GSM

Authors: Rhen Anjerome Bedruz, Aaron Parayno Uy, Argel Bandala, et al.

Conference title: 2018 IEEE 10th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract:

This study presents a coding-based traffic warning system using the GSM technology. With a specific traffic density of cars, the implemented system decides and sends a warning message alerting the nearby drivers about the traffic condition along the Vito Cruz Taft Avenue Street. The warning messages were differentiated in 5 categories. The system in particular, was modelled with source encoding (Huffman), and Channel encoding (Hamming), and that the GSM technology was applied thereafter. The traffic warning system modelled was found to have an average compression ratio of 59.37 %, and BER of 0.916 %. These results show that the system is well-suited for real application of traffic warning system as it provided a reliable means of communication.

Full text available upon request to the author

Article title: Multi-Scale Vehicle Classification Using Different Machine Learning Models

Authors: Edison Roxas, Ryan Rhay P. Vicerra, Laurence A. Gan Lim, Argel Bandala, et al.

Conference title: 2018 IEEE 10th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract:

The focus of this paper is to explore multi-scale vehicle classification based on the histogram of oriented gradient features. Several literatures have used these features together with different classification models, however, there is a need to compare different models suited for vehicle classification application. In order to quantify the results a common dataset was used for the machine learning models: logistic regression, k-nearest neighbor, and support vector machine. However, since the classification of the support vector machine is based on the type of kernel (linear, polynomial, and Gaussian) used, additional tests were conducted. Thus, this study provides the following contributions: (1) comparison of machine learning models for vehicle classification; and (2) comparison of the best type of kernel function.

Full text available upon request to the author

Article title: Vision-Based Passenger Activity Analysis System in Public Transport and Bus Stop Areas

Authors: Robert Kerwin Dela Cruz Billones, Edwin Sybingco, Laurence A. Gan Lim, Argel Bandala, et al.

Conference title: 2018 IEEE 10th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract:

This study presents the development of a vision system for passenger activity analysis in public transport and bus stop areas. The vision system used people detection and counting algorithm to track the flow of boarding and alighting passengers in a bus stop area. A fuzzy logic controller used inputs from the vision system to determine boarding frequency and alighting frequency for analysis of bus route and dwell time to avoid long queueing that usually cause traffic congestion. People detection and counting result using DS6 dataset (indoor) have 96.81% accuracy with 97.93% precision. People detection and counting result using DS4-1

dataset (outdoor, bus stop area) have 80.39% accuracy with 87.13% precision. Fuzzy simulation results show a boarding frequency of 22 passengers/minute and alighting frequency of 12 passengers/minute. The vision system also analyzed the boarding and alighting of passengers in no loading and unloading areas. This event usually caused traffic bottleneck due to road blockage and long bus queues. In the analysis of DS4-1 (24-hr length) videos, a total of 212 no loading/unloading violations were recorded.

Full text available upon request to the author

Article title: Coconut Fruit Maturity Classification using Fuzzy Logic

Authors: Iristed M. Javel, Argel Bandala, Rodolfo C. Salvador

Conference title: 2018 IEEE 10th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract:

The coconut is one of the most useful trees in the world. Its fruit, with the scientific name cocos nucifera, is one of the major agricultural products of the Philippines. The coconut fruit depending on its maturity is used as a food or as a beverage. There are three stages of maturity namely: malauhog, malakanin, and malakatad. The classification into each stage may be based on the color and hardness of its shell so as the amount and tenderness of its meat. To categorize maturity stage, this paper uses fuzzy logic with color and sound as fuzzy inputs. Image color analysis for determining the percentage brown in the shell. Sound spectral analysis for relating the shell hardness and meat condition. Fuzzy inference system for evaluating the relationship of sound and color with the maturity of a coconut fruit. This study is able to simulate coconut fruit maturity classification system using a fuzzy logic approach.

Full text available upon request to the author

Article title: Performance Evaluation of 12Hp 4-stroke Single Cylinder Diesel Engine based on the Philippine Standards

Authors: Jonathan Q. Puerto, Allan John Sala Limson, Fred P. Liza, Argel Bandala, et al.

Conference title: 2018 IEEE 10th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract:
Presently, local demands for single cylinder engines used in agricultural equipment served thru importation. Our country is in complete dependence on other countries concerning supplying the prime movers for its primary source of power. The Department of Science and Technology initiated developing a 12Hp single cylinder diesel engine. And to make it acceptable to the user, performance evaluation of engine was conducted as necessary for their commercial operation. PAES 117:2000 is the basis of assessing the engine performance and tested at starting condition, varying load performance and during a continuous run. Based on the result, the average maximum power was rated 93.9% (8.42 kW). Likewise, the average fuel consumption was 3.15 L/hr. Also, the average continuous power as a percentage of the rated maximum power was 83.6% (7.48 kW). During the continuous running test, the average maximum noise level of the prototypes was 90.6 dB(A). It showed that the engine developed achieved the standard performance conditions and comparable to the leading brands of commercial engines of the same power rating.
Full text available upon request to the author

Article title: Arduino-based Chug Meter With Force Sensing Resistor And Accelerometer
Authors: Gabriela Eustaquio, Colin Velasco, Bernard Chi, Jarred Cheng, Argel Bandala
Conference title: 2018 IEEE 10th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract:
With just about anything and everything being automated or technologized, there remains endless ordinary and mundane objects at easy disposal. An arduino platform was utilized for its many advantages including fast processing and simple interface. The important age-old pub debate of who can chug beer the fastest is to be put to an end with a revolutionary chug meter. To recognize when the beer is lifted up from the coaster to start the timer and when the beer is placed back on the coaster

to stop the timer, a force sensing resistor was used. Moreover, the modification of this prototype involves a validation that the beer is being "chugged" or consumed with the incorporation of an accelerometer to sense that the beer is tilted the entire time after it is lifted from the coaster.

Full text available upon request to the author

Article title: Vision System for Soil Nutrient Detection Using Fuzzy Logic
Authors: John Carlo Velasco Puno, Argel Bandala, Elmer P. Dadios, Edqin Sybingco
Conference title: 2018 IEEE 10th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract:
Several methods exists to identify the nutrient content of the soil. The most popular method is by using Soil Test Kit (STK). STK gives soil qualitative level of macronutrients and pH. Chemicals that change color upon reaction with soil samples can determine macronutrients such as nitrogen, phosphorus, and potassium. These chemicals are going to be processed based on the method given by the kit. With the use of different algorithms that is commonly used for classification, mostly, a vision system is required. In this study, the development of the vision system that will capture the image of the soil sample after conducting soil testing will be tackled together with the image processing and feature extraction. Using the extracted features as the input of the fuzzy logic gives accurate result in determining the nutrient level of the soil.

Full text available upon request to the author

Article title: Automated Image Capturing System for Deep Learning-based Tomato Plant Leaf Disease Detection and Recognition
Authors: Robert de Luna, Elmer P. Dadios, Argel Bandala
Conference title: TENCON 2018-IEEE Region 10 Conference

Abstract:
Smart farming system using necessary infrastructure is an innovative technology that helps improve the quality and quantity of agricultural production in the country including tomato. Since tomato plant farming take considerations from various variables such as environment, soil, and amount of sunlight, existence of diseases

cannot be avoided. The recent advances in computer vision made possible by deep learning has paved the way for camera-assisted disease diagnosis for tomato. This study developed the innovative solution that provides efficient disease detection in tomato plants. A motor-controlled image capturing box was made to capture four sides of every tomato plant to detect and recognize leaf diseases. A specific breed of tomato which is Diamante Max was used as the test subject. The system was designed to identify the diseases namely Phoma Rot, Leaf Miner, and Target Spot. Using dataset of 4,923 images of diseased and healthy tomato plant leaves collected under controlled conditions, we train a deep convolutional neural network to identify three diseases or absence thereof. The system used Convolutional Neural Network to identify which of the tomato diseases is present on the monitored tomato plants. The F-RCNN trained anomaly detection model produced a confidence score of 80 % while the Transfer Learning disease recognition model achieves an accuracy of 95.75 %. The automated image capturing system was implemented in actual and registered a 91.67 % accuracy in the recognition of the tomato plant leaf diseases.
Full text available upon request to the author

Article title: Payload Lift and Transport Using Decentralized Unmanned Aerial Vehicle Quadcopter Teams
Authors: Argel Bandala, Aldrin G. Chua, Ryan R. Dajay, Rafael D. Rabacca
Conference title: TENCON 2018-IEEE Region 10 Conference

Abstract:
This paper presents a decentralized and cooperative load lifting and transportation system using unmanned aerial vehicle quadcopters. The limitation of a single UAV to carry load is addressed in this study by creating a cooperative lifting system that can accommodate varying load weight. Cooperative, independent and scalable agents were implemented with decision making algorithm embedded in each agents. Decentralized sensing of load is done by the UAV and the group consensually decides if another UAV is needed to carry the load. The system can lift different weight by autonomously sending appropriate number of UAV depending on the load. Experiments were conducted to determine the responsiveness of the system in varying load weights. Experiment results showed that the developed system is robust and scalable.
Full text available upon request to the author

Article title: Object Detection Using Convolutional Neural Networks
Authors: Reagan L. Galvez, Argel Bandala, Elmer P. Dadios, Ryan Rhay P. Vicerra, et al.
Conference title: TENCON 2018-IEEE Region 10 Conference

Abstract:
Vision systems are essential in building a mobile robot that will complete a certain task like navigation, surveillance, and explosive ordnance disposal (EOD). This will make the robot controller or the operator aware what is in the environment and perform the next tasks. With the recent advancement in deep neural networks in image processing, classifying and detecting the object accurately is now possible. In this paper, Convolutional Neural Networks (CNN) is used to detect objects in the environment. Two state of the art models are compared for object detection, Single Shot Multi-Box Detector (SSD) with MobileNetV1 and a Faster Region-based Convolutional Neural Network (Faster-RCNN) with InceptionV2. Result shows that one model is ideal for real-time application because of speed and the other can be used for more accurate object detection.
Full text available upon request to the author

Article title: Development of an Adaptive In-Pipe Inspection Robot with Rust Detection and Localization
Authors: Julianne Diaz, Manuel I. Ligeralde, Micah Antoinette B. Antonio, Argel Bandala, et al.
Conference title: TENCON 2018-IEEE Region 10 Conference

Abstract:
In response to addressing the issue of pipe quality checking, the researchers developed an adaptive in-pipe inspection robot that is able to detect rust as well as map the rust on the pipe network. The robot is traversed in a pipe network of horizontal, vertical, elbow, and tee type with diameters of 8, 10 and 12 inches for all. Hence, the test features the versatility, adaptability, and robustness of the robot. The leg expansion of the robot is inspired by the scissors mechanism. On the other hand, rust detection was done through a per pixel classification via image processing. To effectively map the rust, checkpoints were used as a guide of the robot. Testing of the robot were supported in both simulation and actual testing, wherein it yields a

96.45% success rate on the site. Likewise, its rust detection program proved to be successful with a high percentage accuracy of 99.18%. The localization on the other hand yielded an accuracy of 85%. Given the obtained data and results, the researchers were able to go beyond their target objective of 70%.
Full text available upon request to the author

Article title: Detection of Fonts and Characters with Hybrid Graphic-Text Plate Numbers
Authors: Allysa Kate M. Brillanteas, Argel Bandala, Elmer P. Dadios, John Anthony Cheng Jose
Conference title: TENCON 2018-IEEE Region 10 Conference

Abstract:
Philippine license plates have different plate styles and character fonts making the plate character recognition challenging. This paper focuses on improving the segmentation method to recognize characters of different formats of Philippine license plates. The proposed system comprises of license plate classification, character segmentation and character recognition. License plate series was classified using color level of pixels in the image. Plate characters were segmented using 3-Class Fuzzy Clustering with Thresholding and Connected Component Analysis and were recognized using Template Matching. The system achieved an accuracy of 95% and 70% for the 2003 plate series and 2014 plate series, respectively, having tested 20 license plates from each series.
Full text available upon request to the author

Article title: Design of a Fuzzy-Genetic Controller for an Articulated Robot Gripper
Authors: Jason Española, Argel Bandala, Ryan Rhay P. Vicerra, Elmer P. Dadios
Conference title: TENCON 2018-IEEE Region 10 Conference

Abstract:
In this study, a fuzzy logic controller (FLC) was designed to manipulate an articulated robot gripper. An idea from a previous study was utilized to enhance the performance of the FLC using genetic algorithms by optimizing newly-introduced coefficients in the membership functions of the FLC. The proposed controller was applied on a robot gripper model in Simulink. All in all, the genetic algorithm was able to come up with optimized parameters after an average of at least eight (8)

generations and the proposed controller was able to follow the reference trajectory more accurately than the simple fuzzy controller. Further research will be necessary for physical implementation and possible improvement of the utilized genetic algorithm.

Full text available upon request to the author

Article title: Vehicle Classification Using AKAZE and Feature Matching Approach and Artificial Neural Network

Authors: Rhen Anjerome Bedruz, Arvin Fernando, Argel Bandala, Edwin Sybingco, et al.

Conference title: TENCON 2018-IEEE Region 10 Conference

Abstract:

This research proposes a method in order to classify vehicles in a highly congested roads , a robust technique for vehicle classification with low computational power must be used. So, a proposed solution is to embed an AKAZE feature matching extraction which is ran in an artificial neural network will be used. AKAZE was used because it is faster than SIFT. The features extracted from the AKAZE algorithm will be grouped according to the type of vehicle where it was used and be placed to an Artificial Neural Network (ANN) for the training of the network itself. The results yielded good for real-time Vehicle Classification.

Full text available upon request to the author

Article title: Human Gesture Recognition Using Computer Vision for Robot Navigation

Authors: Pocholo James Loresco, Argel Bandala

Conference title: 5th International Conference on Communication and Computer Engineering (ICOCOE'2018)

Abstract:

Robot navigation is one of the significant requirements of human-computer interaction (HCI). Gesture recognition in robots is the control of its movement by gestures priori information. Gesture recognition methods employing wearable technologies are usually not natural and not barrier-free in interaction. Existing computer vision based gesture recognition required full body vector data demanding higher computational complexity. This paper presented hand gesture

recognition to navigate a robot using computer vision focused on the hand image only. The system provided hand gesture recognition algorithms to control robot navigation for 4 dynamic gestures, namely 'Go Left', 'Go Right', 'Go Backwards', and 'Go Forward' and 2 static gestures, namely 'Stop' and 'Turn around'. Tests gave a high identification rate for hand gestures. Future work will involve implementing the proposed gesture control along with other sensor technologies and other computer vision algorithms to enable self-localization and positioning.
Full text available upon request to the author

Article title: Coverage Path Planning on Multi-Depot, Fuel Constraint UAV Missions for Smart Farm Monitoring
Authors: Anton Louise De Ocampo, Argel Bandala, Elmer P. Dadios
Conference title: 2018 IEEE Region 10 Symposium

Abstract:
UAVs used in monitoring crop fields are flying higher than 6 meters and capture telemetric data that provides information on the general condition of the plants in the field. But, in order to obtain specific information on the actual conditions of the plants based on individual morphological aspects, lower altitude monitoring, at most 3 meters, is required. Low-altitude missions cover less than high-altitude and requires UAVs to fly longer to cover more area. In this paper, an approach for multi-depot, fuel constrained coverage path planning is presented. First, target coverage is segmented into smaller regions based on the number of available charging depots. Then, each region is further decomposed into multitude of cells with area equivalent to the camera FOV when UAV is flying at 3 meters above the field. All possible routes are generated and fed into evolutionary optimization in aim to identify the optimal path considering the fuel constraints and availability of recharging depots. The optimization yields a significant improvement in obtaining the route that will provide the minimum distance that the UAV should traverse to cover the entire Area-of-Interest. This approach proved to be useful for crop field monitoring using UAVs.
Full text available upon request to the author

Article title: Development of an Adaptive Pipe Inspection Robot with Rust Detection
Authors: Argel Bandala, Jose Martin Maningo, John Anthony Cheng Jose, Arvin Fernando, et al.

Conference title: 2018 IEEE Region 10 Symposium

Abstract:
In response to addressing the issue of pipe quality checking, the researchers developed an adaptive in-pipe inspection robot that is able to detect rust. The robot is traversed in a pipe network of horizontal, vertical, elbow, and tee type with diameters of 8, 10 and 12 inches for all. Hence, the test features the versatility, adaptability, and robustness of the robot. As for the leg expansion of the robot, it is inspired by the scissors mechanism that is achieved by using of linked, folding supports in a crisscross pattern. In this paper, the traversing of the robot was supported in both simulation and actual testing, wherein it yield a 97.2167% success rate on the site. Likewise, Rust Detection proved to be successful with its high percentage accuracy of 95%. Given the obtained data and results, the researchers were able to go beyond their target objective of 70%.
Full text available upon request to the author

Article title: Vision-based traffic sign compliance evaluation using convolutional neural network
Authors: Edison Roxas, Joshua N. Acilo, Ryan Rhay P. Vicerra, Argel Bandala, et al.
Conference title: 2018 IEEE International Conference on Applied System Innovation (ICASI)

Abstract:
Manual monitoring of road signs compliance procedures are adapted by developing countries. As effective as this method is, the amount of time and funds needed to cover a large area is quite alarming. Thus, a need for a vision - based traffic sign detection and recognition system. However, while a majority of researches using machine vision focuses on the development of a robust real - time traffic sign recognition system, researches addressing the issue of the sign compliance and standardization is lacking.
Full text available upon request to the author

Article title: Vehicle classification method using compound kernel functions
Authors: Edison Roxas, Ryan Rhay P. Vicerra, Elmer P. Dadios, Argel Bandala
Conference title: 2018 IEEE International Conference on Applied System Innovation (ICASI)

Abstract:
The focus of this paper is to explore the use of the Support Vector Machine (SVM) classifier. Though several literatures have already discussed the idea of using this method in vehicle classification, however, SVM accuracy is limited on the type of Kernel function used. Each Kernel functions has their own characteristics and limitations that is highly dependent on its parameter. Thus, in order to overcome these limitations, a method of compounding Kernel function for vehicle classification is hereby implemented.
Full text available upon request to the author

Article title: Cardiovascular health pre-diagnosis based on a BP profile using Artificial Neural Network
Authors: Jackielyn G. Domingo, Sean Harvy S. Geronimo, Gavril Ryan N. Ochoa, Argel Bandala, et al.
Conference title: 2017 IEEE 9th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM)

Abstract:
This study describes the implementation of Artificial Neural Network Pattern Recognition using Back-Propagation algorithm which can perform cardiovascular health pre-diagnosis of a patient through a generated blood pressure profile. The proponents gathered data from institutions that conduct Exercise Stress Testing, specifically the Treadmill Stress Test. The data gathered were age, gender, height, weight, blood pressure and heart rate readings and is considered as blood pressure condition risk factor. They compose the 47 input parameters of the network and was then divided into two - the training data and the testing data. This was put into a database created using Microsoft Excel. The back-propagation neural network model gives an accurate pre-diagnosis. The trained system gives an acceptable pre-diagnosis in reference to the given diagnosis by the attending practitioner that facilitated the collection of data.
Full text available upon request to the author

Article title: Design, fabrication, and testing of a semi-autonomous wheelchair
Authors: S. Karim, B. D. Que, A. Bandala, J. E. Que, et al.

Conference title: 2017 IEEE 9th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM)

Abstract:
This research project presents a semi-autonomous wheelchair that will move and avoid obstacles autonomously while a remote control will be used to guide the wheelchair in its path to the user. The wheelchair is equipped with two DC motors, batteries, a transmitter-receiver pair (to relate to the remote control), and nine ultrasonic sensors that is controlled by an Arduino microcontroller. The motors used are 24VDC, 250W brushed DC motors, and are independently controlled based on the input provided by the ultrasonic sensors and on-board receiver. The control system implements algorithms in obstacle avoidance for the wheelchair and in the path planning for the remote control. In the testing and performance evaluation, factors such as response time, maneuverability, speed, turning radius, and recommended maximum payload is measured and analyzed.
Full text available upon request to the author

Article title: Development of a text to braille interpreter for printed documents through optical image processing
Authors: Joshua L. Dela Druz, Jonaida Angela D. Ebreo, Reniel Inovejas, Argel Bandala, et al.
Conference title: 2017 IEEE 9th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM)

Abstract:
This paper presents the development of an optical text to braille converter device for aiding visually impaired individuals to read printed materials. This is a solution for the lag or even failure of translating or printing the braille version of everyday reading materials. The system utilized optical character recognition engine in which an image of the text to be translated into braille is captured. The digitized texts are then transferred electronically in a braille haptic device. This device are piezoelectric based haptic system which is composed of several haptic pins arranged in a way to resemble the braille writing system. Several experiments were conducted to determine the performance of the system. The overall system reliability obtained

was 95.68%. The system is also capable of processing speed of 1 word in 2 seconds. The system performs at its best with a letter sized page reading material within the range of 15 to 20 cm from the camera, with the camera positioned at 0 degrees.
Full text available upon request to the author

Article title: Path planning for mobile robots using genetic algorithm and probabilistic roadmap
Authors: Robert Martin Cahanding Santiago, Anton Louise De Ocampo, Aristotle Ubando, Argel Bandala, et al.
Conference title: 2017 IEEE 9th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM)

Abstract:
Mobile robots have been employed extensively in various environments which involve automation and remote monitoring. In order to perform their tasks successfully, navigation from one point to another must be done while avoiding obstacles present in the area. The aim of this study is to demonstrate the efficacy of two approaches in path planning, specifically, probabilistic roadmap (PRM) and genetic algorithm (GA). Two maps, one simple and one complex, were used to compare their performances. In PRM, a map was initially loaded and followed by identifying the number of nodes. Then, initial and final positions were defined. The algorithm, then, generated a network of possible connections of nodes between the initial and final positions. Finally, the algorithm searched this network of connected nodes to return a collision-free path. In GA, a map was also initially loaded followed by selecting the GA parameters. These GA parameters were subjected to explorations as to which set of values will fit the problem. Then, initial and final positions were also defined. Associated cost included the distance or the sum of segments for each of the generated path. Penalties were introduced whenever the generated path involved an obstacle. Results show that both approaches navigated in a collision-free path from the set initial position to the final position within the given environment or map. However, there were observed advantages and disadvantages of each method. GA produces smoother paths which contributes to the ease of navigation of the mobile robots but consumes more processing time which makes it difficult to implement in real time navigation. On the other hand, PRM produces the possible

path in a much lesser amount of time which makes it applicable for more reactive situations but sacrifices smoothness of navigation. The presented advantages and disadvantages of the two approaches show that it is important to select the proper algorithm for path planning suitable for a particular application.

Full text available upon request to the author

Article title: Quality assessment of lettuce using artificial neural network

Authors: Ira Valenzuela, John Carlo Velasco Puno, Argel Bandala, Renann Baldovino, et al.

Conference title: 2017 IEEE 9th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM)

Abstract:

The critical features in yield forecasts determination are crop health and seasonal progress. These serve as an indicator for the success of farming. Visual inspection often produces a false assumption on the quality of the lettuce crop health. To address this problem, a proposed solution is the development of a machine vision system for the assessment of the quality of the lettuce crop. This system is composed of two parts: application of digital image processing for the feature extraction of the sample lettuce and implementation of the back propagation artificial neural network for the self-learning classification of the system. ANN is a tool designed like a human brain that can learn patterns and relationship based on the input data. Also, backpropagation has been used because it has the capability to adjust its weights and biases in increasing the efficiency of its learning. A total of 253 images were collected and 70% of these were used for training the network, 15% fro validation and 15% for testing. The developed system produced was able to classify the quality of the lettuce with minimum relative error of 0.051.

Full text available upon request to the author

Article title: Integrative review of the development of a multi-object tracker from a dual camera system in an unmanned aerial vehicle (UAV)

Authors: Jay Robert Del Rosario, Janela Assumpta L. Angeles, Aldwin Jerome P. Cabebe, Argel Bandala, et al.

Conference title: 2017 IEEE 9th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM)

Abstract:
In the modern age, unmanned aerial vehicles are used in industries for a variety of reasons ranging from surveillance uses to product deliveries. They are also used by people for recreational purposes such as aerial photography or drone racing. However, the capabilities of these UAVs are limited to merely recording and storing the videos. This paper introduces the development of a quadcopter capable of multi-object detection. It also explores the possibility of using a dual camera system for extended range.
Full text available upon request to the author

Article title: Machine vision for rat detection using thermal and visual information
Authors: Georjean D. S. Brown, Argel Bandala, Carlo Enrico A. Latonio, Richard Dean N. Oanes, et al.
Conference title: 2017 IEEE 9th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM)

Abstract:
Pests, particularly rodents, are a major cause of problem to people because of the deadly diseases it spreads and the damage it does on field crops as it decreases billion worth of yield crop production in the Philippines. A detection measure to help eradicate rats is proposed by the researchers to prevent future failures or deficiencies in crop cultivation. Researchers developed a solution to this by designing and developing a Machine Vision System using thermal and visual identification for rodent identification. Thermal imaging uses infrared imaging to detect and record only thermal temperature patterns emitted by an object whereas visual imaging record videos exposed to good lighting and has not been configured for dark environment tracking. The rat detection accuracy of both individual cameras were recorded for data comparison and researchers proved that the use of a thermal camera arise to results that are more accurate than with the use of a visual camera.
Full text available upon request to the author

Article title: Multi-view multi-object tracking in an intelligent transportation system: A literature review
Authors: Jay Robert Del Rosario, Argel Bandala, Elmer P. Dadios
Conference title: 2017 IEEE 9th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM)

Abstract:
A comprehensive and interdisciplinary review of notable literatures conducted were topic closely related to object detection and surveillance, mainly vehicle tracking. This survey of literature is focus on multi view vision system in various platform like: static and dynamic cameras.
Full text available upon request to the author

Article title: Fuzzy-based fault-tolerant control of Micro Aerial Vehicles (MAV) — A preliminary study
Authors: Mark Lester F. Padilla, Selwyn Jenson C. Lao, Renann Baldovino, Argel Bandala, et al.
Conference title: 2017 IEEE 9th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM)

Abstract:
Unmanned Aerial Vehicles (UAV) has gained popularity in the past decades. This has been widely used throughout the world in the fields of military, surveillance, agriculture, and construction. One of the main problems in Micro Aerial Vehicles (MAV), typically smaller version of UAV, is its ability to detect and tolerate faults inside the system. In this paper, a Fault-Tolerant Control (FTC) will be developed using fuzzy logic and uses battery percentage and degree of ability to hover as the crisp inputs. The fuzzy logic will use five and three membership functions for the Battery Percentage and Degree of Ability to Hover respectively. The output of the controller will be the degree of ability to continue a certain mission. Further studies can include other constraints such as mapping efficiency where neural networks and deep learning can be associated. Thus, making a hybrid system.
Full text available upon request to the author

Article title: Real-time vehicle detection and tracking using a mean-shift based blob analysis and tracking approach
Authors: Rhen Anjerome Bedruz, Edwin Sybingco, Argel Bandala, Ana Riza Fernandez Quiros, et al.
Conference title: 2017 IEEE 9th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM)

Abstract:
Implementing computer vision on traffic scenarios are one of the most widely sought area in the field of vision research. In dealing with the surveillance in traffic scenarios, every vehicle in the scene must be observed which results to problem arising from instances whenever the traffic density in an area is high due to occlusion caused by the large number of vehicles being observed. Thus, this paper proposes a vehicle detection and tracking algorithm whose main purpose is to detect and track vehicles entering an intersection and track them robustly in real-time. The algorithm which was used is a blob analysis and tracking based on a mean-shift kernel. The blob approach acts as the main tracking and will use the mean-shift in the event of blob merging or occlusion. In this paper, the proposed tracking method is tested using a CCTV camera on an intersection with high traffic density to illustrate the capability of solving occlusion and observe the robustness of the algorithm in the scene. The results show that the proposed system successfully tracks the vehicles during and after occlusion with other vehicles or other types of objects in the scene.
Full text available upon request to the author

Article title: Usage prediction of appliances in filipino households using Bayesian algorithm
Authors: Ian Joseph J. Pastorfide, Jua Franco M. Revilla, Chantel Kim D. Santos, Jennica Tsubasa F. Takada
Conference title: 2017 IEEE 9th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM)

Abstract:

The standby power accumulated after some time contributes to the wasted energy of a household and can be noticeable in a home's power consumption. In this study, the group aims to devise a standby power management system that is able to adapt constantly with one's changing lifestyle. To know the appliances available in households, a survey with 230 respondents was conducted and the most common appliances were taken into consideration. The power measurements of the appliances were also recorded using a power meter. The data log was conducted by members of different households for the activation of the appliances, the users, and the occupancy of the household. The mentioned factors from the usage log was then used on the Bayesian algorithm, which was used to calculate the probability of usage of the appliances. This learning prediction, in addition, to a power management system will minimize the power consumed by appliances in standby mode, thus saving energy and income.

Full text available upon request to the author

Article title: Design of a fuzzy logic controller for a vent fan and growlight in a tomato growth chamber

Authors: Arvin Fernando, Argel Bandala, Laurence A. Gan Lim, Maglaya Archie, et al.

Conference title: 2017 IEEE 9th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM)

Abstract:

In this paper, a fuzzy logic controller was design and develop to control the temperature, relative humidity and Carbon Dioxide (CO 2) inside the prototype tomato growth chamber. The model was develop to automatically adjust the inside parameters to obtain the optimum tomato plant environment condition. The growth chamber fuzzy logic controller was modeled using the MATLAB fuzzy logic tool box. In this research we design a fuzzy logic controller (FLC) to control the environment parameters in the growth chamber. In order to provide the most suitable conditions for the growth of the tomato plant and might minimize energy consumption.

Full text available upon request to the author

Article title: Quadrotor system for gathering discomfort index and amount of air pollutants
Authors: Junlae Cheong, Rohit P. Nihalani, Noel B. Paulino, Argel Bandala, et al.
Conference title: 2017 IEEE 9th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM)

Abstract:
One can often feel some form of discomfort when going outdoors either from the heat or from the pollutants present in the air such as humidity, temperature, and the presence of air pollutants such as carbon monoxide and particulate matter. In the national setting, there has not been much awareness of the factors of discomfort yet these still prevail. The proposed solution for this problem is a system that is able to measure different parameters of discomfort. To provide safety for the measurer and the mobility of the system, the group has implemented the system on an unmanned aerial vehicle, specifically, a quadrotor. Here, the controller can manipulate the quadrotor system to go up at a desired altitude for measurements. This has been tested quarterly during the daytime and is able to maintain 85% accuracy but during testing, this may not be the case since there are other external factors that can affect the measurements such as the input power and wind. An Android application has been developed for the purpose of updating and viewing the data recorded.
Full text available upon request to the author

Article title: Artificial neural network model for solar resource assessment: An application to efficient design of photovoltaic system
Authors: Robert Martin Cahanding Santiago, Argel Bandala, Elmer P. Dadios
Conference title: TENCON 2017-IEEE Region 10 Conference

Abstract:
The power output of solar energy conversion facilities such as photovoltaic systems is highly dependent and proportional to the amount of solar radiation absorbed on the collecting surface. In order to have an efficient design of these systems, it is essential to perform solar resource assessment on the intended location prior to installation. Advancements in computational intelligence led to applications of artificial neural networks for solar resource assessment which outperforms existing empirical models in terms of speed and accuracy and overcomes the cost of using

expensive solar radiation sensors. In this study, a single recurrent or feedback network is developed and assessed for efficacy in estimating the daily sum of solar radiation in the Philippines using meteorological data such as daily sum of sunshine duration, daily mean air temperature, daily mean air pressure, and daily mean air humidity. The collected data used in this study were obtained for the year 2014 from the Bureau of Soils and Water Management (BSWM) Agro-meteorological Station Lufft sensors in three locations: (1) Tanay, Rizal, (2) Barili, Cebu, and (3) Sto. Tomas, Davao del Norte. The developed model responded with mean squared error (MSE) values of 0.1491, 0.1679, and 0.2297 and regression values of 0.9146, 0.9313, and 0.9277 for the training, validation, and testing phases. The error histogram also shows that low values of error exist for each dataset and most errors fall between the ranges of -0.4581 to 0.5646. Results may further be improved by having larger data for training, validation, and testing phases for the neural network which can make the model more robust for larger variations in the weather patterns.

Full text available upon request to the author

Article title: Rust detection using image processing via Matlab

Authors: Julianne Diaz, Manuel I. Ligeralde, John Anthony Cheng Jose, Argel Bandala

Conference title: TENCON 2017-IEEE Region 10 Conference

Abstract:

This research attempted to create a program that is capable of detecting rust through image processing. Image processing is known for the manipulation of image through quantizing the image itself in matrix form. Through this quantization, it gives opportunity to not only manipulate the image but also detect a particular subject on the image as well, such as rust. Through setting the threshold values and the use of edge detection and segmentation, rusts on the image can be detected. The threshold values will set the parameters and characterize what a rust is. The edge detection will check for the sudden changes of colors in the images. The segmentation will then determine the colors on the image. The results in the edge detection and segmentation will be integrated to determine the rust on the image. The results of the program yield a success rate 90% in detecting rust on images with rusts and did not obtain any errors on images with no rust.

Full text available upon request to the author

Article title: Development and implementation of swarm sweep cleaning protocol for quadrotor unmanned aerial vehicle (QUAV) swarm
Authors: Christian Kyle Y. Fermin, Arthur Lanz L. Imperial, Karlo Feliper D. L. Molato, Argel Bandala, et al.
Conference title: TENCON 2017-IEEE Region 10 Conference

Abstract:
This study aims to implement the SWEEP cleaning protocol in a swarm of flying robots. The dynamic cleaners' problem is one of the most popular application of swarm intelligence. The swarm is tasked to cover the target area in an optimized manner. It starts with an area where in a contamination spreads. The swarm is tasked to decontaminate the area and suppress the contamination. The accuracy and speed of cleaning is measured in static and dynamic contamination spreading with varying spreading time. Also, swarm members are increase in the given conditions. Experiment shows that there is an average decrease in cleaning time of 12.87% for every increase in swarm member number. The accuracy of the system is at cleaning the area is 89.8%. The completion of this research paves the way for several real life applications. Some of this will include search and rescue, target searching, and surveillance operations.
Full text available upon request to the author

Article title: A kNN-based approach for the machine vision of character recognition of license plate numbers
Authors: Ana Riza Fernandez Quiros, Rhen Anjerome Bedruz, Aaron Parayno Uy, Argel Bandala, et al.
Conference title: TENCON 2017-IEEE Region 10 Conference

Abstract:
This research proposes to automate the plate recognition process by installing an IP camera on a road and analyzing the video-feed to capture the vehicles along that road. The contours of the characters in a given plate image are detected, violated and isolated from the parent image. This results to segmented characters. Each of the characters are identified using a k nearest neighbors (kNN) algorithm. The kNN algorithm was trained using different sets of training data containing 36 characters each. The algorithm was tested on the previously segmented characters. The

simulations show that an accuracy of 87.43% was achieved for the plate recognition algorithm using kNN at k = 1. Compared against existing character recognition techniques such as artificial neural networks (ANN), the difference in the accuracy is minimal. Moreover, the average processing time was 0.034 s.

Full text available upon request to the author

Article title: Development of a biomorphic and hyper-redundant caecilian based robots

Authors: Karl Fabico, Jan Karlo M. Hernandez, Simon Joseph P. Plata, Argel Bandala, et al.

Conference title: TENCON 2017-IEEE Region 10 Conference

Abstract:

This paper presents the development and design of a mobile multilink robot. Because of its multilink property, snake robots are appropriate in tight and hard to reach places. This is robot is intended to be deployed in such areas specifically in disaster rubbles. The robot is composed of 10 segments each of which has one degree of freedom. The robot is equipped with proximity sensors for obstacle detection and IMU for orientation sensing. In front of the robot, a wireless camera is attached so that the environment where the robot operates is viewed by the base controller. Experiments showed that the movement algorithm which follows the snake's biological motion is successfully implemented with a maximum movement velocity of 70cm/s. The maximum climb height is 22cm. This study demonstrates the effectiveness of the snake robot in different terrain with obstacles and small obstacle gaps.

Full text available upon request to the author

Article title: Localization of license plates using optimized edge and contour detection technique

Authors: Ana Riz Fernandez Quiros, Then Anjerome Bedruz, Aaron Parayno Uy, Argel Bandala, et al.

Conference title: TENCON 2017-IEEE Region 10 Conference

Abstract:

There are a lot of existing studies in the field of plate detection. However, most of them focused on using still images and only a few have applied the process on video

streams. This research proposes to automate the plate detection process by the use of intelligent transport system through image processing techniques such as edge detection and contour matching. The region of interest of the vehicle image was reduced to the lower half since statistically, license plates were located on the bottom half of a vehicle to improve the computational complexity of the system. The edges of the vehicle image were computed, from which contours were calculated. The detected contours were filtered based on three parameters - area, aspect ratio and diagonal. The results show that the system achieved 96.67% accuracy.
Full text available upon request to the author

Article title: Obstacle avoidance algorithm for swarm of quadrotor unmanned aerial vehicle using artificial potential fields
Authors: Reagan L. Galvez, Gerard Ely Ucab Faelden, Jose Martin Maningo, Argel Bandala, et al.
Conference title: TENCON 2017-IEEE Region 10 Conference

Abstract:
Unmanned aerial vehicle that is moving from one place to another needs to have a real-time obstacle avoidance controller to prevent collisions in the obstacles around it. In this paper, the concept of artificial potential field is proposed to implement obstacle avoidance in swarm of quadrotors. This is based on the assumptions that the target and obstacle will introduce a certain force that will direct the robot to its destination. The effectiveness of this method was tested in a computer simulation and verified using real quadrotors.
Full text available upon request to the author

Article title: Road lane reconstruction using vision — based macro block spatial predictions
Authors: Edison Roxas, Rhay Rhay P. Vicerra, Arvin Fernando, Argel Bandala, et al.
Conference title: TENCON 2017-IEEE Region 10 Conference

Abstract:
Vision - based road lane detection and reconstruction is a very common interest in the field of computer vision (CV). It has numerous application ranging from autonomous vehicle to driver assist and support systems technology. These researches are always focusing on both accuracy and complexity of the system's

output; however, none of these uses Macro Block (MB) method. This paper introduces the characteristics of MB method used for spatial road lane detection and reconstruction subjected to different environment conditions; different MB size; and different function approximations.

Article title: Optimization of Photosynthetic Rate Parameters using Adaptive Neuro-Fuzzy Inference System (ANFIS)
Authors: Ira Valenzuela, Renann Baldovino, Argel Bandala, Elmer P. Dadios
Conference title: 2017 International Conference on Computer and Applications (ICCA)

Abstract:
Crop growth is greatly affected by light intensity, temperature and CO 2 concentration. The combinations of these factors are considered in growing crops. In this study, a system was developed using adaptive neuro-fuzzy inference system for the prediction of the photosynthetic rate of lettuce crop based on the temperature, light intensity and CO 2 . A fuzzy inference system is designed to generate the rules for the fuzzy logic where inputs of these are from the output of the trained neural network. Based on the result, the system was able to predict the photosynthetic rate of the lettuce crop based on the three input parameters. The RMSE value for the ANFIS model was found to be 2.7843e-05.
Full text available upon request to the author

Article title: Vehicle detection and tracking using corner feature points and artificial neural networks for a vision-based contactless apprehension system
Authors: Robert Kerwin Dela Cruz Billones, Argel Bandala. Edwin Sybingco, Laurence A. Gan Lim, et al.
Conference title: 2017 Computing Conference

Abstract:
Blocked intersections have been a contributing factor in the city-wide traffic congestion, especially in metropolitan cities. This research study aims to develop a better traffic violations management system in city-road intersections by using a machine vision system that automatically identifies and tags traffic violations committed in an intersection. The proposed system have three main sub-systems

which are the video capture, video analysis, and output sub-systems. This study presents the development and results of a vehicle detection and tracking system using corner feature point detection and artificial neural networks for the vision-based contactless traffic violations apprehension system. This detection and tracking system serves as the front-end processing in the video analysis sub-system. Experiments were conducted for different corner feature-points detection algorithm: Harris, Shi-Tomasi, and Features from Accelerated Segment Test (FAST). The results showed that in the testing phase Harris-ANN have 89.09% accuracy, Shi-TomasiANN have 88.48%, and FAST-ANN have 90.30% accuracy.
Full text available upon request to the author

Article title: Automated vehicle class and color profiling system based on fuzzy logic
Authors: Aaron Christian P. Uy, Rhen Anjerome Bedruz, Ana Riza Fernandez Quiros, Argel Bandala, et al.
Conference title: 2017 5th International Conference on Information and Communication Technology (ICoIC7)

Abstract:
The study proposes an automated vehicle class and color profiling system to specifically have distinct information on any apprehended car in an intelligent traffic system. The problem arises from the fact that traffic enforcers are sometimes unreliable with apprehending cars due to the lack of information on the violator. The solution is an automated system which consists of background difference method, and fuzzy logic to classify these violators. The general process is as follows: a capture picture from a traffic CCTV camera is subjected to a car detection process, and then the fuzzy inference systems are run to find the class and color of the car, and finally display a cropped picture of it along with the said descriptions. The automated car profiling system was found to have an accuracy of 99.391% for the classification process while 98.580% for the color profiling process. These results show that the algorithm is well-suited for a reliable implementation on intelligent traffic system.
Full text available upon request to the author

Article title: Fuzzy-based Decision Support System for Smart Farm Water Tank Monitoring and Control

Authors: John Dela Cruz, Renann Baldovino, Francisco Culibrina, Argel Bandala, et al.
Conference title: 2017 5th International Conference on Information and Communication Technology (ICoIC7)

Abstract:
Water is considered as the blood of the irrigation system. It is a basic necessity in farms so as to have a high amount of production. For some farms located in higher elevation, electric motor pump is being used to collect water from underground reservoir. Since electric motor pumps will be used, electric consumption issue is also a concern. Proper allocation of available resources is one of the main issues for smart farm. In this paper, the authors proposes the consideration of using of a Fuzzy-based Decision Support System (FDSS) in the Water Tank Monitoring and Control Subsystem (WTMCS) of the Smart Farm Automated Irrigation System (SFAIS) based on the following: (1) water level in the tank storage connecting the motor pump and the irrigation pipes, and (2) availability of electricity from a power source with limited amount of energy available. MATLAB simulations, via Fuzzy Logic Toolbox of Simulink, were done to verify the feasibility of the proposed system before the actual implementation.
Full text available upon request to the author

Article title: Water usage optimization of Smart Farm Automated Irrigation System using artificial neural network
Authors: John Dela Cruz, Renann Baldovino, Argel Bandala, Elmer P. Dadios
Conference title: 2017 5th International Conference on Information and Communication Technology (ICoIC7)

Abstract:
Limited water resources had become the main constraint to be considered in farming. Optimizing this has become one of the interests in researches relating to precision agriculture. In this paper, the researchers use Neural Network in optimizing the water usage in the smart farm by incorporating it to the proposed Smart Farm Automated Irrigation System (SFAIS) by implementing an expert system. Simulations were done using the MATLAB Neural Network toolbox and results show that neural network is a useful tool.
Full text available upon request to the author

Article title: Multiple objective optimization of LED lighting system design using genetic algorithm

Authors: Robert Martin Cahanding Santiago, John Anthony Cheng Jose, Argel Bandala, Elmer P. Dadios

Conference title: 2017 5th International Conference on Information and Communication Technology (ICoIC7)

Abstract:

In order to maximize the advantages of LED lighting systems for controlled environment agriculture (CEA), several considerations must be taken into account such as the achievement of required daily light integral (DLI), uniform light distribution over the plant growing area, and minimize the investment and operating costs associated with the lighting system. This study aims to apply the multiple objective optimization of genetic algorithm in designing a lighting system that meets the mentioned objectives. The optimization variables, number of bits per variable and maximum number of iterations are fixed parameters tuned to the requirements of this application and the population size, mutation rate, and selection rate are genetic parameters for explorations. Results of the algorithm suggest the use of a number of LED lamps that is 31.25% lower than the maximum number of lamps that may be used in the plant growing area and, consequently, reduce the investment and operating costs while maintaining the required light integral capacity and uniformity. This and other studies that aim to develop and optimize LED lighting systems open more possibilities and promote the technology for controlled environment. Moreover, control and optimization of agricultural practices can lead to better plant quality and production even on locations and periods that they do not usually grow.

Full text available upon request to the author

Article title: Obstacle Avoidance for Quadrotor Swarm Using Artificial Neural Network Self-Organizing Map

Authors: Argel Bandala, Jose Martin Maningo, Gerard Ely Ucab Faelden, Reiichiro Christian S. Nakano, et al.

Conference title: 2015 International Conference on Humanoid Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract:
Swarm operation in Unmanned Aerial Vehicles is an emerging technology which has numerous uses. It can be used in industrial, agricultural, and even military applications. However, it must be able to perform formations for it to be effective. Also, countermeasures must be made by the swarm to account for certain obstructions that are present in the environment. This paper aims to address this issue by implementing an artificial neural network self-organizing map to give the correct coordinates to each swarm individual such that the swarm formation would be present in the given space while avoiding the obstructions present. Testing would include subjecting the system to three different obstruction patterns in a given 3D space. The results showed that for all cases, the swarm was able to avoid all the obstructions.

Full text available upon request to the author

Article title: Philippine vehicle plate localization using image thresholding and genetic algorithm
Authors: Rhen Anjerome Bedruz, Edwin Sybingco, Argel Bandala, Ana Riza Fernandez Quiros, et al.
Conference title: TENCON 2016-2016 IEEE Region 10 Conference

Abstract:
This paper proposes a vehicle plate localization method using genetic algorithm integrated with image thresholding. Image thresholding outputs a value which varies on the time the image is captured. Genetic algorithm on the other hand, executed the license plate region detection of the digital image which depends on the set-level of the image threshold values obtained. Using the proposed algorithm, it was shown how the algorithm was effective on finding the plate location in a given image. Results show that the different parameters tested were successful and converges to a point where the plate locations can be located. The algorithms were tested on an image of a vehicle equipped with a license plate on its frontal view tested on a large number of trials. The genetic algorithm initialized 2000 chromosomes as its initial population and a fixed generation's count of 100. It was observed that the time it took for the program to locate the plate is about 3 seconds.

Another finding observed is that by varying the initial chromosome count and generation count will lead to longer computation time with increased accuracy. On the contrary, if the initial values were lessened, computation time will be less but the accuracy lessen. Results show that this plate localization technique successfully locates the plate and may be calibrated depending on the time of analysis.

Full text available upon request to the author

Article title: Machine vision of traffic state estimation using fuzzy logic

Authors: Ana Riza Fernandez Quiros, Rhen Anjerome Bedruz, Aaron Parayno Uy, Argel Bandala, et al.

Conference title: TENCON 2016-2016 IEEE Region 10 Conference

Abstract:

One of the problems encountered by motorists are congested roads. Current technology cannot easily broadcast the information about which roads are heavily congested and which are not to the motorists. As such, planning of the route to take to their destinations is compromised. This paper proposes a fuzzy logic method approach to the estimation of the traffic state of a road. Images from IP cameras installed in different roads can be used to determine the state of the traffic in an area at any point in time. The vehicles within the image are needed to be detected first via edge detection. As the vehicles are detected within the image, so are their position and size with respect to the whole image are obtained. As such, three different parameters namely vehicle density, distance between neighboring vehicles and vehicle sizes can be computed. Using these three parameters, a fuzzy logic system can be created. Three degrees of intensity for each parameter was used, creating 27 rules. The center of gravity method was used to defuzzify the traffic density parameter. Based on the results, the designed algorithm was able to identify six different road images of different traffic states accurately.

Full text available upon request to the author

Article title: Formation control in quadrotor swarm aggregation using Smoothed Particle Hydrodynamics

Authors: Jose Martin Maningo, Gerard Ely Ucab Faelden, Reiichiro Christian S. Nakano, Argel Bandala, et al.

Conference title: TENCON 2016-2016 IEEE Region 10 Conference

Abstract:
This paper uses the Smoothed Particle Hydrodynamics technique to perform formation control of quadrotor swarms. The swarm is to be modelled to behave like water. A simple aggregation behavior is exhibited with certain primitives that act as obstacles to force formations from the swarm. Different primitives are implemented to manifest various formations. Results show that SPH outperforms APF by a margin of 7.31% for a cubic container primitive and by a margin of 27.81% for a spherical target enclosure primitive. Formation control was successfully implemented using Smoothed Particle Hydrodynamics and is proven to be more efficient than the benchmark algorithm.
Full text available upon request to the author

Article title: Automated traffic violation apprehension system using genetic algorithm and artificial neural network
Authors: Aaron Parayno Uy, Ana Riz Fernandez Quiros, Rhen Anjerome Bedruz, Argel Bandala, et al.
Conference title: TENCON 2016-2016 IEEE Region 10 Conference

Abstract:
Developing countries face the problem of crowded and congested roads because of inefficient implementation of traffic rules. Motorists ignore the rules because they are not apprehended and can get away easily. This paper proposes an intelligent traffic system that is able to automatically detect and apprehend traffic violators, specifically motorists who either swerve or block the pedestrian lane. The system is designed by integrating three processes: violation detection, plate localization and plate recognition. The violation detection and plate localization were realized using genetic algorithm while the plate recognition process was performed using an artificial neural network. The recognition of the plate number is highly dependent on the position of the detected vehicle with respect to the camera. Thus, the recognized plate number will only be supplementary information about the violator; the physical attributes of the vehicle which is captured by the violation detection process will be the main information on the violator. Based on the results of 48 images tested, the overall system was able to detect the mentioned violations and to identify the plate number of the vehicles that were detected as traffic violators, with an average accuracy of 90.67%, and program runtime of 1.34 seconds.

Full text available upon request to the author

Article title: Implementation of swarm aggregation in quadrotor swarms using an artificial potential function model
Authors: Gerard Ely Ucab Faelden, Jose Martin Maningo, Reiichiro Christian Nakano, Argel Bandala, et al.
Conference title: TENCON 2016-2016 IEEE Region 10 Conference

Abstract:
Swarm robotics is one of the novel approaches being explored in multiple quadrotor. It aims to mimic social behaviors of animals and insects. This paper presents the physical implementation of the swarm behavior aggregation in a quadrotor swarm. It is implemented over a quadrotor swarm testbed that makes use of external motion capture cameras. The completed algorithm makes use of the artificial potential function model with a linear attraction and bounded repulsion. Results show successful demonstration of the aggregation algorithm with minimal error in position. It is tested for an increasing number of quadrotors and errors are seen to increase with swarm size. Results show an error of 3.293 cm from the individual target position for aggregation. It also shows and average aggregation speed of 1.896 secs for all test while having an increase in aggregation speed of about 1.772 sec per increase in swarm size. The time in aggregate is seen to be at an average of 98.5405% of the time. All the tests show successful demonstration of the swarming behavior which can now mark the start of development of implementation of more complex swarming behaviors.
Full text available upon request to the author

Article title: Intelligent system architecture for a vision-based contactless apprehension of traffic violations
Authors: Robert Kerwin Dela Cruz Billones, Argel Bandala, Edwin Sybingco, Laurence A. Gan Lim, et al.
Conference title: TENCON 2016-2016 IEEE Region 10 Conference

Abstract:
The paper presents an intelligent system architecture for detecting traffic violations based on vision. This study aims to better manage traffic conditions in block intersections by employing a computer vision system that facilitates the

identification of traffic violations committed in the road intersection. The architecture includes three sub-system: video capture sub-system, intelligent operating architecture (IOA) sub-system, and output sub-system. The IOA manages different algorithms to recognize traffic violations. The algorithms developed are vehicle detection and tracking, plate number localization, plate character recognition, and traffic violations identification. The traffic violations addressed in this study are number coding, over-speeding, and swerving. The research study is in the initial phase of development, and the experiment results showed that optical character recognition have 86.11% accuracy and speed measurement have 88.45% accuracy.

Full text available upon request to the author

Article title: Implementation of Varied Particle Container for Smoothed Particle Hydrodynamics-Based Aggregation for Unmanned Aerial Vehicle Quadrotor Swarm
Authors: Argel Bandala, Gerard Ely Ucab Faelden, Jose Martin Maningo, Reiichiro Christian S. Nakano, et al.
Conference title: 2016 IEEE/RSJ International Conference on Intelligent Robost and Systems (IROS)

Abstract

The property of the Smoothed Particle Hydrodynamics (SPH) method of being mesh free, adaptable and sui table for tracking of individual particles makes it appropriate for approximating swarm behaviors for multi-agent robotics applications. The researchers modeled each of the swarm robots as SPH particles and then subjected them to external forces to exhibit aggregation and force certain formations. The external forces subjected to the SPH particles are gravity forces and container constraints . The containers explored in the study are simple geometrical primitives: sphere and cube . Computer simulations were done to show how SPH can facilitate in forcing swarm formations with the help of bounding primitives. Algorithm benchmarking was done to show how well SPH performs. Results show that SPH performs better than the benchmark algorithm by a margin of 0.703 and 1.016 units for the two set-ups, respectively. Actual robot implementation was also done to verify the effectivity and viability of the proposed algorithm in exhibiting the aggregation behavior. After 15 seconds of system run time, the interparticle distance and motion accuracy reached 96.93% and 91.14%, respectively.

Full text available upon request to the author

Article title: Utilization of Sensor Network for Combustible Gas Detection and Monitoring Implemented in Household
Authors: Argel Bandala, Kenneth V. Balmes, James Matthew T. Chua, Mary Anne O. De Jesus, et al.
Conference title: 2015 IEEE Region 10 Humanitarian Technology Conference

Abstract
Human negligence and ignorance concerning LPG handling can cause serious risks which may lead to fire and explosion. This study aims to create an automated system that intervenes human processes and implements necessary precautions based on the current state of the concerned area. The fulfillment of this study has produced a small scale system capable of detecting LPG concentration within the accuracy range of 85% to 100%. Results of this study shows that after detecting LPG in the environment, the system then implements specified action and notification procedures with 100% accuracy, thus preventing LPG leakage hazards to aggravate.
Full text available upon request to the author

Article title: A Comparative Study of Swarm Foraging Behaviors; Trophallaxis, Task Allocation and Pheromone
Authors: Argel Bandala, Ryan Rhay P. Vicerra, Elmer P. Dadios
Conference title: 2015 International Conference on Humanoid Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract
A group of algorithms enhancing such collective behavior is inspired by the animals working together as a group such as ants, bees, and etc. In connection, swarm is defined as a set of two or more independent homogeneous or heterogeneous agents acting upon a common environment in a coherent fashion which generates emergent behavior. The development of artificial swarms or robotic swarms has attracted a lot of researchers in the last two decades including pheromone, trophallaxis and task allocation algorithms. However among these swarm based algorithms, the most efficient in terms of group performance, efficiency and interference in collecting the dusts or objects in an environment with variable terrains. With this, the researchers

see the need to develop a swarm simulation platform that would compare the swarm- behavior-based algorithms for an ideal use of robots in different environments in dust collection.

Full text available upon request to the author

Article title: Color Quality Assessment of Coconut Sugar Using Artificial Neural Network (ANN)

Authors: Argel Bandala, Aaron Aquino, Mary Grace Ann Bautista, Elmer P. Dadios

Conference title: 2015 International Conference on Humanoid Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract

This paper presents a simple color recognition algorithm using digital image processing techniques and pattern recognition to eliminate the subjectiveness of manual inspection of the quality of coconut sugar based on Philippine National Standard. The image processing was built using MATLAB functions through RGB acquisition. The Backpropagation Artificial Neural Network was used in this project to enhance the accuracy and performance of image processing. The database of the network involved 300 images and 70% of these were used for training the network, 15% for validation and 15% for testing.

Full text available upon request to the author

Article title: Obstacle Avoidance of Hybrid Mobile-Quadrotor Vehicle With Range Sensors Using Fuzzy Logic Control

Authors: Argel Bandala, Ryan Rhay P. Vicerra, Elmer P. Dadios

Conference title: 2015 International Conference on Humanoid Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract

This study presents a fuzzy logic based approach to a hybrid mobile quadrotor vehicle that is able to perform goal seeking and obstacle avoidance, given that the obstacles are nonmoving and are along a fixed path. Two range sensors will be used to construct the input variable of the fuzzy logic control. The algorithms are developed to achieve goal position while avoiding obstacles. Simulations are

conducted and the efficiency of the results using the method is proved using MATLAB.

Full text available upon request to the author

Article title: Predicting the motion of quadrotor using neural network
Authors: Argel Bandala, Reagan L. Galvez, Elmer P. Dadios
Conference title: 2015 International Conference on Humanoid Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract

Accurate control of quadrotors movement is a challenging task. One must have a reliable controller that will manipulate the speed of each motors. It is also important to study the effect of voltage to the motor speed. This paper will use neural network to predict the rolling and pitching motion of the quadrotor based on the voltage inputs of each motor. It will also determine the net force along z-axis acting at the center of mass of the quadrotor. The neural network is a computer algorithm that mimics the biological structure of neurons (nerve cell) and a powerful tool commonly used in fitting a function, pattern recognition, face recognition, clustering and optimization.

Full text available upon request to the author

Article title: A Multiple Level MIMO Fuzzy Logic Based Intelligence for Multiple Agent Cooperative Robot System
Authors: Argel Bandala, Ryan Rhay P. Vicerra, Kanny Krizzy A. David, Angelo Rejaba dela Cruz, et al.
Conference title: 2015 IEEE Region 10 Conference (TENCON 2015)

Abstract

Fuzzy Logic is a many valued logic and it is very similar to human reasoning which is not binary. It uses approximate measures rather than exact, making it suitable for linguistic variable and analysis. It has been applied to many applications in artificial intelligence, control and robotics. In this paper, the authors develop an artificial intelligence using multiple fuzzy logic for a dynamic multiple agent robot system. The system is made up of multiple robots with multiple identity assignment; which means that each robot will have its distinct behavior. In order to design pure fuzzy

logic artificial intelligence, we used fuzzy logic block in different parallel and series configuration making giving it multiple fuzzy logic levels. Furthermore, there is multiple input - multiple output (MIMO) fuzzy logic implementation in one of our several fuzzy logic blocks, this is necessary in order to utilize pure fuzzy logic control in the whole artificial intelligence. The multi agent cooperative robot platform we choose to test our artificial intelligence is a multiple robot system for FIRA Micro-Robot World Soccer Tournament (MiroSot). In our setup, there are three robots to be assigned dynamically with three different identities; the Forward, the Back and the Goal-keeper. Robot identity assignment depends on the position of each robot with respect to the position of the ball. To tune each fuzzy logic block individually isolation is done. Some tuning procedures are performed in a simulator while most of them are tuned in the actual platform. Although tuning procedures are rigorous, the linguistic approach and human reasoning nature of fuzzy logic made it possible to achieve its completion. Overall, the proposed artificial intelligence produced favorable response based on the expected outcome and experimentations.
Full text available upon request to the author

Article title: Eye State Analysis Using EyeMap for Drowsiness Detection
Authors: Argel Bandala, Jenel Luise C. Bolosan, Mary Lisette L. dela Torre, Josephine Gomez, et al.
Conference title: 2015 IEEE Region 10 Conference (TENCON 2015)

Abstract
Drowsiness has become one of the many reasons of vehicular accidents. This research aims to create a system that can analyze whether the person is drowsy or non- drowsy and send a warning signal whenever it detects signs of drowsiness. This design undergoes several image processing for boosting the systems capability to retain only the region of interest and successfully initiate alarms within minimal time. It utilizes EyeMap mainly for eye localization and windowing and aided by the Circular Hough transform to extract only the eye region - specifically the iris; and classify whether the person is experiencing drowsiness at the moment. The researchers develop an additional device that is equipped with three warning signals and reacts on how the system sees the state of the person. Three setups were implemented in this study: Regular Camera, Infrared Sensitive Camera and Multiple Cameras. All setups were implemented during day and night to test the response of

the system to varying lighting conditions. The subjects are tested inside a car and their present state is determined using the Karolinska Sleeping Scale. The current state of the person is then compared to the system's response. The subjects are tested three times under different setups to determine if the system is responding correctly under different condition. The study shows that the system is able to successfully determine whether the person is in the drowsy or non-drowsy state in all of the three setups, multi-camera being the most effective. However, it is limited by the capability of the camera to adapt to different lighting condition. During night time, the ability of the system to determine the state of the system drops.

Full text available upon request to the author

Article title: Implementation of an Artificial Neural Network in Recognizing in-flight Quadrotor Images

Authors: Argel Bandala, Reiichiro Christian S. Nakano, Gerard Ely Ucab Faelden, Jose Martin Maningo, et al.

Conference title: 2015 IEEE Region 10 Conference (TENCON 2015)

Abstract

This paper shows an implementation of a feedforward artificial neural network capable of recognizing images of the CrazyFlie 2.0 quadrotor during flight. The network is to be used in a real-time quadrotor swarming application and has to be able to successfully differentiate pictures that show a quadrotor in flight versus pictures that do not. The network was trained using a standard backpropagation algorithm and images taken from a video of the said quadrotor in flight. These images were divided into three groups: a training set and validation set for the training stage, and a testing set for verification of the trained neural network. The results showed that the neural network was able to correctly identify the images in the testing phase 100 percent of the time while achieving a 94 percent accuracy for the images in the testing set.

Full text available upon request to the author

Article title: A Neural Network Approach to a Cooperative Balancing Problem in Quadrotor-Unmanned Aerial Vehicles (QUAVs)

Authors: Argel Bandala, Gerard Ely Ucab Faelden, Jose Martin Maningo, Reiichiro Christian S. Nakano, et al.

Conference title: 2015 International Conference on Humanoid Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract

There is growing interest in unmanned aerial vehicles (UAVs) such as quadrotors over the past several years. Cooperation among multiple quadrotors is one of the areas of focus. This paper proposes a neural network form of control for a cooperative task done by four quadrotors and will be tested through simulations. The task at hand is a ball and plate balancing problem during flight of multiple quadrotors carrying the plate. The objective is to maintain the keep the ball at the center of the plate even if the ball is introduced at different parts of the plate. The neural network controller will output the appropriate motor speeds of the rotors based on the detected area of introduction of the ball. Results show that the artificial neural network controller successfully directs the ball towards the center of the plate. The network outputs an average deviation of 0.00924 units from the expected PWM signal strength which corresponds to a 0.249% error from the expected value.

Full text available upon request to the author

Article title: Adaptive Aggregation Algorithm for Target Enclosure Implemented in Quadrotor unmanned aerial vehicle (QUAV) Swarm

Authors: Argel Bandala, Ryan Rhay P. Vicerra, Elmer P. Dadios

Conference title: 2014 International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract

This paper presents aggregation behavior algorithm that will be applied for unmanned aerial vehicle quadrotors (QUAV). The most basic behavior for natural swarms is aggregation. Other swarm or social behaviors are derived from the aggregation behavior. Due to the concept of independence, each swarm members are required to collect themselves together to perform a certain task. However the swarm faces different environments thus this behavior is very complex to accomplish. This is the reason why the researchers developed this paper for multi

robotic systems. Simulations were done to test the said algorithm and the researchers garnered the accuracy of 90.85%.

Full text available upon request to the author

Article title: A Genetic Algorithm Approach to Swarm Centroid Tracking in Quadrotor Unmanned Aerial Vehicles

Authors: Reiichiro Christian S. Nakano, Argel Bandala, Gerard Ely Ucab Faelden, Jose Martin Maningo, et al.

Conference title: 2014 International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract

One of the trademark behaviors of a swarm is aggregation. Aggregation is the ability to gather swarm members around a specific point in space. The goal is to keep an object, stationary or moving, at the center of the swarm. This paper presents a novel approach to centroid tracking in robotic swarms. Genetic algorithm is used in quadrotor unmanned aerial vehicles to keep the object being tracked at the center while minimizing two parameters: the distance travelled by each quadrotor and the distance of each quadrotor from the object. Centroid tracking was found to have an average error of 0.0623568 units for swarm populations ranging from 10 to 100 with the lower swarm populations exhibiting lower errors. Convergence did not exceed the maximum of 23 milliseconds for populations less than 30. These results show that the algorithm is well-suited for implementation in swarms with lower numbers of quadrotors.

Full text available upon request to the author

Article title: Optimization of Decentralized Information Dissemination in Quadrotor Swarm Using Genetic Algorithm

Authors: Argel Bandala, Gerard Ely Ucab Faelden, Jose Martin Maningo, Reiichiro Christian S. Nakano

Conference title: 2014 International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract

There is a glaring problem in communication systems when it comes to a decentralized robotic swarm. Since a decentralized swarm would limit the awareness of each agent to its immediate surroundings/neighbors, the exchange of information between agents may now prove to be challenging. An epidemic-based broadcasting technique is then presented to resolve the problem of end-to-end agent communication. This paper aims to optimize the information diffusion by means of implementing genetic algorithm to optimize the time it will take for each quadrotor individual to acquire the information coming from a single source (i.e. the quadrotor who first received the information from an external stimulus). The method by which this is done is epidemic in nature. Due to this, for each time there would be a signal broadcasting, the genetic algorithm would be run to determine the next ideal location of each individual. A genetic algorithm was looped several times to achieve the desired solution. The results showed that for each run of the GA, the number of quadrotors having received the information continually increased until the output converges to a fitness level. However this only worked under certain constraints that need to be weighed out properly. This includes the readjustment of the fitness and crossover functions. Also, the parameters of the GA must be well calibrated for proper output response.

Full text available upon request to the author

Article title: Blind Localization Method for Quadrotor Unmanned Aerial Vehicle (QUAV) Utilizing Genetic Algortihm

Authors: Argel Bandala, Gerard Ely Ucab Faelden, Jose Martin Maningo, Reiichiro Christian S. Nakano, et al.

Conference title: 2014 International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM), November 2014

Abstract:

There is an increasing research interest in unmanned autonomous vehicles (UAVs) such as quadrotors. These researches applies these quadrotors for much more complicated tasks with most requiring cameras and GPS modules for positioning. This paper presents an alternative way of position localization of a quadrotor without the use of cameras and GPS modules by means of transceivers and Genetic Algorithm (GA). This paper uses the received signals from the transceivers as inputs

for the genetic algorithm in order to locate the quadrotor in a xyz axis. Parameters such as location of transceivers, amount of transceivers and population size of the GA are tested in order to determine a successful way of locating the quadrotor. Results show that the different parameters tested were successful and converges to a point usually with a fitness measure greater than 99%. An average fitness measure greater than 99.9900% served as a benchmark for the tests done. The first test achieved this benchmark at about 130 generations and the second test achieved it at 110 generations. The time it took for the program to locate the quadrotor is about 60 milliseconds. Results show that this blind localization technique successfully locates the quadrotor and may be calibrated to one's own need.

Full text available upon request to the author

Article title: Path Planning for Quadrotor UAV Using Genetic Algorithm

Authors: Argel Bandala, Reagan L. Galvez, Elmer P. Dadios

Conference title: 2014 International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM),

Abstract:

Path planning in quadrotor-typed UAV is essential in navigating from initial to destination point. This will minimize the power consumption of the vehicle which is important to avoid wasted energy in a given amount of time. This paper will use Genetic Algorithm (GA) to determine the shortest path that the quadrotor must travel given one target point to save energy and time without hitting an obstacle. The obstacle is assumed to be any point within the boundary. This algorithm is effective in searching solutions in a given sample space or population. If you know the possible solutions of the problem, you can evaluate it based on its fitness until the fittest individual arrives.

Full text available upon request to the author

Article title: Modelling and Characterization of an Artificial Neural Network for Infant Cry Recognition Using Mel-frequency Cepstral Coefficients

Authors: Argel Bandala, Allimzon M. Lim, Mark Anthony D. Cai, Allan Jeffrey C. Bacar, et al.

Conference title: TENCON 2014 - 2014 IEEE Region 10 Conference

Abstract:
This paper is about the creation of an artificial neural network (ANN) in MATLAB to analyze the features extracted from calculating the mel-frequency cepstral coefficients (MFCC) of the raw audio data. The paper explains basic concepts about the ANN, as well as the MFCC and other relevant theories. Regarding the design of the ANN, it uses multiple infant crying sounds, as well as non-crying sounds, to create a sample training set with a corresponding target that determines whether the sound is a cry or not. The paper uses relevant concepts heavily utilized in speech recognition for the design of the infant cry recognition, modifies them, and adds a few more calculations to fit the desired application to compensate for the differences present in a cry from human speech.
Full text available upon request to the author

Article title: Swarm Algorithm Implementation in Mobile Robots for Security and Surveillance
Authors: Argel Bandala, Patricia Marie L. Lapena, Joseph Ian Q. Blanco, Kevin I. Bunda, et al.
Conference title: TENCON 2014 - 2014 IEEE Region 10 Conference

Abstract:
This paper presents the design and construction of a system consisting of five mobile robots (mobots) and a communications system that will serve as a security surveillance system. This is implemented using a microcontroller as the core that enables the mobots to work cooperatively. The mobots are free to move within their designated areas and are capable of relaying messages via ZigBee communication to a base controller system. The purpose of this system is to have an alternative or even a complement to regular CCTV surveillance, especially in buildings with several rooms. This would enhance the security as the system utilizes a database to store the information gathered from intruder alerts. Furthermore, the communication radios used transmit with low power over a long range. The mobots are enabled to relay data via mobot-to-PC and mobot-to-mobot paths up to five hops. The data transmitted allows the base controller system to identify its source for intrusion detection.
Full text available upon request to the author

Article title: Formation Stabilization Algorithm for Swarm Tracking in Unmanned Aerial Vehicle (UAV) Quadrotors
Authors: Argel Bandala, Ryan Rhay P. Vicerra, Elmer P. Dadios
Conference title: TENCON 2014 - 2014 IEEE Region 10 Conference

Abstract:
This paper presents swarm formation algorithm for swarm tracking behavior in multi robotic system of flying quadrotor unmanned aerial vehicles (QUAV). Multi robotic system ensures the success of the task through the increase in members of the swarm. This characteristic is very suitable for tracking moving objects. Another key feature would be the decentralized processing of the swarm. The loss of a swarm member would not contribute significantly to the swarm. The behaviors were patterned to biological traits of insects and animals and are applied to computer applications. Simulations were performed and results showed that swarm tracking accuracy yielded 89.23%. This result is due to the accuracy of 84.65% of the formation behavior of the swarm. Furthermore, the aggregation behavior further contributed with an accuracy of 90.62%.
Full text available upon request to the author

Article title: Development and Design of Automated Hospital Bed With Incremental Panels for Bedsore Prevention
Authors: Argel Andala, Lance Kevin G. Apelo, Trizia C. Dimalanta, Jan-Anthony Vince V. Macatangay
Conference title: TENCON 2014 - 2014 IEEE Region 10 Conference

Abstract:
The common causes of Bedsores are constant pressure and moisture build-up. To prevent the development of these causes, the researchers have decided to modify the typical hospital bed into an electronically automated prototype. The prototype was built with 50 incremental panels that has the capability to move the patient on the by the combination of the Chain and Sprocket Method and the Lead Screw. These incremental panels were implemented with Temperature Sensors to monitor the ambient temperature on the bed surface and IR Proximity sensors to detect the location of the patient in the prototype. The data gathered by these sensors are processed through the use of a microcontroller. The microcontroller will then relay

the processed data to the stepper motor driver which will manipulate the stepper motors to cause movement to the incremental panels.

Full text available upon request to the author

Article title: Cabling and cost optimization system for IP based networks through Genetic Algorithm

Authors: Charmaine B. Balubal, Angela Rachel D. Bernardo, Argel Bandala, Regina A. Uyehara, et al.

Conference title: 2014 IEEE Region 10 Symposium

Abstract:

The creation of an optimized cabling plan in terms of cost through optimized cable length was introduced in this study. The researchers designed a system that utilized Genetic Algorithm for the said optimization. This system was integrated in a graphical user interface created using visual c# language which enables the users to upload an image representing the floor plan of the desired network to be optimized. The user can then place specified components on the floor plan. Lastly, the system will generate the optimized cabling plan which the user can readily print. Furthermore, a complete bill of materials and costing report will be generated also. The system generated these outputs by using genetic algorithm in the graphical inputs which were processed and converted in numerical representations. Upon accomplishing all the experimentations, the system yielded 99.51% optimization accuracy with 99.02% as the highest optimization level generated after accomplishing 100 trials on 10 different floor plans.

Full text available upon request to the author

Article title: Autonomous parallel parking of four wheeled vehicles utilizing adoptive Fuzzy-Neuro control system

Authors: Jerome T. Marasigan, Iara Buo Saberon, Argel Bandala, Dan Patrick B. San Jose, et al.

Conference title: 2014 IEEE Region 10 Symposium

Abstract:

The study presents an autonomous sensor based parallel parking maneuver on a car-like mobile robot. This project focuses on parallel parking the car-like mobile robot within a given scenario following the fifth degree polynomial reference path in a

backward maneuver. Training data, gathered from the fifth degree polynomial path, is subjected to subtractive clustering algorithm to determine the fuzzy controller and trained by the adaptive neurofuzzy inference system. The project uses eight ultrasonic sensors, placed strategically to avoid radial imprecision, to detect the obstacles along its path; an accelerometer is also used to detect the inclination of the car-like mobile robot (CLMR). The sensors acquire necessary sensor data for the Neuro-Fuzzy Inference System to determine the proper motion direction at each sampling point. The efficiency of the proposed Neuro-Fuzzy Controller (NFC) design is revealed through the actual results.

Full text available upon request to the author

Article title: Unmanned Underwater Vehicle Navigation and Collision Avoidance Using Fuzzy Logic

Authors: Argel Bandala, Kanny Krizzy A. David, Ryan Rhay P. Vicerra, Laurence A. Gan Lim, et al.

Conference title: 2014 IEEE Region 10 Symposium

Abstract:

Unmanned underwater vehicles (UUVs) have become an integral part in helping humans do underwater explorations more efficiently and safely since these vehicles can stay underwater much longer than any human can possibly do and they require little or almost no human interaction. These vehicles are subject to dynamic and unpredictable nature of the underwater environment resulting to complexities in their navigation. This paper proposes a fuzzy logic-based controller to allow the vehicle to navigate autonomously while avoiding obstacles. The said controller is implemented in an actual low-cost underwater vehicle equipped with magnetometer and ultrasonic sensors. The intelligence of the UUV includes a two fuzzy logic block, namely Motion Control block and Heading Correction block. The fuzzy logic controller takes in target positions in X, Y and Z axes. Also, the heading error and rate of heading error are included as inputs in order to correct the bearing or direction of the vehicle. A heuristic and integration stage is also included after these fuzzy logic blocks for vehicle's collision avoidance. The controller output parameters are the adjusted thrusters' speeds which dictate the six thrusters speed and direction. With the proper output commands from this controller, the vehicle is able to navigate in its predefined destination.

Full text available upon request to the author

Article title: Multiple Level Fuzzy Logic-based Artificial Intelligence for Multi-Agent Cooperative Robot Platform
Authors: Ryan Rhay P. Vicerra, Kanny Krizzy David, Kristan Bryan Caluntad Simbulan, Argel Bandala, et al.
Conference title: 2014 IEEE Region 10 Symposium

Abstract:
Fuzzy Logic is a many valued logic and it is very similar to human reasoning which is not binary. It uses approximate measures rather than exact, making it suitable for linguistic variable and analysis. It has been applied to many applications in artificial intelligence, control and robotics. In this paper, the authors develop a pure fuzzy logic artificial intelligence for a dynamic robot platform with multiple robots and multiple identity assignment which means that each robot will have its distinct behavior. In order to design pure fuzzy logic artificial intelligence, we applied fuzzy logic multiple times calling each of them as a fuzzy logic block. These fuzzy logic blocks can be seen in different parallel and series configuration making it multilevel in structure. Furthermore, there is multiple input - multiple output (MIMO) fuzzy logic implementation in one of our several fuzzy logic blocks, this is necessary in order to utilize pure fuzzy logic control in the whole artificial intelligence. The mult-iagent cooperative robot platform we choose to test our artificial intelligence is a multiple robot system for FIRA Micro-Robot World Soccer Tournament (MiroSot). The system requires complex intelligence as its individual agents must perform specific tasks in a dynamic environment, unlike other systems which duplicates a single task for all the agents. In our setup, we use three robots and gave them three different identities; the Forward, the Back and the Goal-keeper. The robot identity assignment is very dynamic and depends on the position of each robot with respect to the position of the object they are pursuing. The developers have to tune each fuzzy logic blocks individually by isolating each one from the other. Some tuning procedures are performed in a simulator while most of them are tuned in real time in the actual platform. Although tuning procedures are rigorous, the linguistic approach and human reasoning nature of fuzzy logic made it easy for the developers to achieve its completion. The multiple trial and error tuning enhanced the developers understanding of how fuzzy logic and the overall system works. Overall,

the proposed artificial intelligence produced favorable response based on the expected outcome and experimentations.
Full text available upon request to the author

Article title: Simultaneous Face Detection and Recognition Using Viola-Jones Algorithm and Artificial Neural Networks for Identity Verification
Authors: Argel Bandala, Ma. Christina D. Fernandez, Kristina Joyce E. Gob, Aubrey Rose M. Leonidas, et al.
Conference title: 2014 IEEE Region 10 Symposium

Abstract:
The study presented aims to design and develop a face recognition system. The system utilized Viola Jones Algorithm in detecting faces from a given image. Also the system used Artificial Neural Networks in recognizing faces detected from the input. Upon experimentation the system generated can recognize human faces with accuracy of 87.05%. The system performs at its best if the person is around 150cm away from the camera with an accuracy rate of 87.59%. Also, the best amount of lighting for the recognition system is at 480 lumens with an accuracy rate of 88.64%. Lastly, the system also performs at its best if the person is directly facing the camera or at 0 degrees with respect to the camera.
Full text available upon request to the author

Article title: Object recognition and detection by shape and color pattern recognition utilizing Artificial Neural Networks
Authors: Jerome Paul N. Cruz, Ma. Lourdes Dimaala, Argel Bandala, Erica Joanna S. Franco, et al.
Conference title: 2014 IEEE Region 10 Symposium

Abstract:
A robust and accurate object recognition tool is presented in this paper. The paper introduced the use of Artificial Neural Networks in evaluating a frame shot of the target image. The system utilizes three major steps in object recognition, namely image processing, ANN processing and interpretation. In image processing stage a frame shot or an image go through a process of extracting numerical values of object's shape and object's color. These values are then fed to the Artificial Neural Network stage, wherein the recognition of the object is done. Since the output of the

ANN stage is in numerical form the third process is indispensable for human understanding. This stage simply converts a given value to its equivalent linguistic term. All three components are integrated in an interface for ease of use. Upon the conclusion of the system's development, experimentation and testing procedures are initiated. The study proved that the optimum lighting condition opted for the system is at 674 lumens with an accuracy of 99.99996072%. Another finding that the paper presented is that the optimum distance for recognition is at 40cm with an accuracy of 99.99996072%. Lastly the system contains a very high tolerance in the variations in the objects position or orientation, with the optimum accuracy at upward position with 99.99940181% accuracy rate.

Full text available upon request to the author

Article title: Development and design of mobile robot with IP-based vision system
Authors: Argel Bandala, Elmer P. Dadios
Conference title: TENCON 2012 - 2012 IEEE Region 10 Conference, November 2012

Abstract:
Hardware, firmware and software design of a mobile robot capable of transmitting video information and receiving commands from a controlling point is presented. The hardware design is composed of a PIC18F4620 microcontroller, a UCC27525 MOSFET gate driver, XBee Series 2 OEM RF Module. Firmware design includes the reception, processing and decoding of Zigbee API packets. Based on this decoded information the microcontroller will generate signals to move the motors namely left and right motors with a corresponding direction, either clockwise of counter clockwise. The software part includes the graphical user interface which generates commands sent to the mobile robot. The images from the mobile robot are sent to the central controller. The images are then processed and a command is generated. The command is formatted in API format and then sent to the mobile robot. Testing of the system is done by experimentation. Three parameters are tested which are influenced by four parameters. Image recognition is measured while varying the distance. Also image recognition is measured while varying the luminance of the environment. The received signal level is measured while varying the distance. Lastly the accuracy of the movement of the mobile robot is also measured while varying the target position. The results showed that the distance used by the researcher has no significant effect on image recognition. The results showed also

that image recognition is unaffected with the luminance of 230-1590 lumens. The mobile robot will respond in an optimum range of one meter and can respond from one to ten meters.

Full text available upon request to the author

Article title: Vehicle parking inventory system utilizing image recognition through artificial neural networks

Authors: Leo S. Bartolome, Argel Bandala, Cesar Llorente, Elmer P. Dadios

Conference title: TENCON 2012 - 2012 IEEE Region 10 Conference, November 2012

Abstract:

An automated vehicle logging system is introduced in this paper. The system utilizes character recognition through images captured from the entrance of a parking area. These images are processed to extract the licensed plates of any vehicle entering the parking area. Extracted plates images are then converted into numerical forms devised by researchers to fit the requirements of the artificial neural network. From the numbered plate, each character is then extracted to produce their distinct features. Character recognition engine is primarily implemented using feed forward neural networks. There are 50 input neurons which are defined by resizing each character into 25×25 pixel image and summing all the pixel values in each row and each columns resulting to 50 sums. After which a numerical value will be produce and will signify a character equivalent. Characters are recognized separately. This process is done until all of the characters are recognized. Afterwards, these characters are then concatenated to produce the plate number identity. The system is trained using 5860 sets of training data yielding a system with 0.0001645724% error.

Full text available upon request to the author

Erees Queen Macabebe

Sex: Female

Education:

Doctor of Philosophy in Physics, Nelson Mandela Metropolitan University 2009

Masters in Physics, Ateneo de Manila University, 2005

Bachelor of Science in Physics, Ateneo de Manila University

Bachelor of Science in Computer Engineering, Ateneo de Manila University

Field of Specialization

Solar Cells

Researches:

Article title: Next Day Power Forecast Model Using Smart Hybrid Energy Monitoring System and Meteorological Data

Authors: Christine May Creayla, Felan Carlo Garcia, Erees Queen B. Macabebe

Publication title: Procedia Computer Science, 105, 256-263, December 2017

Abstract:

The increase in contribution of renewable energy sources into the grid is part of smart grid initiatives. The integration of renewables such as solar energy into the electrical network is a challenge for grid operators because of its intermittency due to weather variations. Despite this, the installed capacity of solar PV globally continues to increase. Thus, forecasting is becoming an important tool for system grid operators to manage solar photovoltaic (PV) energy production and satisfy the demand of energy consumers. This work aims to develop a forecasting model for solar irradiance that can be used in calculating next-day energy generation of solar

PV systems. Site-specific solar irradiance and meteorological parameters were used as inputs to a machine learning algorithm. It is shown that the prediction model fits the measured data with a value of R^2 equal to 85.89%. This model was validated through the measured data of power generation from a hybrid connected solar PV system, installed in Quezon City, Philippines.

Full text available upon request to the author

Article title: Development of an Intelligent System for Smart Home Energy Disaggregation Using Stacked Denoising Autoencoders

Authors: Felan Carlo Garcia, Christine May Creayla, Aries Queen B. Macabebe

Publication title: Procedia Computer Science 105:248-255, December 2017

Abstract:

Energy sustainability remains one of the biggest challenges for the Philippines' energy sector with 51% of the demand coming from the residential and commercial sectors. Intelligent energy monitoring systems play a key role with the opportunity to contribute sizeable amount of energy savings by providing meaningful consumption feedback to home owners. While smart meters provide an ideal ubiquitous energy monitoring solution, these devices lack appliance-level feedback. In this study, we present a concept of augmenting smart utility meters with an energy disaggregation method using Stacked Denoising Autoencoders to provide appliance-level feedback to home owners. We evaluate the results using absolute mean loss and proportion of energy correctly assigned as metrics for the signal disaggregation. The results show that the model was able to decompose an aggregate appliance signal and provide an itemized appliance-level power consumption.

Full text available upon request to the author

Article title: A review of community-based solar home system projects in the Philippines

Authors: Erees Queen B. Macabebe, Reynaldo C. Guerrero, Aleta Domdom, Aison S. Garcia, et al.

Publication title: MATEC Web Conferences 70:12002, January 2016

Abstract:

Solar Home Systems (SHS) are easy to deploy in island and in remote communities where grid connection is costly. However, issues related to maintenance of these systems emerge after they are deployed because of the remoteness and inaccessibility of the communities. This study looked into community-based programs in the Philippines and investigated the following: (1) social preparation, (2) role of the community in the project, and (3) sustainability of the program. In this paper, three communities under two government programs offering SHS are presented. These programs are the Solar Power Technology Support (SPOTS) program of the Department of Agrarian Reform (DAR) and the Household Electrification Program (HEP) of the Department of Energy (DOE). A focused group discussion and key informant interviews were conducted in two communities in Bukidnon province and in a community in Kalinga to obtain information from the project beneficiaries and SHS users on the preparation, implementation and maintenance of the projects. The results revealed that emphasis on the economic value of the technology, proper training of the locals on the technical and management aspects of the project, as well as the establishment of a supply chain for replacement parts are crucial factors for the sustainability of the programs.
Full text available upon request to the author

Article title: Hotspots Detection in Photovoltaic Modules Using Infrared Thermography
Authors: April M. Salazar, Erees Queen B. Macabebe
Publication title: MATEC Web of Conferences 70:10015, January 2016

Abstract:
An increased interest on generating power from renewable sources has led to an increase in solar photovoltaic (PV) system installations worldwide. Power generation of such systems is affected by factors that can be identified early on through efficient monitoring techniques. This study developed a non-invasive technique that can detect localized heating and quantify the area of the hotspots, a potential cause of degradation in photovoltaic systems. This is done by the use of infrared thermography, a well-accepted non-destructive evaluation technique that allows contactless, real-time inspection. In this approach, thermal images or thermograms of an operating PV module were taken using an infrared camera. These thermograms were analyzed by a Hotspot Detection algorithm implemented

in MATLAB. Prior to image processing, images were converted to CIE L*a*b color space making k-means clustering implementation computationally efficient. K-means clustering is an iterative technique that segments data into k clusters which was used to isolate hotspots. The devised algorithm detected hotspots in the modules being observed. In addition, average temperature and relative area is provided to quantify the hotspot. Various features and conditions leading to hotspots such as crack, junction box and shading were investigated in this study.
Full text available upon request to the author

Article title: Parameter extraction from IV characteristics of PV devices
Authors: Erees Queen B. Macabebe, Charles Johannes Sheppard, Eugene Ernest Van Dyk
Publication title: Solar Energy 85(1), January 2011

Abstract:
Device parameters such as series and shunt resistances, saturation current and diode ideality factor influence the behaviour of the current-voltage (I-V) characteristics of solar cells and photovoltaic modules. It is necessary to determine these parameters since performance parameters are derived from the I-V curve and information provided by the device parameters are useful in analyzing performance losses. This contribution presents device parameters of CuIn(Se,S)- and Cu(In,Ga)(Se,S)-based solar cells, as well as, CuInSe, mono- and multicrystalline silicon modules determined using a parameter extraction routine that employs Particle Swarm Optimization. The device parameters of the CuIn(Se,S)- and Cu(In,Ga)(Se,S)-based solar cells show that the contribution of recombination mechanisms exhibited by high saturation current when coupled with the effects of parasitic resistances result in lower maximum power and conversion efficiency. Device parameters of photovoltaic modules extracted from I-V characteristics obtained at higher temperature show increased saturation current. The extracted values also reflect the adverse effect of temperature on parasitic resistances. The parameters extracted from I-V curves offer an understanding of the different mechanisms involved in the operation of the devices. The parameter extraction routine utilized in this study is a useful tool in determining the device parameters which reveal the mechanisms affecting device performance. (author)
Full text available upon request to the author

Article title: Pre-conceptions of Newton's Laws of Motion of Students in Introductory Physics
Authors: Erees Queen B. Macabebe, Ivan Culaba, Joel T. Maquiling
Publication title: AIP Conference Proceedings 1263(1), August 2010

Abstract:
The Force and Motion Conceptual Evaluation (FMCE) developed by R.K. Thornton and D. R. Sokoloff was utilized to evaluate the conceptual understanding of Newton's Laws of Motion. The test was administered to 100 freshman university students enrolled in introductory physics courses. The aim is to find out the conceptual understanding of the students prior to university level instruction. Results show that the Aristotelian notion prevails despite having taken physics in their senior year in high school. This study emphasizes the importance of training high school physics teachers and the significance of a change in the teaching techniques for university level introductory physics.
Full text available upon request to the author

Article title: Opto-electronic analysis of silicon solar cells by LBIC investigations and current–voltage characterization
Authors: N.M. Thantsha, Ereees Queen B. Macabebe, Frederik Vorster, Eugene Ernest Van Dyk
Publication title: Physica B. Condensed Matter 404(22):4445-4448, December 2009

Abstract:
A different laser beam induced current (LBIC) mapping technique has been used for the measurements of spatial variation of light generated current of a solar cell. These variations are caused by parasitic resistances and defects at grain boundaries (GBs) in multicrystalline silicon solar cells (mc-Si). This study investigates and identifies the regions within mc-Si solar cells where dominating recombination and lifetime limiting processes occur. A description of the LBIC technique is presented and the results show how multicrystalline GBs and other defects affect the light generated current of a spot illuminated mc-Si solar cell. The results of the internal quantum efficiency (IQE) at wavelength of 660 nm revealed that some regions in mc-Si solar cell give rise to paths that lead current away from the intended load.
Full text available upon request to the author

Article title: Device and performance parameters of Cu(In,Ga)(Se,S)2-based solar cells with varying i-ZnO layer thickness
Authors: Erees Queen B. Macabebe, Charles Johannes Sheppard, Eugene Ernest Van Dyk
Publication title: Physica B Condensed Matter 404(22):4466-4469, December 2009

Abstract:
In pursuit of low-cost and highly efficient thin film solar cells, Cu(In,Ga)(Se,S)2/ CdS/i-ZnO/ZnO:Al (CIGSS) solar cells were fabricated using a two-step process. The thickness of i-ZnO layer was varied from 0 to 454 nm. The current density–voltage (J–V) characteristics of the devices were measured, and the device and performance parameters of the solar cells were obtained from the J–V curves to analyze the effect of varying i-ZnO layer thickness. The device parameters were determined using a parameter extraction method that utilized particle swarm optimization. The method is a curve-fitting routine that employed the two-diode model. The J–V curves of the solar cells were fitted with the model and the parameters were determined. Results show that as the thickness of i-ZnO was increased, the average efficiency and the fill factor (FF) of the solar cells increase. Device parameters reveal that although the series resistance increased with thicker i-ZnO layer, the solar cells absorbed more photons resulting in higher short-circuit current density (Jsc) and, consequently, higher photo-generated current density (JL). For solar cells with 303–454 nm-thick i-ZnO layer, the best devices achieved efficiency between 15.24% and 15.73% and the fill factor varied between 0.65 and 0.67.
Full text available upon request to the author

Article title: Blend composition study of poly(3,3‴-didodecylquaterthiophene)/ [6,6]-phenyl C61 butyric acid methyl ester solution processed organic solar cells
Authors: Avery P. Yuen, John Stewart Preston, Abdel-Hadi Hor, Erees Queen B. Macabebe, et al.
Publication title: Journal of Applied Physics 105(1):01615-016105-3, February 2009

Abstract:
Photovoltaic devices made from blends of poly(3,3[‴] -didodecylquaterthiophene) (PQT-12) and [6,6]-phenyl C ₆₁ butyric

acid methyl ester have been fabricated and characterized. By varying the polymer loading in the blend, an optimal power conversion efficiency (PCE) of 0.70% has been achieved for a blend consisting of 15 wt % PQT-12, which is an order of magnitude higher than the PCE for a 50 wt % blend. The apparent reason for the large difference is the fact that blends with higher PQT-12 loading are transport limited, with much larger hole-to-electron mobility ratios.
Full text available upon request to the author

Article title: Effects of different selenization conditions on the device parameters of CuIn(Se,S) 2 solar cells
Authors: Erees Queen B. Macabebe, Charles Johannes Sheppard, Vivian Alberts, Eugene Ernest Van Dyk
Publication title: Thin Solid Films 517(7):2380-2382, February 2009

Abstract:
Parameter extraction can be used as a tool to determine the optimum chalcogenization condition of the absorber layer in manufacturing thin film solar cells. In this paper, CuIn(Se1−y,Sy)2 solar cells fabricated at different selenization conditions using a two-step process were characterized. Device and performance parameters of the solar cells were determined from the current density–voltage (J–V) characteristics of the devices. The J–V curves were analyzed using the two-diode solar cell model. Devices selenized for 40–60 min exhibit relatively low series and shunt resistances, low fill factor and conversion efficiency. Better performance was observed for solar cells with absorber layer selenized for 10 to 20 min.
Full text available upon request to the author

Article title: Analysis of performance and device parameters of CIGS PV modules deployed outside
Authors: Chantelle Radue, Eugene Ernest Van Dyk, Erees Queen B. Macabebe
Publication title: Thin Solid Films 517(7):2383-2385, February 2009

Abstract:
Two 20 W copper indium gallium diselenide photovoltaic modules were subjected to a thorough indoor assessment procedure, followed by outdoor deployment at the Nelson Mandela Metropolitan University as part of an ongoing study. The initial indoor measurement of maximum power output (PMAX) of one of the modules was

considerably higher than the manufacturer's rating (E.E. van Dyk, C. Radue and A.R. Gxasheka, Thin Solid Films 515 (2007) 6196). The modules were deployed on a dual-axis solar tracker and current–voltage characteristics were obtained weekly. In addition to the normal PV parameters of short-circuit current, open-circuit voltage, PMAX, fill factor and efficiency, shunt and series resistances were also monitored. The performances of the two modules are compared and analyzed and the results presented in this paper.

Full text available upon request to the author

Article title: Parameter extraction from dark current-voltage characteristics of solar cells

Authors: Erees Queen B. Macabebe, Eugene Ernest Van Dyk

Publication title: South African Journal of Science 104(9-10):401-404, October 2008

Abstract:

Electrical properties derived from the dark currentvoltage (IV) characteristics of solar cells provide essential information necessary in the analysis of performance losses and device efficiency. Device parameters of crystalline silicon solar cells were determined using the one-diode and two-diode models. The parameters extracted from the dark IV curve of the solar cells were series resistance, shunt resistance, saturation currents and ideality factors. Iteration and approximation techniques were used to determine the device parameters of the solar cells. The method, which considered a finite shunt resistance in the high current region of the curve, made the implementation different from other techniques. Standard deviation, R2 values and a fitting routine that provides a graphical representation of the output were implemented to determine the best set of parameters. Comparison of the extracted device parameters against the simulated values suggests that the two-diode model is more suitable than the one-diode model in describing the behaviour of the dark IV curve. The two-diode model also provides more information necessary to explain the mechanisms governing the IV curve under dark conditions.

Full text available upon request to the author

Article title: Extraction of device parameters from dark current–voltage characteristics of PV devices

Authors: Erees Queen B. Macabebe, Eugene Ernest Van Dyk

Publication title: Physica Status Solidi 5(2):616-619, February 2008

Abstract:
Solar cells are p-n junction diodes and are prone to parasitic resistances. High series resistances of a few ohms degrade the device performance, as do low shunt resistances. It is therefore necessary to determine these parameters since they are useful in analyzing performance losses. A method to extract these and other device parameters of solar cells from the dark current-voltage (I-V) characteristics is presented in this paper. The following parameters were determined using the proposed method: saturation current, series resistance, shunt resistance and the ideality factor. A program was created to implement the method which utilized the one-diode equivalent circuit model. Curve-fitting was also employed to provide a graphical representation of the results. Evaluation of the method was done using simulated data and actual dark I-V data obtained from monocrystalline and multicrystalline silicon solar cells. The program algorithm is discussed and results are presented. (© 2008 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim)
Full text available upon request to the author

Papers Presented

Article title: Water Consumption Monitoring with Fixture Recognition Using Random Forest
Authors: James Somontina, Felan Carlo Garcia, Erees Queen B. Macabebe
Conference title: TENCON 2018-2018 IEEE Region 10 Conference

Abstract:
Water is a limited resource that is essential for sustaining life but is often wasted. By monitoring water consumption in real time, users become aware of the amount of water that they utilize. This contribution presents a water monitoring system that determines the volume of water consumed for the following events: use of faucets, toilet flush, and shower. The system utilized a non-intrusive, single point sensing technique. The sensor was interfaced to a microcontroller to monitor fluid dynamics in real-time. Data was collected and processed by a microcomputer that uploads to a graphics user interface for easy viewing and online access. Random forest was used so that the system can identify and determine how much water each faucet or fixture uses. The volume of water used for every event was determined with 92.91 % accuracy and the fixture recognition algorithm resulted in 63% precision.

Full text available upon request to the author

Article title: A Single Point Sensing Approach for Residential Power Monitoring with Appliance Recognition Using Random Forest
Authors: Sheanne Eric P. Cabantac, Felan Carlo Garcia, Erees Queen B. Macabebe
Conference title: TENCON 2018-2018 IEEE Region 10 Conference

Abstract:
This work utilized machine learning, specifically Random Forest, as a classifier to recognize appliance signal from an aggregate energy consumption signal obtained using a single point, nonintrusive load monitoring approach. Appliance level feedback allows energy consumers to make informed decisions and employ energy management strategies to reduce the use of electricity. A mixture-of-experts approach was applied and the appliance models were trained to recognize appliance signals both from pure and aggregate signals of up to three appliances at the same time. Consumption signals of appliances with highly differentiated and slightly differentiated wattages were considered in this study. The Random Forest algorithm resulted in high scores averaging between 97 % to 100 % for both precision and recall for the desired appliance signal.
Full text available upon request to the author

Article title: Isolating Defects in Light Beam Induced Current Maps of Solar Cells
Authors: Genevieve Ngo and Erees Queen B. Macabebe
Conference title: TENCON 2018-2018 IEEE Region 10 Conference

Abstract:
The advances in solar technologies has lead higher device conversion efficiency and lower production costs. Ensuring the quality of the solar cells, however, remains a challenge and automation of defect identification in solar cells can potentially make the process efficient. Light Beam Induced Current (LBIC) mapping is a high-resolution imaging technique that allows researchers to see defects in solar cell. LBIC maps show the spatial distribution of the short-circuit current of a solar cell. In this study, surface and sub-surface defects in an LBIC image were identified using watershed segmentation, image dilation and inpainting. The image processing model on the image presented resulted in an Intersection over Union score of 41.33%. The model was able to highlight features on the LBIC map that are potential

defects and further investigation can be made on these areas to understand the underlying cause of these defects.
Full text available upon request to the author

Article title: Inferring Appliance Energy Usage from Smart Meters using Fully Convolutional Encoder Decoder Networks
Authors: Felan Carlo Garcia and Erees Queen B. Macabebe
Conference title: 2017 ACM on Conference on Information and Knowledge Management.

Abstract:
Energy management presents one of the principal sustainability challenges within urban centers given that they account for 75% of the energy consumption worldwide. In the context of a smart city framework, the use of intelligent urban systems provides a key opportunity in addressing the energy sustainability issue as an informatics problem where the goal is to deliver energy usage feedback to the users as a means of enabling behavioral change towards energy sustainability. In this paper we present a method to provide appliance energy usage feedback from smart meters using energy disaggregation. We put energy disaggregation in the context of a source separation and signal reconstruction problem in which we train a fully convolutional encoder decoder network to separate appliance energy usage from aggregate whole house electricity consumption data. The results show that the proposed fully convolutional encoder decoder model can achieve competitive accuracy compared with several state-of-the-art methods.
Full text available upon request to the author

Article title: Image segmentation using K-means color quantization and density-based spatial clustering of applications with noise (DBSCAN) for hotspot detection in photovoltaic modules
Authors: Genevieve Ngo and Erees Queen B. Macabebe
Conference title: TENCON 2016-2016 IEEE Region 10 Conference

Abstract:
The increasing demand for the use of solar energy as an alternative source of energy to generate electricity has multiplied the need for more photovoltaic (PV) arrays. With the growth of the PV manufacturing industry, automation for defect detection

is seen as a great potential in ensuring the quality of these PV modules. Hotspot formation due to defects is detrimental to the performance of PV devices. Thus this research aims to detect and isolate hotspot areas in PV modules by applying two machine learning techniques, namely K-means color quantization for pre-processing, and density-based spatial clustering of applications with noise (DBSCAN) for processing, in the images captured by an infrared camera. In the preprocessing, K-means clustering algorithm produced a quantized color image represented by the contours while in the processing or clustering part, DBSCAN resulted in the segmentation of the image, isolating the hotspot. Further investigation of the PV module through visual inspection found a crack in one of the solar cells where the hotspot occurred.

Full text available upon request to the author

Article title: Electrical PV Array Reconfiguration Strategy Against Partial Shading
Authors: R.A.S. Peña, Erees Queen B. Macabebe, Davide Del Col
Conference title: ISES Solar World Congress 2015

Abstract:

Partial shading presents a huge problem for photovoltaic (PV) arrays because of mismatch losses. One way to maximize power output is to make the arrays dynamic. These dynamic PV arrays change configuration depending on shading pattern and strength. This work evaluates the electrical PV array reconfiguration (EAR) strategy in dynamic arrays that use total-cross tied topology through modeling and simulation. The approach searches for the optimum configuration which has the most equal row irradiance averages. A static 3×3 PV array model and a dynamic PV array model, which uses the EAR algorithm, were developed. The models were tested for binary- and random-irradiance shading. Results show that the EAR strategy suits some shading patterns and that the irradiance distribution affects improvement in power output. The simulations performed demonstrate both the limitations and benefits of using the EAR strategy in PV array reconfiguration.

Full text available upon request to the author

Article title: Feasibility Study on Thermoelectric Conversion to Improve Photovoltaic Operation
Authors: M.L. Montayre and Erees Queen B. Macabebe
Conference title: ISES Solar World Congress 2015

Abstract:
Thermoelectrics (TE) is an emerging technology with a wide range of potential applications namely recapturing energy lost as wasted heat from burning fossil fuels as well as serving as a cooling agent. One viable application is to integrate thermoelectric devices with photovoltaic (PV) modules that suffer from performance issues because of heat. This study proposes a model where the TE device can help lower the temperature of the PV modules which will optimize its performance through an increase in generated output. The same device can also increase the total output power from the combined PV-TE system when the TE acts as a generator. The PV-TE system was simulated using Matlab software and results show that there is potential in using TE technology as coolant and generator improve the performance of the PV device. Experiments and actual deployment also reveal an improved output for the combined PV-TE system.
Full text available upon request to the author

Article title: Cost-effective LBIC system for solar cell characterization
Authors: Jeric Lim, Paul Lorenzo, Erees Queen B. Macabebe
Conference title: TENCON 2015-2015 IEEE Region 10 Conference

Abstract:
Defects in solar cells such as localized shunts greatly reduce the efficiency of the device by diverting current away from the output. Laser beam induced current (LBIC) technique is a non-destructive characterization tool to identify the spatial distribution of defects by measuring the generated current of the cells. This technique determines the defects by scanning a laser beam onto the cell while measuring the generated current as a function of position. This contribution presents the development of a cost-effective LBIC system using three wavelengths: 650 nm, 532 nm, and 450nm. LBIC resolution is optimized by varying the spot size of the light source and the step size of the machine. LBIC maps generated from different laser wavelengths show variations in image quality and details.
Full text available upon request to the author

Article title: Effects of shading on current, voltage and power output of total cross-tied photovoltaic array configuration

Authors: Beryll Justin G. Montano, Dion Januel F. Rombaoa, Robert Alfie S. Pena, Erees Queen B. Macabebe
Conference title: TENCON 2015-2015 Region 10 Conference

Abstract:
The Philippines, being a tropical country, has a high photovoltaic (PV) energy generation potential that can help meet demand due to impending power supply shortage in the coming years. One factor that limits solar PV generation is nonuniform illumination or partial shading. Partial shading causes voltage and current mismatch which affect the performance of PV arrays. Partially shaded PV systems cannot operate at maximum efficiency because of shadows cast by the surrounding structures, foliage and cloud cover. In this study, the researchers observed the effects of partial shading on the voltage, current and power output of the total cross-tied (TCT) array configuration using 16 shading patterns. Results show that the TCT configuration has the ability to balance out the effects of uneven irradiance on the PV modules. This results in higher power output. However, this effect optimizes the power output most if shaded modules complete columns. Such cases minimize current mismatch among the rows in the array.
Full text available upon request to the author

Article title: Real-time energy monitoring system for grid-tied Photovoltaic installations
Authors: Genevieve Ngo, Judd Kristian I. Floriza, Christine May Creayla, Erees Queen B. Macabebe, et al.
Conference title: TENCON 2015 - 2015 IEEE Region 10 Conference

Abstract:
A real-time energy monitoring system for grid-tied Photovoltaic (PV) installations was developed and deployed in a household located at Barangka, Marikina. The system consists of a BeagleBone Black which serves as the device to processes the measured data from the two power analyzers and the DC sensor. It also features a Mobile and Web-based monitor and analytics platform for end user utilization, and provides a forecasting algorithm for the user's projected monthly bill. One of the receiving ends is a server that stores the data and hosts the web application which aggregates, analyzes and presents the general power generation and grid consumption to the user. The other receiving end, an Android application, displays

the real-time graph of the generated solar energy and the total energy consumed by the load, in this case, a residential load.

Full text available upon request to the author

Article title: Performance of a 3-kWp grid-tied photovoltaic system in a water refilling station

Authors: Erees Queen B. Macabebe, Marianne S. Paloma, Danilo P. Villarey III

Conference title: 5th International Conference on Sustainable Energy and Environment (SEE 2014): Science, Technology and Innovation for ASEAN Green Growth

Abstract:

Due to the recurring power interruptions and the increasing monthly electricity rates in Metro Manila, residents and business owners need to start using renewable energy. Solar photovoltaic (PV) is the most viable and widely available source of energy. To quantify the benefits of using solar PV systems, the performance of a 3 kWp grid-tied photovoltaic system with back-up battery bank installed in a commercial water refilling station was monitored and analyzed. The battery bank provided an uninterrupted source of energy. The calculations for the monthly savings and the potential rebates of the establishment if net metering were applied are included. Despite negative effects due to the non-implementation of the net metering scheme, the grid-tied PV system significantly reduced the monthly electricity bill by 50%. Information obtained within the 3-month duration of the study was used to make necessary modifications in the system.

Full text available upon request to the author

Article title: Development of an Arduino-based I–V curve tracer for performance testing of photovoltaic modules under outdoor conditions

Authors: Erees Queen B. Macabebe, Robert Alfie S. Peña, Ian Christopher Gamara, Keir Alexis Pareja

Conference title: Photovoltaic Science and Engineering Conference (PVSEC-23), 2014

Abstract:

Performance parameters of photovoltaic (PV) modules derived from their current-voltage (I–V) characteristics are significant in the design of PV systems. In

commercially available PV modules, parameters such as maximum power (Pmax), open-circuit voltage (VOC), short-circuit current (ISC) and conversion efficiency (η) are supplied by the manufacturers. However, these values were obtained under laboratory environment at standard testing conditions (1000 W/m2, A.M. 1.5, 25 °C). Actual outdoor conditions vary and fluctuate. To optimize and monitor the performance of the system, it is important to evaluate the performance of the modules under outdoor conditions. For this purpose, a portable, battery-powered, Arduino-based I–V curve tracer was developed with SD card functionality. The device takes advantage of the operation of a metal-oxide-semiconductor field-effect transistor (MOSFET) as a fast-varying electronic load to the PV module which addresses the need for a fast response curve tracer. It also has a sensor module for measuring temperature and a program was written to extract the performance parameters from the measured I–V curve. The design and the use of Arduino allow for easy interfacing with other computer systems.

Full text available upon request to the author

Article title: Effect of collaborative learning in Interactive Lecture Demonstrations (ILD) on student conceptual understanding of motion graphs

Authors: Erees Queen B. Macabebe, Eleanor Alma D. Jugueta

Conference title: International Conference on Physics Education, 2014

Abstract:

To assess effectively the influence of peer discussion in understanding concepts, and to evaluate if the conceptual understanding through Interactive Lecture Demonstrations (ILD) and collaborative learning can be translated to actual situations, ten (10) questions on human and carts in motion were presented to 151 university students comprising mostly of science majors but of different year levels. Individual and group predictions were conducted to assess the students' pre-conceptual understanding of motion graphs. During the ILD, real-time motion graphs were obtained and analysed after each demonstration and an assessment that integrates the ten situations into two scenarios was given to evaluate the conceptual understanding of the students. Collaborative learning produced a positive effect on the prediction scores of the students and the ILD with real-time measurement allowed the students to validate their prediction. However, when the given situations were incorporated to create a scenario, it posted a challenge to the

students. The results of this activity identified the area where additional instruction and emphasis is necessary.

Full text available upon request to the author

Erika Fille Tupas Legara

Sex: Female

Education:

Doctor of Philosophy in Physics Complex Systems, University of the Philippines, 2011

Deep Learning Nanodegree Certification, Udacity, 2017

Non-Degree, Complexity Science, Santa Fe Institute's Complex Systems Summer School, 2010

Master of Science in Physics, University of the Philippines, 2008

Bachelor of Science in Physics, University of the Philippines, 2006

Field of Specialization

Complex Systems

Network Science

Urban Science

Artificial Intelligence

Computational Physics

Researches:

Article title: Characterisation and comparison of spatial patterns in urban systems: A case study of U.S. cities

Authors: Hoai Nguyen Huynh, Evgeny Makarov, Erika Fille Tupas Legara, Christopher Monterola, et al.

Publication title: Journal of Computational Science 24, December 2017

Abstract:

Understanding the morphology of an urban system is an important step towards unveiling the dynamical processes of its growth and development, which can be achieved through a study of its transportation system. Without doubt, transportation is the foundation of every urban system, and it is a crucial component that enables diverse social and economic functions within a city. In this paper, we studied the spatial pattern of 53 cities in the U.S. by analysing its distribution of public transport points, using a method based upon clusters of percolation known in statistical physics. Our analysis revealed that different spatial distributions of points can generally be classified into four groups with distinctive features: clustered, dispersed, or regularly distributed. From visual inspection, we observed that cities with regularly distributed patterns do not have apparent centre. This is in contrast to the other two types where monocentric (or star-node structure) can be clearly observed. In particular, our results provide quantitative evidence on the existence of two different forms of urban system: well-planned and organically grown. In addition, we had also investigated into the spatial distribution of another important urban entity—the amenities, and found that it possessed universal properties regardless of the city's spatial pattern type. This result has an important implication: urban dynamics cannot be controlled at the local scale even though regulation has been meted out at the scale of the entire urban system. Furthermore, interesting relationships between the distribution of amenities within the city and its spatial pattern are detailed in the paper.

Full text available upon request to the author

Article title: Non-invasive Procedure to Probe the Route Choices of Commuters in Rail Transit Systems

Authors: Christopher Monterola, Erika Fille Tupas Legara, Lee Kk, Pan Di, et al.

Publication title: Procedia Computer Science 80:2387-2391, December 2016

Abstract:

Accurately determining the probability of various route choices is critical in understanding the actual spatiotemporal flow of commuters and the instantaneous capacity of trains and stations. Here, we report a novel procedure, based solely on the recorded tap-in tap-out ticketing data, that dictates the route choice of commuters in a rail transit system (RTS). We show that there exists a signature travel time distribution, in the form of Gumbel type 1 function, from a given origin O to a

destination D. Any particular route can then be considered as a superposition of this mapping function and one can compute the probability that a specific path, over other possible paths, is taken by a commuter from O to D. The procedure is demonstrated by considering different scenarios using travel data from smart fare cards from Singapore's RTS; results show that the forecasted characteristic profile deviates by less than 10-5 from the actual distribution. We note that our method utilizes only two parameters that can be experimentally accounted for.
Full text available upon request to the author

Article title: Impacts of land use and amenities on public transport use, urban planning and design
Authors: Hu, Nan, Erika Fille Tupas Legara, Kee Khoon Lee, Terence Gih Guang Hung, et al.
Publication title: Land Use Policy 57, November 2016

Abstract:
Various land-use configurations are known to have wide-ranging effects on the dynamics of and within other city components including the transportation system. In this work, we particularly focus on the complex relationship between land-use and transport offering an innovative approach to the problem by using land-use features at two differing levels of granularity (the more general land-use sector types and the more granular amenity structures) to evaluate their impact on public transit ridership in both time and space. To quantify the interdependencies, we explored three machine learning models and demonstrate that the decision tree model performs best in terms of overall performance—good predictive accuracy, generality, computational efficiency, and "interpretability". Results also reveal that amenity-related features are better predictors than the more general ones, which suggests that high-resolution geo-information can provide more insights into the dependence of transit ridership on land-use. We then demonstrate how the developed framework can be applied to urban planning for transit-oriented development by exploring practicable scenarios based on Singapore's urban plan toward 2030, which includes the development of "regional centers" (RCs) across the city-state. Results show an initial increase in transit ridership as the amount of amenities is increased. This trend, on the other hand, eventually reverses (particularly during peak hours) with continued strategic increase in amenities; a tipping point at 55% increase is identified

where ridership begins to decline and at 110%, the predicted ridership begins to fall below current levels. Our in-silico experiments support one of the medium-term land-use transport goals of stakeholders—to alleviate future strains in the transportation system of Singapore through the development of RCs. The model put forward can serve as a good foundation in building decision-support tools that can assist planners in better strategizing and planning land-use configurations, in particular the amenity resource distribution, to influence and shape public transportation demand.

Full text available upon request to the author

Article title: Tweeting Supertyphoon Haiyan: Evolving Functions of Twitter during and after a Disaster Event

Authors: Clarissa C. David, Jonathan Corpus Ong, Erika Fille Tupas Legara

Publication title: PLoS ONE 11(3): e0150190, March 2016

Abstract:

When disaster events capture global attention users of Twitter form transient interest communities that disseminate information and other messages online. This paper examines content related to Typhoon Haiyan (locally known as Yolanda) as it hit the Philippines and triggered international humanitarian response and media attention. It reveals how Twitter conversations about disasters evolve over time, showing an issue attention cycle on a social media platform. The paper examines different functions of Twitter and the information hubs that drive and sustain conversation about the event. Content analysis shows that the majority of tweets contain information about the typhoon or its damage, and disaster relief activities. There are differences in types of content between the most retweeted messages and posts that are original tweets. Original tweets are more likely to come from ordinary users, who are more likely to tweet emotions, messages of support, and political content compared with official sources and key information hubs that include news organizations, aid organization, and celebrities. Original tweets reveal use of the site beyond information to relief coordination and response.

Full text available upon request to the author

Article title: Generalized Cross Entropy Method for estimating joint distribution from incomplete information

Authors: Hai-Yan Xu, Shyh-Hao Kuo, Erika Fille Tupas Legara, Guoqi Li, et al.

Publication title: Physica A: Statistical Mechanics and its Applications 453, February 2016

Abstract:
Obtaining a full joint distribution from individual marginal distributions with incomplete information is a non-trivial task that continues to challenge researchers from various domains including economics, demography, and statistics. In this work, we develop a new methodology referred to as "Generalized Cross Entropy Method" (GCEM) that is aimed at addressing the issue. The objective function is proposed to be a weighted sum of divergences between joint distributions and various references. We show that the solution of the GCEM is unique and global optimal. Furthermore, we illustrate the applicability and validity of the method by utilizing it to recover the joint distribution of a household profile of a given administrative region. In particular, we estimate the joint distribution of the household size, household dwelling type, and household home ownership in Singapore. Results show a high-accuracy estimation of the full joint distribution of the household profile under study. Finally, the impact of constraints and weight on the estimation of joint distribution is explored.
Full text available upon request to the author

Article title: How Voters Combine Candidates on the Ballot: The Case of the Philippine Senatorial Elections
Authors: Erika Fille Tupas Legara, Clarissa C. David
Publication title: International Journal of Public Opinion Research 29(1), December 2015

Abstract:
In the Philippines, senators are nationally elected officials, and citizens vote for 12 candidates every three years. The country's electoral features include a weak party system, a low-information environment for voters, and a history of political dynasty rule and preponderance of media celebrities in elected political offices. The article first applies cluster analysis on exit poll data for the 2010 Senatorial Election and then examines predictors of Senatorial candidate sets. Hypotheses are proposed based on theories and evidence that name recall has important consequences in voter decision-making under low information circumstances, and that media celebrities and members of political dynasties benefit from the name recall vote. Findings

support predictions that voters put media celebrities and members of national political dynasties together often on a ballot and that the voters who are likely to operate with little information are more likely to vote for these candidates. These are voters with low education and low income, who live in rural areas, and who exhibit high abstention rates.
Full text available upon request to the author

Article title: Inferring Passenger Type from Commuter Eigentravel Matrices
Authors: Erikka Fille Tupas Legara, Christopher P. Monterola
Publication title: Transportmetrica B, August 2015

Abstract:
A sufficient knowledge of the demographics of a commuting public is essential in formulating and implementing more targeted transportation policies, as commuters exhibit different ways of traveling. With the advent of the Automated Fare Collection system (AFC), probing the travel patterns of commuters has become less invasive and more accessible. Consequently, numerous transport studies related to human mobility have shown that these observed patterns allow one to pair individuals with locations and/or activities at certain times of the day. However, classifying commuters using their travel signatures is yet to be thoroughly examined. Here, we contribute to the literature by demonstrating a procedure to characterize passenger types (Adult, Child/Student, and Senior Citizen) based on their three-month travel patterns taken from a smart fare card system. We first establish a method to construct distinct commuter matrices, which we refer to as eigentravel matrices, that capture the characteristic travel routines of individuals. From the eigentravel matrices, we build classification models that predict the type of passengers traveling. Among the models explored, the gradient boosting method (GBM) gives the best prediction accuracy at 76%, which is 84% better than the minimum model accuracy (41%) required vis-\`a-vis the proportional chance criterion. In addition, we find that travel features generated during weekdays have greater predictive power than those on weekends. This work should not only be useful for transport planners, but for market researchers as well. With the awareness of which commuter types are traveling, ads, service announcements, and surveys, among others, can be made more targeted spatiotemporally. Finally, our framework should be effective in

creating synthetic populations for use in real-world simulations that involve a metropolitan's public transport system.

Full text available upon request to the author

Article title: A Data-Driven Agent-Based Model of Congestion and Scaling Dynamics of Rapid Transit Systems

Authors: Nasri Bin Othman, Erika Fille Tupas Legara, Vicknesh Selvam, Christopher Monterola

Publication title: Journal of Computational Science 10, March 2015

Abstract:

Investigating congestion in train rapid transit systems (RTS) in today's urban cities is a challenge compounded by limited data availability and difficulties in model validation. Here, we integrate information from travel smart card data, a mathematical model of route choice, and a full-scale agent-based model of the Singapore RTS to provide a more comprehensive understanding of the congestion dynamics than can be obtained through analytical modelling alone. Our model is empirically validated, and allows for close inspection of congestion and scaling dynamics. By adjusting our model, we can estimate the effective capacity of the RTS trains as well as replicate the penultimate station effect, where commuters travel backwards to the preceding station to catch a seat, sacrificing time for comfort. Using current data, the crowdedness in all 121 stations appears to be distributed log-normally. We find that increasing the current population (2 million) beyond a factor of approximately 10% leads to an exponential deterioration in service quality. We also show that incentivizing commuters to avoid the most congested hours can bring modest improvements to the service quality. Finally, our model can be used to generate simulated data for statistical analysis when such data are not empirically available, as is often the case.

Full text available upon request to the author

Article title: Mechanism-based model of a mass rapid transit system: A perspective

Authors: Erika Fille Tupas Legara, Lee Kee Khoon, Terence Gih Guang Hung, Christopher Monterola

Publication title: International Journal of Modern Physics Conference Series 36:1560011, January 2015

Abstract:
In this paper, we discuss our findings on the spatiotemporal dynamics within the mass rapid transit (MRT) system of Singapore. We show that the trip distribution of Origin-Destination (OD) station pairs follows a power-law, implying the existence of critical OD pairs. We then present and discuss the empirically validated agent-based model (ABM) we have developed. The model allows recreation of the observed statistics and the setting up of various scenarios and their effects on the system, such as increasing the commuter population and the propagation of travel delays within the transportation network. The proposed model further enables identification of bottlenecks that can cause the MRT to break down, and consequently provide foresight on how such disruptions can possibly be managed. This can potentially provide a versatile approach for transport planners and government regulators to make quantifiable policies that optimally balance cost and convenience as a function of the number of the commuting public.
Full text available upon request to the author

Article title: Criticality of forcing directions on the fragmentation and resilience of grid networks
Authors: Cheryl Abundo, Christopher Monterola, Erika Fille Tupas Legara
Publication title: Scientific Reports 4(1):6195, August 2014

Abstract:
A general framework for probing the dynamic evolution of spatial networks comprised of nodes applying force amongst each other is presented. Aside from the already reported magnitude of forces and elongation thresholds, we show that preservation of links in a network is also crucially dependent on how nodes are connected and how edges are directed. We demonstrate that the time it takes for the networks to reach its equilibrium network structure follows a robust power law relationship consistent with Basquin's law with an exponent that can be tuned by changing only the force directions. Further, we illustrate that networks with different connection structures, node positions and edge directions have different Basquin's exponent which can be used to distinguish spatial directed networks from each other. Using an extensive waiting time simulation that spans up to over 16 orders of magnitude, we establish that the presence of memory combined with the scale-free

bursty dynamics of edge breaking at the micro level leads to the evident macroscopic power law distribution of network lifetime.
Full text available upon request to the author

Article title: Critical capacity, travel time delays and travel time distribution of rapid mass transit systems
Authors: Erika Fille Tupas Legara, Christopher Monterola, Kee Khoon Lee, Terence Gih Guang Hung
Publication title: Physica A: Statistical Mechanics and its Applications 406:100-106, July 2014

Abstract:
We set up a mechanistic agent-based model of a rapid mass transit system. Using empirical data from Singapore's unidentifiable smart fare card, we validate our model by reconstructing actual travel demand and duration of travel statistics. We subsequently use this model to investigate two phenomena that are known to significantly affect the dynamics within the RTS: (1) overloading in trains and (2) overcrowding in the RTS platform. We demonstrate that by varying the loading capacity of trains, a tipping point emerges at which an exponential increase in the duration of travel time delays is observed. We also probe the impact on the rail system dynamics of three types of passenger growth distribution across stations: (i) Dirac delta, (ii) uniform and (iii) geometric, which is reminiscent of the effect of land use on transport. Under the assumption of a fixed loading capacity, we demonstrate the dependence of a given origin–destination (OD) pair on the flow volume of commuters in station platforms.
Full text available upon request to the author

Article title: On Centripetal Flows of Entities in Scale-Free Networks with Nodes of Finite Capability
Authors: Jesus Feliz Valenzuela, Christopher Monterola, Erika Fille Tupas Legara, Xiuju Fu, et al.
Publication title: Complexity 21(1), July 2014

Abstract:
We examine the transmission of entities from the peripheries of scale-free networks toward their centers when the nodes of the network have finite processing

capabilities. We look at varying network utilization, U and find that clogging of the network sets in after a threshold value has been exceeded, and that the congestion sets in at the downstream nodes (those nearer to the collector) having large numbers of upstream neighbors. Investigation of the question of the degree of correlation of several characteristics of scale-free networks (such as the average path length to the collector <l(min)> and the average clustering coefficient) with the dynamics of centripetal flow in them reveals a negative answer: any correlation is indirect and will manifest in the number of producer nodes (which dictate the effective heaviness of the flow) and the interconnectedness of the feeder nodes, those nodes which are immediate neighbors of the collector node. An examination of reinforcement strategies shows dramatic improvements in both the finishing rate, and the average total transmission time, when the more centrally-placed nodes are reinforced first, showing that the entities spend a large amount of their lifetime waiting in line at those nodes (which constitute the bottlenecks in the network) compared to the nodes in the periphery. Our results reinforce the importance of a network's hubs and their immediate environs, and suggest strategies for prioritizing elements of a network for optimization. © 2014 Wiley Periodicals, Inc. Complexity, 2014

Full text available upon request to the author

Article title: A network perspective on the calamity, induced inaccessibility of communities and the robustness of centralized, landbound relief efforts

Authors: Jesus Felix Valenzuela, Erika Fille Tupas Legara, Xiuju Fu, Rick Siow Mong Goh, et al.

Publication title: International Journal of Modern Physics C 25(6), March 2014

Abstract:

We examine the robustness of centralized, landbound relief operations' capability to promptly reach areas affected by a disaster event from a network perspective. We initially look at two idealized road networks: a two-dimensional grid and a scale-free network, and compare them to an actual road network obtained from OpenStreetMap. We show that, from a node designated as the center for relief operations (a "relief center"), damage to a road network causes a substantial fraction of the other nodes (about 20% in the three networks we examined) to become initially inaccessible from any relief effort, although the remaining majority can still be reached readily. Furthermore, we show the presence of a threshold in the two

idealized road networks but not in the real one. Below this threshold, all nodes can robustly be reached in a short span of time, and above it, not only the partitioning mentioned above sets in, but also the time needed to reach the nodes becomes susceptible to the amount of damage sustained by the road network. Under damage sustained by random segments of the network, this threshold is higher in the scale-free network compared to the grid, due to the robustness of the former against random attacks. Our results may be of importance in formulating contingency plans for the logistics of disaster relief operations.

Full text available upon request to the author

Article title: Simulating Congestion Dynamics of Train Rapid Transit Using Smart Card Data

Authors: Nasri Bin Othman, Erika Fille Tupas Legara, Vicknesh Selvam, Christopher Monterola

Publication title: Procedia Computer Science 29, February 2014

Abstract:

Investigating congestion in train rapid transit systems (RTS) in today's urban cities is a challenge compounded by limited data availability and difficulties in model validation. Here, we integrate information from travel smart card data, a mathematical model of route choice, and a full-scale agent-based model of the Singapore RTS to provide a more comprehensive understanding of the congestion dynamics than can be obtained through analytical modelling alone. Our model is empirically validated, and allows for close inspection of the dynamics including station crowdedness, average travel duration, and frequency of missed trains---all highly pertinent factors in service quality. Using current data, the crowdedness in all 121 stations appears to be distributed log-normally. In our preliminary scenarios, we investigate the effect of population growth on service quality. We find that the current population (2 million) lies below a critical point; and increasing it beyond a factor of $\sim10\%$ leads to an exponential deterioration in service quality. We also predict that incentivizing commuters to avoid the most congested hours can bring modest improvements to the service quality provided the population remains under the critical point. Finally, our model can be used to generate simulated data

for analytical modelling when such data are not empirically available, as is often the case.

Full text available upon request to the author

Article title: News Frames of the Population Issue in the Philippines
Authors: Clarissa C. David, Erika Fille Tupas Legara, Jenna Mae Atun, Christopher P. Monterola
Publication title: International Journal of Communication 8(1): 1247-1267, January 2014

Abstract:
Using automated semantic network analysis, this study examines media framing of the population issue in the Philippines through the different labels used to refer to it in public discourse. The population issue has been relabeled and repackaged in legislation and other policy documents. This article examines how each relabeling of the issue was reflected in the media. Analysis of news articles published from 1987 to 2007 reveals that word clusters around each label reflect strategic framing of the terms population control, population management, family planning, reproductive health, responsible parenthood, and pro-life. Whereas population control and population management are associated with developmental and economic goals, reproductive health and family planning are more linked with women's and youth's health issues. The terms responsible parenthood and pro-life are mostly identified with the Catholic Church, with the latter more identified with positions on abortion and contraception.

Full text available upon request to the author

Article title: Complex network tools in building expert systems that perform framing analysis
Authors: Erika Fille Tupas Legara, Christopher P. Monterola, Clarissa David
Publication title: Expert Systems with Applications 40(11): 4600-4608, September 2013

Abstract:
Framing, in its specific application to media research, is defined as the "central organizing idea for making sense of an issue or conflict and suggesting what is at stake." It can be found in various disciplines of the social sciences, most notably in

political science, psychology, and communication research. Due to the fuzzy nature of frames, identifying them has proven to be quite complex. Here, we perform framing analysis on a corpus of news texts on the population and family planning issue in the Philippines by operating two varying approaches: human-based and computer-assisted. A singular holistic approach to framing is initially implemented where coders/domain experts classify each news text to a specific pre-defined frame. This traditional approach is known to raise serious issues on the reliability and validity of the results mainly due to human's intrinsic biases. To address such issues, we propose a novel technique that synergically combines the method of Matthes and Kohring (2008) and complex networks approach. In our model, the codings of texts are cast as a network of content analytic variables (CAVs). Our proposed method tackles the clustering issue that MK raised, which plagues framing scholars in the quantitative identification of news frames in texts. Moreover, the research is significant on a societal level as it also aims to gain perspective for reasons on the lack of progress in discussions about suitable population policies in most developing countries like the Philippines.

Full text available upon request to the author

Article title: Finding Frames: Comparing Two Methods of Frame Analysis

Authors: Clarissa C. David, Jenna Mae Atun, Erika Fille Tupas Legara, Christopher Monterola

Publication title: Communication Methods and Measures 5(4): 329-351, December 2011

Abstract:

Detecting media frames has spawned a variety of methods, but very little has been done to investigate whether these methods provide comparable results. This article compares the results of two kinds of human coding framing analysis. The first is a method developed by Matthes and Kohring (2008) involving human coding of elements based on Entman's (1993) definition of frames, and the second coding is based on an extracted set of frames. Cluster analysis of news articles on population published from 1987–2007 in the Philippines yielded an optimum number of three communities or frames that agree with the holistic predetermined frames. Results indicate support for the validity of both procedures. Methodological implications are further discussed.

Full text available upon request to the author

Article title: Power Law Mapping in Human Area Perception
Authors: Anthony Longjas, Erika Fille Tupas Legara, Christopher Monterola
Publication title: International Journal of Modern Physics C 22(5):495-503, May 2011

Abstract:
We investigate how humans visually perceive and approximate area or space allocation through visual area experiments. The participants are asked to draw a circle concentric to the reference circle on the monitor screen using a computer mouse with area measurements relative to the area of the reference circle. The activity is repeated for triangle, square and hexagon. The area estimated corresponds to the area estimates of a participant (perceived) for a corresponding requested area to be drawn (stimulus). The area estimated fits very well (goodness of fit R2 > 0.97) to a power law given by r2alpha where r is the radius of the circle or the distance of the edge for triangle, square and hexagon. The power law fit demonstrates that for all shapes sampled, participants underestimated area for stimulus that are less than ~100% of the reference area and overestimated area for stimulus greater than ~100% of the reference area. The value of alpha is smallest for the circle (alphao ≈ 1.33) and largest for triangle (alpha△ ≈ 1.56) indicating that in the presence of a reference area with the same shape, circle is perceived to be smallest among the figures considered when drawn bigger than the reference area, but largest when drawn smaller than the reference area. We also conducted experiments on length estimation and consistent with the results of Dehaene et al., Science 2008, we recover a linear relationship between the perceived length and the stimulus. We show that contrary to number mapping into space and/or length perception, human's perception of area is not corrected by the introduction of cultural interventions such as formal education.
Full text available upon request to the author

Article title: Ranking of predictor variables based on effect size criterion provides an accurate means of automatically classifying opinion column articles
Authors: Erika Fille Tupas Legara, Christopher Monterola, Cheryl Abundo
Publication title: Physica A: Statistical Mechanics and its Applications 390(1): 110-119, January 2011

Abstract:
We demonstrate an accurate procedure based on linear discriminant analysis that allows automatic authorship classification of opinion column articles. First, we extract the following stylometric features of 157 column articles from four authors: statistics on high frequency words, number of words per sentence, and number of sentences per paragraph. Then, by systematically ranking these features based on an effect size criterion, we show that we can achieve an average classification accuracy of 93% for the test set. In comparison, frequency size based ranking has an average accuracy of 80%. The highest possible average classification accuracy of our data merely relying on chance is ~31%. By carrying out sensitivity analysis, we show that the effect size criterion is superior than frequency ranking because there exist low frequency words that significantly contribute to successful author discrimination. Consistent results are seen when the procedure is applied in classifying the undisputed Federalist papers of Alexander Hamilton and James Madison. To the best of our knowledge, the work is the first attempt in classifying opinion column articles, that by virtue of being shorter in length (as compared to novels or short stories), are more prone to over-fitting issues. The near perfect classification for the longer papers supports this claim. Our results provide an important insight on authorship attribution that has been overlooked in previous studies: that ranking discriminant variables based on word frequency counts is not necessarily an optimal procedure.
Full text available upon request to the author

Article title: News Framing of Population and Family Planning Issues via Syntactic Network Analysis
Authors: Erika Fille Tupas Legara, Christopher Monterola, Clarissa David, Jenna Mae Atun
Publication title: International Journal of Modern Physics C 21 (1): 51-65, January 2010

Abstract:
Contentious political debates regarding the issues on population and family planning have been perennial over the past four decades especially in developing countries. While its prominence in the public agenda varies depending on other national issues vying for public attention, its presence in policy and political agendas

is constant. Here, a computational approach to framing analysis is developed that examines the pattern of media coverage on the population issue in the Philippines. The content of 146 articles sampled from 1988 to 2007 in Manila Bulletin (one of the leading newspapers in the Philippines) is analyzed by creating a syntactic network of concept co-occurrences. The topological properties of the network indicates that the discussion of an article revolves around few central ideas. Moreover, cluster analysis of the network suggests three well-defined frame themes, namely: (1) Development Frame; (2) Maternal Health Frame; and (3) Framing by the Catholic Church. Our results support the thesis that the inability to fruitfully discuss points of contention to reach agreement about suitable population policies in the Philippines is due to the mismatched frames within which it is discussed.

Full text available upon request to the author

Article title: Competition in a Social Structure
Authors: Erika Fille Tupas Legara, Anthony Longjas, Rene Batac
Publication title: International Journal of Modern Physics C 20(01):1-7, January 2009

Abstract:

Complex adaptive agents develop strategies in the presence of competition. In modern human societies, there is an inherent sense of locality when describing inter-agent dynamics because of its network structure. One then wonders whether the traditional advertising schemes that are globally publicized and target random individuals are as effective in attracting a larger portion of the population as those that take advantage of local neighborhoods, such as "word-of-mouth" marketing schemes. Here, we demonstrate using a differential equation model that schemes targeting local cliques within the network are more successful at gaining a larger share of the population than those that target users randomly at a global scale (e.g., television commercials, print ads, etc.). This suggests that success in the competition is dependent not only on the number of individuals in the population but also on how they are connected in the network. We further show that the model is general in nature by considering examples of competition dynamics, particularly those of business competition and language death.

Full text available upon request to the author

Article title: Earning potential in multilevel marketing enterprises

Authors: Erika Fille Tupas Legara, Christopher Monterola, Dranreb Earl Juanico, Marisciel Litong-Palima, et al.

Publication title: Physica A: Statistical Mechanics and its Applications 387(19): 4889-4895, August 2008

Abstract:

Government regulators and other concerned citizens warily view multilevel marketing enterprises (MLM) because of their close operational resemblance to exploitative pyramid schemes. We analyze two types of MLM network architectures — the unilevel and binary, in terms of growth behavior and earning potential among members. We show that network growth decelerates after reaching a size threshold, contrary to claims of unrestricted growth by MLM recruiters. We have also found that the earning potential in binary MLM's obey the Pareto "80 20" rule, implying an earning opportunity that is strongly biased against the most recent members. On the other hand, unilevel MLM's do not exhibit the Pareto earning distribution and earning potential is independent of member position in the network. Our analytical results agree well with field data taken from real-world MLM's in the Philippines. Our analysis is generally valid and can be applied to other MLM architectures.

Full text available upon request to the author

Pia D. Bagamasbad

Sex: Female

Education:

Doctor of Philosophy in Molecular, Cellular and Developmental Biology, University of Michigan, 2012

Bachelor of Science in Molecular Biology and Biotechnology, University of the Philippines, 2001

Field of Specialization

Transcription factors

Molecular Biology

Biotechnology

Genetics

Researches:

Article title: SUN-139 Luminescence-Based Drug Screen for Novel Androgen Receptor Antagonists for Prostate Cancer Therapy

Authors: Romie Angelo Azur, Isagani Padolina, Pia Bagamasbad

Publication title: Journal of the Endocrine Society 4(1), May 2020

Abstract:

The development and maintenance of the adult prostate is dependent on the action of androgens, which mediate its effect by binding to the androgen receptor (AR). Dysregulation in the AR signaling axis disrupts transcriptional homeostasis, shifting the balance towards uncontrolled proliferation and driving the progression towards prostate cancer (PCa). The prominent role of AR signaling in prostate carcinogenesis

led to the development of androgen deprivation therapy (ADT) as the primary treatment strategy for managing PCa. Despite the success of ADT in early PCa cases, most patients develop resistance to ADT and the cancer ultimately recurs towards a lethal state termed castration-resistant prostate cancer (CRPC). Remarkably, AR signaling is still active in CRPC, suggesting that the progression towards CRPC is still reliant on AR activity. Current treatments are ineffective against CRPC, highlighting the need for alternative therapeutics that can combat the resistant nature of CRPC. To address the need for innovative approaches against CRPC, we used a robust luminescence-based bioassay that can identify novel AR antagonists. We screened plant extracts derived from local fauna by measuring their effect on AR-driven activity using a luciferase-based reporter assay in HeLa cells stably overexpressing hAR (HeLa-hAR). To identify candidate hits, HeLa-hAR cells were treated with DHT to induce AR-dependent luciferase activity, DHT with the AR antagonist bicalutamide as a positive control, and DHT plus the plant extracts. We identified one extract, A32, which showed significant inhibition of AR-dependent luciferase activity without having deleterious effects on cell viability. Secondary validation tests also showed that A32 exhibits a dose-dependent inhibition of AR-driven reporter activity. When testing the effect of A32 on gene expression in LNCaP cells, we observed a down-regulation in the expression of canonical AR target genes such as PSA to degrees similar to bicalutamide. These results suggest that A32 may be an AR antagonist or may target the AR signaling axis. Collectively, this study establishes the use of a luminescence-based reporter assay for the identification of novel AR antagonists from a plant extract library.

Full text available upon request to the author

Article title: SAT-725 Alterations in the Phenotype and Epigenomic Landscape of Luminal Breast Cancer Following Long-Term Nanomolar Exposure to Bisphenol a (BPA)

Authors: Jason Tan Liwag, Michael Cu Velarde, Pia Bagamasbad

Publication title: Journal of the Endocrine Society 4(1), May 2020

Abstract:

Breast cancer (BCa) is the leading cause of female cancer-related death worldwide. Luminal BCa accounts for at least 70% of all BCa and is characterized by its hormone dependence, particularly to estrogen. Endocrine disruptors may function to exert the

pro-tumorigenic effects of estrogen in proxy following environmental exposure. Bisphenol A (BPA) is a ubiquitous endocrine disruptor shown to increase risk towards developing BCa in multiple *in vivo* mammalian models and *in vitro* human breast models. Despite this, there is limited information on the phenotypic and epigenetic effects of nanomolar BPA following long-term exposure particularly in the context of BCa stem cell population, which accumulate the 'cellular insult' and are likely to pass such information down through epigenetic mechanisms. We hypothesize that BPA affects the epigenome, in part, by altering the regulation of DNA methyltransferases (DNMTs) since BPA disrupts transcriptional and translational regulation of DNMTs in various other tissue types such as the brain, testis and prostate. In this study, MCF7 cells were chronically (>4 weeks) cultured with nanomolar doses of BPA, and subsequently subjected to phenotypic assays and gene expression analysis in monolayer or mammosphere culture. Gene expression analysis revealed a downregulation of *DNMT3A* and *ESR1* following long-term exposure to BPA in mammosphere culture of MCF7 cells, but not in monolayer culture. This is accompanied by alterations in mammosphere morphology, reduction in mammosphere size, an increase in the mammosphere number, and an increase in the CD49f+ population, indicating a positive contribution of BPA to stemness. However, there are no significant changes in proliferation, apoptotic rate, and metastasis in both monolayer and mammosphere culture. Future analysis includes assessment of genome-wide alterations in DNA methylation patterns in these chronically exposed MCF7 mammospheres, as well as identifying estrogen responsiveness, chemotherapeutic response, and self-renewal properties of these cancer cells.

Full text available upon request to the author

Article title: SAT-132 The Secretory Vesicle Membrane Protein, CYB561, Promotes the Growth and Metastatic Potential of Castration-Resistant Neuroendocrine Prostate Cancer

Authors: Kevin Christian V. Olarte, Pia Bagamasbad

Publication title: Journal of the Endocrine Society 4(1), May 2020

Abstract:

An increase in the population of neuroendocrine (NE) differentiated (NED) cells and their secretory products are closely correlated with prostate cancer (PCa) resistance

to existing therapies and eventual progression to castration-resistant PCa (CRPC). It is hypothesized that NED cells secrete neuropeptides that support tumor growth and induce aggressiveness of adjacent proliferating tumor cells through a paracrine mechanism. A gene that is constitutively expressed in secretory vesicles of NE cells, and has been previously found to be highly expressed in CRPC and cancer of several tissues is Cytochrome b561 (CYB561). The CYB561 gene encodes a secretory vesicle transmembrane protein that primarily functions in the regeneration of ascorbic acid, a necessary step in the α-amidation activation process in the biosynthesis of most neuropeptides. The CYB561 protein also exhibits ferrireductase activity and may contribute in regulating iron transport and metabolism, which are two other pathways often dysregulated in cancer. These findings led us to hypothesize that CYB561 may be a key player in the NE differentiation process that drives the progression of prostate cancers into the more aggressive NE subtype. In our study, we found that CYB561 expression is higher in metastatic and NE PCa (NEPC) models compared to normal prostate epithelia, and that its expression is not affected by androgen treatment or steroid deprivation. Lentiviral-mediated knockdown of CYB561 in the NEPC cell line, PC-3, decreased the expression of genes involved in NE differentiation and labile iron pool storage, decreased cell proliferation, reduced cell survival in a colony formation assay, and slowed down cell migration in a wound-healing assay. Treatment of normal prostate epithelial cells, PNT1A, with conditioned media from CYB561 knockdown PC-3 cells led to a decrease in proliferation rate when compared to treatment of PNT1A cells with media from CYB561 expressing (control) PC-3 cells. Taken together, our findings demonstrate the role of CYB561 in supporting the growth and metastatic potential of NEPC cells, and highlights the potential use of CYB561 as a therapeutic target and biomarker that can be used to identify more aggressive disease.

Full text available upon request to the author

Article title: Differential modulation of the androgen receptor for prostate cancer therapy depends on the DNA response element

Authors: Steven Kregel, Pia Bagamasbad, Shihan He, Elizabeth LaPensee, et al.

Publication title: Nucleic Acids Research 48(9), March 2020

Abstract:

Androgen receptor (AR) action is a hallmark of prostate cancer (PCa) with androgen deprivation being standard therapy. Yet, resistance arises and aberrant AR signaling promotes disease. We sought compounds that inhibited genes driving cancer but not normal growth and hypothesized that genes with consensus androgen response elements (cAREs) drive proliferation but genes with selective elements (sAREs) promote differentiation. In a high-throughput promoter-dependent drug screen, doxorubicin (dox) exhibited this ability, acting on DNA rather than AR. This dox effect was observed at low doses for multiple AR target genes in multiple PCa cell lines and also occurred in vivo. Transcriptomic analyses revealed that low dox downregulated cell cycle genes while high dox upregulated DNA damage response genes. In chromatin immunoprecipitation (ChIP) assays with low dox, AR binding to sARE-containing enhancers increased, whereas AR was lost from cAREs. Further, ChIP-seq analysis revealed a subset of genes for which AR binding in low dox increased at pre-existing sites that included sites for prostate-specific factors such as FOXA1. AR dependence on cofactors at sAREs may be the basis for differential modulation by dox that preserves expression of genes for survival but not cancer progression. Repurposing of dox may provide unique opportunities for PCa treatment.

Full text available upon request to the author

Article title: Coordinated transcriptional regulation by thyroid hormone and glucocorticoid interaction in adult mouse hippocampus-derived neuronal cells

Authors: Pia Bagamasbad, Jose Ezekiel C. Espina, Joseph R. Knoedler, Arasakumar Subramani, et al.

Publication title: PLoS ONE 14(7): e0220378, July 2019

Abstract:

The hippocampus is a well-known target of thyroid hormone (TH; e.g., 3,5,3'-triiodothyronine-T3) and glucocorticoid (GC; e.g., corticosterone-CORT) action. Despite evidence that TH and GC play critical roles in neural development and function, few studies have identified genes and patterns of gene regulation influenced by the interaction of these hormones at a genome-wide scale. In this study we investigated gene regulation by T3, CORT, and T3 + CORT in the mouse hippocampus-derived cell line HT-22. We treated cells with T3, CORT, or T3 + CORT for 4 hr before cell harvest and RNA isolation for microarray analysis. We identified

9 genes regulated by T3, 432 genes by CORT, and 412 genes by T3 + CORT. Among the 432 CORT-regulated genes, there were 203 genes that exhibited an altered CORT response in the presence of T3, suggesting that T3 plays a significant role in modulating CORT-regulated genes. We also found 80 genes synergistically induced, and 73 genes synergistically repressed by T3 + CORT treatment. We performed in silico analysis using publicly available mouse neuronal chromatin immunoprecipitation-sequencing datasets and identified a considerable number of synergistically regulated genes with TH receptor and GC receptor peaks mapping within 1 kb of chromatin marks indicative of hormone-responsive enhancer regions. Functional annotation clustering of synergistically regulated genes reveal the relevance of proteasomal-dependent degradation, neuroprotective effect of growth hormones, and neuroinflammatory responses as key pathways to how TH and GC may coordinately influence learning and memory. Taken together, our transcriptome data represents a promising exploratory dataset for further study of common molecular mechanisms behind synergistic TH and GC gene regulation, and identify specific genes and their role in processes mediated by cross-talk between the thyroid and stress axes in a mammalian hippocampal model system.
Full text available upon request to the author

Article title: Deciphering the Regulatory Logic of an Ancient, Ultraconserved Nuclear Receptor Enhancer Module
Authors: Pia Bagamasbad, Ronald M. Bonett, Laurent M. Sachs, Nicolas Buisine, et al.
Publication title: Molecular Endocrinology 29(6): me20141349, April 2015

Abstract:
Cooperative, synergistic gene regulation by nuclear receptors (NRs) can increase sensitivity and amplify cellular responses to hormones. We investigated thyroid hormone (TH) and glucocorticoid (GC) synergy on the Kr)ppel-like factor 9 (Klf9) gene, which codes for a zinc finger transcription factor involved in development and homeostasis of diverse tissues. We identified regions of the Xenopus and mouse Klf9 genes 5 to 6 kb upstream of the transcription start sites that supported synergistic transactivation by TH plus GC. Within these regions we found an orthologous sequence of ~180 bp that is highly conserved among tetrapods, but absent in other chordates, and possesses chromatin marks characteristic of an enhancer element. The

Xenopus and mouse ~180 bp DNA element conferred synergistic transactivation by hormones in transient transfection assays, so we designate this the Klf9 Synergy Module (KSM). We identified binding sites within the mouse KSM for TH receptor (TR), GC receptor (GR) and nuclear factor kappa B. Thyroid hormone strongly increased recruitment of liganded GR and serine 5 phosphorylated (initiating) RNA polymerase II (pol II) to chromatin at the KSM, suggesting a mechanism for transcriptional synergy. The KSM is transcribed to generate long noncoding RNAs which are also synergistically induced by combined hormone treatment, and the KSM interacts with the Klf9 promoter and a far upstream region through chromosomal looping. Our findings support that the KSM plays a central role in hormone regulation of vertebrate Klf9 genes, it evolved in the tetrapod lineage, and has been maintained by strong stabilizing selection.

Full text available upon request to the author

Article title: Molecular Basis for Glucocorticoid Induction of the Kruppel-Like Factor 9 Gene in Hippocampal Neurons

Authors: Pia Bagamasbad, Tim Ziera, Steffen A. Borden, Ronald M. Bonett, et al.

Publication title: Endocrinology 153(11), September 2012

Abstract:

Stress has complex effects on hippocampal structure and function, which consequently affects learning and memory. These effects are mediated in part by circulating glucocorticoids (GC) acting via the intracellular GC receptor (GR) and mineralocorticoid receptor (MR). Here, we investigated GC regulation of Krüppel-like factor 9 (KLF9), a transcription factor implicated in neuronal development and plasticity. Injection of corticosterone (CORT) in postnatal d 6 and 30 mice increased Klf9 mRNA and heteronuclear RNA by 1 h in the hippocampal region. Treatment of the mouse hippocampal cell line HT-22 with CORT caused a time- and dose-dependent increase in Klf9 mRNA. The CORT induction of Klf9 was resistant to protein synthesis inhibition, suggesting that Klf9 is a direct CORT-response gene. In support of this hypothesis, we identified two GR/MR response elements (GRE/MRE) located -6.1 and -5.3 kb relative to the transcription start site, and we verified their functionality by enhancer-reporter, gel shift, and chromatin immunoprecipitation assays. The -5.3-kb GRE/MRE is largely conserved across tetrapods, but conserved orthologs of the -6.1-kb GRE/MRE were only detected in

therian mammals. GC treatment caused recruitment of the GR, histone hyperacetylation, and nucleosome removal at Klf9 upstream regions. Our findings support a predominant role for GR, with a minor contribution of MR, in the direct regulation of Klf9 acting via two GRE/MRE located in the 5'-flanking region of the gene. KLF9 may play a key role in GC actions on hippocampal development and plasticity.

Full text available upon request to the author

Article title: AVR/NAVR deficiency lowers blood pressure and differentially affects urinary concentrating ability, cognition, and anxiety-like behavior in male and female mice

Authors: Victoria Herrera, Pia Bagamasbad, Julius L. Decano, Nelson Ruiz-Opazo

Publication title: Physiological Genomics 43(1): 32-42, October 2010

Abstract:

Arginine vasopressin (AVP) and angiotensin II (ANG II) are distinct peptide hormones involved in multiple organs modulating renal, cardiovascular, and brain functions. They achieve these functions via specific G protein-coupled receptors, respectively. The AVR/NAVR locus encodes two overlapping V2-type vasopressin isoreceptors: angiotensin-vasopressin receptor (AVR) responding to ANG II and AVP equivalently, and nonangiotensin vasopressin receptor (NAVR), which binds vasopressin exclusively. AVR and NAVR are expressed from a single gene by alternative promoter usage that is synergistically upregulated by testosterone and estrogen. This study tested the hypothesis that AVR/NAVR modulates urinary concentrating ability, blood pressure, and cognitive performance in vivo in a sex-specific manner. We developed a C57BL/6 inbred AVR/NAVR(-/-) knockout mouse that showed lower blood pressure in both male and female subjects and a urinary-concentrating defect restricted to male mice. We also detected sex-specific effects on cognitive and anxiety-like behaviors. AVR/NAVR(-/-) male mice exhibited impaired visuospatial and associative learning, while female mice showed improved performance in both type of cognition. AVR/NAVR deficiency produced an anxiolytic-like effect in female mice, while males were unaffected. Analysis of AVR- and NAVR-mediated phosphorylation/dephosphorylation of signaling proteins revealed activation/deactivation of known modulators of cognitive function. Our

studies identify AVR/NAVR as key receptors involved in blood pressure regulation and sex-specific modulation of renal water homeostasis, cognitive function, and anxiety-like behavior. As such, the AVR/NAVR receptor system provides a molecular mechanism for sexually diergic traits and a putative common pathway for the emerging association of hypertension and cognitive decline and dementia.

Full text available upon request to the author

Article title: Mechanisms and significance of nuclear receptor auto- and cross-regulation

Authors: Pia Bagamasbad and Robert J. Denver

Publication title: General and Comparative Endocrinology 170(1): 3-17, March 2010

Abstract:

The number of functional hormone receptors expressed by a cell in large part determines its responsiveness to the hormonal signal. The regulation of hormone receptor gene expression is therefore a central component of hormone action. Vertebrate steroid and thyroid hormones act by binding to nuclear receptors (NR) that function as ligand-activated transcription factors. Nuclear receptor genes are regulated by diverse and interacting intracellular signaling pathways. Nuclear receptor ligands can regulate the expression of the gene for the NR that mediates the hormone's action (autoregulation), thus influencing how a cell responds to the hormone. Autoregulation can be either positive or negative, the hormone increasing or decreasing, respectively, the expression of its own NR. Positive autoregulation (autoinduction) is often observed during postembryonic development, and during the ovarian cycle, where it enhances cellular sensitivity to the hormonal signal to drive the developmental process. By contrast, negative autoregulation (autorepression) may become important in the juvenile and adult for homeostatic negative feedback responses. In addition to autoregulation, a NR can influence the expression other types of NRs (cross-regulation), thus modifying how a cell responds to a different hormone. Cross-regulation by NRs is an important means to temporally coordinate cell responses to a subsequent (different) hormonal signal, or to allow for crosstalk between hormone signaling pathways.

Full text available upon request to the author

Article title: Stressor and Glucocorticoid-Dependent Induction of the Immediate Early Gene Kruppel-Like Factor 9: Implications for Neural Development and Plasticity

Authors: Ronald M. Bonett, Fang Hu, Pia Bagamasbad, Robert J. Denver

Publication title: Endocrinology 150(4): 1757-65, December 2008

Abstract:

Krüppel-like factor 9 (KLF9) is a thyroid hormone-induced, immediate early gene implicated in neural development in vertebrates. We analyzed stressor and glucocorticoid (GC)-dependent regulation of KLF9 expression in the brain of the frog Xenopus laevis, and investigated a possible role for KLF9 in neuronal differentiation. Exposure to shaking/confinement stressor increased plasma corticosterone (CORT) concentration, and KLF9 immunoreactivity in several brain regions, which included the medial amygdala and bed nucleus of the stria terminalis, anterior preoptic area (homologous to the mammalian paraventricular nucleus), and optic tectum (homologous to the mammalian superior colliculus). The stressor-induced KLF9 mRNA expression in the brain was blocked by pretreatment with the GC receptor antagonist RU486, or mimicked by injection of CORT. Treatment with CORT also caused a rapid and dose-dependent increase in KLF9 mRNA in X. laevis XTC-2 cells that was resistant to inhibition of protein synthesis. The action of CORT on KLF9 expression in XTC-2 cells was blocked by RU486, but not by the mineralocorticoid receptor antagonist spironolactone. To test for functional consequences of up-regulation of KLF9, we introduced a KLF9 expression plasmid into living tadpole brain by electroporation-mediated gene transfer. Forced expression of KLF9 in tadpole brain caused an increase in Golgi-stained cells, reflective of neuronal differentiation/maturation. Our results support that KLF9 is a direct, GC receptor target gene that is induced by stress, and functions as an intermediary in the actions of GCs on brain gene expression and neuronal structure.

Full text available upon request to the author

Article title: Sex-specific hippocampus-dependent cognitive deficits and increased neuronal autophagy in DEspR haploinsufficiency in mice

Authors: Victoria Herrera, Julius L. Decano, Pia Bagamasbad, Timothy Kufahl, et al.

Publication title: Physiological Genomics 12(35):316-29, November 2008

Abstract:

Aside from abnormal angiogenesis, dual endothelin-1/VEGF signal peptide-activated receptor deficiency (DEspR(-/-)) results in aberrant neuroepithelium and neural tube differentiation, thus elucidating DEspR's role in neurogenesis. With the emerging importance of neurogenesis in adulthood, we tested the hypothesis that nonembryonic-lethal DEspR haploinsufficiency (DEspR(+/-)) perturbs neuronal homeostasis, thereby facilitating aging-associated neurodegeneration. Here we show that, in male mice only, DEspR-haploinsufficiency impaired hippocampus-dependent visuospatial and associative learning and induced noninflammatory spongiform changes, neuronal vacuolation, and loss in the hippocampus, cerebral cortex, and subcortical regions, consistent with autophagic cell death. In contrast, DEspR(+/-) females exhibited better cognitive performance than wild-type females and showed absence of neuropathological changes. Signaling pathway analysis revealed DEspR-mediated phosphorylation of activators of autophagy inhibitor mammalian target of rapamycin (mTOR) and dephosphorylation of known autophagy inducers. Altogether, the data demonstrate DEspR-mediated diametrical, sex-specific modulation of cognitive performance and autophagy, highlight cerebral neuronal vulnerability to autophagic dysregulation, and causally link DEspR haploinsufficiency with increased neuronal autophagy, spongiosis, and cognitive decline in mice.

Full text available upon request to the author

Article title: Overlapping genes in Nalp6/PYPAF5 locus encode two V2-type vasopressin isoreceptors: Angiotensin-vasopressin receptor (AVR) and non-AVR

Authors: Victoria Herrera, Pia Bagamasbad, Tamara Didishvili, Julius L. Decano, et al.

Publication title: Physiological Genomics 34(1): 65-77, June 2008

Abstract:

The angiotensin-vasopressin receptor (AVR) responds with equivalent affinities to angiotensin II (ANG II) and vasopressin and is coupled to adenylate cyclase and hence a V2-type vasopressin receptor. AVR maps to the Nalp6 locus and overlaps with the larger Nalp6/PYPAF5 reported to be a T cell/granulocyte-specific, cytoplasmic-specific proapoptotic protein, thus questioning the existence of AVR. Here we confirm, through different experimental modalities, that AVR is distinct from Nalp6/PYPAF5 based on different mRNA and protein sizes, subcellular

localization, and tissue-specific expression patterns. Binding studies of PYPAF5-specific Cos1 transfectants detect high-affinity binding to vasopressin but not ANG II, thus assigning PYPAF5 as a non-AVR (NAVR). Signaling array analysis reveals that AVP stimulation of AVR- and NAVR-specific Cos1 transfectants results in diametrical activation as well as coactivation of signaling pathways known to mediate renal sodium and water balance. Likewise, ANG II stimulation of Cos1-AVR transfectants reveals a signaling profile distinct from that of AVP-stimulated Cos1-AVR transfectants. Analysis of genomic organization of the AVR/NAVR locus shows an overlapping gene arrangement with alternative promoter usage resulting in different NH(2) termini for NAVR and AVR. In addition to core promoter elements, androgen and estrogen response elements are detected. Promoter analysis of NAVR/AVR 5'-regulatory region detects transcriptional upregulation by testosterone and synergistic upregulation by testosterone and estrogen, thus suggesting that AVR and/or NAVR contribute to sex-specific V2-type vasopressin-mediated effects. Altogether, confirmation of AVR and identification of NAVR as vasopressin receptors are concordant with emerging vasopressin functions not attributable to V1a, V1b, or V2 receptors and add molecular bases for the multifunctional complexity of vasopressin-mediated functions and regulation.

Full text available upon request to the author

Article title: A Role for Basic Transcription Element-binding Protein 1 (BTEB1) in the Autoinduction of Thyroid Hormone Receptor

Authors: Pia Bagamasbad, Kembra L. Howdeshell, Laurent M. Sachs, Barbara Dermeneix, et al.

Publication title: Journal of Biological Chemistry 283(4): 2275-85, February 2008

Abstract:

Thyroid hormone (T3) induces gene regulation programs necessary for tadpole metamorphosis. Among the earliest responses to T3 are the up-regulation of T3 receptor β (TRβ; autoinduction) and BTEB1 (basic transcription element-binding protein 1). BTEB1 is a member of the Krüppel family of transcription factors that bind to GC-rich regions in gene promoters. The proximal promoter of the Xenopus laevis TrβA gene has seven GC-rich sequences, which led us to hypothesize that BTEB1 binds to and regulates TrβA. In tadpoles and the frog fibroblast-derived cell line XTC-2, T3 up-regulated Bteb1 mRNA with faster kinetics than TrβA, and Bteb1

mRNA correlated with increased BTEB1 protein expression. BTEB1 bound to GC-rich sequences in the proximal TrβA promoter in vitro. By using chromatin immunoprecipitation assay, we show that BTEB1 associates with the TrβA promoter in vivo in a T3 and developmental stage-dependent manner. Induced expression of BTEB1 in XTC-2 cells caused accelerated and enhanced autoinduction of the TrβA gene. This enhancement was lost in N-terminal truncated mutants of BTEB1. However, point mutations in the zinc fingers of BTEB1 that destroyed DNA binding did not alter the activity of the protein on TrβA autoinduction, suggesting that BTEB1 can function in this regard through protein-protein interactions. Our findings support the hypothesis that BTEB1 associates with the TrβA promoter in vivo and enhances autoinduction, but this action does not depend on its DNA binding activity. Cooperation among the protein products of immediate early genes may be a common mechanism for driving developmental signaling pathways.

Full text available upon request to the author

Article title: Genetics and pharmacogenomics.
Authors: N. Glorosio, Victoria Herrera, Pia Bagamasbad, Fabiana Filigheddu, et al.
Publication title: High Blood Pressure & Cardiovascular Prevention 14(3): 145, September 2007

Abstract:
Essential hypertension remains a major risk factor for cardiovascular and cerebrovascular diseases. As a complex multifactorial disease, elucidation of susceptibility loci remains elusive. ATP1A1 and Dear are candidate genes for 2 closely linked rat chromosome-2 blood pressure quantitative trait loci. Because corresponding human syntenic regions are on different chromosomes, investigation of ATP1A1 (chromosome [chr]-1p21) and Dear (chr-4q31.3) facilitates genetic analyses of each blood pressure quantitative trait locus in human hypertension. Here we report the association of human ATP1A1 ($P<0.000005$) and Dear ($P<0.03$) with hypertension in a relatively isolated, case/control hypertension cohort from northern Sardinia by single-nucleotide polymorphism haplotype analysis. Sex-specific haplotype analyses detected stronger association of both loci with hypertension in males than in females. Haplotype trend-regression analyses support ATP1A1 and Dear as independent susceptibility loci and reveal haplotype-specific

association with hypertension and normotension, thus delineating haplotype-specific subsets of hypertension. Although investigation in other cohorts needs to be performed to determine genetic effects in other populations, haplotype subtyping already allows systematic stratification of susceptibility and, hence, clinical heterogeneity, a prerequisite for unraveling the polygenic etiology and polygene-environment interactions in essential hypertension. As hypertension susceptibility genes, coexpression of ATP1A1 and Dear in both renal tubular cells and vascular endothelium suggest a cellular pathogenic scaffold for polygenic mechanisms of hypertension, as well as the hypothesis that ATP1A1 and/or Dear could contribute to the known renal and vascular endothelial dysfunction associated with essential (polygenic) hypertension.

Full text available upon request to the author

Article title: Gender-Specific Association of ATP1a1 and Dear Haplotypes with Essential Hypertension

Authors: N. Glorosio, Victoria Herrera, Pia Bagamasbad, Fabiana Filigheddu, et al.

Publication title: High Blood Pressure & Cardiovascular Prevention 14(3): 145-196, Januaary 2007

Abstract:

No abstract available

Full text available upon request to the author

Article title: The Escherichia coli GTPase CgtAE Is Involved in Late Steps of Large Ribosome Assembly

Authors: Mengxi Jiang, Kaustuv Datta, Angela K. Walker, John Strahler, et al.

Publication title: Journal of Bacteriology 188(19): 6757-70, November 2006

Abstract:

The bacterial ribosome is an extremely complicated macromolecular complex the in vivo biogenesis of which is poorly understood. Although several bona fide assembly factors have been identified, their precise functions and temporal relationships are not clearly defined. Here we describe the involvement of an Escherichia coli GTPase, CgtAE, in late steps of large ribosomal subunit biogenesis. CgtAE belongs to the Obg/CgtA GTPase subfamily, whose highly conserved members are predominantly involved in ribosome function. Mutations in CgtAE cause both polysome and rRNA

processing defects; small- and large-subunit precursor rRNAs accumulate in a cgtAE mutant. In this study we apply a new semiquantitative proteomic approach to show that CgtAE is required for optimal incorporation of certain late-assembly ribosomal proteins into the large ribosomal subunit. Moreover, we demonstrate the interaction with the 50S ribosomal subunits of specific nonribosomal proteins (including heretofore uncharacterized proteins) and define possible temporal relationships between these proteins and CgtAE. We also show that purified CgtAE associates with purified ribosomal particles in the GTP-bound form. Finally, CgtAE cofractionates with the mature 50S but not with intermediate particles accumulated in other large ribosome assembly mutants.

Full text available upon request to the author

Article title: Embryonic lethality in Dear gene-deficient mice: New player in angiogenesis

Authors: Victoria Herrera, Lorenz R. B. Ponce, Pia Bagamasbad, Benjamin D. VanPelt, et al.

Publication title: Physiological Genomics 23(3): 257-268, December 2005

Abstract:

The dual endothelin-1/angiotensin II receptor (Dear) binds endothelin-1 (ET-1) and angiotensin II (ANG II) with equal affinities in the Dahl S/JRHS rat strain. To elucidate its physiological significance within the context of multiple receptor isoforms and diverse ET-1 and ANG II functions spanning blood pressure regulation, tumor proliferation, and angiogenesis, we characterized mouse Dear and Dear-deficient mice. Unlike null mutant models of ET-1, ANG II, and all other ET-1 and ANG II receptors, Dear(-/-) deficiency results in impaired angiogenesis, dysregulated neuroepithelial development, and embryonic lethality by embryonic day 12.5. Interestingly, mouse Dear does not bind ANG II, similar to Dahl R/JRHS rat Dear, but binds ET-1 and vascular endothelial growth factor (VEGF) signal peptide (VEGFsp) with equal affinities, suggesting a putative novel multifunction for VEGFsp and a parsimonious mechanism for coordination of VEGF-induced and Dear-mediated pathways. Consistent with its developmental angiogenic role, Dear inhibition results in decreased tumor growth in B16-F10 melanoma cell-induced subcutaneous tumor in female Dear(+/-)/C57BL6BC10 mice, but not in males (age 3.5 mo), and in 127Cs radiation-induced orthotopic mammary tumors in Sprague-

Dawley female rats (age range 3-6.5 mo). Altogether, the data identify Dear as a new player in angiogenesis during development downstream to, and nonredundant with, VEGF-mediated pathways, as well as a putative modulator of tumor angiogenesis acting within a gender-specific paradigm.
Full text available upon request to the author

Article title: Analysis of gender-specific atherosclerosis susceptibility in transgenic [hCETP]25(DS) rat model
Authors: Victoria Herrera, Aristides Tsikoudakis, Tamara Didishvili, Lorenz R.B. Ponce, et al.
Publication title: Atherosclerosis 177(1):9-18, December 2004

Abstract:
Epidemiological and clinical data demonstrate differences in atherosclerotic coronary heart disease prevalence between age-matched men and premenopausal women. Mechanisms underlying relative athero-susceptibility in men and athero-resistance in premenopausal women remain to be elucidated. Lack of informative animal models hinders research. We report here a moderate-expresser line transgenic for human cholesteryl ester transfer protein (CETP) in the Dahl salt-sensitive hypertensive rat strain, Tg25, that recapitulates premenopausal female athero-resistance. Having ascertained identical genetic background, environmental factors, and equivalent CETP hepatic RNA levels, we detect worse hypercholesterolemia, hypertriglyceridemia, coronary plaques and survival outcome in Tg25 male rats compared with Tg25 females. Hepatic transcription profiles of Tg25 males and females normalized to respective gender- and age-matched non-transgenic controls exhibit significant differences. Genes implicated on hierarchical cluster analysis and quantitative real-time RT-PCR pinpoint pathways associated with coronary plaque progression such as inflammation and arachidonic acid epoxygenation, and not just cholesterol metabolism pathways. The data demonstrate gender-specific factors as key modulators of atherosclerosis phenotype and suggest a possible role for the liver in atheroma progression as a large organ source of proatherogenic systemic factors.
Full text available upon request to the author

Article title: Attenuated Hippocampus-Dependent Learning and Memory Decline in Transgenic TgAPPswe Fischer-344 Rats
Authors: Nelson Ruiz-Opazo, Kenneth S. Osik, Lyle V. Lopez, Pia Bagamasbad, et al

Publication title: Molecular Medicine 10(1-6):36-44, January 2004

Abstract:

Alzheimer's disease (AD) is characterized by increased beta amyloid (Abeta) levels, extracellular Abeta deposits in senile plaques, neurofibrillary tangles, and neuronal loss. However, the physiological role of normal levels of Abeta and its parent protein, the amyloid precursor protein (APP) are unknown. Here we report that low-level transgenic (Tg) expression of the Swedish APP mutant gene (APPswe) in Fischer-344 rats results in attenuated age-dependent cognitive performance decline in 2 hippocampus-dependent learning and memory tasks compared with age-matched nontransgenic Fischer-344 controls. TgAPPswe rats exhibit mild increases in brain APP mRNA (56.8%), Abeta-42 (21%), and Abeta-40 (6.1%) peptide levels at 12 mo of age, with no extracellular Abeta deposits or senile plaques at 6, 12, and 18 mo of age, whereas 3- to 6-fold increases in Abeta levels are detected in plaque-positive human AD patients and transgenic mouse models. The data support the hypothesis that a threshold paradigm underlies Abeta-related pathology, below which APP expression may play a physiological role in specific hippocampus-dependent tasks, most likely related to its neurotrophic role.

Full text available upon request to the author

Lilibeth A. Salvador-Reyes

Sex: Female

Education:

Doctor of Philosophy in Pharmaceutical Sciences-Medicinal Chemistry, University of Florida

Field of Specialization

Medicinal and Natural Products Chemistry

Biochemistry

Pharmacology

Researches:

Article title: Genomic and Targeted Approaches Unveil the Cell Membrane as a Major Target of the Antifungal Cytotoxin Amantelide A

Authors: Lobna A. Elsadek, James Matthews, Shinichi Nishimura, Lilibeth A. Salvador-Reyes

Publication title: ChemBioChem, February 2021

Abstract:

Amantelide A, a polyhydroxylated macrolide isolated from a marine cyanobacterium, displayed broad-spectrum activity against mammalian cells, bacterial pathogens and marine fungi. We conducted comprehensive mechanistic studies to identify the molecular targets and pathways affected by amantelide A. Our investigations relied on chemical structure similarities with compounds of known mechanisms, yeast knockout mutants, yeast chemogenomic profiling, and

direct biochemical and biophysical methods. We established that amantelide A exerts its antifungal action via binding to ergosterol–containing membranes followed by pore formation and cell death, a mechanism partially shared with polyene antifungals. Binding assays demonstrated that amantelide A also binds to membranes containing epicholesterol or mammalian cholesterol, suggesting that the cytotoxicity to mammalian cells might be due to its affinity to cholesterol–containing membranes. However, membrane interactions were not completely dependent on sterols. Yeast chemogenomic profiling suggested additional direct or indirect effects on actin. Actin polymerization assays suggested that amantelide A also promotes actin polymerization in cell–free systems. However, the C–33 acetoxy derivative amantelide B showed similar effect on actin dynamics in vitro but no significant activity against yeast. Overall, these studies suggest that the membrane effects are the most functionally relevant interactions for the mechanism of action.

Full text available upon request to the author

Article title: Differentiating Two Closely Related Alexandrium Species Using Comparative Quantitative Proteomics

Authors: Bryan John Subong, Arturo O. Lluisma, Rhodora V. Azanza, Lilibeth A. Salvador-Reyes, et al.

Publication title: Toxins 13(1):7, December 2020

Abstract:

Alexandrium minutum and Alexandrium tamutum are two closely related harmful algal bloom (HAB)-causing species with different toxicity. Using isobaric tags for relative and absolute quantitation (iTRAQ)-based quantitative proteomics and two-dimensional differential gel electrophoresis (2D-DIGE), a comprehensive characterization of the proteomes of A. minutum and A. tamutum was performed to identify the cellular and molecular underpinnings for the dissimilarity between these two species. A total of 1436 proteins and 420 protein spots were identified using iTRAQ-based proteomics and 2D-DIGE, respectively. Both methods revealed little difference (10–12%) between the proteomes of A. minutum and A. tamutum, highlighting that these organisms follow similar cellular and biological processes at the exponential stage. Toxin biosynthetic enzymes were present in both organisms. However, the gonyautoxin-producing A. minutum showed higher levels of osmotic growth proteins, Zn-dependent alcohol dehydrogenase and type-I polyketide

synthase compared to the non-toxic A. tamutum. Further, A. tamutum had increased S-adenosylmethionine transferase that may potentially have a negative feedback mechanism to toxin biosynthesis. The complementary proteomics approach provided insights into the biochemistry of these two closely related HAB-causing organisms. The identified proteins are potential biomarkers for organismal toxicity and could be explored for environmental monitoring.

Full text available upon request to the author

Article title: Largazole is a Brain-Penetrant Class I HDAC Inhibitor with Extended Applicability to Glioblastoma and CNS Diseases

Authors: Fatma Al-Awadhi, Lilibeth A. Salvador-Reyes, Lobna A. Elsadek, Ranjala Ratnayake, et al.

Publication title: ACS Chemical Neuroscience 11(13), June 2020

Abstract:

Largazole is a potent class I selective histone deacetylase inhibitor prodrug with anticancer activity against solid tumors in preclinical models. Largazole possesses in vitro activity against glioblastoma multiforme (GBM) cells and sufficiently crosses the blood-brain barrier based on measurement of the active species, largazole thiol, to achieve therapeutically relevant concentrations in the mouse brain. The effective dose resulted in pronounced functional responses on the transcript level based on RNA sequencing and quantitative polymerase chain reaction after reverse transcription (RT-qPCR), revealing desirable expression changes of genes related to neuroprotection, including Bdnf and Pax6 upregulation, extending the applicability of largazole to the treatment of brain cancer and neurodegenerative disorders. The largazole-induced modulation of Pax6 unifies both activities, since Pax6 expression suppresses GBM proliferation and invasion and inversely correlates with GBM tumor grade, while it is also implicated in neurogenesis, neuronal plasticity, and cognitive ability. Our results suggest that largazole could be repurposed for diseases of the brain.

Full text available upon request to the author

Article title: Conomarphins cause paralysis in mollusk: Critical and tunable structural elements for bioactivity

Authors: Charmaine B. Mendoza, Dan Jethro Magcuha Masacupan, Dessa Camille R. Batoctoy, Lilibeth A. Salvador-Reyes, et al.

Publication title: Journal of Peptide Science 25(7), June 2019

Abstract:

Two conomarphins were purified as the major component of the venom of Conus eburneus. Conomarphins Eb1 and Eb2 showed biological activity in the mollusk Pomacea padulosa, causing sluggishness and retraction of siphon, foot, and cephalic tentacles. To further probe the effects of conserved amino acids and posttranslational modifications in conomarphins, we prepared four synthetic analogues: conomarphin Eb1 Hyp10Pro, Hyp10Ala, d−Phe13Ala, and l−Phe13 variants. Structure−activity relationship analysis indicated that d−Phe13 is critical to the biological activity of conomarphins. In contrast, amino acid changes at position 10 and removal of posttranslational modification in Hyp10Pro can be tolerated. The high expression level and observed mollusk activity of conomarphins may suggest their potential role as defensive arsenal of Conoidean snails against other predatory gastropods. Conomarphins Eb1 and Eb2 were purified as the major component of the venom of Conus eburneus. Bioactivity testing indicated mollusk−paralyzing activity of conomarphins in Pomacea padulosa. Four analogues of conomarphin Eb1 were prepared to probe the critical and tunable structural elements for bioactivity. Structure−activity relationship analysis indicated the D−Phe13 to be critical, while changes to Hyp10 can be tolerated. The prevalence and bioactivity of conomarphins point to the potential role of these conopeptides as defensive arsenal against other predatory snails.

Full text available upon request to the author

Article title: Discovery of Amantamide, a Selective CXCR7 Agonist from Marine Cyanobacteria

Authors: Xiao Liang, Danmeng Luo, Jia-Lei Yan, Mohammad A. Rezaei, Lilibeth A. Salvador-Reyes, et al.

Publication title: Organice Letter 21(6), February 2019

Abstract:

CXCR7 plays an emerging role in several physiological processes. A linear peptide, amantamide (1), was isolated from marine cyanobacteria, and the structure was determined by NMR and mass spectrometry. The total synthesis was achieved by solid-phase method. After screening two biological target libraries, 1 was identified as a selective CXCR7 agonist. The selective activation of CXCR7 by 1 could provide

the basis for developing CXCR7-targeted therapeutics and deciphering the role of CXCR7 in different diseases.

Full text available upon request to the author

Article title: Mariculture potential of renieramycin-producing Philippine blue sponge Xestospongia sp. (Porifera: Haplosclerida)

Authors: Viviene Santiago, Geminne Manzano, Clairecynth C. Yu, Lilibeth A. Salvador-Reyes, et al.

Publication title: Aquaculture 502, December 2018

Abstract:

Open-sea mariculture of the Philippine blue sponge Xestospongia sp. was established as a route for the production of the biomedically-important renieramycins. We assessed the effects of harvesting regime, culture period or periodicity, sponge translocation and farming methods to sponge survival, sponge growth, chemistry and bioactivity of sponge extracts. During the 12-month culture, sponge growth, renieramycin M content and antiproliferative activity of sponge extracts showed significant differences, depending on the culture period and location. Growth and renieramycin biosynthesis were minimally affected by temperature and may be driven by thermal-independent processes in the coral reef. Multiple harvesting of Xestospongia sp. was also favorable to growth and consequently, provided higher biomass and renieramycin M yields.

Full text available upon request to the author

Article title: Apratyramide, a Marine-Derived Peptidic Stimulator of VEGF-A and Other Growth Factors with Potential Application in Wound Healing

Authors: Weijing Cai, Lilibeth A. Salvador-Reyes, Wei Zhang, Qi-Yen Cheng, et al.

Publication title: ACS Chemical Biology 13(1):91-99, 2018

Abstract:

A novel linear depsipeptide enriched with tyrosine-derived moieties, termed apratyramide, was isolated from an apratoxin-producing cyanobacterium. The structure was determined using a combination of NMR spectroscopy, mass spectrometry, and chiral analysis of the acid hydrolyzate and confirmed by total synthesis. Apratyramide up-regulated multiple growth factors at the transcript level in human keratinocyte (HaCaT) cells and induced the secretion of vascular

endothelial growth factor A (VEGF-A) from HaCaT cells, suggesting the compound's potential wound-healing properties through growth factor induction. Transcriptome analysis and sequential validation supported the hypothesis and indicated its mode of action (MOA) through the unfolded protein response (UPR) pathway, which is functionally related to wound healing and angiogenesis. The conditioned medium of HaCaT cells treated with apratyramide induced angiogenesis in vitro. An ex vivo rabbit corneal epithelial model was applied to confirm the VEGF-A induction in this wound-healing model.

Full text available upon request to the author

Article title: Amantelides A and B, Polyhydroxylated Macrolides with Differential Broad-Spectrum Cytotoxicity from a Guamanian Marine Cyanobacterium

Authors: Lilibeth A. Salvador-Reyes, Jennifer M. Sneed, Valerie J. Paul, Hendrik Luesch, et al.

Publication title: Journal of Natural Products 78(8), July 2015

Abstract:

Cytotoxicity-guided fractionation of a Guamanian cyanobacterial collection yielded the new compounds amantelides A (1) and B (2). These polyketides are characterized by a 40-membered macrolactone ring consisting of a 1,3-diol and contiguous 1,5-diol units and a tert-butyl substituent. Amantelide A (1) displayed potent cytotoxicity with submicromolar IC50 against HT29 colorectal adenocarcinoma and HeLa cervical carcinoma cell lines. Acetylation of the hydroxy group at C-33 in 2 caused a close to 10-fold decrease in potency. Exhaustive acetylation of the hydroxy groups abrogated the antiproliferative activity of amantelide A (1) by 20-67-fold. Further bioactivity assessment of 1 against bacterial pathogens and marine fungi indicated a broad spectrum of bioactivity.

Full text available upon request to the author

Article title: Caldora penicillata gen. nov., comb. nov. (Cyanobacteria), a pantropical marine species with biomedical relevance

Authors: Niclas Engene, Ana Tronholm, Lilibeth A. Salvador-Reyes, Hendrik Luesch, et al.

Publication title: Journal of Phycology 51(4), May 2015

Abstract:

Many tropical marine cyanobacteria are prolific producers of bioactive secondary metabolites with ecological relevance and promising pharmaceutical applications. One species of chemically rich, tropical marine cyanobacteria that was previously identified as Symploca hydnoides or Symploca sp. corresponds to the traditional taxonomic definition of Phormidium penicillatum. In this study, we clarified the taxonomy of this biomedically and ecologically important cyanobacterium by comparing recently collected specimens with the original type material and the taxonomic description of P. penicillatum. Molecular phylogenetic analyses of the 16S rRNA gene and the 16S-23S ITS regions showed that P. penicillatum formed an independent clade sister to the genus Symploca, and distantly related to Phormidium and Lyngbya. We propose the new genus Caldora for this clade, with Caldora penicillata comb. nov. as the type species and designate as the epitype the recently collected strain FK13-1. Furthermore, the production of bioactive secondary metabolites among various geographically dispersed collections of C. penicillata showed that this species consistently produced the metabolite dolastatin 10 and/or the related compound symplostatin 1, which appear to be robust autapomorphic characters and chemotaxonomic markers for this taxon.

Full text available upon request to the author

Article title: Targeted Natural Products Discovery from Marine Cyanobacteria Using Combined Phylogenetic and Mass Spectrometric Evaluation

Authors: Lilibeth A. Salvador-Reyes, Niclas Engene, Valerie J. Paul, Hendrik Luesch

Publication title: Journal of Natural Products 78(3), January 2015

Abstract:

Combined phylogenetic and HPLC-MS-based natural products dereplication methods aimed at identifying cyanobacterial collections containing the potent cytotoxins largazole, dolastatin 10, and symplostatin 1 were developed. The profiling of the phylogeny, chemical space, and antiproliferative activity of cyanobacterial collections served to streamline the prioritization of samples for the discovery of new secondary metabolites. The dereplication methods highlighted the biosynthetic potential and combinatorial pharmacology employed by marine cyanobacteria. We found that largazole was always coproduced with dolastatin 10 or with symplostatin 1 and consequently tested combinations of these agents against colon cancer cells.

Combinatorial regimens of largazole and dolastatin 10 aimed at curbing the growth of HCT116 cancer cells showed cooperative activity.

Full text available upon request to the author

Article title: Biological Targets and Mechanisms of Action of Natural Products from Marine Cyanobacteria

Authors: Lilibeth A. Salvador-Reyes and Hendrik Luesch

Publication title: Natural Product Reports 32(3), January 2015

Abstract:

Covering: up to 2014 Marine cyanobacteria are an ancient group of organisms and prolific producers of bioactive secondary metabolites. These compounds are presumably optimized by evolution over billions of years to exert high affinity for their intended biological target in the ecologically relevant organism but likely also possess activity in different biological contexts such as human cells. Screening of marine cyanobacterial extracts for bioactive natural products has largely focused on cancer cell viability; however, diversification of the screening platform led to the characterization of many new bioactive compounds. Targets of compounds have oftentimes been elusive if the compounds were discovered through phenotypic assays. Over the past few years, technology has advanced to determine mechanism of action (MOA) and targets through reverse chemical genetic and proteomic approaches, which has been applied to certain cyanobacterial compounds and will be discussed in this review. Some cyanobacterial molecules are the most-potent-in-class inhibitors and therefore may become valuable tools for chemical biology to probe protein function but also be templates for novel drugs, assuming in vitro potency translates into cellular and in vivo activity. Our review will focus on compounds for which the direct targets have been deciphered or which were found to target a novel pathway, and link them to disease states where target modulation may be beneficial.

Rinlee Butch Cervera

Sex: Male

Education:

Doctor of Philosophy in Materials Engineering, University of Tokyo

Masters in Materials Engineering, University of Science Malaysia

Bachelor of Science in Materials Engineering, University of the Philippines

Field of Specialization

Electrochemical Energy

Lithium batteries

Materials Science

Researches:

Article title: Determination of Dose Distributions by High-energy Electrons in Alumina Pellets Using Monte Carlo Simulations

Authors: Frederick C. Hila, Haydee M Solomon, Andrea G Baule, Rinlee Butch M. Cervera, et al.

Publication title: Philippine Journal of Science 150(1): 201-208, 2021

Abstract:

Electron beam (E-beam) accelerators are widely used in multiple industrial and medical applications and investigations (Zhang et al. 2019; Uribe et al. 2009; Zeng et al. 2005; Marrale et al. 2015). E-beams are used in important radiotherapy research, for instance in examining the FLASH effect for efficient tumor treatment (Favaudon et al. 2014; Durante et al. 2017). E-beams are also largely used in investigating

grafting and crosslinking of natural and synthetic polymers, as well as degradation and radiation damage applications

Full text available upon request to the author

Article title: Preparation and Structural Stability of LiFePO4| Ga-LLZO Composite Cathode Material Heat-Treated at Intermediate Temperatures

Authors: Pearl Jamela Diamansil, Jessa Hablado, John Carlo Palomares, Rinlee Butch M. Cervera, et al.

Publication title: Materials Science Forum 987:70-74, 2020

Abstract:

In this study, cathode and lithium-ion conducting solid electrolyte composite pellet with 1: 1 wt.% composition of LiFePO 4 and Li 7-3X Ga x La 3 Zr 2 O 12 (x= 0.1) (LiFePO 4| Ga-LLZO) was prepared via solid-state reaction. The aim of the study is to investigate the phase stability between LiFePO 4 cathode and Ga-LLZO solid electrolyte material when heat treated at 400 to 600 C. The as-mixed LiFePO 4| Ga-LLZO composite was characterized by TG/DTA and the heat treated sample was then analyzed for its structure using XRD and compared to the just as-mixed composite. XRD patterns of the heat treated composite pellet showed that it retains its as-mixed phases of LiFePO 4 and Ga-LLZO when sintered below 500 C under Ar gas flow environment. However, upon heat treatment at 600 C, the sample already reacted and decomposed with the formation of other phases.

Full text available upon request to the author

Article title: Fabrication of Solid Oxide Electrolysis Single Cell Using NiO-YSZ/ YSZ/LSM-YSZ via Drop-Coating Method

Authors: Jennet R. Rabo and Rinlee Butch M. Cervera

Publication title: Key Engineering Materials 847:129-134, 2020

Abstract:

Solid oxide electrolysis cell (SOEC) is a highly efficient and environmentally friendly technology for future hydrogen generation. In this study, electrolyte-supported SOEC single cell was fabricated via a simple and facile drop-coating technique. Thin film electrodes of nickel oxide/yttria stabilized zirconia (NiO-YSZ) cathode and strontium-doped lanthanum manganite/ytrria-stabilized zirconia (LSM-YSZ) anode were deposited onto yttria-stabilized zirconia (YSZ) solid electrolyte substrate.

Scanning electron microscopy (SEM) with energy dispersive analysis (EDS) was used to study the microstructural properties of the heat-treated samples and revealed a successful thin film deposition of porous electrodes onto the dense YSZ substrate. XRD patterns showed the desired crystal structure of the deposited electrode thin films. Distinct phases of cubic YSZ and monoclinic LSM were observed for the LSM-YSZ anode while cubic NiO and YSZ phases were observed for the deposited cathode. Electrochemical conductivity of the cell was investigated using electrochemical impedance spectroscopy analysis (EIS) which revealed a total conductivity of about 2.0 mS/cm at 700 °C.

Full text available upon request to the author

Article title: XRD and SEM Analyses of Bulk Ga-Doped Li7La3Zr2O12 Li-Ion Conducting Solid Electrolyte Prepared via Hot-Pressing Method

Authors: Aimee Lorraine Blaquera, Christine Mae Macalisang, John Carlo Palomares, Rinlee Butch M. Cervera

Publication title: Materials Science Forum 998: 215-220, 2020

Abstract:

In this study, bulk lithium-ion conducting solid electrolyte of Ga-doped Li7La3Zr2O12 (Li7-3XGaxLa3Zr2O12) where x = 0.1 (Ga-LLZO) was prepared via hot pressing at 500 °C. Precursor powder for hot-pressing was prepared using conventional solid state reaction method. Planetary ball milling was employed to investigate the particle size effect on the structure and densification of hot-pressed samples. XRD patterns of the bulk hot-pressed sample revealed a crystalline phase of which the major peaks observed can be indexed to a cubic LLZO structure; however, a major impurity phase of La2Zr2O7 was observed for the ball-milled sample. Thermogravimetric and differential thermal analysis showed about 12% weight loss below 900 °C which may have affected the observed hot-pressing structure. Although lower density measurement and an impurity phase of La2Zr2O7 were observed for the ball-milled sample, ball-milling also resulted to a more homogeneous and finer particle size as shown by SEM images results.

Full text available upon request to the author

Article title: Experimental and Analytical Study of an Anode–Supported Solid Oxide Electrolysis Cell

Authors: Rose Marie Mendoza, Joy Marie Mora, Rinlee Butch Cervera, Po-Ya Abel Chuang

Publication title: Chemical Engineering and Technology 43(12): 2350-2358, 2020

Abstract:

A 1−D electrochemical model for a solid oxide electrolysis cell (SOEC) is developed and validated using published experimental data. The model combines thermodynamics, kinetic, ohmic, and concentration overpotentials to predict cell performance. For the anode−supported SOEC, good agreement is obtained between the model and experimental data, with ohmic loss being the major contributor to the cell's total overpotential. Both kinetic and concentration losses are less significant due to high−temperature operation. Due to the dominating performance loss, reducing the anode thickness is effective in diminishing the cell potential. Overall, this simple 1−D model can be employed as a design tool to evaluate component design and estimate system performance for industrial applications.

Full text available upon request to the author

Article title: Morphology of alumina particles synthesized by sol-gel method and irradiated with high-energy electrons

Authors: Frederick Corpus Hila, Ariel Jorge F. Payot, Roland V. Rallos, Rinlee Butch M. Cervera, et. al.

Publication title: Proceedings of the Samahang Pisika ng Pilipinas, 2020

Abstract:

The morphology of aluminum oxide synthesized by sol-gel method and irradiated by high-energy electrons was investigated. Aluminum foils were dissolved in hydrochloric acid to obtain aluminum chloride which was converted to aluminum hydroxide by the addition of baking soda. The resultant powder was dried at 200 C for 4 hrs, calcined at 500 C for 2 hrs, pelletized, sintered at 1100 C for 1.5 hrs, and irradiated by high-energy electrons for an absorbed dose of 50 kGy. The results of XRD showed that γ-alumina particles were synthesized. SEM images show irregular and flake-like grains for the non-irradiated pellet, and larger rounded grains for the irradiated one.

Full text available upon request to the author

Article title: Investigation on Varying Aluminum Doping Concentrations and Sintering Temperatures on the Synthesis of Garnet Li7La3Zr2O12 Solid Electrolyte via Modified Pechini Method

Authors: Benjamin Jose Alfaro and Rinlee Butch M Cervera

Publication title: Materials Science Forum 950:160-164, 2019

Abstract:

Solid electrolytes such as lithium lanthanum zirconate have shown a lot of promise in an all-solid-state Lithium-based battery since the discovery of its highly conductive cubic garnet structure. In this study, different concentrations of Al-doped Lithium Lanthanum Zirconate (Al-doped LLZ) having the formula of Li7-.3xAlxLa3Zr2O12 with x = 0.1,0 .2, 0.3, were synthesized via modified Pechini method and the effect of sintering temperatures, 1150 and 1200 °C, on the resulting properties were investigated. X-ray diffraction results have shown that cubic Al-doped LLZ can be obtained at a lower temperature using Pechini method. Significant effect to the conductivity on the different sintering temperatures was observed for the 0.1 Al-doped LLZ. With the different studied compositions synthesized via modified Pechini method, it was revealed that the 0.2 Al doped LLZ sintered either at 1150 or 1200 °C showed the highest conductivity of about 1.4x10-4 S/cm.

Full text available upon request to the author

Article title: Screen-Printed NiO-YSZ Thin Film Electrode for Solid Oxide Electrochemical Cell and Subsequent Reduction to Ni-YSZ

Authors: Agnes L. Manalo and Rinlee Butch M. Cervera

Publication title: Materials Science Forum 950:123-127, 2019

Abstract:

Nickel and yttria-stabilized zirconia (Ni-YSZ) ceramic-metal composite electrodes are commonly used for solid oxide electrochemical cells because of their good ionic and electronic conductivity. In this study, a thin film of NiO-YSZ was prepared via screen-print method and subsequently reduced to Ni-YSZ. The precursor powder for screen-printing was prepared via glycine-nitrate combustion process. The effect of precursor particle size and of the use of PVP as binder on film uniformity and quality were investigated. For the NiO-YSZ film, scanning electron microscopy (SEM) micrographs and X-ray diffraction (XRD) patterns confirmed that size

reduction and the use of binder both improved the quality and uniformity of the deposit without changing the composition of the sintered film. SEM with energy-dispersive spectroscopy (EDS) showed elemental mapping of unreduced and reduced films, revealing micro grain size faceted particles of NiO and Ni, while smooth and much larger YSZ grains were also observed. XRD of reduced Ni-YSZ film revealed that the NiO peaks had been replaced by Ni.

Full text available upon request to the author

Article title: Preparation and Characterization of NiO/YSZ and Ni/YSZ Porous Composite Electrodes Synthesized via Glycine-Nitrate Combustion Process

Authors: James Francis Imperial and Rinlee Butch M. Cervera

Publication title: Key Engineering Materials 801:205-210, 2019

Abstract:

Electrode materials require a good porosity and a fine microstructure in order to maximize the triple phase boundary between the electronic conductor, ionic conductor and the gases involved in the reaction. In this study, NiO/YSZ composite, one of the most desired candidates as a cathode material for solid oxide electrolysis cells, was synthesized via glycine-nitrate combustion process. The composite powder was mixed with carbon black pore former in order to increase the porosity of NiO/YSZ. The samples were sintered at 1300 °C and subsequently reduced. X-ray diffraction patterns of the as-reduced samples confirm the transformation of NiO to Ni phase. Scanning electron microscopy and energy dispersive spectroscopy (SEM/ EDS) images were able to confirm the reduction of NiO to Ni. From the results of the electrochemical impedance spectroscopy analysis, the total conductivity of Ni/YSZ at 700 °C were about 1.37 × 10-1 and 1.12 × 10-1 S/cm for the unmodified and carbon black-modified samples, respectively.

Full text available upon request to the author

Article title: Solid State Reaction Synthesis and Characterization of Lithium Lanthanum Titanate Lithium-Ion Conducting Solid Electrolyte with Different Li to La Content

Authors: Andrew Dono and Rinlee Butch M. Cervera

Publication title: Key Engineering Materials 821:389-394, 2019

Abstract:

Lithium Lanthanum Titanate, Li3xLa(2/3)-x□(1/3)-2xTiO3, with three different compositions of (i) x = 0.097 (Li0.29La0.57TiO3), (ii) x = 0.117 (Li0.35La0.55TiO3), and (iii) x = 0.167 (Li0.50La0.50TiO3) were prepared via solid state reaction synthesis sintered at 1150 °C for 36 hours. X-ray diffraction (XRD) analysis revealed that all samples can be indexed to a cubic perovskite structure with lattice parameter a of about 3.86 Å. Morphological analysis using SEM showed that the samples are relatively dense and the calculated relative density of the LLTO samples range from about 94% to as high as 99% with increasing trend as Li content increases. Room temperature conductivity and its temperature dependence up to 120 °C were investigated. LLTO sample with x =0.117 revealed the highest total ionic conductivity at room temperature of about 1.69 x 10-03 S/cm which can be a promising solid electrolyte for an all-solid-state lithium-ion batteries.

Full text available upon request to the author

Article title: Morphology and Structure of Ni/$Zr_{0.84}Sc_{0.16}O_{1.92}$ Electrode Material Synthesized via Glycine-Nitrate Combustion Method for Solid Oxide Electrochemical Cell

Authors: Marion Garcia Renz and Rinlee Butch Cervera

Publication title: Applied Sciences 9(2), 2019

Abstract: Not available

Full text available upon request to the author

Article title: Effects of Mechanical Activation of Precursors in The Synthesis of Ca-Doped BaTiO3 Via Conventional Solid State Reaction Method

Authors: M.B. Gili, R. Chu, R. Cervera

Publication title: Journal of Physics: Conference Series 1191, 2019

Abstract:

The synthesis of pure ceramics with high degree of crystallinity is a major challenge especially in fabricating electronic devices. In this study, Ca-doped BaTiO3 with minimal impurity was successfully synthesized using conventional solid-state reaction method. The effect of mechanical activation of the precursors in the crystallinity and porosity of the material was investigated. For samples sintered at 1000 °C, the crystallite size slightly decreased from 5.410 Å to 5.288 Å which is equivalent to 2.31% reduction upon activation of precursors. At sintering

temperature of 850 °C, the porosity increased from 35.985% to 39.217% with mechanical activation of the precursor powders while at 1000 °C, it jumped from 54.803% to 57.084%.

Full text available upon request to the author

Article title: One-Step Co-Precipitation Synthesis of Water-Stable Poly (Ethylene Glycol)-Coated Magnetite Nanoparticles

Authors: A.E.B. Gorospe, S.C. Buenviaje, Y.D.G. Edañol, R.B.M. Cervera, L.M. Payawan

Publication title: Journal of Physics: Conference Series 1191(1): 012059, 2019

Abstract:

Magnetite is one of the important materials used in drug delivery systems, magnetic resonance imaging, and cancer therapy due to its low toxicity, durability, high biocompatibility, and low cost. Among the different methods of synthesizing magnetite, co-precipitation presents a facile route for synthesizing nanoparticles. Since rapid crystallization occurs in this method, a coating agent is essential to prevent the aggregation of the nanoparticles and increase its water-stability. In this study, PEG-coated and uncoated magnetite nanoparticles were synthesized by one-step co-precipitation. FeSO4▪7H2O, FeCl3▪6H2O, and PEG were used as the precursors for the magnetite nanoparticles. Addition of NH4OH while maintaining the reaction in an N2 environment at 80 ° C completed the synthesis of the nanoparticles. XRD analysis confirmed the structure of the synthesized nanoparticles is magnetite. The addition of PEG coating results in generally weaker diffraction peaks as well as the absence of some peaks, indicating a decrease in the crystallinity of the sample. AFM and SEM measurements reveal a spherical morphology for both PEG-coated and uncoated magnetite nanoparticles. DLS measurements showed that the PEG-coated magnetite nanoparticles had a lower average particle diameter (73.95 ± 0.786 nm) compared to that of the uncoated magnetite nanoparticles (143.72 ± 1.60) nm. The observed values are lower compared to the results of a previous study. DLS also showed that both the uncoated and PEG-coated magnetite nanoparticles are monodisperse. Zeta potential analysis reveals that the PEG-coated magnetite nanoparticles are more stable in water than the uncoated magnetite nanoparticles. Addition of the polymer coating reduces the particle size and enhances the water-stability of the magnetite nanoparticles, making it useful for biomedical applications.

Full text available upon request to the author

Article title: Influence of Carbon Black Pore Former on the Synthesis of LSM-YSZ Composite Electrode Material via Solid-State Reaction and Glycine-Nitrate Process
Authors: Ariana B. Benipayo and Rinlee Butch M. Cervera
Publication title: Materials Science Forum 950: 154-159, 2019

Abstract:
Utilizing two different synthesis methods, solid-state reaction and glycine-nitrate process, composite lanthanum strontium manganite and yttria-stabilized zirconia (LSM-YSZ) powders were prepared. The powders were then mixed with 0, 5, and 10 wt% carbon black nanosized pore former and pressed into 10mm diameter pellets then sintered at 1150 C for 5 hours. The pellet composition and microstructure were investigated using FTIR, XRD, SEM-EDX, and their density and open porosity were measured using the Archimedes principle. The resulting microstructure of the composite pellets obtained using the two fabrication methods and different pore former weight percentages were studied and compared. It was found that the addition of 5 wt% carbon black pore former yields about 40% desired open porosity, and synthesis via GNP results to finer and more evenly distributed LSM and YSZ particles.
Full text available upon request to the author

Article title: Water Adsorption and Dissociation on Ni3 and Ni5 Decorated Y-and Sc-stabilized Zirconia: Insights from Density Functional Theory Investigation
Authors: Darwin Barayang Putungan and Rinlee Butch Cervera
Publication title: e-Journal of Surface Science and Nanotechnology 17: 117-123, 2019

Abstract:
In this work, water adsorption and dissociation on Ni3-and Ni5-decorated Y-and Sc-stabilized zirconia (YZO and ScZO respectively), were probed using planewave, pseudopotential-based density functional theory calculations, to assess water splitting and subsequent hydrogen evolution potential of these metal-on-zirconia structures. It is found that the strength of Ni cluster binding on zirconia depends on the size of the cluster, at least for Ni3 and Ni5, and on the nature of the stabilizing atom. The Ni3 and Ni5 clusters tend to bind more favorably on the Sc site of ScZO compared to that of the Y site of YZO. Water is found to adsorb strongly on Ni3-

YZO, Ni3-ScZO, and Ni5-ScZO. Water dissociation barrier for both the first and second hydrogen atoms tends to decrease for larger Ni cluster, with the Ni5-YZO system giving the lowest energy barriers. With relatively fine dissociation barriers, such systems could potentially be tapped for electrocatalytic water dissociation reactions leading to hydrogen evolution. These results are of importance and could contribute significantly in the further search and design of electrocatalytic materials for water dissociation and eventual hydrogen evolution for sustainable hydrogen production.

Full text available upon request to the author

Article title: Morphology and structure of Ni/Zr0. 84Sc0. 16O1. 92 electrode material synthesized via glycine-nitrate combustion method for solid oxide electrochemical cell

Authors: Renz Marion Garcia and Rinlee Butch Cervera

Publication title: Applied Sciences 9(2): 264, 2019

Abstract:

Nickel oxide and Sc-doped ZrO 2 electrode material with a 1: 1 wt% composition of NiO and Zr 0.84 Sc 0.16 O 1.92 was synthesized via a single-step glycine-nitrate combustion method. Different glycine to nitrate (g/n) molar ratios of 0.27, 0.54, and 1.1 were used to investigate its effect on the structural, morphological, and electrical properties of the heat-treated samples. X-ray diffraction (XRD) patterns of the as-sintered samples for all the g/n ratios were indexed to cubic phases of NiO and ScSZ. Upon reduction at 700 C, NiO was fully reduced to Ni. In-situ XRD patterns showed that the composite Ni/Zr 0.84 Sc 0.16 O 1.92 electrode material retains its cubic structure at intermediate temperatures from 500 C to 800 C. High magnification scanning electron microscopy (SEM) images revealed that nanoparticles of Ni are also formed and situated at the surfaces of ScSZ grains, apart from agglomerated submicron particles of Ni. SEM and electron-dispersive spectroscopy mapping revealed interconnected grains of ScSZ oxide-ion conducting phase. From the calculated conductivity based on electrochemical impedance spectroscopy results, the 0.27 g/n ratio showed an order of magnitude-higher total conductivity among the other prepared samples.

Full text available upon request to the author

Article title: Morphological and Structural Characterization of YSZ Thin Film Fabricated by Electrophoretic Deposition on LSM/YSZ Substrate
Authors: Alexis Karla Garcia and Rinlee Butch M Cervera
Publication title: Key Engineering Materials 775:224-228, 2018

Abstract:
YSZ film was fabricated by a facile electrophoretic deposition process using commercial YSZ powders. YSZ films with average thickness of around 10 μm were deposited on LSM/YSZ substrate at 20 V for 20 minutes and subsequently sintered at 1200 C, 1300 C, and 1350 C. XRD patterns of the deposited and sintered films can be attributed to mostly cubic YSZ phase. On the other hand, SEM images revealed that a sintering temperature above 1300 C was needed to obtain a denser YSZ film. The film morphology also showed that as the sintering temperature increases, the YSZ grain size also increases.
Full text available upon request to the author

Article title: Effect of Precursor Grain Size on the Sinterability and Conductivity of Commercial Yttria-Stabilized Zirconia as Solid Electrolyte
Authors: Anna Romina T. Mercado, Emmalin S. Mesina, Jennet . Rabo, Rinlee Butch M. Cervera
Publication title: Key Engineering Materials 775:331-335, 2018

Abstract:
Solid oxide electrolysis cell (SOEC) and solid oxide fuel cell (SOFC) have been receiving significant attention for future energy storage and hydrogen production applications. This research focuses on the electrolyte material which can be used for both SOEC and SOFC particularly on 8 mol% yttria-stabilized zirconia (8YSZ) electrolyte material. YSZ has been used because of its high stability at elevated temperature, excellent mechanical and chemical properties and its excellent oxygen ion conductivity. This study aims to determine the effect of precursor's grain size and sintering temperature on the properties of YSZ as electrolyte material for SOEC. Solid-state sintering was done to transform the ceramic powders into solid compacts. Pure cubic fluorite structure YSZ was achieved by both micrograined and nanograined YSZ sintered at 1200°C and 1500°C. It was observed that the micrograined YSZ sample sintered at 1500°C achieved the highest relative density at 99.48%. SEM images showed a smooth and compact microstructure for micrograined

YSZ while small pores were still present in the micrographs of nanograined YSZ. However, interestingly, the nanograined YSZ has higher total conductivity as compared to the micrograined YSZ.

Full text available upon request to the author

Article title: Effect of sintering temperature on the structure, morphology, and conductivity of LSM/YSZ composite electrode synthesized via solid state reaction

Authors: Christian C. Vaso, Arianna Benipayo, Rinlee Butch Cervera

Publication title: Philippine e-journals for Applied Research and Development 8:34-43, 2018

Abstract:

To fully achieve the advantages of hydrogen-producing solid oxide electrochemical cells (SOCs), it is necessary to synthesize electrodes that would lengthen the operating time of these SOCs. This study synthesized Lanthanum Strontium Manganite (LSM), yttria-stabilized zirconia (YSZ), and LSM/YSZ composites using the solid state reaction method. LSM/YSZ composites having 50: 50 weight percent composition were sintered at two different sintering temperatures of 1150 and 1300 C. XRD patterns showed distinct peaks of the desired phases, which can be indexed to a rhombohedral structure for LSM and to a cubic structure for YSZ. Morphological results revealed a porous composite microstructure of LSM/YSZ as compared to a more dense structure of pure LSM and pure YSZ. Upon increase in the sintering temperature, larger grain sizes and porosities were observed. The total conductivities of the samples measured at 500 C are 1.22 Scm-1, 1.02 x 10-3 Scm-1 and 8.67 x 10-1 Scm-1 at activations energies of 0.20 eV, 0.85 eV and 0.22 eV for the LSM, YSZ and composite samples, respectively. These measurements were all taken under the oxygen gas environment.

Full text available upon request to the author

Article title: Preparation of porous LSM/YSZ composite with varying grain size of YSZ precursor using solid state reaction method

Authors: Romar Angelo M. Avila, Trina G. Tambago, Rinlee Butch M. Cervera

Publication title: Materials Science Forum 917:93-97, 2018

Abstract:

Lanthanum strontium manganite (LSM) and yttria-stabilized zirconia (YSZ) composite is a promising material as an anode for solid oxide electrolysis cell (SOEC) applications. In this study, LSM/YSZ with a 1:1 LSM to YSZ weight ratio was synthesized via solid state reaction method using oxide precursors of commercial micrograined size LSM with varying YSZ precursor grain size. For the YSZ precursor, both nanograined (nanoYSZ) and micrograined YSZ (microYSZ) precursors were studied. Graphite was added at 10% weight ratio as a pore former. Density measurements using Archimedes principle revealed that LSM/nanoYSZ had the highest relative density of 97.8%, whereas LSM/nanoYSZ with graphite had the lowest density of 89.1%. The addition of graphite to LSM/nanoYSZ reduced the density by 8.7% compared to the decrease of 5.5% for LSM/microYSZ. Scanning electron microscopy confirms that the addition of graphite has a greater effect on the microstructure of LSM/nanoYSZ as compared to LSM/microYSZ. The electrochemical impedance spectroscopy results show that the samples with nanoYSZ had a higher total conductivity than the samples with microYSZ. LSM/nanoYSZ and LSM/nanoYSZ with graphite revealed a total conductivity values of 0.0470 Scm-1 and 0.0440 Scm-1 at 700 °C with activation energies of 0.0178 eV and 0.0234 eV, respectively.

Full text available upon request to the author

Article title: A Multi-Physics Model of Low-Voltage Dual-Electrolyte Water Electrolyzers

Authors: Joy Marie Mora, Rinlee Butch Cervera, Joey Duran Ocon, Jan Samuel C Matuba

Publication title: ECS Meeting Abstracts 22:1161, 2017

Abstract:

Traditional water electrolyzers usually require large overvoltages for splitting water into hydrogen and oxygen due to ohmic resistances, electrode overpotentials, and thermodynamic requirements. One of the most promising concepts in electrolyzer design is the hybrid dual-electrolyte water electrolyzer. This type of system takes advantage of the pH gradient between electrodes whereby a theoretical potential of around 0.4 V vs. SHE is possible. While the traditional electrolyzer operates at 1.23 V, the hybrid electrolyzer operates at voltages as low as 0.8 V, as shown in a recent work by Chen et al. In order to fully understand the mechanisms of this type of

system, it is important to perform a multi-physics model that would predict the behavior of a hybrid dual-electrolyte water system across a specified set of parameters. The modelling approach done in this study allows describing a range of dual-electrolyte water systems. The study takes into account the dependence of the electrical performance on structural parameters and operating conditions of the electrolyzer. The developed multi-physics model was solved using COMSOL Multiphysics® simulation software. The simulation tool was also used to compare the performance of a single- (both acidic and alkaline) and dual-electrolyte system. The analysis of the results showed dual-electrolyte systems having superior performance over their traditional counterparts and that improved electrolyzer operating strategies can be identified with the developed simulation study.
Full text available upon request to the author

Article title: Enhancing the Electrocatalytic Activity of Graphitic Carbon Nitride Towards Oxygen Reduction Reaction Via Heteroatom Doping: A DFT Approach
Authors: Wilbert James Claridad Futalan, Rinlee Butch Cervera, Joey Duran Ocon
Publication title: ECS Meeting Abstracts 12:788, 2017

Abstract:
With the continued depletion of conventional fuel sources, the search for alternative fuel becomes increasingly important. Low temperature fuel cells such as PEMFCs and AFCs have attracted significant attention as a power generation technology. However, the cost of noble metals—which are important in speeding up the sluggish oxygen reduction reaction—remains an impediment in the commercialization of this technology. Metal-free catalysts are now being seen as possible alternatives to these noble metals. Among these metal-free catalysts is the graphitic carbon nitride. Graphitic carbon nitride, g-C3N4, is a polymeric material consisting of C, N, and some impurity H, connected via tris-triazine-based patterns. Due to its unique electronic structure, g-C3N4 and other graphene analogs have garnered interest in the material science community. While previous studies have been able to show experimentally the activity of g-C3N4 towards ORR, *ab initio* studies to explain and generalize the findings of the experiments remain scarce. Here we explain from the standpoint of density functional theory (DFT) calculations the effect of heteroatom doping (e.g., phosphorus, boron, sulfur) in further altering the material's electronic structure in an effort to render g-C3N4 more active towards oxygen reduction

reaction. The trends exhibited by graphitic carbon nitrides in our DFT computations indicate that this emerging class of material can pave the way for the rational design of fuel cell catalysts.
Full text available upon request to the author

Article title: Quantum chemical predictions for Alkaline Earth (AE)- Doped Graphene: A Density Functional Theory (DFT) based investigation for a novel class carbon-based two-dimensional nanomaterials toward electrochemical, catalytic and electronic applications
Authors: Ace Christian Feraren Serraon, Allan Abraham Bustria Padama, Julie Anne Dalmacio del Rosario, Rinlee Butch Cervera, et al.
Publication title: ECS Meeting Abstracts 12:813, 2017

Abstract:
Graphene doping is a known route towards increasing the reactivity of graphene, particularly for the oxygen reduction reaction in fuel cells and metal-air batteries. The most prominent dopants in graphene for ORR are non-metals near to carbon in the periodic table. While alkaline-earth elements, such as beryllium, magnesium, calcium, strontium and barium are relatively abundant in the Earth's crust, graphenes modified with these elements have not been fully explored.

Graphene systems, which were substitutionally doped with alkaline-earth elements, were investigated through density functional theory (DFT) calculations to elucidate its energetics and electronic properties. A localized ionic bonding between alkaline-earth elements and the graphene substrate was observed, with greater charge transfer as inferred by Bader analysis for Be and Mg. The localized nature of the charge transfer from the dopant to the adjoining carbon atoms in the substrate is a novel property of AE-doped graphene. Semi-metallic properties due to strongly localized states near the Fermi level have been observed for all AE-doped graphenes except for Be. For Be, p-type semiconductor properties were observed consistent with previous studies on Be doped graphene.

This will provide the groundwork for further study towards the use of alkaline-earth metal dopants in an alternative precious-metal free cathode material for metal-air battery and fuel cell applications. The basic and exploratory nature of this scientific study is also expected to open a path towards other emergent applications for the

catalysis of other reactions, as well as in electronics and other domains. Observable trends between different alkaline-earth doped graphenes have also been investigated.

Full text available upon request to the author

Article title: Trends in Buckled and Planar Halogen-Doped Graphene for ORR Activity: A DFT Study

Authors: Reynaldo Marcelino Geronia, Ace Christian Serraon, Rinlee Butch Cervera, Joey Duran Ocon, et al.

Publication title: ECS Meeting Abstracts 12:787, 2017

Abstract:

Owing to the sluggish oxygen reduction reaction (ORR), high-performance catalysts like Pt-based alloys are widely used to render the reaction practically useful in systems like fuel cells. Nonetheless, high costs and technical complications associated with such catalysts have encouraged the exploration of alternative ORR catalysts like heteroatom-doped carbon nanomaterials. To improve the catalytic activity of carbon, earlier studies used boron, nitrogen, phosphorus, sulfur, and selenium as dopants. In this paper, we perform density functional theory (DFT) calculations to explore the potential of halogens (X = F, Cl, Br, I) substituted within the two-dimensional structure of graphene. We also validate some of the results of previous experimental and theoretical studies on halogen-doped graphene. For example, we compare halogen adsorption and band structures of the resulting halogen-doped materials, as well as the possible influence of atomic size and atomic interactions (e.g., Br2/Br interactions, polyiodide formation) on their experimentally observed properties. Based on the resulting electronic and structural information, we then identify which among the buckled and planar forms of halogen-substituted graphene show the most promise for ORR activity. Finally, we compare this method of doping with previously studied methods like adsorption and edge-halogenation to provide additional insight on halogen doping.

Full text available upon request to the author

Article title: CoMn2O4 Anchored on N-Doped High-Dimensional Hierarchical Porous Carbon Derived from Biomass for Bifunctional Oxygen Electrocatalysis

Authors: James Lincuna Digol, Marc Francis Maligsa Labata, Maricor Fernandez Divinagracia, Joey Duran Ocon

Publication title: ECS Transactions 77(11): 525, 2017

Abstract:
There is an emerging interest in developing bifunctional oxygen electrocatalysts for oxygen reduction reaction (ORR) and oxygen evolution reaction (OER), being key electrochemical reactions that govern the overall performance of unitized regenerative fuel cells and rechargeable metal-air batteries. However, such undertaking has been a huge challenge due to the high cost of noble metals (e.g. Pt, Ir) and their stability when used as catalysts. Herein, we report CoMn2O4 embedded on three-dimensional (3D) hierarchical porous carbon (HPC) derived from waste corn cobs as a possible noble metal-free bifunctional electrocatalyst. The hybrid catalyst is fabricated by solvothermal reaction of as-prepared N-doped 3DHPC and CoMn2O4. The template-free approach in preparing N-3DHPC ensures ample nitrogen doping using melamine to improve electronic conductivity of carbon and formation of three-dimensional, interconnected pore network, which is favorable for CoMn2O4 crystal dispersion. The same hybrid material also presents good OER activity, rendering an active and inexpensive dual-function electrocatalyst.
Full text available upon request to the author

Article title: Structure and conductivity of NiO/YSZ composite prepared via modified glycine-nitrate process at varying sintering temperatures
Authors: Felix Rey Bueta, James Francis Imperial, Rinlee Butch Cervera
Publication title: Ceramics International 43(18): 16174-16177, 2017

Abstract:
Nickel oxide and Yttria-stabilized zirconia (NiO/YSZ) composite is one of the most promising mixed conducting electrode materials in both solid oxide electrolysis cell and solid oxide fuel cell applications. In this study, 50 wt% NiO and 50 wt% YSZ composite was synthesized via a modified glycine-nitrate combustion process (GNP) and the effect of sintering temperatures (1100 °C, 1300 °C and 1500 °C) on its microstructure and electrical properties were investigated. TG/DTA and in-situ high temperature XRD revealed the thermal property behavior and the structural changes of the as-combusted precursor material. For all the samples sintered at different temperatures, room temperature XRD patterns revealed a distinct cubic phases of both YSZ and NiO while SEM images showed a porous microstructure. The total conductivities at 700 °C are 9.87 × 10–3, 5.26 × 10–3, 4.02 × 10–3 S/cm for the 1100,

1300, and 1500 °C with activation energies of 0.1722, 0.3555, and 0.3768 eV, respectively. Conductivity measurements of the different sintered samples revealed that the total conductivities as well as the activation energies are greatly affected by different sintering temperatures.

Full text available upon request to the author

Article title: Preparation of Amorphous Nanosilica from Philippine Waste Rice Hull via Acid Precipitation Method

Authors: Rinlee Butch M. Cervera and Emie A. Salamangkit-Mirasol

Publication title: Materials Science Forum 864:112-116, 2016

Abstract:

Rice hull or rice husk (RH) is an agricultural waste obtained from milling rice grains. Since RH has no commercial value and is difficult to use in agriculture, its volume is often reduced through open field burning which is an environmental hazard. In this study, amorphous nanosilica from Philippine waste RH was prepared via acid precipitation method. The synthesized samples were fully characterized for its microstructural properties. X-ray diffraction pattern reveals that the structure of the prepared sample is amorphous in nature while Fourier transform infrared spectrum showed the different vibration bands of the synthesized sample. Scanning electron microscopy (SEM) and particle size analysis (PSA) confirmed the presence of agglomerated silica particles. On the other hand, transmission electron microscopy (TEM) revealed an amorphous sample with grain sizes of about 5 to 20 nanometer range and has about 95 % purity according to EDS analyses. The elemental mapping also suggests that leaching of rice hull ash effectively removed the metallic impurity such as potassium element in the material. Hence, amorphous nanosilica was successfully prepared via a low-cost acid precipitation method from Philippine waste rice hull.

Full text available upon request to the author

Article title: Microstructural and Electrochemical Investigation of Carbon Coated Nanograined LiFePO4 as Cathode Material for Li-Batteries

Authors: Rinlee Butch M. Cervera and Princess Stephanie P. Llanos

Publication title: International Journal of Chemical and Materials Engineering 11(1):19-22, 2016

Abstract:
Lithium iron phosphate (LiFePO4) is a potential cathode material for lithium-ion batteries due to its promising characteristics. In this study, pure LiFePO4 (LFP) and carbon-coated nanograined LiFePO4 (LFP-C) is synthesized and characterized for its microstructural properties. X-ray diffraction patterns of the synthesized samples can be indexed to an orthorhombic LFP structure with about 63 nm crystallite size as calculated by using Scherrer's equation. Agglomerated particles that range from 200 nm to 300 nm are observed from scanning electron microscopy images. Transmission electron microscopy images confirm the crystalline structure of LFP and coating of amorphous carbon layer. Elemental mapping using energy dispersive spectroscopy analysis revealed the homogeneous dispersion of the compositional elements. In addition, galvanostatic charge and discharge measurements were investigated for the cathode performance of the synthesized LFP and LFP-C samples. The results showed that the carbon-coated sample demonstrated the highest capacity of about 140 mAhg-1 as compared to non-coated and micrograined sized commercial LFP.
Full text available upon request to the author

Article title: Preparation and Conductivity Measurements of LSM/YSZ Composite Solid Oxide Electrolysis Cell Anode Materials
Authors: Christian C. Vaso and Rinlee Butch M Cervera
Publication title: International Journal of Materials and Metallurgical Engineering 11(1): 23-27, 2016

Abstract:
One of the most promising anode materials for solid oxide electrolysis cell (SOEC) application is the Sr-doped LaMnO3 (LSM) which is known to have a high electronic conductivity but low ionic conductivity. To increase the ionic conductivity or diffusion of ions through the anode, Yttria-stabilized Zirconia (YSZ), which has good ionic conductivity, is proposed to be combined with LSM to create a composite electrode and to obtain a high mixed ionic and electronic conducting anode. In this study, composite of lanthanum strontium manganite and YSZ oxide, La0.8Sr0.2MnO3/Zr0.92Y0.08O2 (LSM/YSZ), with different wt.% compositions of LSM and YSZ were synthesized using solid-state reaction. The obtained prepared composite samples of 60, 50, and 40 wt.% LSM with remaining wt.% of 40, 50, and 60, respectively for YSZ were fully characterized for its microstructure by using

powder X-ray diffraction (XRD), Thermogravimetric analysis (TGA), Fourier transform infrared (FTIR), and Scanning electron microscope/Energy dispersive spectroscopy (SEM/EDS) analyses. Surface morphology of the samples via SEM analysis revealed a well-sintered and densified pure LSM, while a more porous composite sample of LSM/YSZ was obtained. Electrochemical impedance measurements at intermediate temperature range (500-700 °C) of the synthesized samples were also performed which revealed that the 50 wt.% LSM with 50 wt.% YSZ (L50Y50) sample showed the highest total conductivity of 8.27x10-1 S/cm at 600 oC with 0.22 eV activation energy.

Full text available upon request to the author

Article title: Synthesis of Yttrium-doped Barium Zirconate/Barium Cerate (BZY20/ BCY20) Core-shell Structured Proton-conducting Solid Electrolyte via Modified Pechini Method

Authors: Mary Jozen Balanay and Rinlee Butch M Cervera

Publication title: Advanced Materials Research 1098: 92-97, 2015

Abstract:

Intermediate temperature solid oxide fuel cells (IT-SOFCs) operating at 400-700°C utilizes proton conducting electrolytes and are now being one of the focus of many research studies with regards to efficient, clean power sources and energy conversion. Potential electrolyte materials include acceptor-doped barium zirconates and barium cerates. In this study, preparation of a core-shell structured proton-conducting solid electrolytes of 20 vol% BaZr0.8Y0.2O3-δ (20BZY20) for the core and 80 vol% BaCe0.8Y0.2O3-δ (80BCY20) for the shell is done by wet chemistry route. The synthesized core-shell structured material (20BZY20/80BCY20) is developed to possibly address the problem of high grain boundary impedance of Y-doped BaZrO3 and low chemical stability of Y-doped BaCeO3. The obtained samples were characterized for its structure, thermal stability, morphology and elemental distribution of the material. At a lower sintering temperature of 1150°C, a densified pellet was obtained as observed by SEM analysis. The diffraction pattern of 20BZY20/80BCY20 powder shows two distinct phases corresponding to BZY20 and BCY20 suggesting a successful synthesis of the core-shell solid electrolyte.

Full text available upon request to the author

Article title: On the formation of nanograined LiCo2O3 (OH) Spinel-type Material Synthesized via Modified Low-temperature Sol-gel Approach
Authors: Rinlee Butch M. Cervera and Shu Yamaguchi
Publication title: Advanced Materials Research 1119: 106-110, 2015

Abstract:
A new lithium cobalt oxyhydroxide compound has been successfully synthesized. This new compound has been found to be related to the low temperature LiCoO2 (LT-LiCoO2) spinel structure formed at low processing temperatures. With the use of a modified sol-gel approach, this compound with the composition of LiCo2O3(OH) can be successfully synthesized at around 150 °C. Structural analyses using powder X-ray diffraction (XRD) and selected area electron diffraction (SAED) suggest a cubic-spinel structure, which is also supported by FT-IR and TG/DTA analyses. In addition, from the TEM morphological analysis, a very fine nanograined LiCo2O3(OH) powder with an average grain size of 5 nm has been obtained. From these results, the presence of OH or water at low processing temperatures promotes a favorable formation of this structure. At higher temperatures (>400 °C), the phase transforms to a layered high-temperature LiCoO2 (HT-LiCoO2) structure with the excess cobalt precipitated as Co3O4 as suggested by the in-situ high temperature XRD analysis.
Full text available upon request to the author

Article title: Thermal analysis and infrared spectroscopy of acetic anhydride plasma treated chitosan films
Authors: Sidney M. Palardonio, Philippe Martin B. Tingzon, Apollo R. Agcaoili, Henry J. Ramos, Rinlee Butch M. Cervera
Publication title: Proceedings of the Samahang Pisika ng Pilipinas, 2015

Abstract:
This study investigates the effects of acetic anhydride plasma treatment of chitosan films. Chitosan films were prepared by solvent casting method and then exposed to acetic anhydride plasma for 1, 3, and 5 mins. ATR-FTIR revealed that--NH 2 groups were oxidized to-C≡ N. Non-hydrogen bonded–OH groups appeared as hydrogen bonding with water was diminished. Entrapment of the CO 2 gas was not observed. Reacetylation was unsuccessful as no C= O group was introduced. DSC studies

suggested that the thermal stability of the acetic anhydride plasma treated films were found to be higher than unmodified films.

Full text available upon request to the author

Article title: Production of Amorphous and Crystalline Silica from Philippine Waste Rice Hull

Authors: Emie Salamangkit Mirasol and Rinlee Butch M Cervera

Publication title: Advanced Materials Research 1098: 80-85, 2015

Abstract:

Rice husk is the covering of rice seeds and a by-product of milling rice grain. This study is conducted to investigate the production of silica (SiO2) formed from waste rice hull (RH) at different processing temperatures and study its structure, morphology, and thermal properties. Thermal analysis by thermogravimetric analysis (TGA) of the dried RH showed two mass-loss steps associated to the moisture desorption and thermal decomposition. Powder X-ray diffraction patterns of the rice hull calcined at 550 oC showed a purely amorphous SiO2 structure while those calcined for 900 oC for 1 hour and for 3 hours showed a glass-ceramics and crystalline SiO2 structure, respectively. This structural result is supported by the results obtained from the FTIR and Raman analyses of the samples. On the other hand, the Scanning electron microscopy (SEM) images showed the morphology of the samples revealing an increasing particle and grain size of the samples calcined at higher temperatures and longer heat treatment duration. In addition, Energy dispersive X-ray (EDX) spectra of both amorphous and crystalline SiO2 samples confirm that the sample contains mostly silicon and oxygen. Thus, in this study, the desired form of either amorphous or crystalline SiO2 from waste rice hull can be successfully obtained by controlled heat treatment.

Full text available upon request to the author

Article title: Preparation of Y-Doped BaZrO3 Proton Conducting Solid Electrolyte via Modified Low Temperature Pechini Method

Authors: Gandy Nuñez, Mary Jozen Balanay, Rinlee Butch M Cervera

Publication title: Advanced Materials Research 1098: 86-91,2015

Abstract:

One of the promising material for proton-conducting solid electrolyte operating at intermediate temperature range (400-600 °C) is the Yttrium-doped BaZrO3 (BZY) due to its high conductivity and chemical stability. In this study, a modified citrate-nitrate combustion method (Pechini method) has been employed for BZY powder preparation. A stoichiometric amounts of starting nitrates and oxide raw materials with nitric acid, citric acid and ethylene glycol for the synthesis of 20 mol% Y-doped BaZrO3 (BZY20) were prepared, then calcined and sintered at 1000 °C for two heat treatment durations of 24 hours and 48 hours. The obtained BZY20 powder samples have been fully characterized for its structure, morphology, and thermal properties. From the X-ray diffraction (XRD) results, the sample sintered for 48 hours showed a cubic phase of BZY20 which can be indexed to a Pm3m cubic structure which is also supported by Raman analysis. The calculated lattice parameter is 4.2067 Å which is higher than the reported lattice parameter of a pure BaZrO3 (BZ) of 4.1930 Å which indicates a successful doping due to higher ionic radius of Y3+ dopant as compared to Zr4+ in the B-site ABO3 perovskite sub-lattice. In addition, SEM-EDX analyses of the sintered pellet revealed a uniform distribution of Yttrium dopant in the BZY20 prepared solid electrolyte.

Full text available upon request to the author

Article title: Anode Properties of Si–FeS Films Prepared By Pulsed Laser Deposition in Solid-State Lithium Batteries

Authors: Rinlee Butch Cervera, Naoki Suzuki, Tsuyoshi Ohnishi, Minoru Osada, et al.

Publication title: ECS Meeting Abstracts 2:227, 2014

Abstract:

Lithium–silicon alloys are one of the most attracting anode materials for next-generation lithium-ion batteries due to the high theoretical capacity, low electrode potential, and the second largest Clark number. However, they have exerted their high performance only in nano-sized form. This study reveals that Si-based anodes fabricated into films exhibit excellent performance even in a bulky state, when they are in a solid electrolyte.

The Si-based films were deposited on stainless steel plates used as current collectors by pulsed laser deposition. Because it is impossible to ablate pure Si by the KrF excimer laser used in this study, 10wt% of FeS, which was reported to be effective in

enhancing electrode activity in solid electrolytes [1], was added to Si powder before pressed into a target in order to allow the ablation. Film thickness was varied from 30 nm to 1 μm. Electrode properties of the films were investigated in a solid electrolyte, 70Li2S–30P2S5 glass ceramics, with an In–Li alloy as a counter electrode. The films were galvanostatically lithiated (charged) down to 0.01 V vs. Li+/Li and then delithiated (discharged) up to 2.62 V vs. Li+/Li at various discharge rates.

The Si–FeS films exhibit excellent performance in the solid electrolyte, as shown in the figure. The rate dependence of the discharge capacity clearly indicates that a film with thickness of 30 nm delivers a high capacity approaching the theoretical value at 0.1 C-rate discharge and maintains a high capacity of 2300 mAh g–1 at 100 C. Although such high rate capability may have been reported only for nano-sized Si materials, the film keeps it against increasing thickness. Even a 1-μm-thick film anode delivers a capacity of 3100 mAh g–1 at a discharge rate of 0.1 C, and 2500 mAh g–1is kept at a high rate discharge of 10 C.

It should be emphasized that such high performance is realized in a solid-state cell, which will be free from safety issues. In addition, the use of solid electrolytes is effective in improving cycling performance, which is a great drawback of Si anodes, by preventing detachment of the active material from current collectors. Capacity retention observed for a 400 nm-thick film over 120 cycles exceeds 80% in the solid electrolyte, while it decreases to 38% in an organic liquid electrolyte.
Full text available upon request to the author

Article title: Nanograined Sc-doped BaZrO3 as a proton conducting solid electrolyte for intermediate temperature solid oxide fuel cells (IT-SOFCs)
Authors: Rinlee Butch Cervera, Yukiko Oyama, Shogo Miyoshi, Itaru Oikawa, et al.
Publication title: Solid State Ionics 264:1-6, 2014

Abstract:
Nanograined 25 mol% Sc-doped BaZrO3, BaZr0.75Sc0.25O3 − δ, well-known as a proton conductor, has been successfully synthesized at low processing temperature with average grain sizes of 8.9 nm, 15.9 nm, and 68.5 nm, and the effect of grain size on the conductivity has been examined. X-ray diffraction (XRD) and selected area electron diffraction (SAED) patterns for these samples suggest a simple cubic perovskite type structure. The total DC conductivity, bulk and grain boundary

contributions, of BaZr0.75Sc0.25O3 – δ as-pressed at room temperature (non-sintered) is 5.53 × 10– 6 S/cm (8.9 nm grains) at 500 °C, while values of 2.68 × 10– 5 S/cm and 1.27 × 10– 3 S/cm are observed at 500 °C for those samples post-annealed at 800 °C and 1250 °C with average grain sizes of 15.9 and 68.5 nm, respectively. The observed total DC conductivity for 68.5 nm grain size is almost comparable to that reported for benchmark Y-doped BaZrO3 with nanometer and micrometer grains.
Full text available upon request to the author

Article title: High performance silicon-based anodes in solid-state lithium batteries
Authors: Rinlee B Cervera, Naoki Suzuki, Tsuyoshi Ohnishi, Minoru Osada, et al.
Publication title: Energy & Environmental Science 7(2): 662-66, 2014

Abstract:
Silicon–lithium alloys are one of the most attractive anode materials for next-generation lithium-ion batteries; however, they have demonstrated high performance, only when they are fabricated into nano-sized materials. Here we show that even bulky alloys exhibit high potential that has never been shown in conventional liquid electrolytes, when they are in solid electrolytes.
Full text available upon request to the author

Article title: N-doped and Al-doped ZnO thin films as thermoelectric energy harvesters
Authors: Evan Angelo Mondarte, Jefferson Abrenica, Miguel Heinritz Majella Miguel, Rinlee Butch Cervera, Arnel Salvador, et al.
Publication title: Proceedings of the Samahang Pisika ng Pilipinas, 2013

Abstract:
Nitrogen-doped ZnO (P-type) and aluminum-doped ZnO (N-type) thin films were investigated for their thermoelectric properties. Under a temperature difference of 33.7 K, N-doped ZnO was found to have higher ZT value of 0.697 and conversion
Nitrogen-doped ZnO (P-type) and aluminum-doped ZnO (N-type) thin films were investigated for their thermoelectric properties. Under a temperature difference of 33.7 K, N-doped ZnO was found to have higher ZT value of 0.697 and conversion
Full text available upon request to the author

Article title: Perovskite-Structured $BaScO_2(OH)$ as a Novel Proton Conductor: Heavily Hydrated Phase Obtained via Low-Temperature Synthesis
Authors: Rinlee B Cervera, Shogo Miyoshi, Yukiko Oyama, Youssef E Elammari,, et al.
Publication title: Chemistry of Materials 25(9): 1483-1489, 2013

Abstract:
A novel proton-conducting material, BaScO2(OH) has been successfully fabricated. The known high-temperature proton conductors are typically perovskite-type oxides, in which the proton concentration is determined by hydration reaction of oxygen vacancies introduced by a small amount of acceptor dopant. On the other hand, the novel material BaScO2(OH) is still associated with the A2+B4+O3 perovskite structure but with the B-site cation fully consisting of an acceptor cation Sc3+, which facilitates to retain an appreciable amount of protonic defects. While it is difficult to obtain the material by simply hydrating the unhydrated form (Ba2Sc2O5), a combination of a new low-temperature sol–gel synthesis and ultrahigh-pressure (4 GPa) compaction at room-temperature enables us to obtain the heavily hydrated phase BaScO2(OH) due to *on-synthesis* hydration. The BaScO2(OH) synthesized has been proved to be a pseudocubic perovskite phase with XRD and Raman analyses. The thermal dehydration analyses have verified the composition BaScO2(OH) in terms of proton concentration, and their mobile nature has been observed with in situ FT-IR analysis. The protonic conductivity of the material is as high as 1.7 × 10–2 S·cm–1 at 500 °C, which is well higher than the total conductivity of the best proton-conducting perovskite oxides at intermediate temperature range.
Full text available upon request to the author

Article title: Silicon nitride thin film electrode for lithium-ion batteries
Authors: Naoki Suzuki, Rinlee Butch Cervera, Tsuyoshi Ohnishi, Kazunori Takada
Publication title: Journal of power sources 231: 186-189, 2013

Abstract:
This paper presents electrode properties of silicon nitride ($SiN_{0.92}$) as a negative electrode in a lithium battery investigated in a solid electrolyte. $SiN_{0.92}$ thin films formed by using pulsed laser deposition technique show redox reactions below 0.5 V vs. Li^+/Li. A 200 nm thick film delivers a high capacity of 1800 mAh g^{-1} at the first reduction process and retains 1300 mAh g^{-1} after 100 cycles. Although increasing the

film thickness to 500 nm decreases the capacity to some extent, the capacities in the 1st and 100th are 1200 and 700 mAh g^{-1}, respectively, which are quite higher than that of the current carbon negative electrode.
Full text available upon request to the author

Article title: Epitaxial Growth of LiCoO2 Thin Film on Single Crystal Substrate by Sol-Gel Method
Authors: Taeri Kwon, Tsuyoshi Ohnishi, Kosho Akatsuka, Rinlee B Cervera, et al.
Publication title: ECS Meeting Abstracts 8:628, 2012

Abstract:
No available
Full text available upon request to the author

Article title: Silicon nitride thin film electrode for lithium-ion batteries
Authors: Naoki Suzuki, Rinlee B Cervera, Tsuyoshi Ohnishi, Kazunori Takada
Publication title: ECS Meeting Abstracts 10:855

Abstract:
This paper presents electrode properties of silicon nitride (SiN0.92) as a negative electrode in a lithium battery investigated in a solid electrolyte. SiN0.92 thin films formed by using pulsed laser deposition technique show redox reactions below 0.5 V vs. Li+/Li. A 200 nm thick film delivers a high capacity of 1800 mAh g–1 at the first reduction process and retains 1300 mAh g–1 after 100 cycles. Although increasing the film thickness to 500 nm decreases the capacity to some extent, the capacities in the 1st and 100th are 1200 and 700 mAh g–1, respectively, which are quite higher than that of the current carbon negative electrode.
Full text available upon request to the author

Article title: Phase relation in the BaO–ZrO2–YO1. 5 system: Presence of separate BaZrO3 phases and complexity in phase formation
Authors: Yukiko Oyama, Akira Kojima, Xinyu Li, Rinlee Butch Cervera, et al.
Publication title: Solid State Ionics 197(1):1-12. 2011

Abstract:
In order to estimate the phase stability and homogeneous range of BaZrO3, which is expected as a candidate electrolyte material for intermediate temperature solid oxide

fuel cell, the phase relation in the BaO–ZrO2–YO1.5 systems has been examined at a typical processing temperature of 1600 °C. The stable existence of two cubic phases of BaZrO3, termed as BZ(I) and BZ(II), with different dopant concentration is observed above 1400 °C in the present study. The latter is of long-range ordered supercell with a wide range of solid solution between Ba3Zr2YO8.5 and Ba9Zr4Y8O29. Also observed is the presence of liquid phase at higher BaO concentration region above the ternary eutectic temperature that is estimated to be around 1300 °C, giving enormous effects to sintering process when Y3+ is overdoped beyond the solubility limit. From the present results, the pseudo-ternary phase diagram of BaO–ZrO2–YO1.5 of the isothermal section at 1600 °C is proposed.
Full text available upon request to the author

Article title: Bulk-Nanograined BaScO2 (OH) as a New Class of Oxide Protonics Materials
Authors: Rinlee Butch Cervera, Yukiko Oyama, Shogo Miyoshi, Kiyoshi Kobayashi, et al.
Publication title: ECS Meeting Abstracts 13: 1396, 2008

Abstract:
Solid electrolytes for intermediate temperature solid oxide fuel cells (IT-SOFC) applications are usually multicomponent metal oxides. The typically studied are those of acceptor-doped ABO3 type perovskite structures [1-3]. In principle, protonic defects can be incorporated in the ABO3 lattice structure in the form of hydroxyl anions as replacement for oxygen vacancies (Vö) created by the acceptor dopant on the B-site sublattice according to equation (1) in Kröger-Vink notation.
Full text available upon request to the author

Article title: Protonic Conduction in Nano-Grained Fluorite Oxides of Y-doped ZrO2 and Yb-doped CeO2
Authors: Yasuaki Akao, Tetsuo Fukuda, Rinlee Butch Cervera, Shogo Miyoshi, et al.
Publication title: ECS Meeting Abstracts 13:1398, 2008

Abstract:
No available
Full text available upon request to the author

Article title: Structural study and proton transport of bulk nanograined Y-doped BaZrO3 oxide protonics materials

Authors: Rinlee Butch Cervera, Yukiko Oyama, Shogo Miyoshi, Kiyoshi Kobayashi, et. al.

Publication title: Solid State Ionics 179:7-8, 2008

Abstract:

Nanograin size of about 3-5nm of 20mol% Y-doped BaZrO3 (BZY20) proton conducting solid electrolyte has been prepared at low processing temperature (< 200°C) and a bulk nanograined sample has been obtained at room temperature using cubic anvil pressing at 4GPa. The grain morphology and structural changes of the as-pressed and annealed BZY20 samples have been studied using powder X-ray diffraction (XRD), high resolution transmission electron microscope (HRTEM) equipped with energy dispersive X-ray (EDX), and electron diffraction analyses. Due to the presence of inhomogeneity such as trace formations of hydroxide phases of the as-pressed sample as observed from thermogravimetric and differential thermal analysis (TG/DTA), Fourier transform infrared (FTIR) results, and from the thermodynamics phase equilibria viewpoint, the conductivity is immeasurable. On the other hand, the sample annealed at 800°C with ~ 10nm grain size shows a rather low protonic conductivity possibly due to poor interfacial grain boundary contacts and structurally disordered interface. However, as the grain grows to a well-crystallized structure with better interfacial and refined grain boundary and better yttrium distribution from grain interior to the grain boundaries, the total protonic conductivity increases and shows a good agreement with the results obtained using proton and deuteron isotope exchange reaction. The total protonic conductivities, bulk and grain boundary contributions, at 500°C for samples annealed at 800°C, 1250°C, and 1500°C are 8.7 × 10− 6Scm− 1, 2 × 10− 3Scm− 1, and 4 × 10− 3Scm− 1 with grain sizes of about 10nm, 50nm, and 200nm, respectively.

Full text available upon request to the author

Article title: Low temperature synthesis of nanocrystalline proton conducting BaZr0. 8Y0. 2O3− δ by sol–gel method

Authors: Rinlee Butch Cervera and Yukiko Oyama, Shu Yamaguchi

Publication title: Solid State Ionics 178(7-10): 569-574, 2007

Abstract:

Nanoceramic powders of proton conducting BaZr0.8Y0.2O3 – δ (BZY20) have been prepared at low crystallization temperature (below 130 °C) by sol–gel synthesis using all-alkoxide route. Due to a very low crystallization temperature, hydroxyl defects in the lattice crystal are incorporated in-situ during the synthesis process as confirmed by the gradual decrease in the lattice constant from 4.227 to 4.200 Å on annealing from X-ray diffraction (XRD) analysis, OH vibrations observed in the diffuse reflectance infrared Fourier transform spectroscopy (DRIFTS) analysis, and weight loss and heat exchange reaction observed by TG/DTA analysis. The results of XRD have revealed well-crystallized BZY20 peaks of this advanced ceramic material even at low processing temperature. Analysis of FT–Raman spectrum taken at room temperature for the nanocrystalline BZY20 samples prepared at 130 °C using sol–gel processing has revealed an ideal Pm3m cubic crystal symmetry. However, a very slight distortion due to the difference in the B-site sublattice is also observed in the FT–Raman spectrum of the samples upon annealing at higher temperatures. SEM images show the microstructural evolution of the powders from agglomerated nanoscaled crystallites to the nanosized pseudospherical morphology with diameter less than 50 nm. The present low temperature synthesis can be successfully applied to other oxide protonics materials highly doped with protonic defects.

Full text available upon request to the author

Majah-Leah Ravago

Sex: Female

Education:

Doctor of Philosophy in Economics, University of Hawaii at Manoa, 2011

Master's Degree in Economics, University of of the Philippines, 2002

Bachelor of Science in Economics, University of the Philippines, 1997

Field of Specialization

Development Economics

Energy Economics

Economics of Disasters

Resource Economics

Research:

Article title: Does quality of electricity matter? Household-level evidence from the Philippines

Authors: Vanessa Mae Pepino, Majah-Leah Ravago, Karl Jandoc

Publication title: Journal of Asia Pacific Economy, November 2020

Abstract:

The Philippines is a country that faces many development challenges, including providing reliable and good quality electricity. Access to good quality electricity connection matters because it affects many aspects that increase productivity (e.g. education, health and business) and can make lives easier and more comfortable.

While access has improved over time, many households still suffer from poor quality of their connection brought about by incidents of power outages, fluctuations and low voltage. This article attempts to examine whether better electricity quality improves household welfare. We apply a two-stage probit-ordered probit model to overcome endogeneity caused by reverse causation between electricity quality and household income. We find that households experiencing better electricity quality decrease the probability of remaining in the lowest income category by 23%.

Full text available upon request to the author

Article title: Localized disaster risk management index for the Philippines: Is your municipality ready for the next disaster?

Authors: Majah-Leah Ravago, Dennis S. Mapa, Angelie Grace Aycardo, Michael R.M. Abrigo

Publication title: International Journal of Disaster Risk Reduction 51(101913), October 2020

Abstract:

We developed a Localized Disaster Risk Management Index (DRMI) that measures how well local government units (LGUs) in the Philippines prepare for a disaster. Focusing on LGUs that have experienced at least one of the four hydrometeorological hazards, strong winds and rain, floods, landslide/mudslide, and big waves, we capture in one number the ex post and ex ante risk management strategies that influence post disaster outcomes. Given the nature of our data, we used the iterative principal component analysis to compute for the LGUs' Localized DRMI, which was then correlated with conditions, outcomes, and social indicators. Our results show a negative correlation between localized DRMI and recovery, which means that LGUs with high Localized DRMI scores are also those that have not fully recovered. This does not mean that these LGUs would be better off having lower scores. This result implies LGUs that perform well in terms of Localized DRMI scores are also those that frequently experience very severe disasters due to hydrometeorological hazards. Just as they are recovering from a disaster, another

one hits them. This is corroborated by other correlation results: positive for severity and frequency, positive for poverty, and negative for LGUs' revenue.

Full text available upon request to the author

Article: Awards and recognition: Do they matter in teachers' income trajectory?
Authors: Majah-Leah Ravago and Dennis S. Mapa
Publication title: Studies in Educational Evaluation 66:100901, September 2020

Abstract:

Do teaching awards affect the growth in income of teachers recognized for excellence? Our study is one of the firsts to use income as the primary indicator of success when evaluating the impact of an award. Taking the case of Metrobank Foundation Award for Outstanding Teachers in the Philippines, our analysis reveals that the award had a higher impact on the income of winners who were in the middle of their career when they received the award. This implies that timing as to when an award is received matters. Relatively younger winners, in their mid-career, have more years in their professional career to capitalize on the award.

Full text available upon request to the author

Article: Survey data of finalists and winners in the search for outstanding teachers in the Philippines, 1988-2010
Authors: Majah-Leah Ravago and Dennis S. Mapa
Publication title: Data in Brief 32:106238, August 2020

Abstract:

The data derives from a survey of teachers who competed at the national level in the Metrobank Foundation, Inc. Search for Outstanding Teachers in the Philippines from 1988 to 2010. Conducted in March-September 2014, the survey has complete information from 252 national winners and finalists. The survey collected data on teachers' professional profile, socio-demographic characteristics, community involvement, socioeconomic characteristic of the teachers' household including income and expenditure, and their overall perception on the search for process. It

also collected information from school heads. The data collected by the survey from the school head include statistics on the educational profile of their teachers, performance indicators of the school, physical characteristics of the school, and school head's general assessment of colleagues and overall perception on the search process. The survey also includes information about the financial literacy of teachers. The dataset is in comma-separated values file (.csv) with accompanying data dictionary (.txt). The questionnaire is also included in data supplementary appendix. This data article is related to the research article, "Awards and Recognition: Do they Matter in Teachers' Income Trajectory?" Ravago and Mapa, 2020, where data interpretation and analysis can be found.

Full text available upon request to the author

Article: The Role of Power Prices in Structural Transformation: Evidence from the Philippines

Authors: Majah-Leah Ravago, Arlan Ilagan Brucal, James A. Roumasset, Jan Carlo Punongbayan

Publication title: Journal of Asian Economics 61:20-33. February 2019

Abstract:

The Philippines provides an extreme example of Rodrik's observation that late developing countries experience deindustrialization at lower levels of per capita income than more advanced economies. Previous studies point to the role of protectionist policies, financial crises, and currency overvaluation as explanations for the shrinking share of the industry sector. We complement this literature by examining the role of power prices in the trajectory of industry share. We make use of data at the country level for 33 countries over the period 1980–2014 and at the Philippine regional level for 16 regions over the period 1990–2014. We find that higher power prices tend to amplify deindustrialization, causing industry share to turn downward at a lower peak and a lower per capita income, and to decline more steeply than otherwise. In a two-country comparison, we find that power intensive manufacturing subsectors have expanded more rapidly in Indonesia, where power prices have been low, whereas Philippine manufacturing has shifted toward less

power intensive and more labor intensive subsectors in the face of high power prices.

Full text available upon request to the author

Article: Games with Dynamic Externalities and Climate Change Experiments
Authors: Tatsuyoshi Saijo, Katerina Sherstyuk, Nori Tarui, Majah-Leah Ravago
Publication title: Journal of the Association of Environmental and Resource Economists 3(2):247-281, April 2016

Abstract:

We report on laboratory experiments with series of games with dynamic externalities, where the current actions of each player affect not only the player's payoff today, but also the group payoffs levels of the game that will be played tomorrow. The mo-tivating example is the climate change problem, where welfare opportunities (payoff levels) in the present depend on the stock of greenhouse gases (GHG) accumulated in the past, with higher current emissions leading to lower future payoffs. We investigate whether socially optimal actions may be sustained in such dynamic externality games with changing payoffs if no explicit enforcement mechanisms are present. Two main experimental treatments are studied. In the Long-Lived treatment, the dynamic game is played by the same group of subjects who interact for many periods (generations). This represents an idealistic setting where countries' decision-makers and citizens are motivated by long-term welfare of their countries. In the Inter-Generational treat-ment, the dynamic game is played by several groups (generations) of subjects, with later generations having access to history and advice from previous generations. This represents a more realistic setting in which the countries' decision-makers and citizens may be motivated more by the immediate welfare and may care only partially about the future generations' payoffs. Experimental results indicate that in the Long-Lived treatment, many groups of subjects were able to avoid the myopic Nash outcome and to sustain or come back close to the socially optimal emissions and GHG stock levels. In the Inter-Generational treatments, subject decisions were often myopic. These findings

suggest that international dynamic enforcement mechanisms (treaties) are necessary to control GHG emissions.

Full text available upon request to the author

Article: Lighting Up the Last Mile: The Benefits and Costs of Extending Electricity to the Rural Poor

Authors: Ujjayant Chakravorty, Kyle Emerick, Majah-Leah Ravago

Publication title: SSRN Electric Journal, January 2016

Abstract:

Approximately one billion people live without access to electricity. However, there has been no study that rigorously estimates both the realized benefits and costs of electricity provision. In this paper, we document substantial short-run welfare gains from electricity expansion in the Philippines. We first project the expansion of the electricity grid under a least-cost first principle. Using this projected expansion as an instrument, we estimate large impacts of electricity infrastructure on household income and expenditures. We then use data on costs of electrifying individual villages to show that in a majority of cases, the physical cost of expanding electricity infrastructure is recovered after only a single year of realized expenditure gains. Finally, we find that electricity does not increase employment, suggesting that increased labor force participation is not the relevant mechanism. Rather, increases in agricultural income appear to account for a meaningful share of the income gains from electrification. These findings suggest that the benefits to rural electrification may be significantly high, even in the very short run.

Full text available upon request to the author

Article: Islands of Sustainability in Time and Space

Authors: Kimberly Burnett, Lee H. Endress, Majah-Leah Ravago, James A. Roumasset, et al.

Publication title: International Journal of Sustainable Society 6(1 - 2): 9-27, January 2014

Abstract:

We review the economics perspective on sustainable resource use and sustainable development. Under standard conditions, dynamic efficiency leads to sustainability of renewable resources but not the other way around. For the economic-ecological system as a whole, dynamic efficiency and intergenerational equity similarly lead to sustainability, but ad hoc rules of sustainability may well lead to sacrifices in human welfare. We then address the challenges of extending economic sustainability to space as well as time and discuss the factors leading to optimal islands of preservation regarding renewable resources. Exogenous mandates based on moral imperatives such as self-sufficiency and strong sustainability may result in missed win-win opportunities that could improve both the economy and the environment, as well as increase social welfare across generations.

Full text available upon request to the author

Article: Eastern Visayas after Yolanda: Evidence from Household Survey

Authors: Majah-Leah Ravago and Dennis S. Mapa

Publication title: Philippine Center for Economic Development: Policy Notes 2014-05, November 2014

Abstract:

No available

Full text available upon request to the author

Article: Payment schemes in random termination experimental games

Authors: Katerina Sherstyuk, Nori Tarui, Majah-Leah Ravago, Tatsuyoshi Saijo

Publication title: Climate Change Experiments, April 2011

Abstract:

No available

Full text available upon request to the author

Article: THE AFTA-CEPT and the ASEAN-China Early Harvest Program: An Assessment of Potential Short-run Impact

Authors: Ann Pimentel-Prenio, Majah-Leah Ravago, Erlinda Medalla

Abstract:

Theoretical and empirical support for a more liberal trading environment has grown increasingly over the years. In the last decade, many countries have aggressively pursued unilateral trade liberalization. Based on decadal growth rates, globalizing developing countries has outpaced growth of non-globalizing developing economies in the 1980's and 1990's. Aside from participation in regular WTO Ministerial to discuss multilateral trade issues, many countries have also entered into bilateral and regional trade agreements (RTA's). Since 1995, the WTO has received 130 notifications regarding the creation of RTA's which is slightly higher than the notifications received by GATT over its almost fifty years of existence. In this paper, we aim to sift thru the effects of trade policy on agriculture, focusing in particular on the possible short-run impact of the Common External Preferential Tariffs under the ASEAN Free Trade Agreement (AFTA-CEPT) and the ASEAN-China Early Harvest Program (EHP). While few would argue about the long-run benefits from a liberal trade regime, fewer still would deny the possible short-run adjustment costs that could accompany trade reforms. As such, it would help policy makers to be cognizant of the possible ramifications of pursuing a particular trade strategy. We provide an overview of the Philippine trade policy leading to the AFTA-CEPT and the EHP and isolate their impact. The immediate impact of trade policy is on the effective rate of protection it provides to various sectors. How uniform it is or how diverse reflects the relative protection, how much one sector is favored over another. Ultimately, the resulting trade protection structure would impact on output, income and employment. We measure how the EHP and AFTA impact on these variables. We employ a simulation model following an earlier study under the Joint Tariff Commission-PIDS (TC-PIDS) Study. The simulation analysis is done for three scenarios: (1) the Early Harvest Program, (2) the AFTA-CEPT, and (3) a hypothetical Base scenario reverting tariffs to 1994 levels which allows for comparative analysis that can be useful for policy formulation.

Full text available upon request to the author

Clarissa C. David

Sex: Female

Education:

Doctor of Philosophy in Communication Research, University of Pennsylvania, 2006

Master of Arts in Communication Research, University of the Philippines, 2000

Bachelor of Arts in Communication, Ateneo de Manila University, 1998

Field of Specialization

Quantitative Research

Survey Research

Politics

Researches:

Article: Navigating Globalization in the Aftermath of COVID-19

Authors: Ronald U. Mendoza, Arsenio M. Balisacan, Sheena Valenzuela, Clarissa C. David, et al.

Publication title: SSRN Electronic Journal, January 2021

Abstract:

The COVID-19 pandemic has affected over 200 countries and territories, leading to well over 40 million confirmed cases and over 1.1 million deaths worldwide (covid19.who.int/). While many are hopeful, an effective vaccine is not yet assured, and the world still struggles with the so-called "new normal" during the pandemic. Meanwhile, even prior to the pandemic, deep structural "mega-trends" have been

sweeping across the world, notably the emergence of a new era of "digital globalization". These changes promise to re-shape international economic linkages just like the previous waves of globalization relating to trade, finance, and people. In important ways, this new globalization is linked to the 4th industrial revolution, which sees automation, artificial intelligence, the internet of things (IoT) and other technological trends reshaping not just the world economy, but also creating disruptions and spurring innovations in social and political spheres.

Using a Philippine perspective, it is critical to understand the implications of these waves of change, which are sweeping across the world. Intended as an evidence-based foresight analysis. this paper maps the main features of globalization in the aftermath of COVID-19; and it outlines some initial policy directions with a particular focus on science and technology. Its main recommendation is to focus the Philippines' effort to build-back-better from the health pandemic on areas that would improve on inclusive recovery from the pandemic, and inclusive development during the post-pandemic period.

Full text available upon request to the author

Article title: The Philippines' antidrug campaign: Spatial and temporal patterns of killings linked to drugs

Authors: Jenna Mae Atun, Ronald U. Mendoza, Clarissa C. David, Radxeanel Peviluar N. Cossid, et al.

Publication title: The International Journal on Drug Policy 73(1): 100-111, August 2019

Abstract:

Background: As soon as President Rodrigo Duterte assumed office in 2016, the Philippine government launched a nationwide anti drug campaign based on enforcement-led anti-illegal drugs policies primarily implemented by the national police. This was followed by a spate of killings resulting from both acknowledged police operations and by unidentified assailants. This study assembles a victim-level dataset of drug-related killings covered by the media during the Philippine government's anti drug campaign, and presents a spatial and temporal analysis of the killings. Methods: The dataset covers information on 5021 people killed from

May 10, 2016 to September 29, 2017. Data collected systematically through online search procedures and existing listings of media organizations detailing information about incidences of drug-related police operations and drug-related killings in 'vigilante-style' manner reveal patterns for who were being killed, where, and how. Results: Over half of the killings were due to acknowledged police operations, and the rest were targeted in so-called 'vigilante-style' killings. The first three months after Mr. Duterte was sworn in were the deadliest months. Those who were killed were mostly low-level drug suspects. The analysis of temporal pattern reveals the scale of killings in the country, with rapid escalation starting in July 2016 and lasting throughout the rest of that year. Observable declines occurred during periods when the 'drug war' was suspended and operations were moved to a non-police enforcement unit and rose again when police were brought back into operations. The spatial analysis indicates a large concentration of deaths in the National Capital Region (40%) compared to the rest of the country with wide variations across cities and regions. Conclusions: Overall, the Philippine 'drug war' exhibits similarities with violent wars on drugs waged in other countries such as Thailand, with heavily police-led interventions leading to fatalities in the thousands over a span of under two years. Findings of this study point to important policy adjustments that need to be made, including the role that local governments play in drug policy implementation, the disproportionate negative impacts of enforcement-led policies against drugs on urban and poor areas, the targeting of low-level suspected drug dealers and users, and the importance of proper data monitoring and transparency by the government to inform policy adjustments in the face of high costs to human life. We also discuss the importance of independent monitoring systems when the government reports conflicting information.

Full text available upon request to the author

Article: Crystallising the official narrative: News discourses about the killings from the Philippine government's campaign against illegal drugs

Authors: Cheryll Soriano, Clarissa C. David, Jenna Mae Atun

Publication title: Journalism, August 2019

Abstract:

News media's construction of crime and drugs can shape and change public perceptions and influence popular acceptance of policy and state responses. In this

way, media, through selection of sources and framing of narratives, act as important agents of social control, either independently or indirectly by state actors. This article examines how the Philippine government's anti-drug campaign, and the thousands of deaths resulting from them, has been depicted by the media to the public. We conducted a discourse analysis of television news stories to extract dominant frames and narratives, finding a pattern of over-privileging of State authority as a source, resulting in a monolithic message of justifying the killing of suspects. Furthermore, the 'event-focused' slant, which dominates the character of reports by media, inevitably solidifies the narrative that the deaths are a necessary consequence of a national public safety campaign. By relying almost exclusively on this narrative, to the exclusion of alternative frames, the media amplifies and crystallises the state's narrative. As we critically examine how drugs, drug use and the zero-tolerance policy are positioned through discourse in news texts, the article raises important implications to the ethics and role of journalism in politics and provides explanations relating to crime-reporting norms, values and media organisation realities in the country.

Full text available upon request to the author

Article: Reliance on Facebook for news and its influence on political engagement
Authors: Clarissa C. David, Ma. Rosel San Pascual, Ma. Eliz S. Torres
Publication title: PLoS ONE 14(3):e0212263, March 2019

Abstract:

This paper examines the link between reliance on Facebook for news, political knowledge, and political engagement in the Philippines. We tested five hypotheses using data gathered from an online survey of 978 Filipinos conducted from February 1 to March 31, 2016. Findings support the hypothesis that those who rely less on social media as a news source exhibit higher levels of perceived knowledge about politics than those who rely more on it for news. Controlling for traditional news use, following political officials or institutions on social media is associated with higher levels of political interest and engagement, those with more politically active friends on Facebook have higher levels of exposure to political content online, and

there is a positive correlation between Facebook being a source of information about politics and discussing politics more often with others. However, the hypothesis that those with more friends on their network who are politically active, will have greater political knowledge and more political engagement than those who have few politically active friends on their Facebook network is not supported.

Full text available upon request to the author

Article: Crystallizing the Official Narrative: News Discourses About the Killings from the Philippine Government's Campaign Against Illegal Drugs

Authors: Cheryll Soriano, Clarissa C. David, Jenna Mae Atun

Publication title: SSRN Electronic Journal, January 2019

Abstract:

The paper examines the media's role in shaping, crystallizing and amplifying a state-driven discourse of fear of illegal drug use, crime, and dehumanization of drug users. Drawing from a discourse analysis of news reports about the killings connected to the Philippine government's campaign against illegal drugs, the paper argues that privileging a single source (state authority) and taking an "event-focused" narrative slant which were found to dominate the character of the reports, may unwittingly contribute to the justification of the stateled policy of zero tolerance policing towards illegal drugs. The expectation of "neutral reporting" about crime compels journalists to be reliant on traditional sources of crime stories and leaves them constrained from critically examining the circumstances of the killings. The paper raises important implications to the ethics and role of journalism in politics and provides explanations relating to traditional crime reporting norms, values, and media organization realities.

Full text available upon request to the author

Article: School hazard vulnerability and student learning

Authors: Clarissa C. David, Sheryl Lyn Carreon Monterola, Antonino Paguirigan, Erika Fille Tupas Legara, et al.

Publication title: International Journal of Educational Research 92, August 2018

Abstract:

The Philippines is among the most exposed countries to natural hazards. Little is known about impacts of different natural hazards on academic gains or losses of cohorts of school children. Data from 33,704 elementary and 6337 secondary public schools (2009–2014) on typhoons, flood, earthquakes, and use as an evacuation center were analyzed. Provinces that are heavily populated and located near inland bodies of water are vulnerable to floods and those in the eastern side of the country are most vulnerable to typhoons. Correlational analyses on hazard vulnerability and change in school performance reveal that repeated use of school structures as evacuation centers has negative impact on school performance. There is provincial variability in magnitude of association between hazard vulnerability and test score gains/losses. These results have important implications on disaster mitigation and management in relation to education.

Full text available upon request to the author

Article: The Philippines Anti-Drug Campaign: Building a Dataset of Publicly-Available Information on Killings Associated With the Anti-Drug Campaign

Authors: Clarissa C. David, Ronal U. Mendoza, Jenna Mae Atun, Radxeanel Peviluar Cossid, et al.

Publication title: SSRN Electronic Journal, January 2018

Abstract: no available

Full text available upon request to the author

Article : Predicting vote choice for celebrity and political dynasty candidates in Philippine national elections

Authors: Clarissa C. David, Ma. Rosel San Pascual

Publication title: Philippine Political Science Journal 37(2): 1-12, July 2016

Abstract:

Media celebrities and political dynasts dominate Philippine electoral politics, but little individual-level research has been done to understand who votes for them. This article studies three senatorial election cycles, and based on the theoretical argument

that name recall plays a major role in vote choice in these elections, hypotheses are posed regarding associations with education, wealth status, media exposure, trust of the electoral process, and abstention rates. Tests indicate that wealthier voters and more educated ones are less likely to vote for media celebrities, and more highly educated voters are more likely to vote for dynastic candidates. No associations were found with media exposure and trust in elections. Abstention rates are highly associated with voting for media celebrity and dynastic candidates. Implications on the future of Philippine electoral politics are discussed.

Full text available upon request to the author

Article: Tweeting Supertyphoon Haiyan: Evolving Functions of Twitter during and after a Disaster Event

Authors: Clarissa C. David, Jonathan Corpus Ong, Erika Fille Tupas Legara

Publication title: PLoS ONE 11(3):E0150190, March 2016

Abstract:

When disaster events capture global attention users of Twitter form transient interest communities that disseminate information and other messages online. This paper examines content related to Typhoon Haiyan (locally known as Yolanda) as it hit the Philippines and triggered international humanitarian response and media attention. It reveals how Twitter conversations about disasters evolve over time, showing an issue attention cycle on a social media platform. The paper examines different functions of Twitter and the information hubs that drive and sustain conversation about the event. Content analysis shows that the majority of tweets contain information about the typhoon or its damage, and disaster relief activities. There are differences in types of content between the most retweeted messages and posts that are original tweets. Original tweets are more likely to come from ordinary users, who are more likely to tweet emotions, messages of support, and political content compared with official sources and key information hubs that include news organizations, aid organization, and celebrities. Original tweets reveal use of the site beyond information to relief coordination and response.

Full text available upon request to the author

Article: How Voters Combine Candidates on the Ballot: The Case of the Philippine Senatorial Elections

Authors: Erika Fille Tupas Legara and Clarissa C. David

Publication title: International Journal of Public Opinion Research 29(1), December 2015

Abstract:

In the Philippines, senators are nationally elected officials, and citizens vote for 12 candidates every three years. The country's electoral features include a weak party system, a low-information environment for voters, and a history of political dynasty rule and preponderance of media celebrities in elected political offices. The article first applies cluster analysis on exit poll data for the 2010 Senatorial Election and then examines predictors of Senatorial candidate sets. Hypotheses are proposed based on theories and evidence that name recall has important consequences in voter decision-making under low information circumstances, and that media celebrities and members of political dynasties benefit from the name recall vote. Findings support predictions that voters put media celebrities and members of national political dynasties together often on a ballot and that the voters who are likely to operate with little information are more likely to vote for these candidates. These are voters with low education and low income, who live in rural areas, and who exhibit high abstention rates.

Full text available upon request to the author

Article: News Frames of the Population Issue in the Philippines

Authors: Clarissa C. David, Erika Fille Tupas Legara, Jenna Mae Atun, Christopher P. Monterola

Publication title: International Journal of Communication 8(1):1247-1267, January 2014

Abstract:

Using automated semantic network analysis, this study examines media framing of the population issue in the Philippines through the different labels used to refer to it

in public discourse. The population issue has been relabeled and repackaged in legislation and other policy documents. This article examines how each relabeling of the issue was reflected in the media. Analysis of news articles published from 1987 to 2007 reveals that word clusters around each label reflect strategic framing of the terms population control, population management, family planning, reproductive health, responsible parenthood, and pro-life. Whereas population control and population management are associated with developmental and economic goals, reproductive health and family planning are more linked with women's and youth's health issues. The terms responsible parenthood and pro-life are mostly identified with the Catholic Church, with the latter more identified with positions on abortion and contraception.

Full text available upon request to the author

Article: ICTs in political engagement among youth in the Philippines

Authors: Clarissa C. David

Publication title: International Communication Gazette 75(3): 322-337, April 2013

Abstract:

Political engagement among young activists in the Philippines has changed since new media technologies have gained critical mass. This article reports on how engagement has been redefined by the young and how information and communication technologies (ICTs) have contributed to the amplification of their voices in political life. Activists and ordinary youth were interviewed through unstructured individual and group conversations, and they were asked about their definitions of political, civic, and social engagement. The expression of opinions online is highly valued as a political activity and is believed to be a politically consequential action. Young activists strategically use ICTs and social networks to gather support for their causes and to gain the attention of the traditional media and politicians.

Full text available upon request to the author

Article: Framing in Legislation: The Case of Population Policy in the Philippines

Authors: Clarissa C. David, Jenna Mae Atun, Antonio G.M. La Viña

Publication title: Population Research and Policy Review 31(2):297-319, April 2012

Abstract:

This paper investigates the political framing of population in policy discourse through an analysis of legislative documents. Semantic network analysis was conducted and results were interpreted through discourse analysis of the typical arguments identified. Policy texts were classified into three sets: population management, reproductive health and family planning, and anti-abortion and anti-FP. While the "population management" frame focuses on social and economic consequences of population growth, the "reproductive health" frame defines the problem from a health perspective. Both policies propose aggressive FP programs but each frame uses distinct political rhetoric and semantic approach in its arguments. The "anti-abortion and anti-FP" frame identifies two problems: rise in incidence of abortion and existing policy that prohibit health professionals from refusing patients information on contraception. By invoking a moral argument and anchoring on rights, these policies challenge the problem and solutions identified by the first two frames.

Full text available upon request to the author

Article: Finding Frames: Comparing Two Methods of Frame Analysis

Authors: Clarissa C. David, Jenna Mae Atun, Erika Fille Tupas Legara, Christopher Monterola

Publication title: Communication Methods and Measures 5(4): 329-351, December 2011

Abstract:

Detecting media frames has spawned a variety of methods, but very little has been done to investigate whether these methods provide comparable results. This article compares the results of two kinds of human coding framing analysis. The first is a method developed by Matthes and Kohring (2008) involving human coding of elements based on Entman's (1993) definition of frames, and the second coding is based on an extracted set of frames. Cluster analysis of news articles on population

published from 1987–2007 in the Philippines yielded an optimum number of three communities or frames that agree with the holistic predetermined frames. Results indicate support for the validity of both procedures. Methodological implications are further discussed.

Full text available upon request to the author

Article: Framing the population debate: A comparison of source and news frames in the Philippines

Authors: Clarissa C. David, Jenna Mae Atun, Antonio G.M. La Vina

Publication title: Asian Journal of Communication 20(3):337-353, September 2010

Abstract:

This study compares frames constructed by two sides of the Philippine population management debate with media frames of the issue. Analysis was conducted through neural network analysis with the CatPac computer program. On the one hand, supporters of the policy use a 'development frame' which defines population as a problem borne out of people having large families; it is argued that unchecked population growth negatively impacts on development outcomes such as education and income. In the development frame, the proposed solution is to institute a population management policy that promotes family planning (contraceptive use) to help Filipinos achieve their desired family size. Opponents on the other hand use two frames, one which equates the policies with abortion, and another which argues that such policies will lead to a degradation of moral values. Results delineate the competing frames from both sides and show that the media frame reflects both views, but that the discourse is presented as conflict.

Full text available upon request to the author

Article: Learning Political Information From the News: A Closer Look at the Role of Motivation

Authors: Clarissa C. David

Publication title: Journal of Communication 59(2), June 2009

Abstract:

This paper investigates how motivations that drive news use affect the process of learning political information from the news. A model that traces the influence of motivational factors on following news about general public affairs is proposed. Tests conducted with nationally representative surveys revealed that motivations for following general public affairs in the news are conceptually and empirically distinct. Results showed that certain psychological needs drive motivations toward following general news, and that various types of motives have independent effects on exposure and attention to news. Finally, we found that motivations have significant indirect effects on knowledge about politics. Implications on theoretical developments in political knowledge and learning are discussed.

Full text available upon request to the author

Article: Intergroup Attitudes and Policy Support: How Prejudice against Minority Groups Affects Support for Public Policies

Authors: Clarissa C. David

Publication title: International Journal of Public Opinion Research 21(1), March 2009

Abstract:

It is natural for humans to identify themselves with groups and use these group memberships as key self-identification mechanisms (Brewer & Miller, 1996). Such groups are important for social cohesion and support (Nelson, 2002). However, the existence of groups also introduces problems and negative behaviors because people will favor members of their own groups (ingroups) over those from other groups (outgroups; Allport, 1954; Hamilton, 1976; Ostrom & Sedikides, 1992). Social identity theory posits that people's conception of self is derived, in significant part, from the social groups and categories in which they belong (Hogg & Reid, 2006). Prejudice against "outgroup members" are often based on irrational and illogical reasons, and yet many educated and intelligent people continue to harbor such attitudes (Brewer, 1979; Nelson, 2002). Outgroup members are stereotyped, discriminated against, and marginalized (Hogg & Reid, 2006), and in the immediate past, religion, particularly Islam, has emerged as a category that is subject to increasing "outgroup prejudice" all over the world (Hussain, 2000; Weller, 2006).

Liberal democratic ideals support equality and equal protection under the law, regardless of race, gender, or religion. Historically, however, there are instances when

government policies support discrimination, or are guided by discriminatory tendencies among the public. Thus, the very government that professes to protect all people equally, at times – through policy – worsens prejudicial practices. If a majority of the public holds prejudicial attitudes against minority groups (based on group differences such as religion), and those attitudes directly affect opinions about support for policy proposals in line with prejudicial opinions, then a government that follows public opinion may end up institutionalizing policies that perpetuate discriminatory practices. This study, guided by ideas in social identity theory and self-categorization theory, examines the influence of individual beliefs in negative stereotypes on one's propensity to discriminate and the effects of both on support for aggressive government policy approaches to address religion-based conflict. It also examines the effect of reliance on media for information about minority groups on prejudice and discrimination.

The Philippine experience with conflict in its Southern region, where many Filipino Muslims reside, provides a context for this study. This country has been the site of continued armed conflict with the Moro front, which – some research argues – began and continues because of the marginalization and minoritization of the Filipino Islamic population (Santos, 2005).

Full text available upon request to the author

Joey Duran Ocon

Sex: Male

Education:

Doctor of Philosophy in Environmental Science and Engineering, Catalysis and Electronic Engineering, Gwangju Institute of Science and Technology, 2015

Master in Public Management, Ateneo de Manila University, *unfinished*

Master of Science in Chemical Engineering, University of the Philippines, 2011

Bachelor of Science in Chemical Engineering, University of the Philippines, 2008

Field of Specialization

Graphene

Electrochemical Analysis

Material Characterization

Nanomaterials

Carbon Nanomaterials

Nanostructured materials

X-ray diffraction

Researches:

Article title: Insights on platinum-carbon catalyst degradation mechanism for oxygen reduction reaction in acidic and alkaline media

Authors: Marc Francis Labata, Li Guangfu, Joey Duran Ocon, Po-Ya Abel Chuang

Publication title: Journal of Power Sources 487(5): 229356, March 2021

Abstract:

Developing durable electrocatalyst for oxygen reduction reaction (ORR) is essential for fuel cell commercialization. Herein, we perform a study of platinum-carbon (Pt/C) degradation mechanisms using potential cycling of accelerated durability testing protocols in acidic and alkaline media. Physicochemical results indicate that carbon surface oxides are formed after high-potential cycling in acid causing an increase in the double-layer capacitance and severe ORR activity loss due to Pt poisoning. Whereas, low-potential cycling in acid shows less ORR activity loss, mainly caused by Pt Ostwald ripening, and does not lead to a significant change in double-layer capacitance. In alkaline, the Pt/C catalyst after high-potential cycling shows a decrease of double-layer capacitance over time because of carbon layer dissolution. TEM images reveal larger Pt agglomerates in alkaline, due to high Pt mobility. These findings provide new insights into the role of catalyst and carbon support interface in developing mitigation strategies for stable fuel cell operation.

Full text available upon request to the author

Article title: Alkaline earth atom doping-induced changes in the electronic and magnetic properties of graphene: a density functional theory study

Authors: Ace Christian Feraren Serraon, Julie Anne D. del Rosario, Po-Ya Abel Chuang, Meng Nan Chong, et al.

Publication title: RSC Advances 11(11): 6268-6283, February 2021

Abstract:

Density functional theory was used to investigate the effects of doping alkaline earth metal atoms (beryllium, magnesium, calcium and strontium) on graphene. Electron transfer from the dopant atom to the graphene substrate was observed and was further probed by a combined electron localization function/non-covalent interaction (ELF/NCI) approach. This approach demonstrates that predominantly ionic bonding occurs between the alkaline earth dopants and the substrate, with beryllium doping having a variant characteristic as a consequence of electronegativity equalization attributed to its lower atomic number relative to carbon. The ionic bonding induces spin-polarized electronic structures and lower

workfunctions for Mg-, Ca-, and Sr-doped graphene systems as compared to the pristine graphene. However, due to its variant bonding characteristic, Be-doped graphene exhibits non-spin-polarized p-type semiconductor behavior, which is consistent with previous works, and an increase in workfunction relative to pristine graphene. Dirac half-metal-like behavior was predicted for magnesium doped graphene while calcium doped and strontium doped graphene were predicted to have bipolar magnetic semiconductor behavior. These changes in the electronic and magnetic properties of alkaline earth doped graphene may be of importance for spintronic and other electronic device applications.

Full text available upon request to the author

Article title: Unravelling the roles of alkali-metal cations for the enhanced oxygen evolution reaction in alkaline media

Authors: Julie Anne D. del Rosario, Li Guangfu, Marc Francis Labata, Joey Duran Ocon, et al.

Publication title: Applied Catalysis B: Environmental 288:119981, February 2021

Abstract:

The electrical double layer (EDL) structure and interfacial interactions are studied to illustrate the influence of alkali metal (AM) cations on alkaline oxygen evolution reaction (OER). The electrochemical measurements show that the OER activity both on IrOx and NiCo2O3 increases in the sequence of $Li^+ < Na^+ < Cs^+ < K^+$ mainly due to the various interaction strength of specifically adsorbed OHad intermediates and non-specifically adsorbed AM^+ad in the EDL. In particular, K^+ breaks the limitation of the adsorbate's linear scaling relation and enables a lattice-oxygen-mediated mechanism, resulting in enhancing activity. Further, based on our investigation, new strategies are proposed to synthesize Ir-Co oxide with modifications of various AM elements, such as Li, Na and K. The K-assistant Ir0.6Co0.4 amorphous oxide exhibits outstanding OER performance, i.e. 290 mV overpotential (without ohmic correction) at 10 mA cm^{-2}, and 36.9 mV dec^{-1} kinetic Tafel slope. The modification of potassium plays a crucial role for the superior performance, which highlights the importance of the interfacial engineering to facilitate the electron transfer reactions.

Full text available upon request to the author

Article title: What makes energy systems in climate-vulnerable islands resilient? Insights from the Philippines and Thailand

Authors: Laurence Delina, Joey Duran Ocon, Eugene, Jr. Agusan Esparcia

Publication title: Energy Research & Social Science 69:101703, November 2020

Abstract:

Destructive weather extremes – the key impacts of the climate emergency – acutely signal the need to increase the resiliency, especially of climate-vulnerable islands and its peoples. "Islands" are detached communities that are either geographically bounded by water or are metaphors for inland off-grid villages. The extant literature on resilient infrastructures is rich, but this corpus is mostly concentrated on food and water systems, security, and transport. Making energy systems resilient in islands, this paper argues, is equally important. In these island energy systems, resilience can be achieved by regarding them as sociotechnical assemblages where engineering innovation is co-produced alongside social and institutional shifts. This article suggests that resilient energy systems in islands can be checked against their explicit characteristics as a system condition, as a set of processes, and as a set of outcomes. Understanding power relations and ethical concerns are also important. To illustrate these characteristics, case studies from Romblon in the Philippines (a geographic island) and Petchaburi in Thailand (a metaphorical island) are provided. There is no perfect resilient island energy systems, but these illustrations show that they can be pursued.

Full text available upon request to the author

Article title: Projecting the Price of Lithium-Ion NMC Battery Packs Using a Multifactor Learning Curve Model

Authors: Xaviery Penisa, Michael Castro, Jethro Daniel Agbayani Pascasio, Eugene Jr. Agusan Esparcia

Publication title: Energies 13(20): 5276, October 2020

Abstract:

Renewable energy (RE) utilization is expected to increase in the coming years due to its decreasing costs and the mounting socio-political pressure to decarbonize the world's energy systems. On the other hand, lithium-ion (Li-ion) batteries are on track to hit the target 100 USD/kWh price in the next decade due to economy of scale and manufacturing process improvements, evident in the rise in Li-ion gigafactories. The forecast of RE and Li-ion technology costs is important for planning RE integration into existing energy systems. Previous cost predictions on Li-ion batteries were conducted using conventional learning curve models based on a single factor, such as either installed capacity or innovation activity. A two-stage learning curve model was recently investigated wherein mineral costs were taken as a factor for material cost to set the floor price, and material cost was a major factor for the battery pack price. However, these models resulted in the overestimation of future prices. In this work, the future prices of Li-ion nickel manganese cobalt oxide (NMC) battery packs - a battery chemistry of choice in the electric vehicle and stationary grid storage markets - were projected up to year 2025 using multi-factor learning curve models. Among the generated models, the two-factor learning curve model has the most realistic and statistically sound results having learning rates of 21.18% for battery demand and 3.0% for innovation. By year 2024, the projected price would fall below the 100 USD/kWh industry benchmark battery pack price, consistent with most market research predictions. Techno-economic case studies on the microgrid applications of the forecasted prices of Li-ion NMC batteries were conducted. Results showed that the decrease in future prices of Li-ion NMC batteries would make 2020 and 2023 the best years to start investing in an optimum (solar photovoltaic + wind + diesel generator + Li-ion NMC) and 100% RE (solar photovoltaic + wind + Li-ion NMC) off-grid energy system, respectively. A hybrid grid-tied (solar photovoltaic + grid + Li-ion NMC) configuration is the best grid-tied energy system under the current net metering policy, with 2020 being the best year to deploy the investment.

Full text available upon request to the author

Article title: Quantifying the Techno-Economic Potential of Grid-Tied Rooftop Solar Photovoltaics in the Philippine Industrial Sector

Authors: Patrick Gregory B. Jara, Michael Castro, Eugene Jr. Agusan Esparcia, Joey Duran Ocon

Publication title: Energies 13(19): 5070, October 2020

Abstract:

The industrial sector is a major contributor to the economic growth of the Philippines. However, it is also one of the top consumers of energy, which is produced mainly from fossil fuels. The Philippine industrial sector must therefore be supported economically while minimizing the emissions associated with energy consumption. A potential strategy for minimizing costs and emissions is the installation of solar photovoltaic (PV) modules on the rooftops of industrial facilities, but this approach is hindered by existing energy policies in the country. In this work, we performed a techno-economic assessment on the implementation of rooftop solar PV in Philippine industrial facilities under different policy scenarios. Our study considered 139 randomly sampled industrial plants under MERALCO franchise area in the Philippines. Under the current net metering policy, 132 of the evaluated facilities were economically viable for the integration of rooftop solar PV. This corresponds to an additional 1035 MW p of solar PV capacity and the avoidance of 8.4 million tons of CO 2 emissions with minimal financial risk. In comparison, an expanded net metering policy supports the deployment of 4653 MW p of solar PV and the avoidance of 38 million tons of CO 2. By enabling an enhanced net metering policy, the widespread application of rooftop solar PV may present considerable savings and emission reduction for energy-intensive industries (electrical and semiconductors, cement and concrete, steel and metals, and textile and garments) and lower generation costs for less energy intensive industries (construction and construction materials, transportation and logistics, and food and beverages).

Full text available upon request to the author

Article title: Fabrication of cellulose acetate-based radiation grafted anion exchange membranes for fuel cell application

Authors: Angelo Jacob Samaniego, Allison Kaye Itularde Arabelo, Mrittunjoy Sarker, Feliper Mojica, et al.

Publication title: Journal of Applied Polymer Science 138(10): September 2020

Abstract:

Novel cellulose acetate-based anion exchange membranes (CA-AEM) are successfully synthesized via gamma radiation grafting as a possible renewable alternative to commercial AEMs. Using CA film precursors with degree of acetylation of 2.5, the synthesized AEM shows a high ion exchange capacity of 2.15 mmol/g obtained at high degree of grafting of 45%. It was determined using thermogravimetric analysis that the radiation-grafted CA-AEM has stable amine functional groups under oxygen environment within the normal operating temperature range of alkaline fuel cells. The CA-AEM also exhibits appreciable performance over a range of temperatures, with a highest ionic conductivity of up to 0.163 S/cm depending on the synthesis parameters. Results revealed that membranes prepared using gamma radiation dose of 31 kGy and above are susceptible to mechanical and dimensional instability due to increased water uptake and degree of swelling. Further study should consider the balance between grafting parameters and the desired hydrophysical properties.

Full text available upon request to the author

Article title: Decentralized versus Clustered Microgrids: An Energy Systems Study for Reliable Off-Grid Electrification of Small Islands

Authors: Olivia Francesa B. Agua, Robert Joseph A. Basilio, Erschad D. Pabillan, Michael T. Castro, et al.

Publication title: Energies 13(17): 4454, August 2020

Abstract:

Philippine off-grid islands are mostly electrified by diesel generators, resulting in costly electricity that is interrupted by fuel supply disruptions. The archipelagic nature of the country also impedes off-grid electrification due to the high capital cost of grid extension. Transitioning from diesel-only systems to hybrid renewable energy systems and interconnecting the island microgrids can solve these problems while promoting cleaner energy production. In this work, a comparative study on

decentralized and clustered hybrid renewable energy system microgrids in the Polillo group of islands in the Philippines, using HOMER Pro, was performed. Microgrids comprising solar photovoltaics, lithium-ion battery energy storage, and diesel generators were designed on each island. Clustered systems encompassing multiple islands in the island group were simulated by also considering the least-cost interconnection paths. The techno-economics of each decentralized or clustered system and the four-island system were evaluated based on the levelized cost of electricity (LCOE). Reliability was assessed using the change in LCOE upon the failure of a component and during weather disturbances. Transitioning from diesel-only systems to hybrid systems reduces generation costs by an average of 42.01% and increases the renewable energy share to 80%. Interconnecting the hybrid systems results in an average increase of 2.34% in generation costs due to the cost of submarine cables but improves system reliability and reduces the optimum solar photovoltaic and lithium-ion storage installations by 6.66% and 8.71%, respectively. This research serves as a framework for the interconnection pre-feasibility analysis of other small off-grid islands.

Full text available upon request to the author

Article title: Spatiotemporal Variation of Groundwater Arsenic in Pampanga, Philippines

Authors: Kurt Louis B. Solis, Reygie Q. Macasieb, Roel C. Parangat, Augustus C. Resurreccion, et al.

Publication title: Water 12(9): 2366, August 2020

Abstract:

Several confirmed cases of arsenic (As) poisoning have been reported in Central Luzon, the Philippines, in recent years. There is a growing interest in As research in the Philippines due to the reported As poisoning cases. However, an extensive spatiotemporal As study has not been conducted. In this work, As concentration measurements were conducted in 101 wells in Guagua, Pampanga, in Central Luzon, the Philippines, from November 2018 to November 2019. The wells included 86 public hand pumps, 10 pumping stations, and 5 private, jet-powered pumps. Using

hydride generation—inductively coupled plasma—optical emission spectroscopy (HG-ICP-OES), analysis of the wells in 12 barangays in Guagua revealed that 38.7% had average As concentrations beyond the 10 ppb limit with some wells having high Mn (4.0 ppm) and Fe (2.0 ppm) content as well. The high pH and reducing conditions in the wells in Guagua may have contributed to the persistence of As in the groundwater. The mean difference in wet season versus dry season As measurements were –4.4 (As < 10 ppb), –13.2 (10 to 50 ppb As), and –27.4 (As > 50 ppb). Eighty-three wells (82.2%) had higher As concentrations in the dry season, 8 wells (7.92%) had higher As concentrations in the wet season, 7 wells (6.93%) had no significant difference between the wet and dry season, and 3 wells had been decommissioned. These results indicate that there is a significant difference in As concentrations in the wet and dry seasons, and this could have implications in water treatment technology and policy implementation. The work resulted in the first year-long characterization of groundwater As in the Philippines.

Full text available upon request to the author

Article title: Arsenic Removal by Advanced Electrocoagulation Processes: The Role of Oxidants Generated and Kinetic Modeling

Authors: Micah Flor Montefalcon, Meliton Chiong III, Augustus C. Resurreccion, Sergi Garcia-Segura, et al.

Publication title: Catalysts 10(8): 928, August 2020

Abstract:

Arsenic (As) is a naturally occurring element in the environment that poses significant risks to human health. Several treatment technologies have been successfully used in the treatment of As-contaminated waters. However, limited literature has explored advanced electrocoagulation (EC) processes for As removal. The present study evaluates the As removal performance of electrocoagulation, electrochemical peroxidation (ECP), and photo-assisted electrochemical peroxidation (PECP) technologies at circumneutral pH using electroactive iron electrodes. The influence of As speciation and the role of oxidants in As removal were investigated. We have identified the ECP process to be a promising alternative for the

conventional EC with around 4-fold increase in arsenic removal capacity at a competitive cost of 0.0060 $/m3. Results also indicated that the rate of As(III) oxidation at the outset of electrochemical treatment dictates the extent of As removal. Both ECP and PECP processes reached greater than 96% As(III) conversion at 1 C/L and achieved 86% and 96% As removal at 5 C/L, respectively. Finally, the mechanism of As(III) oxidation was evaluated, and results showed that Fe(IV) is the intermediate oxidant generated in advanced EC processes, and the contribution of •OH brought by UV irradiation is insignificant.

Full text available upon request to the author

Article title: Ethanol Electrooxidation on Phase- and Morphology-Controlled Ni(OH)2 Microspheres

Authors: Jun Jeffri B.Lidasan, Julie Anne D. del Rosario, Joey Duran Ocon

Publication title: Catalysts 10(7): 740, July 2020

Abstract:

The electrooxidation kinetics of ethanol is key to making direct ethanol fuel cells and electrocatalytically reforming ethanol viable technologies for a more sustainable energy conversion. In this study, the electrooxidation of ethanol was investigated on nickel hydroxide (Ni(OH)2) catalysts synthesized using a facile solvothermal method. Variations in the temperature, heating time, and the addition of oleylamine in the precursor enabled the phase and morphology control of the catalysts. X-ray diffraction and scanning electron microscopy show that the addition of oleylamine in the precursor resulted in microspheres with a high surface area, but favored the formation of β-phase Ni(OH)2. Elevated temperatures or prolonged periods of heating in a controlled environment, on the other hand, can lead to the formation of the ethanol oxidation reaction-active α-phase. Among the synthesized catalysts, the α-Ni(OH)2 microspheres with nanoflakes achieved the highest activity for ethanol oxidation with a current density of 24.4 mA cm−2 at 1.55 V (vs. RHE, reversible hydrogen electrode) in cyclic voltammetry tests and stable at 40 mA cm−2 in chronoamperometric tests at the same potential, comparatively higher than other Ni-based catalysts found in the literature. While the overpotential is beyond the useful

range for direct ethanol fuel cells, it may be useful for understanding the mechanism of ethanol oxidation reactions on transition metal hydroxides at their oxidizing potential for ethanol electroreforming.

Full text available upon request to the author

Article title: Experimental Study of Three Channel Designs with Model Comparison in a PEM Fuel Cell

Authors: Feliper Mojica, Azimur Rahman, J.M. Mora, Joey Duran Ocon, et al.

Publication title: Fuel Cells 20(5), June 2020

Abstract:

The flow field is an integral part of a proton exchange membrane fuel cell. In this work, three flow−field designs, including straight parallel, multiple channel serpentine, and single channel serpentine, are studied systematically to investigate their effects on fuel cell performance. To evaluate the characteristics of each design, relative humidity and flow rate are parametrically adjusted to evaluate performance experimentally. A finite element−based 3D steady state, single phase COMSOL computational model is employed to analyze reactant distribution and fuel cell performance. The single channel serpentine exhibits the best performance under the greatest variety of operating conditions, but also experiences the highest inlet−outlet pressure differentials. This study shows that parallel channel design has more evenly distributed reactant concentration, but is prone to liquid water accumulation, which requires high flow rate to remain stable operation under wet conditions. In summary, the multiple channel serpentine design can provide a reasonable balance between pressure drop and flow distribution with robust fuel cell operation.

Full text available upon request to the author

Article title: Cluster size effects on the adsorption of CO, O, and CO2 and the dissociation of CO2 on two-dimensional Cux (x = 1, 3, and 7) clusters supported on Cu(111) surface: a density functional theory study

Authors: Ellaine Rose A. Beronio, Anne Nicole P. Hipolito, Joey Duran Ocon, Hiroshi Nakanishi, et al.

Publication title: Journal of Physics Condensed Matter 32(40), May 2020

Abstract:

In this study, we performed density functional theory (DFT) based calculations to determine the effect of the size of Cux(x = 1 (adatom), 3 (trimer), 7 (heptamer)) cluster supported on Cu(111) toward the adsorption of CO, O, and CO2, and the dissociation of CO2. CO adsorbs with comparable adsorption energies on the different cluster systems, which are influenced by the reactivity of the Cu atoms in the cluster and the interaction of CO with the Cu atoms in the terrace. O atom, on the other hand, will always favor to adsorb on hollow sites and is more stable on hollow sites of smaller clusters. CO2dissociates with lower activation energy on the cluster region than on flat Cu(111). We obtained the lowest activation energy on Cu3due to its more reactive Cu atoms than the Cu7case, and due to the possibility of O to adsorb on the cluster region which is not observed for the Cu1case. The presented results will provide insights on future studies on supported cluster systems and on their possible use as catalysts for CO2-related reactions.

Full text available upon request to the author

Article title: A Comparative Techno-Economic Analysis of Different Desalination Technologies in Off-Grid Islands

Authors: Michael Castro, Myron Alcanzare, Eugene, Jr. Agusan Esparcia, Joey Duran Ocon

Publication title: Energies 13(9): 2261, May 2020

Abstract:

Freshwater in off-grid islands is sourced from rain, groundwater, or mainland imports, which are unreliable, limited, and expensive, respectively. Sustainable freshwater generation from desalination of abundant seawater is another alternative worth exploring. Model-based techno-economic simulations have focused on reverse osmosis desalination due to its low energy consumption and decreasing costs. However, reverse osmosis requires frequent and costly membrane replacement. Other desalination technologies have advantages such as less stringent feedwater requirements, but detailed studies are yet to be done. In this work, a techno-

economic comparison of multi-effect distillation, multi-stage flash, mechanical vapor compression, and reverse osmosis coupled with solar photovoltaic-lithium ion-diesel hybrid system was performed by comparing power flows to study the interaction between energy and desalination components. Optimization with projected costs were then performed to investigate future trends. Lastly, we used stochastic generation and demand profiles to infer uncertainties in energy and desalination unit sizing. Reverse osmosis is favorable due to low energy and water costs, as well as possible compatibility with renewable energy systems. Multi-effect distillation and multi-stage flash may also be advantageous for low-risk applications due to system robustness.

Full text available upon request to the author

Article title: Facile synthesis and characterisation of functional MoO3 photoanode with self-photorechargeability

Authors: Chun Yuan Chot, Meng Nan Chong, A.K. Soh, Khang Wei Tan, et al.

Publication title: Journal of Alloys and Compounds 838:155624, May 2020

Abstract:

There is a growing research interest in exploring the self-photorechargeability of photoanodes, which enables photoelectrochemical (PEC) water oxidation even under non-irradiated conditions. The main aim of this study was to develop a facile synthesis of molybdenum trioxide (MoO3) photoanode displaying self-photorechargeability using an aerosol-assisted chemical vapour deposition (AA-CVD) method. A systematic optimisation of the key synthesis parameters of AA-CVD method, namely: (1) ultrasonication time of precursor solution, and (2) annealing temperature was carried out in order to understand the best trade-off between photocurrent density (illuminated conditions) and charge density (non-illuminated conditions). Field emission-scanning electron microscopy images showed that the MoO3 photoanodes synthesized via AA-CVD method exhibited a 3D plate-like crystalline structure that gave a large voltammogram area, indicating that the MoO3 photoanodes possessed high charge storage capacity for photogenerated electrons. PEC measurements showed that the optimised MoO3

photoanode obtained during an ultrasonication time of 25 min and at the annealing temperature of 500 °C achieved a photocurrent density of 1.47 μA/cm² at 1.0 V vs Pt electrode. A significantly prolonged on-off illumination cycle (i.e. 1,000 s) showed a significant storage capacity of photogenerated electrons within the 3D plate-like MoO3 crystalline structure was discharged during the non-irradiated conditions, and a charge density of 0.35 mC/cm².

Full text available upon request to the author

Article title: Hydrothermally Carbonized Waste Biomass as Electrocatalyst Support for α-MnO2 in Oxygen Reduction Reaction

Authors: Harold Panganoron, Jethro Daniel Agbayani Pascasio, Eugene, Jr. Agusan Esparcia, Julie Anne D. del Rosario, et al.

Publication title: Catalysts 10(2):177, February 2020

Abstract:

Sluggish kinetics in oxygen reduction reaction (ORR) requires low-cost and highly durable electrocatalysts ideally produced from facile methods. In this work, we explored the conversion and utilization of waste biomass as potential carbon support for α-MnO2 catalyst in enhancing its ORR performance. Carbon supports were derived from different waste biomass via hydrothermal carbonization (HTC) at different temperature and duration, followed by KOH activation and subsequent heat treatment. Scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIR), energy dispersive X-ray spectroscopy (EDX) and X-Ray diffraction (XRD) were used for morphological, chemical, and structural characterization, which revealed porous and amorphous carbon supports for α-MnO2. Electrochemical studies on ORR activity suggest that carbon-supported α-MnO2 derived from HTC of corncobs at 250 °C for 12 h (CCAC + MnO2 250-12) gives the highest limiting current density and lowest overpotential among the synthesized carbon-supported catalysts. Moreover, CCAC + MnO2 250-12 facilitates ORR through a 4-e− pathway, and exhibits higher stability compared to VC + MnO2 (Vulcan XC-72) and 20% Pt/C. The synthesis conditions preserve oxygen functional groups and form porous structures in corncobs, which resulted in a highly stable

catalyst. Thus, this work provides a new and cost-effective method of deriving carbon support from biomass that can enhance the activity of α-MnO2 towards ORR.

Full text available upon request to the author

Article title: Exploration of a novel Type II 1D-ZnO nanorods/BiVO4 heterojunction photocatalyst for water depollution

Authors: Jan Seng Chang, Yi Wen Phuan, Meng Nan Chong, Joey Duran Ocon

Publication title: Journal of Industrial and Engineering Chemistry 83, December 2019

Abstract:

In this study, we reported on the successful fabrication of a novel heterojunction photocatalyst (in particulate system) with a Type II band alignment between 1D-ZnO nanorods and BiVO4 nanocrystals. Pristine 1D-ZnO nanorods and BiVO4 nanocrystals were first fabricated through hydrothermal reaction followed by heterojunction formation via the wet chemical reaction. The 1D-ZnO/xBiVO4 heterojunction photocatalyst (x = weight ratio of BiVO4 in g) that found optimum when x = 0.08 g was used for the degradation of salicylic acid (SA) and Reactive Black 5 (RB5) resulting in high pseudo-first-order reaction rate constants of 0.0049 min^{-1} and 0.0132 min^{-1}, respectively. Electrochemical studies proved that the 1D-ZnO/0.08BiVO4 heterojunction photocatalyst demonstrated a fast charge mobility and the most efficient photogenerated charge carriers separation among other heterojunction samples as analysed from PL spectra. Besides, UV–vis spectroscopic measurement and optical characterisation showed that the improved photoactivity in 1D-ZnO/BiVO4 is attributed to the formation of a Type II heterojunction staggered arrangement that enables a broader visible-light harvesting ability. Finally, a postulation photocatalytic mechanism was proposed based on the theoretical band alignment diagram between the 1D-ZnO nanorods and BiVO4 nanocrystals as well as portraying the fundamental charge carriers transfer within the 1D-ZnO/BiVO4 heterojunction photocatalyst.

Full text available upon request to the author

Article title: Impacts of morphological-controlled ZnO nanoarchitectures on aerobic microbial communities during real wastewater treatment in an aerobic-photocatalytic system

Authors: Jang Sen Chang, Meng Nan Chong, Phaik Eong Poh, Joey Duran Ocon, et al.

Publication title: Environmental Pollution 259: 113867, December 2019

Abstract:

This study aimed to evaluate the impacts of morphological-controlled ZnO nanoarchitectures on aerobic microbial communities during real wastewater treatment in an aerobic-photocatalytic system. Results showed that the antibacterial properties of ZnO nanoarchitectures were significantly more overwhelming than their photocatalytic properties. The inhibition of microbial activities in activated sludge by ZnO nanoarchitectures entailed an adverse effect on wastewater treatment efficiency. Subsequently, the 16S sequencing analysis were conducted to examine the impacts of ZnO nanoarchitectures on aerobic microbial communities, and found the significantly lower microbial diversity and species richness in activated sludge treated with 1D-ZnO nanorods as compared to other ZnO nanoarchitectures. Additionally, 1D-ZnO nanorods reduced the highest proportion of Proteobacteria phylum in activated sludge due to its higher proportion of active polar surfaces that facilitates Zn2+ ions dissolution. Pearson correlation coefficients showed that the experimental data obtained from COD removal efficiency and bacterial log reduction were statistically significant (p-value < 0.05), and presented a positive correlation with the concentration of Zn2+ ions. Finally, a non-parametric analysis of Friedman test and post-hoc analysis confirmed that the concentration of Zn2+ ions being released from ZnO nanoarchitectures is the main contributing factor for both the reduction in COD removal efficiency and bacterial log reduction.

Full text available upon request to the author

Article title: Cost Saving Potential of Grid-tied Solar Photovoltaic-based Hybrid Energy System in the Philippine Industrial Sector

Authors: Patrick Gregory Jara, Michael Castro, Eugene, Jr. Agusan Esparcia, Carl Odulio, et al.

Publication title: Chemical Engineering Transactions 76:937-942, October 2019

Abstract:

The Philippine Industrial Sector contributes USD 124x109 (~PHP 6.5x1012) or about 1/3 in the economy. However, the electricity cost, which is 2nd highest in Asia, constitutes up to 10 % of their total operating expenses. This hinders foreign direct investment to the country. Solar photovoltaic grid-tied hybrid energy systems are one of the emerging ways to reduce electricity expenses of the industrial sector. Current net-metering policy, which enables grid-tied systems, restricts the export of energy to the grid up to 100 kWp with compensation equal to the average generation rate of the distribution utility. This work evaluates the techno-economic viability of putting up solar photovoltaic grid-tied hybrid energy systems for 66 randomly selected industrial establishments classified under electrical/electronics/ semiconductors, steel/metal, food/beverages, transportation/logistics and textile/ garment sub-sectors using Island System LCOEmin Algorithm (ISLA). ISLA will provide the optimal system component sizes of solar photovoltaic and battery in the least levelized cost of electricity (LCOE) by performing hourly calculations for one reference year using actual load profiles. The results suggest 63 out of 66 sample industrial establishments are viable to put up solar photovoltaic grid-tied hybrid energy systems, with a total solar photovoltaic capacity of 783 MWp. There are 7 establishments that are capable of off-grid solar photovoltaic-battery-diesel configuration. If export restriction in net-metering policy is lifted, the total solar photovoltaic potential will significantly increase up to 3,947 MWp, which corresponds to LCOE reduction to USD 0.14 (~PHP 7.2) per kWh and increase in renewable energy share to 34 %. This work shows that tapping solar rooftop potential and amending the net-metering policy increases operational savings of the Philippine industrial sector.

Full text available upon request to the author

Article title: Long-Discharge Flywheel Versus Battery Energy Storage for Microgrids: a Techno-Economic Comparison

Authors: Eugene Jr. Agusan Esparcia, Michael Castro, Roger Evangelista Buendia, Joey Duran Ocon

Publication title: Chemical Engineering Transactions 76:949-954, October 2019

Abstract:

The energy storage deployment becomes necessary as more renewable energy sources are being installed to achieve sustainable energy access in off-grid areas. Battery prices, however, still hinder massive deployment. One of the energy storage technologies being developed for microgrid applications are flywheels, which stores energy through rotational kinetic energy and are typically suited for high power applications. With the advent of long-discharge flywheels, such as those being marketed by Amber Kinetics® and Beacon Power®, they can be used in microgrids, which are dominated by batteries. This study provides a techno-economic comparison with sensitivity analysis between long-discharge flywheel and utility-scale lithium-ion battery for microgrid applications. The results show lowest levelized cost of electricity (LCOE) for flywheel-based hybrid energy system with 0.345 USD/kWh and renewable share of 62.4 % among tested configurations. The competitiveness of long-discharge flywheel over lithium-ion battery in the microgrid market depends on the diesel prices, expected reduction in lithium-ion battery prices, and improvements in lithium-ion battery lifespan.

Full text available upon request to the author

Article title: Waste Biomass Integration to Reduce Fuel Consumption and Levelized Cost of Electricity in Philippine Off-Grid Islands

Authors: Marco Angelo Decujos, Eugene, Jr. Agusan Esparcia, Joey Duran Ocon

Publication title: Chemical Engineering Transactions 76:943-948, October 2019

Abstract:

A techno-economic assessment was made for thirteen large off-grid islands in the Philippines using HOMER Pro (Hybrid Optimization Model for Electric Renewables

Software) to determine the feasibility of integrating waste biomass into their energy systems. Sensitivity analysis on the diesel fuel prices and biomass feedstock prices was performed to determine their effects on the levelized cost of electricity (LCOE) and the renewable energy (RE) share. The results suggest that an average LCOE reduction of around 4.57 %, fuel reduction of 5.71 %, and RE share increase of 4.99 % can be realized by integrating biomass to the existing diesel system even without incorporation of other renewable energy generators such as solar photovoltaics. In cases where biomass is available in large quantities, and the energy demand is relatively low, LCOE reduction, fuel reduction, and RE share increase may even reach up to more than 20 %. This makes the integrated biomass-diesel hybrid system a viable option for reducing diesel consumption in the off-grid islands. And even with the establishment of a feedstock market, the biomass-diesel hybrid system still has a lower LCOE compared to the existing diesel-only systems. This work provides the first systematic techno-economic study on the potential of incorporating waste biomass in off-grid islands.

Full text available upon request to the author

Article title: A Techno-Economic Assessment of Small Energy Access Microgrids in the Philippines

Authors: Patricia Baricaua, Eugene, Jr. Agusan Esparcia, Carl Odulio, Joey Duran Oron

Publication title: Chemical Engineering Transactions 76:967-972, October 2019

Abstract:

In an effort to expedite the electrification in off-grid areas in the Philippines, the Qualified Third Party (QTP) scheme encourages private sector to engage in power generation and distribution business through competitive selection, a process that requires at least two rival bidders with rigorous registration requirements. An exemption is offered for microgrids with sub-100 kW capacity by not undergo competitive selection in order to further attract investors and private sector to engage in these off-grid areas since these areas are deemed highly unviable. The Department of Energy opened around 995 areas waived by electric cooperatives for

third party servicing. The sub-100 kW capacity can serve areas with fewer than 500 household connections, which fits the profile of the 995 areas. In this work, the techno-economic feasibility of installation of sub-100 kW microgrids is done in order to know the required level of subsidies, loans, and/or grants to sustainably operate in these areas. The proposed microgrids were evaluated using ISLA, an open-source microgrid optimizer validated by HOMER Pro, by finding the optimal system component sizes of solar PV, battery, and diesel generators with the least levelized cost of electricity (LCOE). Initial results suggest initial investment cost for the establishment of 15 sub-100 kW microgrids ranged from USD 0.5 to 1 M (~PHP 25 to 55 M), with LCOE averaged at PHP 10.26/kWh. This corresponds to 30 % reduction relative to the LCOE from using diesel generator only. Strategies such as partial financing and full grant of capital expenditures show that the former can provide generation rates at par with typical generation rates of existing electric cooperatives at ~PHP 5 to 6 per kWh, while full subsidy can significantly reduce the generation cost to PHP 2 to 3 per kWh. Providing long term and low interest rates from financial institutions to fund these projects will help hasten the deployment of sub-100 kW microgrids. To achieve financial sustainability in these areas, productive use of energy through income generating projects should be highly encouraged in order to give the inhabitants the capacity to pay.

Full text available upon request to the author

Article title: Technoeconomics of Reverse Osmosis as Demand-Side Management for Philippine Off-Grid Islands

Authors: Michael Castro, Eugene, Jr. Agusan Esparcia, Carl Odulio, Joey Duran Ocon

Publication title: Chemical Engineering Transactions 76:1129-1134, October 2019

Abstract:

Providing water supply in off-grid islands is difficult due to remoteness and high logistics cost. Despite interest in providing energy sustainability in these areas, there is relatively lesser interest in coupling it with sustainable water access. One of the possible solutions is through the use of reverse osmosis (RO) technology for

desalination since it has a low energy requirement and high throughput. In this work, the techno-economic viability of incorporating desalination units was elucidated as demand-side management in different dispatch algorithm, accounting water-energy nexus. Different water-energy system configurations were optimized and simulated using ISLA, an open-source microgrid optimizer. Results suggest the viability of installing desalination units with a minimum-level dispatch algorithm yielding the lowest levelized cost of water (LCOW) with only minimal increase in the levelized cost of electricity (LCOE).

Full text available upon request to the author

Article title: Grid Parity and Defection Studies in Major Philippine Cities Using Solar Photovoltaic-Plus-Storage Configuration

Authors: Niel Gabriel Enriquez Saplagio, Eugene Jr., Agusan Esparcia, Henning Meschede, Patrick Gregory Jara, et al.

Publication title: Chemical Engineering Transactions 76:995-960, October 2019

Abstract:

Due to the rapidly declining costs of solar photovoltaic (solar PV) modules and batteries, the possibility of defecting from the grid is starting to become an alternative for some consumers. Should many consumers defect from the grid, given the current rate structures, electricity prices would increase even faster which will further encourage more people to defect from the grid. This positive feedback loop has been called the “utility death spiral”. Previous grid defection studies were conducted in the United States, Australia, as well as some countries in Europe. In this work, the technical feasibility and economic viability of grid parity and defection were determined for residential customers in the major cities of the Philippines (Manila, Cebu and Davao) based on the franchise areas of Manila Electric Company, Visayan Electric Company, and Davao Light and Power Company. The grid defection analysis was divided into customer clustering, levelized cost of electricity (LCOE) calculation, and finally grid parity comparison. Three main clusters were identified based on the k-means clustering by utilizing 18 different features in order to get a more detailed overview on how many customers

of each type are more likely to defect based on the representative load profiles from MERALCO. Average silhouette widths of 0.657, 0.587 and 0.585 were obtained for the three clusters. Based on the clusters, the LCOE of optimally sized solar PV-battery systems were calculated using Hybrid Optimization Model for Multiple Energy Resources Software, from 2018 up to 2050. The LCOE data were then compared to the projected retail electricity prices based on the actual data from the mentioned distribution utilities to find the economic viability of grid defection per customer cluster. Results show that grid parity and defection would be possible for residential customers starting in the next 30 y, with customers from Cebu more likely to defect first followed by Manila and then Davao. Based on the clustering, it was observed that the grid parity occurred earliest in Cluster C, followed by Cluster B, and then Cluster A. Different scenarios were also explored depending on the rate of decrease of local prices of photovoltaics, lithium-ion batteries, and a combination of both. Results show that decreasing battery prices play a bigger role achieving grid parity in the country.

Full text available upon request to the author

Article title: Optimal Multi-Criteria Selection of Energy Storage Systems for Grid Applications

Authors: Eugene, Jr. Agusan Esparcia, Jethro Daniel Agbayani Pascasio, Raymond R. Tan, et al.

Publication title: Chemical Engineering Transactions 76:1153-1158, October 2019

Abstract:

Currently, a wide variety of energy storage alternatives are available, each with a unique set of characteristics advantageous on selective applications. Current studies focus only on levelized costs on predicting the best-fit technology for specific applications. The study addresses this limitation by considering multiple factors on the selection process among technologies for specific applications. A systematic approach on the selection of energy storage technologies based on multiple and possible conflicting factors was proposed in this study for two specific applications: frequency regulation and load levelling. Fuzzy Analytic Hierarchy Process was

utilized to generate the relative importance of each criterion. Monte Carlo simulations were performed to reflect the effect of battery characteristics and operating parameters uncertainties on the resulting scores of technologies. Grey Relational Analysis was used to aggregate the performance attributes of alternatives into a single score reflecting the desirability of alternatives. The levelized costs dominated all other criteria for both applications. Lithium ion battery dominated all technologies for both applications resulting from its well-rounded performance across all considered attributes. Results emphasized the importance of considering socio-economic indicators alongside techno-economic parameters on selecting the technology for future deployment. Thorough analysis on the results is important not only for decision-makers but for developers and innovators as well to direct future research.

Full text available upon request to the author

Article title: High Renewable Energy (Solar Photovoltaics and Wind) Penetration Hybrid Energy Systems for Deep Decarbonization in Philippine Off-grid Areas

Authors: Jethro Daniel Agbayani Pascasio, Eugene, Jr. Agusan Esparcia, Carl Odulio, Joey Duran Ocon

Publication title: Chemical Engineering Transactions 76:1135-1140, October 2019

Abstract:

The Philippines has many off-grid areas relying on diesel generators for energy access, but have high greenhouse gas emissions, high electricity costs, and intermittent operation. An opportunity to decarbonize the energy system of off-grid islands is by harnessing both solar photovoltaic (PV) and wind power. This work evaluates the techno-economic viability of putting up solar PV-wind-battery-diesel hybrid energy systems in 143 existing off-grid island areas operated by the National Power Corporation-Small Power Utilities Group (NPC-SPUG) using HOMER® Pro. The application obtains the optimal system component sizes with the least levelized cost of electricity (LCOE). The results suggest that there are 137 islands capable of using both solar PV and wind generation, 4 islands using solar PV only, and 2 islands using wind only. The hybrid energy systems in the sample islands require

USD 774,171,061 (~ PHP 40,643,980,682) worth of investment cost with potential annual savings of USD 132,403,163 (~ PHP 6,951,166,051). The resulting system capacities and their corresponding LCOEs suggest high sensitivity towards wind potential due to lower capital cost of wind and potential higher energy share up to 58.47 %. Wind generation for off-grid islands should be considered alongside solar PV, especially in areas with high wind potential, to provide reliable energy access and reduce greenhouse gas emissions.

Full text available upon request to the author

Article title: On the transferability of smart energy systems on off-grid islands using cluster analysis – A case study for the Philippine archipelago

Authors: Henning Meschede, Eugene, Jr. Agusan Esparcia, Peter K. R. Holzapfel, Paul Bertheau, et al.

Publication title: Applied Energy 251, October 2019

Abstract:

Islands are highly diverse in their climatic, physical, social, and economic characteristics. Thus, each island's energy system needs to be designed according to its specific features. However, similarities among islands exist which can enable the fast transfer of concepts and experiences with energy systems. In the Philippines, only few off-grid islands are incorporating smart energy systems through hybrid electricity systems. While most off-grid islands still do not have access to electricity, the majority of off-grid Philippine islands having access to electricity are powered primarily by diesel-fired generators. In this work, a cluster analysis is performed for 502 off-grid islands in the Philippine archipelago, classifying the islands according to their similarities in socio-economic and physical characteristics, and indigenous energy resource potential. The results show that most of the islands belong to five clusters of very small and small islands for which photovoltaic-battery systems would be the favourable backbone of a future energy system based on renewable energies. These islands show a varying level of feasibility for harnessing wind energy. In medium and big islands, opportunities of linking electricity systems to water supply and thermal energy loads as well as to the transport sector, are

identified and their relevance in the clusters is discussed. The results are consistent with the validation of the individual characteristics of chosen off-grid islands. The cluster analysis results support policy makers and private investors in deciding which smart energy system projects are suitable for which particular islands.

Full text available upon request to the author

Article title: Electrolyte-Dependent Oxygen Evolution Reactions in Alkaline Media: Electrical Double Layer and Interfacial Interactions

Authors: Li Guangfu, Maricor Fernandez Divinagracia, Marc Francis Labata, Joey Duran Ocon, et al.

Publication title: ACS Applied Materials & Interfaces 11(37), August 2019

Abstract:

Traditional understanding of electrocatalytic reactions generally focuses on either covalent interactions between adsorbates and the reaction interface (i.e., electrical double layer, EDL) or electrostatic interactions between electrolyte ions. Here, our work provides valuable insights into interfacial structure and ionic interactions during alkaline oxygen evolution reaction (OER). The importance of inner-sphere OH- adsorption is demonstrated as the IrO x activity in 4.0 M KOH is 6.5 times higher than that in 0.1 M KOH. Adding NaNO3 as a supporting electrolyte, which is found to be inert for long-term stability, complicates the electrocatalytic reaction in a half cell. The nonspecially adsorbed Na+ in the outer compact interfacial layer is suggested to form a stronger noncovalent interaction with OH- through hydrogen bond than adsorbed K+, leading to the decrease of interfacial OH- mobility. This hypothesis highlights the importance of outer-sphere adsorption for the OER, which is generally recognized as a pure inner-sphere process. Meanwhile, based on our experimental observations, the pseudocapacitive behavior of solid-state redox might be more reliable in quantifying active sites for OER than that measured from the conventional EDL charging capacitive process. The interfacial oxygen transport is observed to improve with increasing electrolyte conductivity, ascribing to the increased accessible active sites. The durability results in a liquid alkaline electrolyzer which shows that adding NaNO3 into KOH solution leads to additional

degradation of OER activity and long-term stability. These findings provide an improved understanding of the mechanistic details and structural motifs required for efficient and robust electrocatalysis.

Full text available upon request to the author

Article title: Multi-Dimensional Zinc Oxide (ZnO) Nanoarchitectures as Efficient Photocatalysts: What is the fundamental factor that determines photoactivity in ZnO?

Authors: Jang Sen Chang, Jennifer Strunk, Meng Nan Chong, Phaik Eong Poh, et al.

Publication title: Journal of Hazardous Materials 381:120958, August 2019

Abstract:

While bulk zinc oxide (ZnO) is of non-toxic in nature, ZnO nanoarchitectures could potentially induce the macroscopic characteristics of oxidative, lethality and toxicity in the water environment. Here we report a systematic study through state-of-the-art controllable synthesis of multi-dimensional ZnO nanoarchitectures (i.e. 0D-nanoparticle, 1D-nanorod, 2D-nanosheet, and 3D-nanoflowers), and subsequent in-depth understanding on the fundamental factor that determines their photoactivities. The photoactivities of resultant ZnO nanoarchitectures were interpreted in terms of the photodegradation of salicylic acid as well as inactivation of Bacillus subtilis and Escherichia coli under UV-A irradiation. Photodegradation results showed that 1D-ZnO nanorods demonstrated the highest salicylic acid photodegradation efficiency (99.4%) with a rate constant of 0.0364 min-1. 1D-ZnO nanorods also exhibited the highest log reductions of B. subtilis and E. coli of 3.5 and 4.2, respectively. Through physicochemical properties standardisation, an intermittent higher k value for pore diameter (0.00097 min-1 per mm), the highest k values for crystallite size (0.00171 min-1 per nm) and specific surface area (0.00339 min-1 per m2/g) contributed to the exceptional photodegradation performance of nanorods. Whereas, the average normalised log reduction against the physicochemical properties of nanorods (i.e. low crystallite size, high specific surface area and pore diameter) caused the strongest bactericidal effect.

Full text available upon request to the author

Article title: Interaction of CO, O, and CO2 with Cu cluster supported on Cu(111): A density functional theory study

Authors: Allan Abraham Bustria Padama, Joey Duran Ocon, Hiroshi Nakanishi, Hideaki Kasai

Publication title: Journal of Physics Condensed Matter 31(41), June 2019

Abstract:

We performed density functional theory (DFT) based calculations to investigate the interaction of CO2 and its dissociated species (CO and O) on Cu3 cluster supported on Cu(111) (Cu3/Cu(111)) surfaces. Similar investigations were conducted on Cu(111) for purpose of comparison. In general, adsorption of CO and O are stronger on the cluster region than on the terrace region of Cu3/Cu and on the flat Cu surface. CO2, on the other hand, is weakly adsorbed on the surfaces. With reference to CO2 dissociation on Cu(111), we found that the cluster lowers the activation barrier and provides a more stable adsorption of the dissociated species. The presence of co-adsorbed CO in the cluster, however, will increase the activation energy. The variation in the activation barrier with the amount of CO is influenced by the stability of the O atom from the dissociated CO2. We further found that the adsorption energy of O atom is a possible descriptor for CO2 dissociation on the cluster region. The Cu cluster supported on Cu surface could be a promising catalyst for CO2 related reactions based on the lower activation energy for CO2 dissociation on the system than on Cu(111).

Full text available upon request to the author

Article title: One-pot hydrothermal synthesis of heteroatom co-doped with fluorine on reduced graphene oxide for enhanced ORR activity and stability in alkaline media

Authors: Yvonne Ligaya F. Musico, Nitul Kakati, Marc Francis Labata, Joey Duran Ocon, et al.

Publication title: Materials Chemistry and Physics 236:121804, June 2019

Abstract:

Boron (B) or nitrogen (N) was co-doped with fluorine (F) on reduced graphene oxide (rGO) using a low cost and simplified one-pot hydrothermal treatment method avoiding complicated technology, such as gas phase deposition or high temperature pyrolysis method. X-ray photoelectron microscopy spectra revealed successful doping of heteroatoms into the rGO. The Brunauer-Emmett-Teller (BET) results demonstrated that high surface areas of B–F-rGO and N–F-rGO are favorable for O2 adsorption. Electrochemical evaluations show that B–F-rGO and N–F-rGO catalysts have improved oxygen reduction reaction (ORR) catalytic performance in alkaline media compared to B-rGO and N-rGO. A Koutechy-Levich (KL) analysis and rotating ring disk electrode (RRDE) measurements suggest that both electrocatalysts dominantly favor a 4-electron reduction process. These heteroatoms co-doped with fluorine on rGO exhibit remarkable long-term ORR stability than the Pt/C. These improved electrochemical properties indicate that B–F-rGO and N–F-rGO are promising candidates as cost-effective electrode materials for energy related applications.

Full text available upon request to the author

Article title: Synthesis of Silver-Doped Titanium Dioxide Nanotubes by Single-Step Anodization for Enhanced Photodegradation of Acid Orange 52

Authors: Edgar Clyde Lopez, Joey Duran Ocon, Jem Valerie D. Perez

Publication title: Materials Science Forum 950:149-153, April 2019

Abstract:

Silver-doped TiO2 nanotubes (Ag-TiNTs) were synthesized in a top-down approach by single-step anodization of titanium sheets. The highly-ordered array of Ag-TiNTs was confirmed by scanning electron microscopy with an average inner diameter of 41.28 nm and a wall thickness of 35.38 nm. Infrared spectroscopy confirmed the presence of O-Ti-O bonds. Analysis of the X-ray powder diffraction profiles showed the characteristic peaks for anatase and titanium for both pristine TiNTs and Ag-TiNTs. Ag-doping caused no observed changes in the crystalline structure of pristine TiNTs. High-definition X-ray fluorescence spectroscopy revealed that the

synthesized Ag-TiNTs have 0.05 wt% Ag-loading. Even at low Ag-loading, the Ag-TiNTs were shown to be photo-active, achieving 10.13% degradation of Acid Orange 52 under UV illumination after 120 min.

Full text available upon request to the author

Article title: Monatomic oxygen adsorption on halogen-substituted monovacant graphene

Authors: Reynaldo M. Geronia, Allan Abraham B. Padama, Po-Ya Abel Chuang, Meng Nan Chong, et al.

Publication title: International Journal of Hydrogen Energy 43(37), August 2018

Abstract:

Doping of graphene-based materials with heteroatoms relies on the disruption of existing charge densities found on pristine graphene. Even though it is known that this phenomenon helps catalyze oxygen reduction reaction (ORR), there are only a few theoretical studies regarding the use of halogen as dopants despite their high electronegativity differences with carbon. Using density functional theory calculations, this work explores the low-concentration halogenation of monovacant graphene as well as the adsorption of oxygen atom onto resulting halogen-based substrates (X = F, Cl, Br, I). In general, formation of doped graphene and the subsequent adsorption of monatomic oxygen is more favored in non-coplanar systems than in their coplanar counterparts. In addition, F-based systems exhibited the most favorable energetics for monoatomic adsorption and electronic properties among the four substrates. Electronegativity also plays a key role on the destruction and formation of molecular structures during the adsorption of monatomic oxygen. Further work with adsorption of O2 on these substrates is warranted to elucidate their potential to catalyze ORR.

Full text available upon request to the author

Article title: Ammonium Vanadium Bronze (NH4V4O10) as a High-Capacity Cathode Material for Nonaqueous Magnesium-Ion Batteries

Authors: Eugene, Jr. Agusan Esparcia, Munseok S. Chase, Joey Duran Ocon, Seung-Tae Hong

Publication title: Chemistry of Materials 30(11), May 2018

Abstract:

Magnesium-ion batteries (MIBs) offer improved safety, lower cost, and higher energy capacity. However, lack of cathode materials with considerable capacities in conventional nonaqueous electrolyte at ambient temperature is one of the great challenges for their practical applications. Here, we present high magnesium-ion storage performance and evidences for the electrochemical magnesiation of ammonium vanadium bronze NH4V4O10, as a cathode material for MIBs. NH4V4O10 was synthesized via a conventional hydrothermal reaction. It shows reversible magnesiation with an initial discharge capacity of 174.8 mAh g–1, and the average discharge voltage of ~2.31 V (vs. Mg/Mg2+) using 0.5 M Mg(ClO4)2 in acetonitrile as the electrolyte. Cyclic voltammetry, galvanostatic, discharge–charge, FTIR, XPS, Powder XRD, and elemental analyses unequivocally show evidences for the reversible magnesiation of the material and suggests that keeping the ammonium ions in the interlayer space of NH4V4O10 could be crucial for the structural stability with a sacrifice of initial capacity but much enhanced retention capacity. This is the first demonstration of electrochemical magnesiation with a high capacity above 2 V (vs Mg/Mg2+) using a conventional organic electrolyte with a relatively low water concentration.

Full text available upon request to the author

Article title: Electrochemically-synthesized tungstate nanocomposites γ-WO 3 / CuWO 4 and γ-WO 3 /NiWO 4 thin films with improved band gap and photoactivity for solar-driven photoelectrochemical water oxidation

Authors: Tao Zhu, Meng Nan Chong, Eng Seng Chan, Joey Duran Ocon

Publication title: Journal of Alloys and Compounds 762(11), May 2018

Abstract:

The main aim of this study was to synthesize and characterise tungstate (WO3) nanocomposites with its metal-based nanostructures, such as copper (II) tungstate (CuWO4) and nickel tungsten oxide (NiWO4), as visible-light active thin film photoanodes for solar-driven photoelectrochemical (PEC) water oxidation. FE-SEM and AFM results showed that the bare as-deposited WO3 films were transformed into polycrystalline WO3 structure with highly agglomerated surfaces and roughness during the annealing-induced crystallisation process. XRD results suggested that the bare as-deposited WO3 films undergone phase transformation process from amorphous to the photoactive monoclinic-I (γ-WO3) at 550 °C. XPS results indicated the existence of $WO4^{2-}$, Ni^{2+} and Cu^{2+} ions at 35.58 eV, 856 eV and 932.4 eV, respectively. Through the formation of WO3 nanocomposites, the energy band gap was effectively lowered from 2.7 eV (γ-WO3) → 2.3 eV (γ-WO3/CuWO4) → 2.1 eV (γ-WO3/NiWO4) as estimated from the UV–Vis spectra. Finally, the corresponding photoactivity of WO3 nanocomposites was estimated by measuring the photocurrent density and γ-WO3/NiWO4 nanocomposite structure was found to give the highest photocurrent density of 400 μA/cm² at 1.5 V vs Ag/AgCl (4 M KCl).
Full text available upon request to the author

Article title: Energy Transition from Diesel-based to Solar Photovoltaics-Battery-Diesel Hybrid System-based Island Grids in the Philippines – Techno-Economic Potential and Policy Implication on Missionary Electrification
Authors: Paul Berheau, Joey Duran Ocon
Publication title: Journal of Sustainable Development of Energy and Water and Environment Systems 7(1), April 2018

Abstract:
The cost of unsubsidized electricity in off-grid areas, particularly in the islands dependent on fossil fuels, is expensive. Previous studies and recent installations have proven that renewable energy-based hybrid systems could be suitable alternative to diesel power plants in island grids. In this comprehensive analysis of small island grids in the Philippines, results show that there is a huge economic potential to shift the diesel generation to solar photovoltaics-battery-diesel hybrid

systems, with an average cost reduction of around 20% of the levelized cost of electricity. By encouraging private sector participation, hybridization could help provide electrification for twenty-four hours, stabilize the true cost of generation rate with less dependence on imported diesel prices, and reduce greenhouse gas emissions. Further, the declining cost of solar modules and batteries will significantly improve the economics of energy transition in the island grids.

Full text available upon request to the author

Article title: Synthesis and characterisation of a novel bilayer tungsten trioxide nanojunction with different crystal growth orientation for improved photoactivity under visible light irradiation

Authors: Tao Zhu, Meng Nan Chong, Eng Seng Chan, Joey Duran Ocon

Publication title: Journal of Alloys and Compounds 749, March 2018

Abstract:

The main aim of this study was to prove the concept and elucidate the effect of a bilayer tungsten trioxide (WO3) nanojunction with different crystal growth orientation for improved photoactivity under visible light irradiation. For the first time, the concept of a bilayer WO3 nanojunction with different crystal growth orientation was demonstrated. A layer-by-layer assembly for the bilayer WO3 nanojunction with the same monoclinic ɣ-WO3 crystal structure, but with two different crystal growth orientation of {002} at 600 °C and {200} at 500 °C was synthesized via the controlled electrodeposition-annealing method. Photocurrent measurements showed that the individual photoactivity of WO3 thin film with {002} crystal growth orientation was higher than that of WO3 thin film with {200} crystal growth orientation, while the bilayer WO3 nanojunction with different crystal growth orientation exhibited the highest photoactivity. To further characterise the bilayer WO3 nanojunction, X-ray diffraction (XRD), field emission-scanning electron microscopy (FE-SEM), high resolution-transmission electron microscopy (HRTEM), X-ray photoelectron spectroscopy (XPS), and photocurrent density measurements were performed. Based on the findings, a theoretical postulation model was proposed in explaining the transfer of photogenerated charge carriers in bilayer

WO3 nanojunction that leads to improved photoactivity under visible light irradiation.

Full text available upon request to the author

Article title: Pseudocapacitive Behavior of Ni(OH)2/NiO Hierarchical Structures Grown on Carbon Fiber Paper

Authors: Luigi Dahonog, Joey Duran Ocon, Mary Donnabelle Balela

Publication title: Solid State Phenomena 266:17-181, October 2017

Abstract:

Transition metal oxides and hydroxides, specifically nickel (Ni), are currently being studied for their pseudocapacitive behaviors due to their high specific capacitance and efficient redox reactions. In this study, nickel oxide (NiO) and nickel hydroxide [Ni (OH)2] hierarchical structures were grown on carbon fiber paper via hydrothermal treatment for a binder-free electrode for pseudocapacitor. Cyclic voltammetry was employed to determine the influence of annealing temperature on the specific capacitance of NiO-and/or Ni (OH)2 – carbon fiber electrodes. The NiO – carbon fiber electrode annealed at 400°C exhibited the highest specific capacitance of about 1993.12 F/g at a scan rate of 2 mV/s. The carbon fibers were fully covered by NiO platelets which possibly provide efficient transport of electrolyte, enhancing the capacitance.

Full text available upon request to the author

Article title: Prospects of Electrochemically Synthesized Hematite Photoanodes for Photoelectrochemical Water Splitting: A Review

Authors: Yi Wen Phuan, Wee-Jun Ong, Meng Nan Chong, Joey Duran Ocon

Publication title: Journal of Photochemistry and Photobiology C Photochemistry Reviews 33:54-82, October 2017

Abstract:

Hematite (α-Fe2O3) is found to be one of the most promising photoanode materials used for the application in photoelectrochemical (PEC) water splitting due to its

narrow band gap energy of 2.1 eV, which is capable to harness approximately 40% of the incident solar light. This paper reviews the state-of-the-art progress of the electrochemically synthesized pristine hematite photoanodes for PEC water splitting. The fundamental principles and mechanisms of anodic electrodeposition, metal anodization, cathodic electrodeposition and potential cycling/pulsed electrodeposition are elucidated in detail. Besides, the influence of electrodeposition and annealing treatment conditions are systematically reviewed; for examples, electrolyte precursor composition, temperature and pH, electrode substrate, applied potential, deposition time as well as annealing temperature, duration and atmosphere. Furthermore, the surface and interfacial modifications of hematite-based nanostructured photoanodes, including elemental doping, surface treatment and heterojunctions are elaborated and appraised. This review paper is concluded with a summary and some future prospects on the challenges and research direction in this cutting-edge research hotspot. It is anticipated that the present review can act as a guiding blueprint and providing design principles to the scientists and engineers on the advancement of hematite photoanodes in PEC water splitting to resolve the current energy- and environmental-related concerns.

Full text available upon request to the author

Article title: A novel ternary nanostructured carbonaceous-metal-semiconductor eRGO/NiO/α-Fe2O3 heterojunction photoanode with enhanced charge transfer properties for photoelectrochemical water splitting

Authors: Yi Wen Phuan, Meng Nan Chong, Joey Duran Ocon, Eng Seng Chan

Publication title: Solar Energy Materials and Solar Cells 169:236-244, September 2017

Abstract:

A novel ternary hematite (α-Fe2O3)-based nanostructured photoanode with excellent photoelectrochemical (PEC) performance consisting of 2D-electrochemical reduced graphene oxide (eRGO) and nickel oxide (NiO) was successfully developed through electrodeposition synthesis method. Surface morphology studies showed that the flexible eRGO sheets provided intimate and coherent interfaces between α-

Fe2O3, NiO, and eRGO that enhanced charge transfer properties and thus, lowering the recombination rate of photogenerated electron-hole pairs. The incorporation of eRGO and NiO has also endowed α-Fe2O3 nanostructured photoanode with a wider spectral absorption range, where the light absorption intensities in the visible light and near infrared regions were improved. Electrochemical impedance spectroscopy analysis further confirmed that the ternary eRGO/NiO/α-Fe2O3 nanostructured photoanode possessed the lowest charge transfer resistance among all as-synthesized photoanodes. This indicates that the combinatorial effects of eRGO and NiO could improve the electron mobility and prolong the recombination process of photogenerated charge carriers that result in enhanced PEC performance. In this instance, the eRGO sheets act as surface passivation layer and electron transporting bridge that increase the electrons transfer at the semiconductor/liquid junction. Whilst NiO serves as hole scavenger that also effectively hinders the recombination of photogenerated electron-hole pairs, and provides electron donor centres that accelerate the interfacial charge transfer. Finally, the hydrogen evolution rate from the ternary eRGO/NiO/α-Fe2O3 nanostructured photoanode was measured to be 92 μmol h^{-1} cm^{-2}, which was about 3-fold higher than bare α-Fe2O3 nanostructured photoanode. It is expected that the fundamental understanding gained through this study is helpful for the rational design and construction of highly efficient ternary nanostructured heterojunction photoanodes for application in PEC water splitting.

Full text available upon request to the author

Article title: Electrochemical Oxidation Remediation of Real Wastewater Effluents – A review

Authors: Sergi Garcia-Segura, Joey Duran Ocon, Meng Nan Chong

Publication title: Process Safety and Environmental Protection 113, September 2017

Abstract:

Fate and health risks associated with persistent organic pollutants present in water effluents are one of the major environmental challenges of this century. In this paper, the electrochemical advanced oxidation process electrochemical oxidation is reviewed for its performance over the treatment of actual industrial and urban

effluents. The electrochemical treatment of industrial effluents resulting from textile dyeing, petrochemical, paper mill, tannery industry as well as the treatment of domestic and urban wastewaters are discussed. Furthermore, the combination of electrochemical oxidation with other water treatment technologies as pre-treatment, post-treatment, and integrated treatment is also examined.

Full text available upon request to the author

Article title: Effect of Adsorption Structures of Adsorbates (CO, COH, HCO) in Adsorbate-Induced Migration of Pd Atoms in PdCu(111)

Authors: Allan Abraham Bustria Padama, Anna Patricia S. Cristobal, Joey Duran Ocon, Wilson Angerico Diño, et al.

Publication title: The Journal of Physical Chemistry C 121(33), July 2017

Abstract:

We investigated the influence of adsorbates to the tendency of Pd atom migration in PdCu(111) with CO, COH, and HCO as adsorbates using density functional theory (DFT) based calculations. We modeled several Pd alloyed Cu(111) surfaces, which we referred as PdCu(111), by substituting a small number of Cu atoms of Cu(111) with Pd atoms. Pd atoms are located in the topmost and in the subsurface layers. The stability of the surfaces and the possibility of Pd atom migration in the presence of adsorbate are predicted based on the stability of the systems with various arrangements of Pd atoms in the topmost and in the subsurface layers. In clean PdCu(111) surface, Pd atoms prefer to remain as non-aggregated atoms in the surface. It is more energetically favored if higher number of Pd atoms exist in the topmost layer than in subsurface layer. In the presence of the adsorbed molecules, however, we showed that Pd atoms could possibly migrate either parallel or perpendicular to the surface plane until they form the aggregated Pd configuration. CO and HCO facilitate the migration process regardless of Pd atom composition in the topmost and subsurface layers. Adsorption of these molecules is dictated by the coordination of Pd atoms in the topmost layer. On the other hand, COH will prefer to have more Pd atoms in the topmost layer due to its stable adsorption on the fcc

hollow site. With these results, we conclude that the adsorption structure of the molecules can influence Pd migration in PdCu surfaces.

Full text available upon request to the author

Article title: A First-Principles Study on the Electronic and Structural Properties of Halogen-Substituted Graphene

Authors: Reynaldo Marcelino Geronia, Ace Christina Feraren Serraon, Allan Abraham Bustria Padama, Joey Duran Ocon

Publication title: ECS Transactions 77(11): 607-620, July 2017

Abstract:

In this work, we explore the properties of halogen-substituted graphene through density functional theory (DFT) calculations. Energetics and charge analysis calculations show that fluorine (F)-doped systems exhibit favorable properties like negative adsorption energies and consistent electron withdrawal ability. In addition, the densities of states (DOS) of systems involving secondarily bonded fluorine show Dirac cone-like structures below and F-1s/2px/2py-associated peaks above the Fermi level. Further work with spin polarization, nudged elastic band, and oxygen adsorption calculations is recommended to assess the potential of the above-mentioned F-based systems for synthesis and oxygen reduction reaction (ORR) activity.

Full text available upon request to the author

Article title: CoMn2O4Anchored on N-Doped High-Dimensional Hierarchical Porous Carbon Derived from Biomass for Bifunctional Oxygen Electrocatalysis

Authors: James Lincuna Digol, Marc Francis Labata, Maricor Fernandez Divinagracia, Joey Duran Oron

Publication title: ECS Transactions 77(11):525-531, July 2017

Abstract:

There is an emerging interest in developing bifunctional oxygen electrocatalysts for oxygen reduction reaction (ORR) and oxygen evolution reaction (OER), being key

electrochemical reactions that govern the overall performance of unitized regenerative fuel cells and rechargeable metal-air batteries. However, such undertaking has been a huge challenge due to the high cost of noble metals (e.g. Pt, Ir) and their stability when used as catalysts. Herein, we report CoMn2O4 embedded on three-dimensional (3D) hierarchical porous carbon (HPC) derived from waste corn cobs as a possible noble metal-free bifunctional electrocatalyst. The hybrid catalyst is fabricated by solvothermal reaction of as-prepared N-doped 3DHPC and CoMn2O4. The template-free approach in preparing N-3DHPC ensures ample nitrogen doping using melamine to improve electronic conductivity of carbon and formation of three-dimensional, interconnected pore network, which is favorable for CoMn2O4 crystal dispersion. The same hybrid material also presents good OER activity, rendering an active and inexpensive dual-function electrocatalyst.

Full text available upon request to the author

Article title: Exploring Novel Dopants in Graphene: Unique Properties, Group Trends, and New Insights from DFT for Electrocatalytic Applications

Authors: Joey Duran Ocon, Ace Christian Feraren Serraon, Wilbert James Claridad Futalan, Reynaldo Marcelino Geronia, et al.

Publication title: ECS Transactions 77(11):1383-1391, July 2017

Abstract:

This exploration on various new dopants for graphene and graphitic carbon nitride through ab-initio density functional theory (DFT) calculations was able to predict feasible structural configurations for these doped systems. Emergent electronic and magnetic properties have been predicted for these new classes of carbon-based two dimensional nanomaterials. In particular, alkaline-earth doped graphenes and halogen doped graphenes were qualitatively found to have potential as catalysts for the oxygen reduction reaction (ORR) due to their favorable electronic and magnetic properties as indicated by previous studies.

Full text available upon request to the author

Article title: Carbon DioxideCO2Electrocatalytic Recycling on Electrodeposited Nanostructured Copper-Gold Electrodes

Authors: Karl Adrian Gandionco, Desiree Mae Sua-an Prado, Julie Anne D. del Rosario, Joey Duran Ocon

Publication title: ECS Transactions 77(11): 1433-1438, July 2017

Abstract:

Electrocatalytic recycling of carbon dioxide provides an ideal storage medium for renewable energy sources while off-setting the emissions of CO2 into the environment. It requires, however, an appropriate electrocatalyst to efficiently produce valuable organic molecules. In this study, electrodeposited nanostructured Cu-Au alloys were used as electrocatalysts for CO2 reduction. XRD and EDS mapping confirmed the deposition of Cu and Au. On the other hand, cyclic voltammetry verifies the activity of the fabricated catalysts towardsCO2 reduction.

Full text available upon request to the author

Article title: S-Doped Graphitic Carbon Nitride as Potential Catalyst towards Oxygen Reduction Reaction

Authors: Wilbert James Claridad Futalan, Ace Christian Feraren Serraon, Allan Abraham Bustria Padama, Joey Duran Ocon

Publication title: ECS Transactions 77(11):621-628, July 2017

Abstract:

Graphitic carbon nitride (GCN) is a polymeric material, which consists of carbon and nitrogen connected *via* tri-s-triazine-based patterns. By performing density functional theory (DFT) based study, we show that substitutional doping of various nitrogen sites by sulfur resulted in modification not only in terms of geometry of GCN but also in its electronic properties. In particular, it was shown that depending on the location of the dopant, sulfur can either donate or withdraw electrons from its neighboring carbon atoms. This property can be utilized to tune the electronic properties of graphitic carbon nitride to allow the optimum adsorption of oxygen on the catalyst surface.

Full text available upon request to the author

Article title: Quantum Chemical Predictions on Alkaline-Earth Doped Graphene: A Density Functional Theory (DFT) Based Investigation for a Novel Class of Carbon-Based Two-Dimensional Nanomaterials toward Electrochemical, Catalytic, and Electronic Applications

Authors: Ace Christian Feraren Serraon, Allan Abraham Bustria Padama, Julie Anne D. del Rosario, Joey Duran Ocon

Publication title: ECS Transactions 77(11): 629-636, July 2017

Abstract:

Predictions for the physical, chemical, electronic and magnetic properties of alkaline earth doped graphenes (AE-graphenes) were performed using density functional theory (DFT) calculations. Alkaline earth doping in graphene is feasible based on the adsorption energy, with alkaline earth dopants tending to adopt a nonplanar configuration when substitutionally doped in graphene. Electron transfer from the dopant atom to the graphene substrate was determined to be the primary mode of interaction within the system. Magnetic properties were also predicted for most of the AE-graphenes, with Mg-, Sr- and Ba-graphenes having ferromagnetic properties and Ca-graphene having ferrimagnetic properties. Previous DFT studies on Be-graphene were also successfully replicated and verified by this study. The unique emergent properties (i.e. electronic conductivity, spin polarization, local charge differences) of AE-graphene is promising for various applications such as catalytic, electrochemical, and electronics.

Full text available upon request to the author

Article title: Formation of Ni(OH))2 hybrid structures on Carbon Cloth

Authors: Luigi Dahonog, Joey Duran Ocon, Mary Donnabelle Balela

Publication title: IOP Conference Series Materials Science and Engineering 201(1): 012030, May 2017

Abstract:

Nickel hydroxide [Ni(OH)2] structures were successfully grown on carbon cloth via hydrothermal treatment followed by annealing. The Ni(OH)2 structures grown on carbon cloth were characterized using X-Ray Diffraction (XRD) and Scanning Electron Microscope (SEM) analysis. XRD analysis revealed the formation of α and β phases of Ni(OH)2. Microflowers and interconnected grass-like particles were observed on the surface of the carbon cloth. The as-prepared sample could be a promising material for the fabrication of high energy storage devices because of its unique structures.

Full text available upon request to the author

Article title: Employing electrochemical reduced graphene oxide as a co-catalyst for synergistically improving the photoelectrochemical performance of nanostructured hematite thin films

Authors: Yi Wen Phuan, Meng Nan Chong, T. Zhu, E. S. Chan, et al.

Publication title: Journal of the Taiwan Institute of Chemical Engineers 71:510-517, 2017

Abstract:

In this study, a series of electrochemical reduced graphene oxide (eRGO)-hematite nanocomposites were developed through a facile and environmental benign two-step electrodeposition method with high photoelectrochemical (PEC) performance. The resulting nanocomposites formed an intimate contact between the eRGO and hematite interface as supported by the field emission-scanning electron microscopy (FE-SEM) analysis. A remarkable 8-fold enhancement in the photocurrent density was observed on the eRGO-hematite-4 nanocomposite (using 2.0 mg/ml GO precursor) relative to the bare hematite under light irradiation. This improvement is ascribed to the finely controlled eRGO sheets that enhance the light absorption, increase PEC active surface area of hematite, improve efficient transfer of the photoinduced electrons from the conduction band of hematite to eRGO sheets and as a result leads to a minimised electron–hole pairs recombination rate. This was further evidenced with impedance characteristics, where the obtained surface charge resistance values of eRGO-hematite-4 nanocomposite are much lower than the bare

hematite, revealing an efficient charge transfer step to impede the charge recombination. Lastly, a postulated mechanism for the PEC process associated with eRGO-hematite nanocomposite was presented.

Full text available upon request to the author

Article title: Dip-coating synthesis of high-surface area nanostructured FeB for direct usage as anode in metal/metalloid-air battery

Authors: Graniel Harne Abrenica, Joey Duran Ocon, J. Lee

Publication title: Current Applied Physics 16(9):1075-1080, September 2016

Abstract:

Multi-electron reaction anodes have been exciting battery materials due to their exceptionally high energy densities. Herein, nanostructured iron borides (nanoFeB) have been synthesized via dip-coating chemical reduction in conjunction with a heat treatment procedure and were directly used as anodes in a metal/metalloid-air battery. The crystal structure, particle size, BET surface area, and electrochemical properties of iron boride samples treated at four different temperature conditions (200 °C, 300 °C, 400 °C, and 500 °C) were investigated using scanning electron microscopy (SEM), transmission electron microscopy (TEM), X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), N2 adsorption-desorption isotherms, potentiodynamic polarization, and electrochemical impedance spectroscopy (EIS). The nanoFeB heat-treated at 300 °C (nanoFeB300) exhibits the highest surface area among reported values in literature and demonstrates excellent anode discharge performance in a metal/metalloid-air battery.

Full text available upon request to the author

Article title: In Situ Ni-doping During Cathodic Electrodeposition of Hematite for Excellent Photoelectrochemical Performance of Nanostructured Nickel Oxide-Hematite p-n Junction Photoanode

Authors: Yi Wen Phuan, Elyas Ibrahim, Meng Nan Chong, Tao Zhu, et al.

Publication title: Applied Surface Science 392, September 2016

Abstract:

Nanostructured nickel oxide-hematite (NiO/α-Fe2O3) p-n junction photoanodes synthesized from in situ doping of nickel (Ni) during cathodic electrodeposition of hematite were successfully demonstrated. A postulation model was proposed to explain the fundamental mechanism of Ni2+ ions involved, and the eventual formation of NiO on the subsurface region of hematite that enhanced the potential photoelectrochemical water oxidation process. Through this study, it was found that the measured photocurrent densities of the Ni-doped hematite photoanodes were highly dependent on the concentrations of Ni dopant used. The optimum Ni dopant at 25 M% demonstrated an excellent photoelectrochemical performance of 7-folds enhancement as compared to bare hematite photoanode. This was attributed to the increased electron donor density through the p-n junction and thus lowering the energetic barrier for water oxidation activity at the optimum Ni dopant concentration. Concurrently, the in situ Ni-doping of hematite has also lowered the photogenerated charge carrier transfer resistance as measured using the electrochemical impedance spectroscopy. It is expected that the fundamental understanding gained through this study is helpful for the rational design and construction of highly efficient photoanodes for application in photoelectrochemical process.

Full text available upon request to the author

Article title: Effects of electrodeposition synthesis parameters on the photoactivity of nanostructured tungsten trioxide thin films: Optimisation study using response surface methodology

Authors: Tao Zhu, Meng Nan Chong, Yi Wen Phuan, Joey Duran Ocon

Publication title: Journal of the Taiwan Institute of Chemical Engineers 61, January 2016

Abstract:

The main aim of this study was to synthesize and characterise nanostructured tungsten trioxide (WO3) thin films via electrodeposition and subsequently, optimise the electrodeposition synthesis parameters using response surface methodology

(RSM). Statistical Box-Behnken RSM design was used to investigate and optimise the effects of four independent electrodeposition synthesis parameters, namely: deposition time, precursor tungsten (W) concentration, annealing temperature and pH. In addition, the synergistic interaction between different electrodeposition synthesis parameters was identified and quantified in enabling a higher photoactivity achievable by nanostructured WO3 thin films. Resultant nanostructured WO3 thin films were characterised using field-emission scanning electron microscopy (FE-SEM), X-ray diffraction (XRD) and photocurrent density measurements under one-Sun irradiation. From the electrodeposition synthesis process, it was found that there was a gradual increase in the nanocrystallites WO3 size from 30 nm to 70 nm when the annealing temperature was varied between 400 °C and 600 °C. XRD results verified the existence of the same photoactive phase of monoclinic WO3 with increasing annealing temperature with the preferred growth orientation along the (002) planar. Whilst from the Box-Behnken RSM design, it was found that the optimum deposition time, precursor W concentration, annealing temperature and pH were: 60 min, 0.15 mol/L, 600 °C, and pH 1.0, respectively. The highest photocurrent density of 120 μA/cm2 was measured at 1 V (versus Ag/AgCl) for nanostructured WO3 thin film synthesized at the optimum conditions as informed by the Box-Behnken RSM. Further analysis and validation of the Box-Behnken RSM model using analysis of variance (ANOVA) revealed that the RSM-derived statistical predictive model was robust, adequate and representative to correlate the various electrodeposition synthesis parameters to photocurrent density. This study highlights the importance to systematically optimise the electrodeposition synthesis parameters in order to achieve a higher photocurrent density on nanostructured WO3 thin film for sustainable hydrogen production from photoelectrochemical water splitting reaction.

Full text available upon request to the author

Article title: Enhanced electrical and mass transfer characteristics of acid-treated carbon nanotubes for capacitive deionization

Authors: Joey Duran Ocon

Publication title: Current Applied Physics 15(11), November 2015

Abstract:

Capacitive deionization (CDI) has attracted significant attention for the next generation water treatment due to its low energy consumption and environment friendly properties in comparison to widely established methods. For CDI technology to move forward, however, the development of carbon electrodes having superb electrosorption behavior is essential. In this study, we demonstrate the functionalization of carbon nanotubes (CNTs) via acid treatment shows enhanced electrochemical characteristics and effectively improves the wettability of the acid-treated CNTs (a-CNTs) via the addition of oxygen functional groups, leading to a higher electric double layer capacitance. Furthermore, defect formation in a- CNTs increases the conductivity and decreases the mass transfer resistance during CDI operation. CDI measurements confirmed a 270% increase in performance of a-CNTs in contrast to pristine CNTs (p-CNTs), attributable to the improved characteristics outlined above.

Full text available upon request to the author

Article title: Direct power generation from waste coffee grounds in a biomass fuel cell

Authors: Hansem Jang, Joey D. Ocon, Seunghwa Lee, Jae Kwang Lee, et al.

Publication title: Journal of Power Sources 296(20):433-439, November 2015

Abstract:

We demonstrate the possibility of direct power generation from waste coffee grounds (WCG) via high-temperature carbon fuel cell technology. At 900 °C, the WCG-powered fuel cell exhibits a maximum power density that is twice than carbon black. Our results suggest that the heteroatoms and hydrogen contained in WCG are crucial in providing good cell performance due to its in-situ gasification, without any need for pre-reforming. As a first report on the use of coffee as a carbon-neutral fuel, this study shows the potential of waste biomass (e.g. WCG) in sustainable electricity generation in fuel cells.

Full text available upon request to the author

Article title: High Power Density Semiconductor-Air Batteries Based on P-Type Ge with Different Crystal Orientations

Authors: Joey Duran Ocon, Graniel Harne Abrenica, Jaeyoung. Lee

Publication title: ChemElectroChem 3(2), November 2015

Abstract:

The quasi−perpetual discharge behavior of Ge anodes in semiconductor–air batteries was first demonstrated in our previous studies, marked by high anode utilization and a flat discharge profile over long−term discharge operation. In this Article, we show the crystal orientation dependence of the discharge behavior of p−type Ge anodes. In general, p−type Ge anodes at the low−index crystal indices could operate in the milliampere−scale current range and at high power densities, in stark contrast to the current−limited operation of Si–air batteries.

Full text available upon request to the author

Article title: An optimized mild reduction route towards excellent cobalt-graphene catalysts for water oxidation

Authors: Doungkamon Phihusut, Joey Duran Ocon, Jae K. Lee, J. Lee

Publication title: RSC Advances 5(80). July 2015

Abstract:

Low cost yet efficient water oxidation catalysts are crucial in making economically competitive water electrolyzers and secondary metal-air batteries. In this study, we demonstrate the optimized mild reduction of graphene oxide towards the synthesis of highly active and stable cobalt-graphene electrocatalysts for water oxidation. Contrary to the conventional use of fully reduced graphene oxide (RGO) as composite material in electrocatalysis, our results suggest that the oxygen functional groups, which are retained during mild GO reduction, are crucial in the formation of cobalt oxalate (CoC2O4) microstructures. Gently reduced graphene oxide (gRGO) with low degree of reduction results to CoC2O4/gRGO microrods with impressive water oxidation activity, reaching current densities 21.1% higher than conventional

iridium oxide-based catalysts and 70.5% more than the unoptimized CoC2O4/gRGO catalysts. Mild reduction of GO favors the homogeneous formation of microstructures via the negatively-charged functional groups, which attract the positive Co ions and lead to stronger chemical interaction between the two components. This work points towards investigating and reevaluating the role of the degree of GO reduction on graphene's contribution to the composition and catalytic activity of metal-graphene composites.

Full text available upon request to the author

Article title: Ultrahigh purification in concentrated NaOH by electrowinning for solar cell application

Authors: Jiyong Joo, Jongwon Kim, Jin Won Kim, Joey Duran Ocon, et al.

Publication title: Separation and Purification Technology 145, May 2015

Abstract:

High purity sodium hydroxide (NaOH) solution is extremely important in the large-scale manufacturing of impurity-free silicon (Si) wafers for solar cells. In this paper, we demonstrate the purification of highly concentrated NaOH *via* electrowinning. By optimizing temperature, current density, and the type of electrode for both anodes and cathodes, we maximized the selectivity toward cathodic deposition of Fe and Ni. Our results suggest that removal of metal impurities in the concentrated 50 wt.% NaOH is highly dependent on the reactor temperature (>90 °C) due to enhanced reaction kinetics and decreased solution viscosity. Meanwhile, current density has limited effect on the metal removal efficiency. We further demonstrate that the cathodic deposition of Fe and Ni strongly relies on the type of electrode pair used, with platinum (Pt) and nickel (Ni) as the anode and cathode, respectively, exhibiting the best removal performance. The good electrochemical performance arises from the high catalytic activity of Pt anode and good stability of Ni cathode from the highly corrosive concentrated alkaline conditions. Following these results, we recommend future scientific and technical studies on the use of electrowinning as a possible alternative to the costly membrane-based purification techniques.

Full text available upon request to the author

Article title: Improvement of Energy Capacity with Vitamin C Treated Dual-Layered Graphene–Sulfur Cathodes in Lithium–Sulfur Batteries

Authors: Jin Won Kim, Joey Duran Ocon, Ho-Sung Kim, J. Lee

Publication title: ChemSusChem 8(17), April 2015

Abstract:

A graphene−based cathode design for lithium–sulfur batteries (LSB) that shows excellent electrochemical performance is proposed. The dual−layered cathode is composed of a sulfur active layer and a polysulfide absorption layer, and both layers are based on vitamin C treated graphene oxide at various degrees of reduction. By controlling the degree of reduction of graphene, the dual−layered cathode can increase sulfur utilization dramatically owing to the uniform formation of nanosized sulfur particles, the chemical bonding of dissolved polysulfides on the oxygen−rich sulfur active layer, and the physisorption of free polysulfides on the absorption layer. This approach enables a LSB with a high specific capacity of over 600 mAh gsulfur−1 after 100 cycles even under a high current rate of 1C (1675 mA gsulfur−1). An intriguing aspect of our work is the synthesis of a high−performance dual−layered cathode by a green chemistry method, which could be a promising approach to LSBs with high energy and power densities.

Full text available upon request to the author

Article title: Alkaline CO2 Electrolysis Towards Selective and Continuous HCOO - Production over SnO2Nanocatalysts

Authors: Seunghwa Lee, Joey D. Ocon, Young-il Son, Jaeyoung Lee

Publication title: The Journal of Physical Chemistry C 119(9): 150210022236005, February 2015

Abstract:

The electrolyte pH is an important parameter in determining the equilibrium concentrations of the carbon dioxide-bicarbonate-carbonate system, as well as in mapping out the thermodynamically stable phases of tin dioxide (SnO2) in an

aqueous electrochemical system. Thus, we explored an optimized region in the combined potential-pH (E-pH) diagram of the two systems, where there is a simultaneously high catalytic activity for carbon dioxide (CO2) electrolysis and good phase stability for the SnO2 nanocatalysts. Our results suggest that choosing the right E-pH combination, which in this case is at 0.6 V (vs. RHE) and pH=10.2, resulted in a high faradaic efficiency of 67.6 % for formate (HCOO-) synthesis and an efficiency retention of ~90% after 5 hr, while maintaining the stability of the oxide structure and avoiding the formation of carbon monoxide. Widely applicable to neutral or near-neutral pH metal oxide electrocatalysts, optimized alkaline CO2 electrolysis offer distinct advantages in terms of the three major catalyst properties: activity, selectivity, and stability.

Full text available upon request to the author

Article title: Controlled Electrochemical Etching of Nanoporous Si Anodes and Its Discharge Behavior in Alkaline Si – Air Batteries

Authors: Dong-Won Park, Soeun Kim, Joey Duran Ocon, Graniel Harne Abrenica, et al.

Publication title: ACS Applied Materials & Interfaces 7(5), January 2015

Abstract:

We here report the fabrication of nanoporous silicon (nPSi) electrodes via electrochemical etching to form a porous Si layer with controllable thickness and pore size. Varying the etching time and ethanolic HF concentration results to different surface morphologies, with various degrees of electrolyte access depending on the pore characteristics. Optimizing the etching condition leads to well-developed nPSi electrodes, which have thick porous layers and smaller pore diameter and exhibit improved discharge behaviour as anodes in alkaline Si-air cells in contrast to flat Si anode. Although electrochemical etching is effective in improving the interfacial characteristics of Si in terms of high surface area, we observed that mild anodization occurs and it produces an oxide overlayer. We then show that this oxide layer in nPSi anodes can be effectively removed to produce an nPSi anode with good discharge behaviour in an actual alkaline Si-air cell. In the future, the combination of

high surface area nPSi anodes with non-aqueous electrolytes (e.g. room temperature ionic liquid electrolyte) to minimize the strong passivation behaviour and self-discharge in Si could lead to Si-air cells with stable voltage profile and high anode utilization.

Full text available upon request to the author

Article title: Diagnosis of the measurement inconsistencies of carbon-based electrocatalysts for the oxygen reduction reaction in alkaline media

Authors: Dongyoon Shin, Beomgyun Jeong, Myounghoon Choun, Joey Duran Ocon, et al.

Publication title: RSC Advances 5(2):1571-1580, January 2015

Abstract:

Finding inexpensive alternative catalysts for the oxygen reduction reaction (ORR) is considered as one of the most overriding challenges in the development of electrochemical technologies. Although significant progress has been made in developing carbon-based ORR catalysts, there is difficulty in judging improvements in the catalysts due to the inconsistent results arising from differences in experimental conditions. In this review, we provide a diagnosis of the influence of key factors in the measured ORR activity of catalysts. Knowing the exact conditions when measuring ORR activity is of paramount importance in establishing a reference for relevant comparison of ORR performance in developed catalysts.

Full text available upon request to the author

Article title: Electrode Architecture in Galvanic and Electrolytic Energy Cells

Authors: Beomgyun Jeong, Joey Duran Ocon, J. Lee

Publication title: Angewandte Chemie International Edition in English 55(16), January 2015

Abstract:

Electrodes in galvanic and electrolytic energy cells are complicated structures comprising redox-active materials, ionic/electronic conductors, and porous

pathways for mass transfer of reactants. In contrast to breakthroughs in component development, methods of optimizing whole-system architectural design to draw maximum output have not been well explored. In this Minireview, we introduce generalized types of electrode architecture, discuss fabrication strategies, and characterize already built structures. Systematic efforts to discover optimal electrode configurations will resolve long-standing discrepancies that arise between whole systems and the sums of their parts for a number of electrochemical reactions and technologies.

Full text available upon request to the author

Article title: Enhancing Role of Nickel in the Nickel–Palladium Bilayer for Electrocatalytic Oxidation of Ethanol in Alkaline Media

Authors: Julie Anne D. del Rosario, Joey Duran Ocon, Hongrae Jeon, Youngmi Yi, et al.

Publication title: The Journal of Physical Chemistry C 118(39):22473-22478, October 2014

Abstract:

Direct ethanol fuel cells (DEFCs) have been widely studied because of their potential as a high-energy density and low-toxicity power source of the future. Suitable catalysts for the anode reaction, however, are necessary to fully utilize the advantages of DEFCs. In this paper, we fabricated nickel (Ni)palladium (Pd) bimetallic catalysts with a bilayer structure, using sputtering deposition on a titanium (Ti) foil substrate, and investigated the activity and stability of the catalysts toward ethanol electro-oxidation in alkaline media. Our results suggest that while Pd is the active component and Ni has negligible activity toward ethanol oxidation, Ni-modified Pd (NiPd/Ti) provides the best activity in comparison to PdNi/Ti and the monometallic catalysts. In fact, optimizing the Ni amount could lead to a highly active and stable bimetallic electrocatalyst because of Nis ability to increase the active surface area of the Pd layer, provide hydroxyl species to replenish the active sites, and act as a protective layer to the Pd. Overall, these results provide a better understanding on the role of Ni in bimetallic catalysts, especially in a bilayer

configuration, to allow the use of an ethanol oxidation reaction (EOR)-active electrocatalyst with a much lower Pd content.

Full text available upon request to the author

Article title: Insights into autonomously formed oxygen-evacuated Cu2O electrode for the selective production of C2H4from CO2

Authors: Dahee Kim, Seunghwa Lee, Joey Duran Ocon, Beomgyun Jeong, et al.

Publication title: Physical Chemistry Chemical Physics 17(2), September 2014

Abstract:

Electrochemical conversion of carbon dioxide (CO2) to small organic fuels (e.g. formate, methanol, ethylene, and ethanol) is touted as one of the most promising approaches in solving the problems of climate change and energy security. In this study, we report the highly efficient electrochemical reduction of CO2 using cuprous oxide (Cu2O) electrodes to produce ethylene (C2H4) primarily. During CO2 electrolysis with an electrodeposited Cu2O on a carbon electrode, we observe the transformation of compact metal oxide layer to a bulk metal oxide structure with oxygen-vacated sites, where the notable electrocatalytic process towards selective production of C2H4 occurs. In contrast with previous studies, our results clearly indicate that the Cu2O bulk structure remains inside the entire Cu2O layer (I have different opinion to this conclusion.) and it efficiently catalyzes the conversion process of CO2 at low overpotential, exhibiting high selective faradaic efficiency of over 20 % towards C2H4 formation even in long-term electrolysis.

Full text available upon request to the author

Article title: Gently reduced graphene oxide incorporated into cobalt oxalate rods as bifunctional oxygen electrocatalyst

Authors: Doungkamon Phihusut, Joey Duran Ocon, Beomgyun Jeong, Jin Won Kim, et al.

Publication title: Electrochimica Acta 140:404-411, September 2014

Abstract:

Water-oxygen electrochemistry is at the heart of key renewable energy technologies (fuel cells, electrolyzers, and metal-air batteries) due to the sluggish kinetics of oxygen reduction reaction (ORR) and oxygen evolution reaction (OER). Although much effort has been devoted to the development of improved bifunctional electrocatalysts, an inexpensive, highly active oxygen electrocatalyst, however, remains to be a challenge. In this paper, we present a facile and robust method to create gently reduced graphene oxide incorporated into cobalt oxalate microstructures (CoC2O4/gRGO) and demonstrate its excellent and stable electrocatalytic activity in both OER and ORR, arising from the inherent properties of the components and their physicochemical interaction. Our synthesis technique also explores a single pot method to partially reduce graphene oxide and form CoC2O4 structures while maintaining the solution processability of reduced graphene oxide. While the OER activity of CoC2O4/gRGO is exclusively due to CoC2O4, which transformed into OER-active Co species, the combination with gRGO significantly improves OER stability. On the other hand, CoC2O4/gRGO exhibits synergistic effect towards ORR, *via* a quasi-four-electron pathway, leading to a slightly higher ORR limiting current than Pt/C. Remarkably, gRGO offers dual functionality, contributing to ORR activity *via* the N-functional groups and also enhancing OER stability through the gRGO coating around CoC2O4 structures. Our results suggest a new class of metal-carbon composite that has the potential to be alternative bifunctional catalysts for regenerative fuel cells and metal-air batteries.

Full text available upon request to the author

Article title: Carbon Electrodes in Capacitive Deionization Process

Authors: Sangho Chung, Jae K Lee, Joey Duran Ocon, Young-Il Son, et al.

Publication title: Journal of the Korean Industrial and Engineering Chemistry 25(4):346-351, August 2014

Abstract:

With the world population's continuous growth and urban industrialization, capacitive deionization (CDI) has been proposed as a next-generation water treatment technology to augment the supply of water. As a future water treatment

method, CDI attracts significant attention because it offers small energy consumption and low environmental impact in comparison to conventional methods. Carbon electrodes, which have large surface area and high conductivity, are mainly used as electrode materials of choice for the removal of ions in water. A variety of carbon materials have been investigated, including their adsorption-desorption behavior in accordance to the specific surface area and pore size distribution. In this review, we analyzed and highlighted these carbon materials and looked at the impact of pore size distribution to the overall CDI efficiency. Finally, we propose an optimal condition in the interplay between micropores and mesopores in order to provide the best electrosorption property for these carbon electrodes.

Full text available upon request to the author

Article title: Quasi-perpetual discharge behaviour in p-type Ge–air batteries
Authors: Joey Duran Ocon, Jin Won Kim, Graniel Harne Abrenica, Jae K. Lee, et al.
Publication title: Physical Chemistry Chemical Physics 16(41), June 2014

Abstract:

Metal-air batteries continue to become attractive energy storage and conversion systems due to their high energy and power densities, safer chemistries, and economic viability. Semiconductor-air batteries - a term we first define here as metal-air batteries that use semiconductor anodes such as silicon (Si) and germanium (Ge) - have been introduced in recent years as new high-energy battery chemistries. In this paper, we describe the excellent doping-dependent discharge kinetics of p-type Ge anodes in a semiconductor-air cell employing a gelled KOH electrolyte. Owing to its Fermi level, n-type Ge is expected to have lower redox potential and better electronic conductivity, which could potentially lead to a higher operating voltage and better discharge kinetics. Nonetheless, discharge measurements demonstrated that this prediction is only valid at the low current regime and breaks down at the high current density region. The p-type Ge behaves extremely better at elevated currents, evident from the higher voltage, more power available, and larger practical energy density from a very long discharge time, possibly arising from the high overpotential

for surface passivation. A primary semiconductor-air battery, powered by a flat p-type Ge as a multi-electron anode, exhibited an unprecedented full discharge capacity of 1302.5 mA h gGe(-1) (88% anode utilization efficiency), the highest among semiconductor-air cells, notably better than new metal-air cells with three-dimensional and nanostructured anodes, and at least two folds higher than commercial Zn-air and Al-air cells. We therefore suggest that this study be extended to doped-Si anodes, in order to pave the way for a deeper understanding on the discharge phenomena in alkaline metal-air conversion cells with semiconductor anodes for specific niche applications in the future.

Full text available upon request to the author

Article title: Electrocatalytic oxygen evolution reaction at a FeNi composite on a carbon nanofiber matrix in alkaline media

Authors: Xianghua An, Dongyoon Shin, Joey Duran Ocon, Jae K. Lee

Publication title: Chineses Journal of Catalysis 35(6):891-895, June 2014

Abstract:

Non-noble metals such as Fe and Ni have comparable electrocatalytic activity and stability to that of Ir and Ru in an oxygen evolution reaction (OER). In this study, we synthesized carbon nanofibers with embedded FeNi composites (FeNi-CNFs) as OER electrocatalysts by a facile route comprising electrospinning and the pyrolysis of a mixture of metal precursors and a polymer solution. FeNi-CNFs demonstrated catalytic activity and stability that were better than that of 20 wt% Ir on Vulcan carbon black in oxidizing water to produce oxygen in an alkaline media. Physicochemical and electrochemical characterization revealed that Fe and Ni had synergistic roles that enhanced OER activity by the uniform formation and widening of pores in the carbon structure, while the CNF matrix also contributed to the increased stability of the catalyst.

Full text available upon request to the author

Article title: Functionalized Graphene-Based Cathode for Highly Reversible Lithium-Sulfur Batteries

Authors: Jin Won Kim, Joey Duran Ocon, Dong-Won Park, J. Lee
Publication title: ChemSusChem 7(5):1265-1273, May 2014

Abstract:
In this article, we highlight the salient issues in the development of lithium-sulfur battery (LSB) cathodes, present different points of view in solving them, and argue, why in the future, functionalized graphene or graphene oxide might be the ultimate solution towards LSB commercialization. As shown by previous studies and also in our recent work, functionalized graphene and graphene oxide enhance the reversibility of the charge-discharge process by trapping polysulfides in the oxygen functional groups on the graphene surface, thus minimizing polysulfide dissolution. This will be helpful for the rational design of new cathode structures based on graphene for LSBs with minimal capacity fading, low extra cost, and without the unnecessary weight increase caused by metal/metal oxide additives.
Full text available upon request to the author

Article title: Excavated Fe-N-C Sites for Enhanced Electrocatalytic Activity in the Oxygen Reduction Reaction
Authors: Beomgyun Jeong, Dongyoon Shin, Hongrae Jeon, Joey Duran Ocon
Publication title: ChemSusChem 7(5), May 2014

Abstract:
Platinum (Pt) is the best electrocatalyst for the oxygen reduction reaction (ORR) in hydrogen fuel cells, but it is an extremely expensive resource. The successful development of a cost-effective non-Pt ORR electrocatalyst will be a breakthrough for the commercialization of hydrogen-air fuel cells. Ball milling has been used to incorporate metal and nitrogen precursors into micropores of carbon more effectively and in the direct nitrogen-doping of carbon under highly pressurized nitrogen gas in the process of the preparation of non-noble ORR catalysts. In this study, we first utilize ball milling to excavate the ORR active sites embedded in Fe-modified N-doped carbon nanofibers (Fe-N-CNFs) by pulverization. The facile ball-milling process resulted in a significant enhancement in the ORR activity and the

selectivity of the Fe-N-CNFs owing to the higher exposure of the metal-based catalytically active sites. The degree of excavation of the Fe-based active sites in the Fe-N-CNFs for the ORR was investigated with cyclic voltammetry, X-ray photoelectron spectroscopy, and pore-size distribution analysis. We believe that this simple approach is useful to improve alternative ORR electrocatalysts up to the level necessary for practical applications.

Full text available upon request to the author

Article title: High Energy Density Germanium Anodes for Next Generation Lithium Ion Batteries

Authors: Joey Duran Ocon, Jae K. Lee, J. Lee

Publication title: Journal of the Korean Industrial and Engineering Chemistry 25(1), February 2014

Abstract:

Lithium ion batteries (LIBs) are the state-of-the-art technology among electrochemical energy storage and conversion cells, and are still considered the most attractive class of battery in the future due to their high specific energy density, high effi-ciency, and long cycle life. Rapid development of power-hungry commercial electronics and large-scale energy storage appli-cations (e.g. off-peak electrical energy storage), however, requires novel anode materials that have higher energy densities to replace conventional graphite electrodes. Germanium (Ge) and silicon (Si) are thought to be ideal prospect candidates for next generation LIB anodes due to their extremely high theoretical energy capacities. For instance, Ge offers relatively lower volume change during cycling, better Li insertion/extraction kinetics, and higher electronic conductivity than Si. In this fo-cused review, we briefly describe the basic concepts of LIBs and then look at the characteristics of ideal anode materials that can provide greatly improved electrochemical performance, including high capacity, better cycling behavior, and rate capability. We then discuss how, in the future, Ge anode materials (Ge and Ge oxides, Ge-carbon composites, and other Ge-based composites) could increase the capacity of today's Li batteries. In recent years, considerable efforts have been made to fulfill the requirements of

excellent anode materials, especially using these materials at the nanoscale. This article shall serve as a handy reference, as well as starting point, for future research related to high capacity LIB anodes, especially based on semiconductor Ge and Si.
Full text available upon request to the author

Article title: Ultrafast and stable hydrogen generation from sodium borohydride in methanol and water over Fe-B nanoparticles
Authors: Joey Duran Ocon, Trinh Ngoc Tuan, Youngmi Yi, Rizalinda de Leon
Publication title: Journal of Power Sources 243, December 2013

Abstract:
Use of environmentally friendly hydrogen as fuel on a massive scale requires efficient storage and generation systems. Chemical hydrides, such as sodium borohydride (NaBH4), have the capacity to meet these needs as demonstrated by its high hydrogen storage efficiency. Here, we first report the catalytic activity of Fe–B nanoparticles supported on porous Ni foam – synthesized *via* a simple chemical reduction technique – for hydrogen generation from the mixtures of NaBH4, H2O, and CH3OH. Activation energies of the catalyzed hydrolysis (64.26 kJ mol–1) and methanolysis (7.02 kJ mol–1) are notably lower than other metal-boron catalysts previously reported. Methanol, in combination with a cheap but highly active Fe–B nanocatalysts, provides ultrafast rates of low temperature hydrogen generation from the sodium borohydride solutions.
Full text available upon request to the author

Article title: Lessons from Korean Innovation model for ASEAN Countries towards a knowledge economy
Authors: Joey Duran Ocon, Doungkamon Phihusut, Julie Anne D. del Rosario, Trinh Ngoc Tuan, et al.
Publication title: STI Policy Review 4(2), September 2013

Abstract:

The Association of Southeast Asian Nations (ASEAN) achieved relatively rapid economic growth over the past decade. Sustainable growth among member states, however, is put into question due to macroeconomic challenges, political risk, and vulnerability to external shocks. Developed countries, in contrast, have turned into less labor-intensive technologies to further expand their economies. In this paper, we review the science, technology, and innovation (STI) policies and statuses of the scientific and technological capabilities of the ASEAN member countries. Empirical results based on STI indicators (R&D spending, publications, patents, and knowledge economy indices) reveal considerable variation between the science and technology (S&T) competence and effectiveness of STI policies of ASEAN members. We have categorized nations into clusters according their situations in their S&T productivity. Under the Korean Innovation Model, Cambodia, Laos, Myanmar, and Brunei are classified as being in the institutional-building stage, while Malaysia, Thailand, Indonesia, the Philippines, and Vietnam in the catch up stage, and Singapore in the post-catch up stage. Finally , policy prescriptions on how to enhance the S&T capabilities of the developing ASEAN countries, based on the South Korea development experience, are presented.

Full text available upon request to the author

Article title: An etched nanoporous Ge anode in a novel metal-air energy conversion cell

Authors: Joey Duran Ocon, Jin Won Kim, Sunghyun Uhm, Bongjin Simon Mun, et al.

Publication title: Physical Chemistry Chemical Physics 15(17), March 2013

Abstract:

We first report the successful synthesis of porous germanium with ordered hierarchical structures, via controlled etching, and show its performance as an anode in a new metal-air battery. Our experimental results demonstrate the potential use of porous germanium in a high power density Ge-air energy conversion cell, showing a stable long-term discharge profile at various current drains.

Full text available upon request to the author

Article title: Enhanced reversible capacity of Li-S battery cathode based on graphene oxide

Authors: Jin Won Kim, Joey Duran Ocon, Dong-Won Park, J. Lee

Publication title: Journal of Energy Chemistry 22(2): 336-340, March 2013

Abstract:

Lithium sulfur battery (LSB) offers several advantages such as very high energy density, low-cost, and environmental-friendliness. However, it suffers from serious degradation of its reversible capacity because of the dissolution of reaction intermediates, lithium polysulfides, into the electrolyte. To solve this limitation, there are many studies using graphene-based materials due to their excellent mechanical strength and high conductivity. Compared with graphene, graphene oxide (GO) contains various oxygen functional groups, which enhance the reaction with lithium polysulfides. Here, we investigated the positive effect of using GO mixed with carbon black on the performance of cathode in LSB. We have observed a smaller drop of capacity in GO mixed sulfur cathode. We further demonstrate that the mechanistic origin of reversibility improvement, as confirmed through CV and Raman spectra, can be explained by the stabilization of sulfur in lithium polysulfide intermediates by oxygen functional groups of GO to prevent dissolution. Our findings suggest that the use of graphene oxide-based cathode is a promising route to significantly improve the reversibility of current LSB.

Full text available upon request to the author

Article title: Oxygen electrocatalysis in chemical energy conversion and storage technologies

Authors: J. Lee, Beomgyun Jeong, Joey Duran Ocon

Publication title: Current Applied Physics 13(2):309-321, March 2013

Abstract:

Oxygen electrocatalysis that we first defined is considered as the most important phenomenon in almost all electrochemical industries because it is the most sluggish reaction that governs the overall reaction rate in electrochemical cells. In this review,

we cover two main areas of oxygen–water electrocatalysis, oxygen reduction to water and oxygen evolution from water. In particular, it aims to provide the readers with an understanding of the critical scientific challenges facing the development of oxygen electrocatalysts, various unique attributes of recent novel catalysts, the latest developments in electrode construction and the outlook for future generation of oxygen electrocatalysts. This review will be of value to both electrochemists and other applied scientists interested in this field of electrocatalysis.

Full text available upon request to the author

Article title: Theory-derived law of the wall for parallel flat-plates turbulent flow
Authors: Rizalinda de Leon, Joey Duran Ocon, Ludek Jirkovsky, Armador Muriel
Publication title: CFD Letters 4(3):93-101, July 2012

Abstract:

It is well known that in a turbulent flow between two parallel flat plates, the horizontal mean velocity varies logarithmically with height (the so-called 'logarithmic-law-of-the- wall'). The law of the wall is a description of the mean velocity profile in wall bounded flows and has been regarded as one of the underpinning doctrine in the turbulence community for more than half a century. Much of our understanding in wall turbulence has been based from the continuum Navier-Stokes Equation (NSE). More recently, following studies of a modified Navier Stokes Equation, we applied a modified incompressible NSE to the flow of turbulent fluid between two parallel flat plates and solved it analytically [1]. We extended the analysis to the turbulent flow along a single wall and compared the results with the established controversial von Karman logarithmic law of the wall [2]. We found velocity profiles and velocity time evolution of a turbulent system, through simple numerical simulations, that cannot be reproduced from the classical NSE.

Full text available upon request to the author

Papers Presented

Article title: On the transferability of smart energy systems on off-grid islands using cluster analysis-a case study for the Philippine Archipelago

Authors: Henning Meschede, Eugene, Jr. Agusan Esparcia, Peter K. R. Holzapfel, Paul Bertheau, et al.

Conference title: 13th SDEWES Conference in Palermo, October 2018

Abstract:

Islands are highly diverse in their climatic, physical, social, and economic characteristics. Thus, each islands energy system needs to be designed according to its specific features. However, similarities among islands exist, which can enable fast transfer of concepts and experiences on energy systems. In the Philippines, only few off-grid islands are incorporating smart energy systems through hybrid electricity systems. While most off-grid islands still do not have access to electricity, majority off-grid Philippine islands having access to electricity are powered primarily by diesel-fired generators, which come along with limited operating time, high CO2 emissions, low efficiency and system unreliability. Therefore, a systematic classification through cluster methods could potentially fast-track design of smart energy systems for off-grid Philippine islands. In this work, a cluster analysis is performed for 502 off-grid islands in the Philippine archipelago, classifying the islands according to their similarities in socio-economic and physical characteristics, and local energy resource potential. The results show that most of the islands belong to five clusters of very small and small islands for which PV-battery systems would be the favourable backbone of a future energy system based on RES. These islands show a varying level of feasibility for harnessing wind energy. In medium and big islands, opportunities of linking electricity systems to water supply and thermal energy loads as well as to the transport sector, are identified and their relevance in the clusters is discussed. The results are consistent in validating the individual characteristics of chosen off-grid islands. This study supports policy makers and private investors to decide which smart energy system projects are suitable for which particular islands.

Full text available upon request to the author

Article title: Sputtered palladium-nickel bilayer for electrocatalytic oxidation of ethanol in alkaline media

Authors: Julie Anne D. del Rosario, Joey Duran Ocon, Hongrae Jeon, J. Lee, et al.

Conference title: Annual International Conference on Chemistry, Chemical Engineering and Chemical Process, January 2015

Abstract:

Direct ethanol fuel cell (DEFC) has been widely studied because of its potential to be a high-energy density and low-toxicity power source of the future. Suitable catalysts for the anode reaction are necessary to fully utilize the advantages of DEFCs. Consequently, we fabricated bilayer models of palladium-nickel catalysts using sputtering deposition technique. We then investigated the activity of the catalysts towards oxidation of ethanol in alkaline media. Results suggest that palladium is the active component of the bilayer catalysts whereas nickel alone has negligible activity towards ethanol oxidation. Interestingly, Ni-modified palladium surface gives higher activity than Pd and Pd-modified nickel surface. This investigation is expected to be of great importance in the development of suitable EOR catalysts for direct ethanol fuel cells.

Full text available upon request to the author

Article title: Assessment of co-production of alternative fuels in the Philippines

Authors: Rizalinda de Leon, Joey Duran Ocon, Stephen Salve Doliente, Nes Daniel Sabud

Conference title: 2011 University of the Philippines Diliman College of Engineering Professorial Chair Colloquium

Enrico C. Paringit

Sex: Male

Education

Doctor of Philosophy in Engineering, Tokyo Institute of Technology 2003

Master of Science in Remote Sensing, University of the Philippines, 1999

Bachelor of Science in Geodetic Engineering, University of the Philippines, 1997

Field of Specialization

Remote Sensing

Radiative Transfer

Water Quality

Hyperspectral Remote Sensing

Water Color Remote Sensing

Lidar Remote Sensing

Catchment Hydrology

Flood Modelling

Lidar

Renewable Energy and Environment

Article title: An Assessment on the Development of the Nationwide Solid Waste-To-Energy Potential Model in the Philippines

Authors: Ronald Allan Co, Enrico C. Paringit

Publication title: E3S Web of Conferences 190:00035, January 2020

Abstract:

Solid waste biomass contains a significant amount of carbohydrates and other combustible chemical compounds that have potential as an alternative energy source. In this paper, the synthesis of biomass energy potential assessment from solid waste and the development of a model equation was presented, in order to utilize as assessment tools for the Philippine local government units, most especially the established sanitary landfills and waste-to-energy technologies and facilities that are soon-to-be installed. Data for the said model equation was obtained from various Philippine government agencies, such as the Department of Energy, Department of Environment and Natural Resources, and others. In order to accumulate those in the model, numerous concepts are applied, such as parameterization and others. Furthermore, a time-series study is subjected to analysis, in order to forecast of the biomass energy. Moreover, the biomass energy potential from the rest of the Philippine archipelago may be further evaluated with the use of the proposed model equation.

Full text available upon request to the author

Article title: Linear spectral unmixing of sentinel-3 imagery for urban land cover - land surface temperature (LST) analysis: a case study of Metro Manila, Philippines

Authors: Charmaine Cruz, Ariel Blanco, Jennieveive Babaan, John Andrew Cruz, et al.

Publication title: The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, XLII-4/W19, 2019

Abstract:

The advancement of remote sensing technologies is a huge advantage in various environmental applications including the monitoring of the rapid development in an urban area. This study aims to estimate the composition of the different classes (vegetation, impervious surfaces, soil) in Metro Manila, Philippines using a 300-meter spatial resolution Sentinel-3 Ocean and Land Colour Instrument image. The relationship between these land cover fractions with the spatial distribution of land surface temperature at this scale is evaluated. Sentinel-3 image has a higher spectral resolution (i.e. 21 bands), as compared with other Landsat and Sentinel missions,

which is a requirement for an accurate cover mapping. Linear Spectral Unmixing (LSU), a sub-pixel classification method, was employed in identifying the fractional components in the image based on their spectral characteristics. Field survey using spectroradiometer was conducted to acquire spectral signatures of an impervious surface, vegetation, and soil which were used as the endmembers in the unmixing process. To assess the accuracy of the resulting vegetation fractional image, this was compared with a separate land cover pixel-based classification result using a 3-meter high spatial resolution PlanetScope image and with another vegetation index product of Sentinel-3. The results indicate that the recently available Sentinel-3 image can accurately estimate vegetation fraction with R2 = 0.84 and 0.99, respectively. In addition, the land surface temperature (LST) retrieved from Climate Engine is negatively correlated with the vegetation fraction cover (R2 = 0.81) and positively correlated with the impervious surface fraction cover (R2 = 0.66). Soil, on the other hand, has no correlation with the LST.

Full text available upon request to the author

Article title: Canopy cover estimation from satellite data for acacia mangium plantation Basay, Negros Oriental

Authors: F. A. M. Tandoc, Czar Jakiri Soriano Sarmiento, Enrico C. Paringit, Ayin Modina Tamondong, et al.

Publication title: The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, XLII-4/W19, 2019

Abstract:

Forest assessment and measurement can be costly, laborious and time-consuming when done manually. Remote Sensing aids by providing data of sufficient accuracy for large tracts of forest lands in the form of maps. These data can then assist in decision- making for better forest management. This study estimated canopy cover, a primary forest measurement parameter, using remotely- sensed data. Satellite images such as Planetscope and WorldView were used to estimate canopy cover. The results were then compared to measurements obtained from a manual inventory – in this case, of an Acacia mangium plantation. The manual inventory was conducted in

a National Greening Program (NGP) site in Basay, Negros Oriental. Field inventory involved a Static Global Navigation Satellite System (GNSS) survey and a Total Station survey to get the accurate location of trees present in the plot. Diameter- at-breast was measured for all trees. Tree height and crown diameter were measured for at least 10 percent of all trees in the plot.

Full text available upon request to the author

Article title: Spectral characterization of a closed canopy and open canopy forest in northern Sierra Madre Natural Park

Authors: C. Vidad, Czar Jakiri Soriano Sarmiento, Carla Arellano, Regine Anne Faelga, et al.

Publication title: The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, XLII-4/W19, 2019

Abstract:

Forest lands play crucial roles in nutrient recycling and climate regulation. The change of closed canopy forests to open canopy forests may indicate disturbance within the closed canopy forest. Within the local context of the Philippines, few studies have been conducted to monitor changes in closed canopy forest lands. Efforts to do so are limited by the spatial extent, remoteness and ruggedness of closed canopy forests. Satellite imagery can cover the spatial extent of forest lands as well as provide constant revisit periods for monitoring. However, while multispectral imaging can detect changes in land cover, it has limitations when detecting the subtler change from closed canopy to open canopy forest cover. This study aims to provide baseline spectral characterization of a closed canopy forest in the Philippines. For this study, a hyperspectral sensor (EO1-Hyperion) with 198 band channels ranging from 426.82 nm to 2395.50 nm and a pixel size of 30 m was used to characterize the spectral variations of closed canopy forest, open canopy forest, shrubs and cropland in Northern Sierra Madre, Philippines. Multiple endmember spectral mixture analysis (MESMA) was employed to sort the image into classes as well as to characterize intra-spectral variations among the identified classes. Spectral library endmembers were assembled, optimized and used to classify the image. The

spectral libraries were optimized by using Endmember Average Root Mean Square Error (EAR) , Minimum Average Spectral Angle (MASA) and Iterative Endmember Selection (IES). Results overall agreement is 0.56 for EAR and IES and kappa coefficient is at 0.4.

Full text available upon request to the author

Article title: Multi-temporal analysis of dense and sparse forests' radar backscatter using Sentinel-1A collection in google earth engine

Authors: Carla Arellano, A. A. Maralit, Enrico C. Paringit, Czar Jakiri Soriano Sarmiento, et al.

Publication title: The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, XLII-4/W19, 2019

Abstract:

Radar data has been historically expensive and complex to process. However, in this milieu of cloud-computing platforms and open-source datasets, radar data analysis has become convenient and can now be performed for more exploratory researches. This study aims to perform multi-temporal analysis of radar backscatter to characterize dense and sparse forest from Sentinel-1 images. The area of study are reforested sites under the National Greening Program (NGP) of the Philippines. Ground data were collected: (1) in 2019, from a 1.35 ha -site in Brgy. Calula, Ipil, Zamboanga Sibugay, (2) in 2019, from a 1.10 ha- site in Brgy. Cabatuanan, Basay, Negros Oriental, and (3) from PhilLiDAR 2 – Project 3: FRExLS' 2.4 ha -validated site in Ubay, Bohol. SAR intensity values were derived from Sentinel-1 from Google Earth Engine, which is a cloud-based platform with a repository of satellite images and functionalities for data extraction and processing. The temporal variation in C-band radar backscatter from 2014 to 2018 were analyzed. The results show, for the whole period of analysis, that: in VH polarization, dense forest samples backscatter range from –11 to –18 dB in VH and –2 to -13 dB in VV; sparse forest samples range from –12 to -21 dB in VH and –7 to –14 dB in VV; ground samples range from –12 to –24 dB in VH and –6 to –15 dB in VV; and water samples range from –21 to –30 dB in VH and –11 to –26 dB in VV. Forest backscatter are expected to saturate over time,

especially in dense forests. These variations are due to differences in forest species, landscape, environmental and climatic drivers, and phenomenon or interventions on the site.

Full text available upon request to the author

Article title: Modelling inundation patterns and sediment dynamics in the extensive floodplain along the Tonle Sap River

Authors: Sokly Siev, Enrico C. Paringit, Chihiro Yoshimura, Seingheng Hul

Publication title: River Research and Applications 35(1), July 2019

Abstract:

The Tonle Sap River (TSR) serves as a natural medium for the reversal flow between Tonle Sap Lake (TSL) and the Mekong River to sustain productivity and biodiversity in the TSR floodplain and TSL. Understanding the hydrological connectivity and its dynamics in the TSR, including its floodplain, is therefore important to support activities that aim to maintain ecological services in the TSR–TSL system. Thus, the main objective of this study is to examine the hydrological connectivity of the TSR and its floodplain by a modelling approach that integrates inundation patterns and sediment dynamics. The Caesar–Lisflood model was applied to describe inundation, sediment erosion, transport, and deposition in the TSR for the period of 2003–2013. The inundation areas connected to the TSR ranged from 140 to 2,327 km2, whereas the isolated inundation areas from the TSR ranged from 0.27 to 504 km2. Sediment dynamics showed its influence on inundation patterns and hydrological connectivity and could alter the yearly inundation ratio (defined as a normalized inundation frequency with a value ranging from 0 to 1) up to 0.8. Our approach provides a quantitative way to determine key factors (e.g., total inundation areas, seasonality, and connectivity of inundation patterns) for further investigation of ecological processes in relation to the inundation patterns and sediment dynamics in the TSR and TSL.

Full text available upon request to the author

Article title: Decadal-scale morphological adjustment of a lowland tropical river

Authors: Elizabeth Dingle, Enrico C. Paringit, Pamela Louise Tolentino, Richard D. Williams, et al.

Publication title: Geomorphology 333(2), February 2019

Abstract:

Compared with temperate regions, much less is known about the dynamics of tropical river systems. Tropical rivers are typically characterised by pronounced seasonal changes in precipitation, large sediment loads and high rates of lateral channel migration across often very low-gradient and densely populated floodplains. Understanding the controls on channel migration or change is integral to our ability to fully predict and build resilience against flood risk and wider river-related hazards. Here, we analyse channel and confluence migration over the last ~40 years along a ~85 km reach of the Cagayan River and one of its tributaries, the Pinacanauan de Ilagan (Luzon, Philippines) using optical satellite imagery captured during this period. Combining this with spatial variations in channel pattern, valley width and new bed material grain size data, we demonstrate that sediment transport and deposition are key drivers of the observed tropical channel morphodynamics in this region. The high sediment supply generated in the catchment headwaters (by mass-wasting of hillslopes triggered especially in typhoons) results in high aggradation rates and channel widening on the lower gradient alluvial plain. We suggest that this aggradation enhances local confluence and lateral channel migration rates, which can reach >300 m per decade, and that lateral migration rates of tropical rivers are typically greater than those of temperate rivers. Channel morphodynamics have implications for how to best manage these types of tropical river systems, where hard bank protection structures may result in a complex geomorphic response and flood risk mapping may need to include assessment of sensitivity to varying channel position and topography.

Full text available upon request to the author

Article title: Nationwide Natural Resource Inventory of the Philippines Using LiDAR: Strategies, Progress, and Challenges

Authors: Ariel Blanco, Ayin Tamonding, A. M. Perez, Rosario Ang, et al.

Publication title: ISPRS Journal of Photogrammetry and Remote Sensing XLI(B6):105-109, August 2018

Abstract:

The Philippines has embarked on a detailed nationwide natural resource inventory using LiDAR through the Phil-LiDAR 2 Program. This 3-year program has developed and has been implementing mapping methodologies and protocols to produce high-resolution maps of agricultural, forest, coastal marine, hydrological features, and renewable energy resources. The Program has adopted strategies on system and process development, capacity building and enhancement, and expanding the network of collaborations. These strategies include training programs (on point cloud and image processing, GIS, and field surveys), workshops, forums, and colloquiums (program-wide, cluster-based, and project-based), and collaboration with partner national government agencies and other organizations. In place is a cycle of training, implementation, and feedback in order to continually improve the system and processes. To date, the Program has achieved progress in the development of workflows and in rolling out products such as resource maps and GIS data layers, which are indispensable in planning and decision-making. Challenges remains in speeding up output production (including quality checks) and in ensuring sustainability considering the short duration of the program. Enhancements in the workflows and protocols have been incorporated to address data quality and data availability issues. More trainings have been conducted for project staff hired to address human resource gaps. Collaborative arrangements with more partners are being established. To attain sustainability, the Program is developing and instituting a system of training, data updating and sharing, information utilization, and feedback. This requires collaboration and cooperation of the government agencies, LGUs, universities, other organizations, and the communities.

Full text available upon request to the author

Article title: Modelling above ground biomass of mangrove forest using sentinel-1 imagery

Authors: Reginald Argamosa, Ariel Blanco, Alvin Baloloy, Christian Candido, et al.
Publication title: ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences, IV(3):13-20, 2018

Abstract:
Many studies have been conducted in the estimation of forest above ground biomass (AGB) using features from synthetic aperture radar (SAR). Specifically, L-band ALOS/PALSAR (wavelength ~23 cm) data is often used. However, few studies have been made on the use of shorter wavelengths (e.g., C-band, 3.75 cm to 7.5 cm) for forest mapping especially in tropical forests since higher attenuation is observed for volumetric objects where energy propagated is absorbed. This study aims to model AGB estimates of mangrove forest using information derived from Sentinel-1 C-band SAR data. Combinations of polarisations (VV, VH), its derivatives, grey level co-occurrence matrix (GLCM), and its principal components were used as features for modelling AGB. Five models were tested with varying combinations of features; a) sigma nought polarisations and its derivatives; b) GLCM textures; c) the first five principal components; d) combination of models a–c; and e) the identified important features by Random Forest variable importance algorithm. Random Forest was used as regressor to compute for the AGB estimates to avoid over fitting caused by the introduction of too many features in the model. Model e obtained the highest r2 of 0.79 and an RMSE of 0.44 Mg using only four features, namely, σ°*VH* GLCM variance, σ°*VH* GLCM contrast, PC1, and PC2. This study shows that Sentinel-1 C-band SAR data could be used to produce acceptable AGB estimates in mangrove forest to compensate for the unavailability of longer wavelength SAR.
Full text available upon request to the author

Article title: Estimation of mangrove forest aboveground biomass using multispectral bands, vegetation indices and biophysical variables derived from optical satellite imageries: rapideye, planetscope and sentinel-2
Authors: Alvil Baloloy, Ariel Blanco, Christian Candido, Reginald Argamosa, et al.
Publication title: ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences, IV(3), 2018

Abstract:

Aboveground biomass estimation (AGB) is essential in determining the environmental and economic values of mangrove forests. Biomass prediction models can be developed through integration of remote sensing, field data and statistical models. This study aims to assess and compare the biomass predictor potential of multispectral bands, vegetation indices and biophysical variables that can be derived from three optical satellite systems: the Sentinel-2 with 10 m, 20 m and 60 m resolution; RapidEye with 5m resolution and PlanetScope with 3m ground resolution. Field data for biomass were collected from a Rhizophoraceae-dominated mangrove forest in Masinloc, Zambales, Philippines where 30 test plots (1.2 ha) and 5 validation plots (0.2 ha) were established. Prior to the generation of indices, images from the three satellite systems were pre-processed using atmospheric correction tools in SNAP (Sentinel-2), ENVI (RapidEye) and python (PlanetScope). The major predictor bands tested are Blue, Green and Red, which are present in the three systems; and Red-edge band from Sentinel-2 and Rapideye. The tested vegetation index predictors are Normalized Differenced Vegetation Index (NDVI), Soil-adjusted Vegetation Index (SAVI), Green-NDVI (GNDVI), Simple Ratio (SR), and Red-edge Simple Ratio (SRre). The study generated prediction models through conventional linear regression and multivariate regression. Higher coefficient of determination (r^2) values were obtained using multispectral band predictors for Sentinel-2 (r^2 = 0.89) and Planetscope (r^2 = 0.80); and vegetation indices for RapidEye (r^2 = 0.92). Multivariate Adaptive Regression Spline (MARS) models performed better than the linear regression models with r^2 ranging from 0.62 to 0.92. Based on the r^2 and root-mean-square errors (RMSE's), the best biomass prediction model per satellite were chosen and maps were generated. The accuracy of predicted biomass maps were high for both Sentinel-2 (r^2 = 0.92) and RapidEye data (r^2 = 0.91).

Full text available upon request to the author

Article title: A novel approach for vegetation classification using UAV-based hyperspectral imaging

Authors: Tetsuro Ishida, Junichi Kurihara, Fra Angelico Malicdin Viray, Shielo Namuco, et al.

Publication title: Computers and Electronics in Agriculture 144:80-85, January 2018

Abstract:

The use of unmanned aerial vehicle (UAV)-based spectral imaging offers considerable advantages in high-resolution remote-sensing applications. However, the number of sensors mountable on a UAV is limited, and selecting the optimal combination of spectral bands is complex but crucial for conventional UAV-based multispectral imaging systems. To overcome these limitations, we adopted a liquid crystal tunable filter (LCTF), which can transmit selected wavelengths without the need to exchange optical filters. For calibration and validation of the LCTF-based hyperspectral imaging system, a field campaign was conducted in the Philippines during March 28–April 3, 2016. In this campaign, UAV-based hyperspectral imaging was performed in several vegetated areas, and the spectral reflectances of 14 different ground objects were measured. Additionally, the machine learning (ML) approach using a support vector machine (SVM) model was applied to the obtained dataset, and a high-resolution classification map was then produced from the aerial hyperspectral images. The results clearly showed that a large amount of misclassification occurred in shaded areas due to the difference in spectral reflectance between sunlit and shaded areas. It was also found that the classification accuracy was drastically improved by training the SVM model with both sunlit and shaded spectral data. As a result, we achieved a classification accuracy of 94.5% in vegetated areas.

Full text available upon request to the author

Article title: A LiDAR-based flood modelling approach for mapping rice cultivation areas in Apalit, Pampanga

Authors: Luigi Toda, John Colin Estrada Yokingco, Enrico C. Paringit, Rodel D. Lasco

Publication title: Applied Geography 80:34-47, March 2017

Abstract:

Abstract Majority of rice cultivation areas in the Philippines are susceptible to excessive flooding owing to intense rainfall events. The study introduces the use of fine scale flood inundation modelling to map cultivation areas in Apalit, a rice-producing municipality located in the province of Pampanga in the Philippines. The study used a LiDAR-based digital elevation model (DEM), river discharge and rainfall data to generate flood inundation maps using LISFLOOD-FP. By applying spatial analysis, rice cultivation zone maps were derived and four cultivation zones are proposed. In areas where both depth and duration exceed threshold values set in this study, varieties tolerant to stagnant flooding and submergence are highly recommended in Zone 1, where flood conditions are least favorable for any existing traditional lowland irrigation varieties. The study emphasizes that a decline in yield is likely as increasing flood extents and longer submergence periods may cause cultivation areas for traditional irrigated lowland varieties to decrease over time. This decrease in yield may be prevented by using varieties most suitable to the flooding conditions as prescribed in the rice zone classification. The method introduced in this study could facilitate appropriate rice cultivation in flood-prone areas.

Full text available upon request to the author

Article title: Seasonal Changes in the Inundation Area and Water Volume of the Tonle Sap River and Its Floodplain

Authors: Sokly Siev, Enrico C. Paringit, Chihiro Yoshimura, Seingheng Hul

Publication title: Hydrology 3(4):33, October 2016

Abstract:

Flood pulses occur annually along the Tonle Sap River (TSR) due to the large volume of water flowing from Tonle Sap Lake (TSL), its tributaries, and the Mekong River (MR). This study describes the seasonal changes in inundation area and water volume in the floodplain along the TSR over three years. The method employed time series remote sensing images of Moderate Resolution Imaging Spectroradiometer (MODIS) satellite data, the digital elevation model (DEM) of the Shuttle Radar

Topography Mission (SRTM), bathymetric data, and observed water level data. Adding normalized difference vegetation index (NDVI) as a "third band" in the maximum likelihood classification (MLC) provided higher accuracy compared to thresholding NDVI and pure MLC (two bands) only. The results showed that the inundation area ranged from 123.8 to 3251.2 km2 (mean: 1028.5 km2) with overall accuracy of 96.9%. The estimated water volume ranged from 418.3 to 2223.9 million m3 (mean: 917.3 million m3) from the dry to wet season, respectively. Seasonally, the TSR floodplain accounted for up to 5.3% and 3.2% of the mean annual inflow and outflow of the TSR, respectively. In addition to the TSL water reservoir, the TSR and its floodplain exchanged and stabilized the flow of the MR and its downstream delta, respectively. Overall, the obtained results have enhanced our understanding of the TSR, supporting further studies on river connectivity and reversal flow in this study area.

Full text available upon request to the author

Article title: Separability and variability of Rhizophocraceae and Avicenniaceae in a Natural Mangrove Forest Using Point Density Disribution from Lidar Data
Authors: Regine Anne Faelga, Enrico C. Paringit, Gay Jane Perez
Publication title: Journal of the Philippine Geoscience and Remote Sensing Society, August 2016

Abstract:
Utilization of remote sensing techniques, particularly from high resolution airborne laser scanning could be an effective tool in describing forest structural features. The study aims to assess LiDAR's capability in characterizing mangrove forest stand using the available LiDAR dataset in the Philippines. Characterization of the structural attributes between mangrove families is done through separability and variability analysis of the point density distribution and height values at different levels. On a hectare scale, point densities of two mangrove families were extracted and graphed to determine separability. The point density parameter was further processed through image classification to come up with LiDAR-based Point Density Distribution Curves (PDDC) for Rhizophoraceae and Avicenniaceae mangroves. The

result yielded an overall accuracy of 77.43% with a Kappa coefficient value of 0.42. Variability between and across families were analyzed using point density clustering at a finer scale of 5 by 5 meter plots. The sample plots have homogenous families, wherein fifteen (15) are composed of Rhizophoraceae and fifteen (15) Avicenniaceae, respectively. At finer scales of 5x5m, variability within and across families were evident. LiDAR point density data can serve as an important tool to structurally characterize the two mangrove families by utilizing the height and point density parameters. However, exploring other ways to statistically describe point density distribution per plot should be done as well to be able to improve the analysis.

Full text available upon request to the author

Article title: Lidar-Based Canopy Cover Estimation Using Linear Regression Techniques

Authors: M. A. V. Posilero, Enrico C. Paringit, Reginald Argamosa, Regine Anne Faelga, et al.

Publication title: Journal of the Philippine Geoscience and Remote Sensing Society, August 2016

Abstract:

Airborne LIDAR systems are becoming the remote sensing system of choice for precise and accurate measurement of forest vegetation structure because of its ability to capture data over and underneath the canopy. One of the most useful parameters that can be estimated from LIDAR is canopy cover. To infer the canopy cover from LIDAR point cloud data, we have developed and investigated a set of metrics derived from distribution of points and their corresponding beam footprint. Improvements were introduced by taking into account beam sizes. Particularly, ten (10) bincentile parameters and area generation of vegetation points that may overlap vertically within a point cloud LiDAR data. The method was tested over a forest plantation (FP) site against field canopy cover generated through Digital Hemispherical Photography (DHP). LiDAR canopy cover estimation of the forest plantation site was observed at r 2 = 0.5629 and 1.82 percent canopy cover RMSE.

Full text available upon request to the author

Article title: Fully automated GIS-based individual tree crown delineation based on curvature values from a lidar derived canopy height model in a coniferous plantation

Authors: Reginald Argamosa, Enrico C. Paringit, Khristoffer Ryan Quinton, F. A. M. Tandoc

Publication title: The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences XLI-B8:563-569, 2016

Abstract:

The generation of high resolution canopy height model (CHM) from LiDAR makes it possible to delineate individual tree crown by means of a fully-automated method using the CHM's curvature through its slope. The local maxima are obtained by taking the maximum raster value in a 3 m x 3 m cell. These values are assumed as tree tops and therefore considered as individual trees. Based on the assumptions, thiessen polygons were generated to serve as buffers for the canopy extent. The negative profile curvature is then measured from the slope of the CHM. The results show that the aggregated points from a negative profile curvature raster provide the most realistic crown shape. The absence of field data regarding tree crown dimensions require accurate visual assessment after the appended delineated tree crown polygon was superimposed to the hill shaded CHM.

Full text available upon request to the author

Article title: Estimating DBH of trees employing multiple linear regression of the best lidar-derived parameter combination automated in python in a natural broadleaf forest in the Philippines

Authors: C.A. G. Ibanez, Biel Carcellar, Enrico C. Paringit, Reginald Argamosa, et al.

Publication title: The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences XLI-B8:657-662, 2016

Abstract:

Diameter-at-Breast-Height Estimation is a prerequisite in various allometric equations estimating important forestry indices like stem volume, basal area, biomass and carbon stock. LiDAR Technology has a means of directly obtaining different forest parameters, except DBH, from the behavior and characteristics of point cloud unique in different forest classes. Extensive tree inventory was done on a two-hectare established sample plot in Mt. Makiling, Laguna for a natural growth forest. Coordinates, height, and canopy cover were measured and types of species were identified to compare to LiDAR derivatives. Multiple linear regression was used to get LiDAR-derived DBH by integrating field-derived DBH and 27 LiDAR-derived parameters at 20m, 10m, and 5m grid resolutions. To know the best combination of parameters in DBH Estimation, all possible combinations of parameters were generated and automated using python scripts and additional regression related libraries such as Numpy, Scipy, and Scikit learn were used. The combination that yields the highest r-squared or coefficient of determination and lowest AIC (Akaike's Information Criterion) and BIC (Bayesian Information Criterion) was determined to be the best equation. The equation is at its best using 11 parameters at 10mgrid size and at of 0.604 r-squared, 154.04 AIC and 175.08 BIC. Combination of parameters may differ among forest classes for further studies. Additional statistical tests can be supplemented to help determine the correlation among parameters such as Kaiser- Meyer-Olkin (KMO) Coefficient and the Barlett's Test for Spherecity (BTS).

Full text available upon request to the author

Article title: Mangrove plantation forest assessment using structural attributes derived from light detection and ranging (Lidar) data

Authors: Regine Anne Faelga, Enrico C. Paringit, G. J. Perez, C. A. G. Ibanez

Publication title: The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences XLI-B8: 617-623, 2016

Abstract:

Estimating the structural and functional attributes of forests is integral in performing management strategies and for understanding forest ecosystem functions. Field

sampling methods through plot level is one of the known strategies in forest studies; however, these methods have its limitations and are prone to subjected biases. Remote Sensing data, particularly that of Light Detection and Ranging (LiDAR) can be utilized to alleviate the limitations of extracting forest structure parameters. The study aims to characterize a Rhizophoraceae-dominated mangrove forest plantation. Point cloud distribution within a 1-hectare plot was processed by utilizing thirty (30) samples of 5x5 meter plots, which were analysed for the characterization and forest structure assessment. Point densities were grouped at intervals of 10% of the plot's maximum height (Height at Bincentile or HBn) to determine where the clustering of points occur per plot. The result shows that most of the points are clustered at HBn with height values ranging from 2.98 to 4.15 meters for plots located at the middle part of the forest, with a standard deviation of 1.78 to 3.69, respectively. On the other hand, sample plots that are located at the periphery part of the forest shows that the point clustering occurs at different heights ranging from 1.71 meters to 4.43 meters, with standard deviation values ranging from 1.69 to 3.81.Plots that are located along the fringes of the forest reflect a stunted clustering of points, while plots that explicitly show mangrove trimmings and cuts reflect even distribution in terms of point density within each HBn. Both species present in the area (R. mucronata and R. apiculata) exhibits similar clustering, which could represent detection of Rhizophoraceae mangroves.

Full text available upon request to the author

Article title: Fully automated GIS-based individual tree crown delineation based on curvature values from a lidar derived canopy height model in a coniferous plantation

Authors: Reginald Argamosa, Enrico C. Paringit, Khristoffer Ryan Quinton, F. A. M. Tandoc, et al.

Publication title: The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences XLI-B8: 563-569, 2016

Abstract:

The generation of high resolution canopy height model (CHM) from LiDAR makes it possible to delineate individual tree crown by means of a fully-automated method using the CHM's curvature through its slope. The local maxima are obtained by taking the maximum raster value in a 3 m x 3 m cell. These values are assumed as tree tops and therefore considered as individual trees. Based on the assumptions, thiessen polygons were generated to serve as buffers for the canopy extent. The negative profile curvature is then measured from the slope of the CHM. The results show that the aggregated points from a negative profile curvature raster provide the most realistic crown shape. The absence of field data regarding tree crown dimensions require accurate visual assessment after the appended delineated tree crown polygon was superimposed to the hill shaded CHM.

Full text available upon request to the author

Article title: Nationwide natural resource inventory of the Philippines using Lidar: strategies, progress, and challenges

Authors: Ariel Blanco, Ayin Tamondong, A. M. Perez, Rosario Ang, et al.

Publication title: The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences XLI-B6: 105-109, 2016

Abstract:

The Philippines has embarked on a detailed nationwide natural resource inventory using LiDAR through the Phil-LiDAR 2 Program. This 3-year program has developed and has been implementing mapping methodologies and protocols to produce high-resolution maps of agricultural, forest, coastal marine, hydrological features, and renewable energy resources. The Program has adopted strategies on system and process development, capacity building and enhancement, and expanding the network of collaborations. These strategies include training programs (on point cloud and image processing, GIS, and field surveys), workshops, forums, and colloquiums (program-wide, cluster-based, and project-based), and collaboration with partner national government agencies and other organizations. In place is a cycle of training, implementation, and feedback in order to continually improve the system and processes. To date, the Program has achieved progress in the

development of workflows and in rolling out products such as resource maps and GIS data layers, which are indispensable in planning and decision-making. Challenges remains in speeding up output production (including quality checks) and in ensuring sustainability considering the short duration of the program. Enhancements in the workflows and protocols have been incorporated to address data quality and data availability issues. More trainings have been conducted for project staff hired to address human resource gaps. Collaborative arrangements with more partners are being established. To attain sustainability, the Program is developing and instituting a system of training, data updating and sharing, information utilization, and feedback. This requires collaboration and cooperation of the government agencies, LGUs, universities, other organizations, and the communities.

Full text available upon request to the author

Article title: Improving predictions of the effects of extreme events, land use, and climate change on the hydrology of watersheds in the Philippines

Authors: Rubianca Benavidez, Bathanna Jackson, Deborah Maxwell, Enrico C. Paringit

Publication title: Proceedings of the International Association of Hydrological Sciences 373:147-151, May 2016

Abstract:

Due to its location within the typhoon belt, the Philippines is vulnerable to tropical cyclones that can cause destructive floods. Climate change is likely to exacerbate these risks through increases in tropical cyclone frequency and intensity. To protect populations and infrastructure, disaster risk management in the Philippines focuses on real-time flood forecasting and structural measures such as dikes and retaining walls. Real-time flood forecasting in the Philippines mostly utilises two models from the Hydrologic Engineering Center (HEC): the Hydrologic Modeling System (HMS) for watershed modelling, and the River Analysis System (RAS) for inundation modelling. This research focuses on using non-structural measures for flood mitigation, such as changing land use management or watershed rehabilitation. This

is being done by parameterising and applying the Land Utilisation and Capability Indicator (LUCI) model to the Cagayan de Oro watershed (1400 km2) in southern Philippines. The LUCI model is capable of identifying areas providing ecosystem services such as flood mitigation and agricultural productivity, and analysing trade-offs between services. It can also assess whether management interventions could enhance or degrade ecosystem services at fine spatial scales. The LUCI model was used to identify areas within the watershed that are providing flood mitigating services and areas that would benefit from management interventions. For the preliminary comparison, LUCI and HEC-HMS were run under the same scenario: baseline land use and the extreme rainfall event of Typhoon Bopha. The hydrographs from both models were then input to HEC-RAS to produce inundation maps. The novelty of this research is two-fold: (1) this type of ecosystem service modelling has not been carried out in the Cagayan de Oro watershed; and (2) this is the first application of the LUCI model in the Philippines. Since this research is still ongoing, the results presented in this paper are preliminary. As the land use and soil parameterisation for this watershed are refined and more scenarios are run through the model, more robust comparisons can be made between the hydrographs produced by LUCI and HEC-HMS and how those differences affect the inundation map produced by HEC-RAS.

Full text available upon request to the author

Article title: The Phil-Lidar 2 program: national resource inventory of the Philippines using lidar and other remotely sensed data

Authors: Ariel Blanco, Ayin Tamondong, A. M. C. Perez, Rosario Ang, et al.

Publication title: The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences XLI-7/W3: 1123-1127, 2015

Abstract:

The Philippines embarked on a nationwide mapping endeavour through the Disaster Risk and Exposure Assessment for Mitigation (DREAM) Program of the University of the Philippines and the Department of Science and Technology (DOST). The derived accurate digital terrain models (DTMs) are used in flood

models to generate risk maps and early warning system. With the availability of LiDAR data sets, the Phil-LiDAR 2 program was conceptualized as complementary to existing programs of various national government agencies and to assist local government units. Phil-LiDAR 2 aims to provide an updated natural resource inventory as detailed as possible using LiDAR point clouds, LiDAR derivative products, orthoimages and other RS data. The program assesses the following natural resources over a period of three years from July 2014: agricultural, forest, coastal, water, and renewable energy. To date, methodologies for extracting features from LiDAR data sets have been developed. The methodologies are based on a combination of object-based image analysis, pixel-based image analysis, optimization of feature selection and parameter values, and field surveys. One of the features of the Phil-LiDAR 2 program is the involvement of fifteen (15) universities throughout the country. Most of these do not have prior experience in remote sensing and mapping. With such, the program has embarked on a massive training and mentoring program. The program is producing more than 200 young RS specialists who are protecting the environment through RS and other geospatial technologies. This paper presents the program, the methodologies so far developed, and the sample outputs.

Full text available upon request to the author

Article title: A Combined Multi-Site and Multi-Device Decision Support System for Tidal In-Stream Energy

Authors: Michael Lochinvar Sim Abundo, Allan Nerves, Enrico C. Paringit, Cesar Villanoy

Publication title: Energy Procedia 14:812-817, December 2012

Abstract:

This paper combines site and device suitability approaches into one framework to assist stakeholders in identifying locations fit for Tidal In-Stream Energy (TISE) extraction as well as nominating devices that are matched to the conditions of those locations. A Matlab-based decision support system is developed using the framework. Site-Device matching is performed considering resource data, device

power generation, energy production, and cost. A case study, involving four sites in the Philippines, is presented. Hydrodynamic simulations using DELFT3D are done. The suitability of modeled TISE conversion devices is investigated over several locations in the case study. Device nominations are made for respective locations using highest energy production as dominating criterion. (C) 2011 Published by Elsevier Ltd. Selection and/or peer-review under responsibility of the organizing committee of 2nd International Conference on Advances in Energy Engineering (ICAEE).

Full text available upon request to the author

Article title: Simultaneous estimation of benthic fractional cover and shallow water bathymetry in coral reef areas from high-resolution satellite images

Authors: Enrico C. Paringit and Kazuo Nadaoka

Publication title: International Journal of Remote Sensing 33(10):3026-3047, May 2012

Abstract:

This article describes the development of a technique to estimate shallow water benthic cover and depth simultaneously from high-resolution satellite images of reef areas, specifically from the high-resolution sensor onboard IKONOS. The technique to derive the estimates of five bottom benthic cover types (sand, coral, seagrass, macroalgae and pavement) and depth from the four-band images uses a coupling of radiative transfer (RT) theory and spectral unmixing implemented in an iterative manner. To resolve the cover types for the unmixing, the method employed a combinatorial approach to select benthic cover composition. The estimation technique was applied to two reef areas around the coast of the Ishigaki in southern Ryukyus, namely, the Fukido River mouth area and the Shiraho Reef. The IKONOS images of Fukido River mouth area and Shiraho Reef were acquired in 2003 and 2002, respectively. The accuracy of the fractional cover and the depth estimates from the satellite images are then presented and compared with sea truth data and depth measurements. The results indicate good correspondence between estimated and

measured depths, while the estimates for the benthic cover were at reasonable levels of accuracy.

Full text available upon request to the author

Article title: Integrated Landsat Image Analysis and Hydrologic Modeling to Detect Impacts of 25-Year Land-Cover Change on Surface Runoff in a Philippine Watershed
Authors: Jojene Santillan, Meriam Makinano-Santillan, Enrico C. Paringit
Publication title: Remote Sensing 3(6):1067-1087, December 2011

Abstract:

Landsat MSS and ETM+ images were analyzed to detect 25-year land-cover change (1976–2001) in the critical Taguibo Watershed in Mindanao Island, Southern Philippines. This watershed has experienced historical modifications of its land-cover due to the presence of logging industries in the 1950s, and continuous deforestation due to illegal logging and slash-and-burn agriculture in the present time. To estimate the impacts of land-cover change on watershed runoff, land-cover information derived from the Landsat images was utilized to parameterize a GIS-based hydrologic model. The model was then calibrated with field-measured discharge data and used to simulate the responses of the watershed in its year 2001 and year 1976 land-cover conditions. The availability of land-cover information on the most recent state of the watershed from the Landsat ETM+ image made it possible to locate areas for rehabilitation such as barren and logged-over areas. We then created a "rehabilitated" land-cover condition map of the watershed (re-forestation of logged-over areas and agro-forestation of barren areas) and used it to parameterize the model and predict the runoff responses of the watershed. Model results showed that changes in land-cover from 1976 to 2001 were directly related to the significant increase in surface runoff. Runoff predictions showed that a full rehabilitation of the watershed, especially in barren and logged-over areas, will be likely to reduce the generation of a huge volume of runoff during rainfall events. The results of this study have OPEN ACCESS Remote Sens. 2011, 3 1068 demonstrated the usefulness of multi-temporal Landsat images in detecting land-cover change, in

identifying areas for rehabilitation, and in evaluating rehabilitation strategies for management of tropical watersheds through its use in hydrologic modeling.
Full text available upon request to the author

Papers Presented:

Article title: Determination of the Pre-launch Image- Processing Techniques for Liquid Crystal Tunable Filter (LCTF) for PHL-Microsat DIWATA-1
Authors: Enrico C. Paringit, Mara Alain Mendoza Maestro, Fra Angelico Malicdin Viray, James Calvo
Conference title: 37th Asian Conference on Remote Sensing 2017

Abstract:
The Program, "Development of Philippine Scientific Earth Observation Microsatellite (PHL- MICROSAT) has successfully launched a microsatellite called Philippines' first microsatellite, DIWATA-1 last April 2016. DIWATA-1 is equipped with remote sensing sensors. It seeks to maximize and utilize its earth observation capabilities as applied in resource and disaster management and weather observations in the Philippines through multispectral images taken by its cameras. One of the payloads mounted in the microsatellite is the Space-borne Multi-spectral Imager (SMI) with Liquid Crystal Tunable Filter (LCTF), specifically made and designed for DIWATA-1. Like any other optical imaging sensors, it contains radiometric noise and geometric distortions and images should be further projected unto a map coordinate system. Thus, a methodology to increase the radiometric precision and to correct geometric distortions of DIWATA-1's images is necessary. This research used data from laboratory and practical airborne experiments of an LCTF Camera to design the image-processing line. Corrections introduced include radiance offsets, and reduction of transmittance limitation and vignetting caused by the camera's optical assembly composed of a charge-coupled device (CCD), filter and lenses. An irradiance model was adapted to account for radiometric corrections due to viewing, terrain and sun-angle conditions. Processed LCTF and DIWATA- 1 geospatial images will give way to level 1 satellite products which can be used or

further processed by government agencies and research institutions for different applications.

Full text available upon request to the author

Article title: Calibration and Validation of LCTF Camera on an Experimental Airborne Mission at Gerona and Ramos, Tarlac, Philippines

Authors: Enrico C. Paringit, Mara Alain Mendoza Maestro, Fra Angelico Malicdin Viray, James Calvo

Conference title: 37th Asian Conference on Remote Sensing 2017

Abstract:

An experimental airborne mission over an agricultural field in Gerona and Ramos, Tarlac, Philippines was carried out to calibrate and validate remote sensing instruments similarly installed in the Philippines' first microsatellite. Particularly, the mission aimed to calculate calibration parameters for converting Liquid Crystal Tunable Filter (LCTF) Camera spectral image band data from digital numbers (DN) to spectral radiance. The LCTF Camera was flown vicariously with another airborne imaging spectrometer, compact airborne spectrographic imager (CASI) for comparison. The two sensors were mounted side-by-side on a CESSNA 206 aircraft with an average flying speed of 60 m/s at an altitude ranging from 550m to 600m for the airborne data acquisition collecting a total of 20,850 images, with a spatial resolution of 0.5m and image swath of 300m for the CASI images, and a spatial resolution of 0.7m and image swath of 700m for the LCTF camera images. A field spectroradiometer (FS) was used to simultaneously measure field spectral reflectance. A spectral irradiance model was used to convert data from radiance to reflectance or vice versa. The LCTF camera data was then correlated to the field spectral data in order to generate calibration parameters. Using the calibration parameters, the LCTF camera data were converted from DN to spectral radiance, and cross-validated with the CASI and FS data using linear regression. The validation with the CASI data displayed a correlation of 0.743369 for the bands at 460nm to 700nm but an inferior correlation of 0.441638 for the near-infrared (NIR) bands 720nm and 750nm. The validation with FieldSpec data displayed a correlation

of 0.387419 on the lower spectra compared to the correlation of 0.2535 of the NIR bands. The results show about 35-40% difference in spectral radiance at the near-infrared bands of the calibration parameters from the LCTF camera DN data. The calibration parameters show an effectiveness when converting data acquired in the afternoon, the root-mean-square error is significantly higher (200%) when applied to data acquired in the morning

Full text available upon request to the author

Article title: Implementation of a Solar Spectral Model for the Calibration of the Spaceborne Multispectral Imager (SMI) of DIWATA 1

Authors: Enrico C. Paringit, Mara Alain Mendoza Maestro, Fra Angelico Malicdin Viray, James Calvo

Conference title: 37th Asian Conference on Remote Sensing 2017

Abstract:

DIWATA-1 is a low earth orbit (LEO) microsatellite that hovers 400km above the earth. It was launched from the International Space Station (ISS) and deployed into orbit last April 27, 2016. It is envisioned that a set of multi-spectral satellite images from DIWATA-1 will be collected and processed to monitor changes in vegetation and to oversee oceans' productivity in the Philippines. To meet these objectives, the images should be consistent enough to produce meaningful derivative products. The images taken by the sensor must be corrected to eliminate geometric and radiometric distortions and noises. Spectral extraterrestrial solar irradiance is attenuated while passing through the atmosphere by Rayleigh scattering, ozone, mixed gases, water vapor absorption and aerosol transmission. These conditions make it necessary to apply any correction to the atmosphere's effect. A spectral radiance model was applied to estimate the top-of-atmosphere (TOA) radiance which can be predicted using the field data acquired through an airborne mission. The payload, a Liquid Crystal Tunable Filter (LCTF) camera, was installed for an experimental airborne mission to acquire spectral images. The digital number in each pixel of the image was then converted to radiance by modelling the irradiance at the sensor and obtaining reflectance values of certain types of vegetation. The output provides an

at-sensor radiance (airborne) accounting for the effects of the atmosphere and incoming solar irradiance. Initial results from the comparison of the irradiance data using the pyranometer and the model show a root mean square error (RMSE) of 90.67 W/m2/um in band 7 (0.64um) but also yields an RMSE of 980.66 W/m2/um in band 11 (0.75um) for the spectral irradiance, while an RMSE of 124.281 W/m2/um was computed for the broadband irradiance. For the normal operation of DIWATA-1, it is vital to include not only the atmospheric correction of the incoming solar irradiance at ground but the incoming radiance at the sensor (DIWATA-1) as well.
Full text available upon request to the author

Article title: Diameter at breast height estimation in Mt. Makiling, Laguna, Philippines using metrics derived from airborne LiDAR data and Worldview-2 bands
Authors: Fe Andrea M. Tandoc, Enrico C. Paringit, Nathaniel Bantayan, Reginald Argamosa, et al.
Conference title: SPIE Asia-Pacific Remote Sensing, June 2016

Abstract:
Airborne LiDAR is fast becoming an innovation for forest inventory. It aids in obtaining forest characteristics in areas or cases where actual field inventory would be very tedious. This study aims to estimate diameter at breast height (DBH) using airborne LiDAR point-cloud parameters with Worldview-2 satellite images, and to validate these with actual measurements done in the field. The study site is a field plot with forest inventory at Mt. Makiling, Laguna, Philippines that was surveyed into 20m, 10m and 5m subplots or grids. The estimation of DBH was carried out by extracting the said parameters from the LiDAR point-cloud, and extracting different bands from the Worldview image and performing linear and log-linear regression of these values. The regressions were done in four different cases, namely: LiDAR parameters without intensity (case1), LiDAR parameters without intensity with Worldview bands (case 2), intensity of LiDAR points (case 3), and LiDAR parameters with intensity and Worldview bands (case 4). From these it was found that the best case for estimating DBH is with the use of LiDAR parameters with intensity and

Worldview bands in a 10x10 grid, in Log-Linear regression with a root mean squared error of 1.96 cm and an adjusted R^2 value of 0.65. This was further improved through stepwise regression, and adjusted R^2 value was 0.71.

Full text available upon request to the author

Article title: Analysis of Positional Displacement in Bohol Island on Aftermath of the 2013 Central Visayas Earthquake from GNSS Surveys

Authors: Enrico C. Paringit, Louie Balicanta, Joemarie Caballero, Wilfredo Rada

Conference title: FIG Working Week 2016

Abstract:

A 7.2 magnitude earthquake struck Central Visayas, Philippines on 8:12 AM 15 October 2013. Ground shaking resulted in heavy casualties and damage to infrastructure and still linger threatened by failure-prone hillslopes, debris-filled rivers and collapsing sinkholes. Quantifying the distribution of seismic-induced ground movement is important not only for assessing the damage caused by the earthquake but also for guiding local surveyors that the rely on a stable reference system for conduct of surveys in the area necessary for reconstruction and rehabilitation. A static GNSS survey was conducted from 10-12 November 2013 to quantify the displacements. GNSS receivers were occupied previously established High-Ordered reference points and fixing a relatively stable point. Subsequently, the GNSS data were analyzed to assess the movement of areas were conducted. The average horizontal displacement is about 0.5166m+-0.2682m. Maximum displaced 1.169 m observed while minimum displacement is 0.063. The displacement headed towards southeast direction with greatest magnitudes computed at the northern and eastern portion of the Island. The results of the survey may provide key agencies further motivation to review the control points and conduct the necessary re-observation and re-adjustment.

Full text available upon request to the author

Article title: Addressing lidar overlap for diameter at breast height estimation using a point-cloud processing software

Authors: Gio Perseveranda Zaragosa, Enrico C. Paringit, Carlyn Ann G. Ibañez, Regine Anne Faelga

Conference title: SPIE Asia-Pacific Remote Sensing, May 2016

Abstract:

LiDAR Overlap is the area that is common to two or more flight lines. This is essential to ensure the continuity of data as the acquisition moves from one flight line to another. Looking into overlaps is important when doing DBH Estimation using point cloud data because it doubles the density of points in the overlap region. To remove this effect when determining the DBH of a forest area, the LiDAR data was processed using a point-cloud processing software. The processes include separating flight lines using the GPS time when the points were acquired. After separating, the number of points in the overlap region were decreased by removing excess points within the area of twice the point spacing. The parameters needed for DBH estimation were then obtained. The absolute number of points in the whole overlap area was originally 4,960,726 after decreasing the number of points, it was reduced to 1,479,884. The number of points would have an effect on DBH estimation because the values obtained were significantly different at 95% level of confidence.

Full text available upon request to the author

Article title: Validation of the separability measure for Rhizophoraceae and Avicenniaceae using point density distribution from lidar

Authors: Regine Anne Faelga, Enrico C. Paringit, Gay Perez, Reginald Argamosa, et al.

Conference title: SPIE Asia-Pacific Remote Sensing, May 2016

Abstract:

The extent at which mangrove forest characterization can be done through utilization of Light Detection and Ranging (LiDAR) data is investigated in this paper. Particularly, the ability of LiDAR parameters, such as its point density to provide height and structural information was explored to supplement manual field surveys which are time-consuming and requires great effort. Point cloud information was

used to produce separability measure within a mangrove forest. The study aims to validate the point density distribution curves (PDDC) that were established to characterize the structural attributes between Rhizophoraceae and Avicenniaceae. The applicability of the PDDC was applied to fifteen (15) 5x5 sample plots of pure Rhizophoraceae and fifteen (15) 5x5 sample plots of pure Avicenniaceae in a one hectare (1ha) natural riverine mangrove forest. 15 out of 15 plots were correctly discriminated as Rhizophoraceae; however, Avicenniaceae plots were not correctly discriminated using the established separability measure. This study had determined that the two mangrove families are difficult to separate in terms of point density distribution alone. Enhancement of the PDDC as a separability measure should be improved to pave way for a more sensitive and robust way to separate the two families.

Full text available upon request to the author

Article title: Oil spill detection in Envisat ASAR images using backscatter thresholding and logistic regression analysis

Authors: Jojene Santillan, Enrico C. Paringit

Conference title: 32nd Asian Conference on Remote Sensing (ACRS 2011), October 2014

Abstract:

This paper presents a technique to detect oil spills in ENVISAT Advanced Synthetic Aperture Radar (ASAR) images using radar backscatter thresholding and logistic regression analysis. We developed and tested this technique using 4 Envisat ASAR images that were acquired many days after the M/T Solar I oil spill incident occurred on August 11, 2006 in Panay Gulf, southwest of Guimaras Island in Visayas, Philippines. A semi-automated approach by histogram analysis and radar backscatter thresholding was implemented to detect and segment dark formations in the Envisat ASAR images. Then, a logistic regression (LR)-based dark formation classifier was developed using 4 shape features, 11 contrast features, 2 homogeneity, and 2 slick surrounding features of the detected dark formations consisting of 154 verified oil slicks and 1,355 look-alikes. From this, a dataset consisting of 77

confirmed oil slicks and 77 look-alikes were randomly selected and used to train the classifier while the remaining dataset of 77 oil slicks and 1,272 look-alikes were used for validation. Features of the training dataset were fitted in a binary LR model and a backward stepwise-likelihood ratio approach was utilized to determine the sets of features that best discriminate an oil slick from its look-alike. Cross-validation of the LR classifier using the training dataset showed 84% accuracy for oil slick classification, 87% accuracy for look-alike classification, and an overall classification accuracy of 86%. An independent validation of the LR classifier revealed an above average performance, with 92% accuracy for oil slick classification, 76% accuracy for look-alike classification, and overall classification accuracy of 77%. The results of this study indicate that the combined radar backscatter thresholding and logistic regression analysis could be a promising approach in oil spill detection in Envisat ASAR images. The simplicity of the technique and its use of information readily available from the SAR images are advantageous in the rapid mapping of oil slicks right after an oil spill incident. Its improvement through consideration of prevailing wind conditions, the use of large training and validation datasets as well as inclusion of other relevant image features during classifier development could be a subject of future studies.

Full text available upon request to the author

Article title: Analysis of effective window size in texture-based classification of 2007–2010 ALOS PALSAR 25m mosaic images

Authors: Margie Parinas, Enrico C. Paringit

Conference title: IGARSS 2013- 2013 IEEE International Geoscience and Remote Sensing Symposium, July 2013

Abstract:

This study aims to develop a land cover texture-based classification scheme applicable for ALOS PALSAR imageries of the upper Marikina watershed acquired 2007 - 2010. From the raw dual polarization bands of HH+HV that has a ground resolution of 25m, additional bands HH/HV and NL was computed for surface texture normalization. The classification scheme was based on texture analysis using

grey level co-occurrence matrix with parameters of mean, variance and angular second moment to extract imageries feature statistics. Varied window sizes from 3×3 to 29×29 in odd series was produced to generate texture-window size bands (TWS bands). Using Support Vector Machine for land cover classification, each classified TSW bands' accuracy was computed and yielded an initial result of stability on the NL band at ~78%-81% on window sizes 15-29. Additional 2,744 TWS bands with permuted window sizes of the 3 texture variable of NL band was produced and classified for accuracy assessment. In general, high dependence on variance texture variable was observed for classified TWS bands with high accuracy. These TWS bands has large window size that caused generalization of classification. For land cover change detection, given an illogical transition of land cover due to misclassification from the SVM classification, a drastic land cover was observed especially on the forest cover of the watershed from 2007-2010.

Full text available upon request to the author

Article title: Use of Geospatial Technologies and Numerical Modeling to Monitor and Forecast Flooding Along Marikina River, Philippines

Authors: Jojene Santillan, Roseanne Ramos, Sabrina Recamadas, Girlie David, et al.

Conference title: 12th South East Asia Survey Congress (SEASC 2013)

Abstract:

In this paper, we present how geospatial technologies and techniques (hydrographic surveys, Remote Sensing -RS, Geographic Information System -GIS) together with numerical models can be used in near-real time monitoring and forecasting of floods. We chose Marikina River that traverses the province of Rizal and the Metropolitan Manila in Luzon Island, Philippines as our study area. We developed and parameterized a near-real time flood extent monitoring numerical model for Marikina River, Philippines using the Hydrologic Engineering Center – River Analysis System (HEC RAS) program. Model development and parameterization was done using GIS. Hydrographic surveys were conducted to generate the geometry of the Marikina River required by HEC RAS. Flood plain surface roughness coefficients needed to parameterize the model were derived from

multispectral classification of a 10-m spatial resolution ALOS AVNIR-2 satellite image of the study area. Automation scripts were developed for running the HEC RAS modelling workflow without human intervention such as assigning of model initial and boundary conditions, setting of simulation time window, model computation and generation of flood extent and flood depths. The outputs generated are then uploaded automatically to the Project NOAH (Nationwide Operational Assessment of Hazards, http://noah.dost.gov.ph) website where the public could view in near real-time if there is flooding along Marikina River. This near-real time generation of flood maps can be useful in providing information to the public as to the possible extent of flooding in the Marikina River that could then assist in preparation for evacuation. We also developed a forecasting system for Marikina River that provides water level forecasts for the next 48 hours. Forecasts are results of model simulation of basin hydrology as well as river and flood plain hydraulics, using recorded data of rainfall events 3 days ago to present time as primary input of the models. The forecast model is based on the Hydrologic Engineering Center – Hydrologic Modeling System (HEC HMS). This model was also developed and parameterized using GIS, wherein river and floodplain geometry from field surveys and digital elevation model (DEM) as well as land-cover information from the ALOS AVNIR-2 satellite image were used as primary inputs.

Full text available upon request to the author

Article title: Hydrodynamic and trajectory modeling of the August 11, 2006 M/T solar 1 oil spill in Guimaras, central Philippines with validation using envisat asar data

Authors: Jojene Santillan, Enrico C. Paringit

Conference title: 33rd Asian Conference on Remote Sensing 2012

Abstract:

Oil spill patterns detected from Envisat ASAR images were integrated with hydrodynamic and oil spill trajectory models for the purposes of understanding the August 11, 2006 M/T Solar 1 oil spill, and to evaluate the accuracy of the oil spill patterns simulated by an oil trajectory model. The oil spill incident event that

occurred a few kilometers southwest of Guimaras Island in Panay Gulf and Iloilo Guimaras Strait (PG-IGS), Central Philippines, is considered to be the worst oil-related environmental disaster the Philippines has experienced. A three-dimensional, wind- and tide-driven hydrodynamic model of the PG-IGS coastal zone was developed using the Environmental Fluid Dynamics Code (EFDC) to ascertain water circulation patterns. The simulated currents by the EFDC model were used as inputs to an oil spill trajectory model based on the General NOAA Operational Modeling Environment (GNOME) that provided continuous simulation of the transport of spilled oil from its source to the nearby coastal communities. The oil trajectories simulated by the GNOME model were validated by comparing it to oil spill patterns detected from Envisat Advanced Synthetic Aperture Radar (ASAR) images of the oil spill incident. The use of sea surface currents simulated by the EFDC-based hydrodynamic model was vital in explaining the trend, shape, and direction of the observed oil slicks from the Envisat ASAR images. Conversely, the use of Envisat ASAR images for oil spill pattern validation provides an easier and direct assessment of the GNOME-based oil trajectory model's performance. The comparison between model-simulated oil spill patterns and the patterns mapped from Envisat ASAR images showed that in general, the simulated slick patterns differ in location, shape and extent to those detected from the SAR images. It appears from the results of actual-versus-simulated oil spill patterns that improvement is needed in the EFDC and GNOME models, most especially in their data inputs. While the oil spill patterns simulated by the GNOME model differs at some aspects from the actual patterns, the results highlighted the usefulness of the model for oil spill trajectory analysis and its use for oil spill response in the future once improvements to the model have been considered.

Full text available upon request to the author

Article title: Near-real time flood extent monitoring in Marikina river philippines: Model parameterisation using remotely-sensed data and field measurements

Authors: Jojene Santillan, Enrico C. Paringit, Roseanne Ramos, J.R.T Mendoza, et al.

Conference title: 33rd Asian Conference on Remote Sensing 2012

Abstract:

Floods are a persistent problem in the Philippines that need to be addressed in a more scientific way in order to mitigate its costly impacts to human lives and properties. The September 2009 floods caused by Typhoon Ketsana that devastated Metro Manila and its surroundings exemplified the need for an accurate and reliable flood monitoring tool for determining the extents of floods and for assessing the risks due to this disaster. In this study, we developed and parameterized a near-real time flood extent monitoring model for Marikina River, Philippines using the Hydrologic Engineering Center - River Analysis System (HEC RAS) program. River bathymetric surveys and cross-section measurements were conducted to generate the geometry of the Marikina River required by HEC RAS. Flood plain surface roughness coefficients needed to parameterize the model were derived from multispectral classification of a 10-m spatial resolution ALOS AVNIR-2 of the study area. The HEC RAS model was configured to accept real time 10-minute water level data from the Enhanced Flood Control and Operation Warning System (EFCOS) monitoring stations along the Marikina River as model boundary conditions. Automation scripts were used to convert the time series of water level data from the stations to a format that could be readily used by the HEC RAS model. An automation script was also developed for running the HEC RAS modeling workflow without human intervention such as assigning of model initial and boundary conditions, setting of simulation time window, model computation and generation of flood extent and flood depths. The outputs generated are then uploaded automatically to the Project NOAH (Nationwide Operational Assessment of Hazards) website where the public could view in near real-time the flooding extent along Marikina River. This near-real time generation of flood maps could be useful in providing information to the public as to the possible extent and depth of flooding in the Marikina River that could then assist in preparation for evacuation. Validation of the model using time series of water level data for two rainfall events showed an average error of -16 cm and root mean square error of 25 cm. The model has a Nash-Sutcliffe Coefficient of Model Efficiency (E) of 0.88 which signifies satisfactory model performance but requires further improvement and calibration. The study proves the usefulness of remote sensing and GIS technologies in model preparation and

parameterizations, as well as in providing near-real time outputs for viewing by the public.

Full text available upon request to the author

Article title: Development of a HEC RAS Model for Near-Real Time Flood Extent Monitoring in Marikina River, Philippines

Authors: Jojene Santillan, Enrico C. Paringit, Roseanne Ramos, John Robert, et al.

Conference title: 1st Philippine Geomatics Symposium

Abstract:

We developed and parameterized a near-real time flood extent monitoring model for Marikina River, Philippines using the Hydrologic Engineering Center – River Analysis System (HEC RAS). The development consisted of three major steps: flood model setup, flood model automation, and online visualization. The HEC RAS model was configured to accept real time 10-minute water level data from the Enhanced Flood Control and Operation Warning System (EFCOS) monitoring stations along the Marikina River as model boundary conditions. Automation scripts were used to convert the time series of water level data from the stations to a format that could be readily used by the HEC RAS model. An automation script was also developed for running the HEC RAS modeling workflow without human intervention such as assigning of model initial and boundary conditions, setting of simulation time window, model computation and generation of flood extent and flood depths. The outputs generated are then uploaded automatically to the Project NOAH (Nationwide Operational Assessment of Hazards) website where the public could view in near real-time the flooding extent along Marikina River. This near-real time generation of flood maps could be useful in providing information to the public as to the possible extent and depth of flooding in the Marikina River that could then assist in preparation for evacuation. Validation of the model using time series of water level data showed an average error of -16 cm and root mean square error of 25 cm. The model has a Nash-Sutcliffe Coefficient of Model Efficiency (E) of 0.88 which signifies satisfactory model performance but requires further improvement and calibration. The study proves the usefulness of remote sensing and GIS technologies

in model preparation and parameterizations, as well as in providing near-real time outputs for viewing by the public.

Full text available upon request to the author

Article title: Utilizing Spectral Reflectance and Vegetation Indices of Bougainvillea spectabilis in Monitoring Particulate Air Pollution in Metro Manila

Authors: Alex Olpenda, Enrico C. Paringit

Conference title: 32nd Asian Conference on Remote Sensing 2011

Abstract:

This research aims to examine the potential of high-resolution multispectral remote sensing in assessing particulate air pollution wherein plant responses were utilized as indicators of air quality. Spectral reflectance measurements simultaneous with air particulate matter concentration sampling were conducted daily for a one-month period. Vegetation indices such as Ratio Vegetation Index (RVI), Normalized Difference Vegetation Index (NDVI) and Difference Vegetation Index (DVI) including Red Edge Parameter (REP) were utilized to assess potted bougainvillea plants exposed at different pollution level. Further, a spectral mixture analysis (SMA) was made to simulate the effects of vehicular exhaust soot to the spectral characteristics of a bougainvillea leaf. The generated data was later used in creating a model thru Partial Least Squares (PLS) regression. The SMA-based PLS-ran model was then applied to WorldView-2 imageries in producing an interpolated detailed air quality map showing the spatial extent and concentration of suspended particulate matter. The clearest and least hazed image showed the most reasonable representation of particulate air pollution suggesting a valid scenario. However, portions of vegetated areas present unrealistic estimates due to intrinsic factors like canopy biophysical attributes and external conditions such as soil reflectance, atmospheric and illumination conditions and viewing geometry.

Full text available upon request to the author

Article title: Merging landsat image information with georeferenced biophysical and socio-economical datasets to describe forest cover change in a Philippine province

Authors: Meriam Makinano-Santillan, Jojene Santillan, Enrico C. Paringit

Conference title: 32nd Asian Conference on Remote Sensing 2011

Abstract:

This paper describes a combined remote sensing-GIS-logistic regression approach of merging extracted information from Landsat images with georeferenced biophysical and socio-economic datasets in the detection and analysis of the driving forces of forest cover change in Agusan del Norte (ADN) in Mindanao Island, Philippines, a province where forest resource use have been historically extensive. Year 1976 Landsat 2 MSS and year 2001 Landsat ETM+ images were independently classified using Support Vector Machines (SVM) to produce land cover maps with overall classification accuracies of 95% and 98%, respectively. Changes in forest cover and other types of land-cover change in the 25-year period were then detected from these maps through post-classification comparison in a GIS. To investigate what has driven these conversions, the associations between these changes and a selection of biophysical and socio-economical variables were explored through logistic regression analysis. The results show that while both the biophysical and socio-economical variables were significantly associated with the occurrences of forest cover change, the models containing only the socio-economical variables predict better the occurrences of change than those containing only the biophysical variables. This implies that most of the forest cover change detected in the year 2001 in ADN is much more a socio-economical matter, and is less forced by biophysical limitations. With these results, this study demonstrated the usefulness of RS, GIS and statistical analysis as exploratory tools in understanding the underlying processes and identification of driving forces of forest cover change, especially in areas of extensive forest resource use.

Full text available upon request to the author

Article title: Energy potential metric for rapid macro-level resource assessment of tidal in-stream energy in the Philippines

Authors: Michael Lochinvar Sim Abundo, Allan C. Nerves, Rosario Ang, Enrico C. Paringit, et al.

Conference title: Environment and Electrical Engineering 2011, 10th Conference

Abstract:

This paper presents preliminary efforts in developing a rapid evaluation tool for tidal in-stream energy (TISE) in the Philippines. We study the possibility of using an energy density metric based on the sea surface elevation (SSE) or tide height difference at the boundaries of a site of interest as a gauge for the TISE potential of that site. Results show good correlation with high potential sites and the proposed metric. Verde Island Passage was assessed, through a combination of DELFT3D simulation and Matlab-based power computations, to have four potential TISE sites with a total energy density of 271.90 kW-h /m² in a month.

Full text available upon request to the author

Geoffrey M. Ducanes

Sex: Male

Education:

Doctor of Philosophy in Economics, University of the Philippines Diliman, 2011

Masters of Arts in Economics, University of the Philippines, 1999

Bachelor of Science in Statistics, University of the Philippines, 1995

Field of Specialization

Applied Econometrics

International migration

Poverty and inequality

Macroeconometric forecasting

Labor economics

Researches:

Article title: Navigating Globalization in the Aftermath of COVID-19

Authors: Ronald U. Mendoza, Arsenio M. Balicasan, Sheena Valenzuela, Clarissa C. David, et al.

Publication title: SSRN Electronic Journal 2021

Abstract:

The COVID-19 pandemic has affected over 200 countries and territories, leading to well over 40 million confirmed cases and over 1.1 million deaths worldwide

(covid19.who.int/). While many are hopeful, an effective vaccine is not yet assured, and the world still struggles with the so-called "new normal" during the pandemic. Meanwhile, even prior to the pandemic, deep structural "mega-trends" have been sweeping across the world, notably the emergence of a new era of "digital globalization". These changes promise to re-shape international economic linkages just like the previous waves of globalization relating to trade, finance, and people. In important ways, this new globalization is linked to the 4th industrial revolution, which sees automation, artificial intelligence, the internet of things (IoT) and other technological trends reshaping not just the world economy, but also creating disruptions and spurring innovations in social and political spheres. Using a Philippine perspective, it is critical to understand the implications of these waves of change, which are sweeping across the world. Intended as an evidence-based foresight analysis. this paper maps the main features of globalization in the aftermath of COVID-19; and it outlines some initial policy directions with a particular focus on science and technology. Its main recommendation is to focus the Philippines' effort to build-back-better from the health pandemic on areas that would improve on inclusive recovery from the pandemic, and inclusive development during the post-pandemic period.

Full text available upon request to the author

Article title: The Impact of Basic Education Reform on the Educational Participation of 16- to 17-year-old Youth in the Philippines

Authors: Geoffrey Ducanes and Dina Joana Ocampo

Publication title: The Philippine Statistician 68(2): 111-130, 2020

Abstract:

The study measures the impact on the school participation of 16 to 17-year-old learners in the Philippines of the implementation of the Senior High School program (SHS), which came into full effect in school year 2017–2018. The SHS program, which extended secondary education in the country from four to six years, was the most ambitious education reform action in the country in recent memory. The study found that the SHS program resulted in an increase in overall school participation rate of at

least 13 percentage points among 16 to 17-year-olds. Perhaps more importantly, the increase in school participation rate was found to be highly progressive with those 16 to 17-year-olds in the two bottom income quintiles experiencing the highest increase in school participation rates by a wide margin. The study also found that both male and female students benefited from the program, although the gains appear to be higher for female students. Most of the gains in school participation were also found to occur outside Metro Manila.

Full text available upon request to the author

Article title: Quality of nursing schools in the Philippines: Trends and evidence from the 2010–2016 Nurse Licensure Examination results

Authors: John Robert Bautista, Geoffrey Ducanes, Clarissa C. David

Publication title: Nursing Outlook 67(3): 259-269, 2019

Abstract:

Background: The quality of undergraduate nursing programs offered by higher education institutions (HEIs) in the Philippines is usually evaluated using Nurse Licensure Examination (NLE) results. Purpose: To describe NLE trends in 2010–2016, compare low and high performing HEIs, and examine the association of HEIs' characteristics with NLE passing rate. Method: NLE and HEI data were collected from two Philippine government agencies. Descriptive statistics were used to present NLE trends while multiple linear regression was used to determine the association of HEI characteristics with NLE passing rate. Findings: There was a downward trend for NLE takers and passers from 2010–2016. Regression results showed that location, size, type, year of establishment, and student-faculty ratio were associated with NLE passing rate. Discussion: HEIs should consider decreasing their student-faculty ratio to improve NLE performance. Relevant government agencies should take measures to improve most HEIs' NLE performance in the Philippines.

Full text available upon request to the author

Article title: A note on the effects of remittances and overseas migration on some Philippine statistics

Authors: Sarah Lynne Daway and Geoffrey Ducanes

Publication title: Philippine Review of Economics 52(1): 95-116, 2015

Abstract:

The Philippines is peculiar in that a significant portion of its population is dispersed globally, sending remittances that have exceeded 8 percent of its gross domestic product (gdp) in recent years. For the last two decades, the country has enjoyed a steady flow of remittances from overseas Filipino workers, which has not only provided an additional source of disposable income to domestic households but has also served as a buffer against economic downturns. This note shows that standard gdp accounting and current labor statistics may inadequately account for remittances and overseas migration, especially their corresponding welfare consequences. A better valuation of welfare and living standards requires alternative measures that would better capture the migration phenomenon.

Full text available upon request to the author

Article title: The welfare impact of overseas migration on Philippine households: Analysis using panel data

Authors: Geoffrey Ducanes

Publication title: Asian and Pacific Migration Journal 24(1): 79-106, 2015

Abstract:

This study uses a panel of some 8,000 households common to the 2007 and 2008 Annual Poverty Indicators Surveys to examine the economic impact of overseas migration on Philippine households. It finds overseas migration to be an important driving factor for household social mobility in the Philippines. Using panel regression analysis, the study shows households that are able to send members overseas experience a windfall in income transfers, but they also incur losses in domestic wages. This moves them up the income ladder, supports their increased consumption – including spending for education, medical care, real property and

equipment, food, clothing and recreation – reduces their poverty, and allows them to increase inter-household transfers.

Full text available upon request to the author

Article title: Who Are Poor and Do They Remain Poor?

Authors: Geoffrey M Ducanes, Edita Abella Tan

Publication title: UPSE Discussion Papers 1(1), 2014

Abstract:

This paper examines the link between poverty and income, on the one hand, and human capital and location, on the other. In the process, the paper proposes a shift in the household indicator of human capital from the usual education of the household head to the education of the most educated member. The paper finds poverty to be most severe and persistent for households with low human capital, and that the effect of human capital varies substantially across locations. Additionally, the paper finds that low human capital households tend to underinvest in the human capital of school-age members, thus likely perpetuating poverty.

Full text available upon request to the author

Article title: Are remittances inducing laziness in households?: a reexamination of the evidence

Authors: Geoffrey M Ducanes

Publication title: Philippine Review of Economics 49(2): 1-24, 2012

Abstract:

Over the years, the volume of studies on the economic impact of overseas migration and remittances on the Philippine economy and the welfare of Philippine households has grown almost in tandem with the scale of overseas migration and remittances themselves. The studies cover a broad range of topics, touching on the effect on poverty and inequality, household consumption and investment, education and employment, as well as more macroeconomic concerns, such as the exchange rate, gross domestic product (GDP) growth, and overall investment growth. On

employment, the most typical finding is that migration and remittances cause recipients to be less active participants in the labor market—what has been called the "complacency effect" or "leisure effect"

Full text available upon request to the author

Article title: The future of Chinese and South-East Asian migration to OECD countries

Authors: Geoffrey Ducanes, Manolo Abella

Publication title: OECD Journal: General Papers 2009(4): 7-29, 2010

Abstract:

CHINA and the Philippines are among the top 10 main sending countries to OECD countries. Population growth is still high in the Philippines, which will likely exert strong pressure for emigration if economic opportunities in the country do not keep up. In China and Indonesia population growth has been reduced to replacement or below replacement levels, thereby reducing future emigration pressure. Recent economic success, if continued, would likely reduce emigration on condition that in China the distribution of benefits from its economic growth is more equitable; that Indonesia is able to generate more employment-intensive economic growth; and that the Philippines is able to extricate itself from its long history of boom-bust economic growth. There are pockets of ethnic unrest that are currently mainly dormant, but should they escalate, they will most likely have an impact on emigration to nearby countries.

Full text available upon request to the author

Article title: Effects of income inequality on China's economic growth

Authors: Duo Qin, Marie Anne Cagas, Geoffrey Ducanes, Xinhua He, et al.

Publication title: Journal of Policy Modeling 31(1): 69-86, 2009

Abstract:

A pilot empirical study is carried out on how income inequality affects growth through incorporating panel data information into a quarterly macro-econometric model of China. Provincial urban and rural household data are used to construct

income inequality measures, which are then used to augment household consumption equations in the model. Model simulations test the inequality effect on GDP growth and its components. Results show that income inequality forms robust explanatory variables of consumption and that the way inequality develops carries negative consequences on GDP and sectoral growth.

Full text available upon request to the author

Article title: The effect of the global economic crisis on Asian migrant workers and governments' responses

Authors: Manolo Abella, Geoffrey Ducanes

Publication title: Asian and Pacific Migration Journal 18(1): 143-161, 2009

Abstract:

It will take more time for the full scale of the global economic crisis to unravel and for its impact on the cross border movements of labor, their conditions of employment and possible return to become manifest. 1 Although the recession in the United States started well over a year before the collapse of sub-prime financial market migration and remittances grew strongly and rapidly in many parts of the world obscuring any early signs of the effects of the on-coming crisis. Many factors remain uncertain even today, including how the fiscal and monetary stimuli that many governments have hurriedly crafted are working to revive afflicted economies.

Full text available upon request to the author

Article title: Empirical assessment of sustainability and feasibility of government debt: The Philippines case

Authors: Duo Qin, Marie Anne Cagas, Geoffrey Ducanes, Nedelyn Magtibay-Ramos, et al.

Publication title: Journal of Asian Economics 17(1): 63-84, 2006

Abstract:

This paper develops empirical methods of assessing the sustainability and feasibility of public debt under the No Ponzi Game (NPG) criterion, using the Philippines as the testing case. Historical data and forecasts generated by a quarterly macro-econometric model are used in the assessment. Stochastic simulations are carried out to mimic future uncertainty. Through various simulation experiments, we show that, up to the end of the present administration in 2010, the Philippine government debt is not sustainable but weakly feasible if only simple budgetary deficit control policy is used, that such feasibility is vulnerable to major adverse shocks, and that fiscal measures to increase tax effort are desirable to achieve sustainability.
Full text available upon request to the author

Article title: A small macroeconometric model of the Philippine economy
Authors: Marie Anne Cagas, Geoffrey Ducanes, Nedelyn Magtibay-Ramos, Duo Qin, et al.
Publication title: Economic Modelling 23(1): 45-55, 2006

Abstract:
This paper describes the ADB Philippine model, a quarterly macroeconometric model for forecasting and policy analysis. The model covers private consumption, investment, government, foreign trade, GDP 3-sector labor and production, prices and monetary sectors. The equilibrium-correction form is used, estimated via the general→specific dynamic specification approach, to ensure the best possible blend of a priori long-run theories with short-run dynamics through a posteriori guidance. Country-specific features are incorporated and special attention is given the government block design to enable variables simulations of the fiscal debt problem, one of the most critical problems of the economy at present.
Full text available upon request to the author

Article title: Automatic leading indicators versus macroeconometric structural models: A comparison of inflation and GDP growth forecasting
Authors: Duo Qin, Marie Anne Cagas, Geoffrey Ducanes, Nedelyn Magtibay-Ramos, et al.

Publication title: International Journal of Forecasting 24(3): 399-413, 2008

Abstract:

This paper compares the forecast performance of automatic leading indicators (ALIs) and macroeconometric structural models (MESMs) commonly used by non-academic macroeconomists. Inflation and GDP growth form the forecast objects for comparison, using data from China, Indonesia and the Philippines. ALIs are found to outperform MESMs for one-period-ahead forecasts, but this superiority disappears as the forecast horizon increases. It is also found that ALIs involve greater uncertainty in choosing indicators, mixing data frequencies and utilizing unrestricted VARs. Two ways of reducing the uncertainty are explored: (i) give theory priority in choosing indicators, and include theory-based disequilibrium shocks in the indicator sets; and (ii) reduce the VARs by means of the general-to-specific modeling procedure.

Full text available upon request to the author

Article title: A macroeconometric model of the Chinese economy

Authors: Duo Qin, Marie Anne Cagas, Geoffrey Ducanes, Xinhua He, et al.

Publication title: Economic Modelling 24(5): 814-822, 2007

Abstract:

This paper describes a quarterly macroeconometric model of the Chinese economy. The model comprises household income and consumption, investment, government, trade, production, prices, money, and employment blocks. The equilibrium-correction form is used for all the behavioral equations and the general → simple dynamic specification approach is adopted. Great efforts have been made to achieve the best possible blend of standard long-run theories, country-specific institutional features and short-run dynamics in data. The tracking performance of the model is evaluated. Forecasting and empirical investigation of a number of topical macroeconomic issues utilizing model simulations have shown the model to be immensely useful.

Full text available upon request to the author

Article title: Philippines' progress towards the Millennium Development Goals: geographical and political correlates of subnational outcomes

Authors: Solita Collas-Monsod, Toby C Monsod, Geoffrey M Ducanes

Publication title: Journal of Human Development 5(1): 121-149, 2004

Abstract:

While the Philippines seems to be on track towards achieving some Millennium Development Goals (MDGs), subnational disparities exist indicating possible patterns of isolation or discrimination. This paper examines whether and how geographical and political economy factors help to explain these disparities, focusing specifically on the MDG targets most closely related to the Human Development Index: poverty incidence, per-capita income, infant mortality and primary education completion rates. The paper shows that climate, topography and other spatial factors affect the pace of communities with respect to human development targets. In addition, history and institutions also play a role: provinces characterized by ongoing social-political or socio-cultural conflicts with the state, or those governed by local political dynasties, are lagging on most outcomes.

Full text available upon request to the author

Ian Kendrich C. Fontanilla

Sex: Male

Education:

Doctor of Philosophy in Genetics, University of Nottingham, United Kingdom, 2010

Field of Specialization

Vertebrates

DNA Barcoding

Nematodes

Phylogenetics

Article title: Analysis of Environmental DNA and Edaphic Factors for the Detection of the Snail Intermediate Host Oncomelania hupensis quadrasi

Authors: Fritz Ivy Calderon Calata, Camille Z. Caranguian, Jillian Ela Mamaril Mendoza, Raffy Jay Fornillos, et al.

Publication title: Pathogens 8(4): 160, September 2019

Abstract:

Background: The perpetuation of schistosomiasis japonica in the Philippines depends to a major extent on the persistence of its intermediate host Oncomelania hupensis quadrasi, an amphibious snail. While the malacological survey remains the method of choice in determining the contamination of the environment as evidenced by snails infected with schistosome larval stages, an emerging technology known as environmental DNA (eDNA) detection provides an alternative method. Previous reports showed that O. hupensis quadrasi eDNA could be detected in water, but no

reports have been made on its detection in soil. Methods: This study, thus focused on the detection of O. hupensis quadrasi eDNA from soil samples collected from two selected schistosomiasis-endemic barangays in Gonzaga, Cagayan Valley using conventional and TaqMan-quantitative (qPCR) PCRs. Results: The results show that qPCR could better detect O. hupensis quadrasi eDNA in soil than the conventional method. In determining the possible distribution range of the snail, basic edaphic factors were measured and correlated with the presence of eDNA. The eDNA detection probability increases as the pH, phosphorous, zinc, copper, and potassium content increases, possibly indicating the conditions in the environment that favor the presence of the snails. A map was generated to show the probable extent of the distribution of the snails away from the body of the freshwater. Conclusion: The information generated from this study could be used to determine snail habitats that could be possible hotspots of transmission and should, therefore, be targeted for snail control or be fenced off from human and animal contact or from the contamination of feces by being a dumping site for domestic wastes.

Full text available upon request to the author

Article title: Complete Mitochondrial Genome and Novel Gene Organization of Ryssota otaheitana (Pulmonata: Chronidae), and its Implications on the Stylommatophora Phylogeny

Authors: Amor Li Damatac, Ian Kendrich Carandang Fontanilla

Publication title: Philippine Journal of Science 148(S1): 167-180, August 2019

Abstract:

Whole mitochondrial genomes (mitogenomes) have been increasingly used as markers for phylogenetic inferences. In the Philippines, a marine snail from the Conidae family has been the only species to date whose mitogenome has been fully sequenced, despite the country's rich malacofaunal diversity particularly in the terrestrial environment. In this study, we sequenced the complete mitogenome of the land snail Ryssota otaheitana (Chronidae), an endemic Philippine pulmonate species. The mitogenome is 13,888 bp in length and encodes the typical 37 genes – including 13 protein-coding, 22 tRNA, and 2 rRNA genes. Short intergenic spacers

were found – including a reduced, 42-bp putative control region. Although the gene content is conserved, R. otaheitana showed a novel mitogenome organization involving the translocation of tRNASerine and NADH dehydrogenase subunit 4 gene segment. Combined with available stylommatophoran mitogenomes, different datasets from concatenated sequences of protein-coding and rRNA genes were used for phylogenetic reconstructions. Bayesian Inference (BI) and Maximum Likelihood (ML) trees congruently supported several monophyletic clades within the Stylommatophora such as the Helicoidea, Urocoptoidea, Orthurethra, and Limacoidea sensu lato (syn. 'limacoid clade'). R. otaheitana is grouped with Deroceras reticulatum in the lower Stylommatophora and forms the monophyletic Limacoidea sensu lato. Both sequence-based phylogeny and gene order comparisons have led us to a hypothesis that Limacoidea sensu lato is at the base of the 'non-achatinoid' clade while supporting the division of 'achatinoid and 'non-achatinoid' groups in the Stylommatophora. This study reports the first complete mitogenome from the Chronidae family, which can be used further for the molecular phylogeny of Philippine snails and gastropods at large.

Full text available upon request to the author

Article title: Forensic entomology in the Philippines: Establishing Baseline Data on the Forensically Important Blow Fly Species Chrysomya megacephala (Fabricius, 1794)

Authors: Ronniel Pedales, Ian Kendrich Carandang Fontanilla

Publication title: Philippine Journal of Science 147(1): 17-25, March 2018

Abstract:

The Philippines is yet to adapt and implement guidelines and protocols in forensic entomology, particularly establishing local databases. Considering the efforts made by neighboring Southeast Asian countries in the field, the nation has been left behind in insect evidence-based investigations. Of utmost importance to forensic entomology are blow flies (Diptera: Calliphoridae), which are primary colonizers of carrion. Through knowledge of their distribution, identity, and growth rates, investigators are able to provide a post-mortem interval that is most accurate after

the onset of putrefaction. The Philippines has a total of 83 blow fly species recorded, including the cosmopolitan species Chrysomya megacephala. This paper aims to establish a baseline reference in Philippine forensic entomology by mapping the distribution, providing DNA barcodes, and estimating larval growth rates from oviposition to pupariation of C. megacephala. Distribution data were mapped in QGIS using localities from fieldwork data in this study and those in the Key to the Philippine Calliphoridae by Kurahashi and Magpayo. DNA barcodes of specimens from Isabela, Quezon City, and Marinduque in the Philippines matched with C. megacephala from the database in GenBank and revealed a possible SNP in the fragment amplified. C. megacephala was reared from oviposition in a simple incubation set-up to estimate the duration of development to pupariation, which ranged 100-113 hours. This is the first study on the distribution, molecular identification, and development of C. megacephala in the Philippines. Further work is needed to distinguish among populations of the species and to construct more precise growth curves.

Full text available upon request to the author

Article title: Genetic Comparison of Oncomelania hupensis quadrasi Genetic Comparison of Oncomelania hupensis quad rasi (Möllendorf, 1895) (Gastropoda: Pomatiopsidae), the Intermediate Host of Schistosoma japonicum in the Philippines, Based on 16S Ribosomal RNA Sequence Online

Authors: James Christopher Chua, Ian Kim Basas Tabios, Pebbles Grayle Panado Tamayo, Lydia Leonardo, et al

Publication title: PLoS One 14(11): e0224617, 2019

Abstract:

Schistosomiasis japonica is a water-borne trematode infection transmitted by different subspecies of Oncomelania hupensis. As parasites may either co-evolve or locally adapt with their hosts, snail diversity, as revealed by morphometric and genetic studies, may reflect parasite diversity and elucidate snail susceptibility and transmission patterns. This study aimed to compare isolates of O. h. quadrasi based on a 342-bp fragment of the 16S ribosomal RNA gene. O. h. quadrasi isolates were

collected from nine provinces known to have S. japonicum in the Philippines, namely Cagayan Valley, Bohol, Negros Occidental, Leyte, Davao, Davao del Sur, Mindoro Oriental, Northern Samar, and Sorsogon. O. h. hupensis and O. h. nosophora isolates were also collected from China and Japan, respectively. The 16S ribosomal RNA gene of each specimen was amplified and sequenced. Phylogenetic and network analyses based on the 221 16S rRNA gene sequences revealed that O. h. quadrasi clustered as a distinct clade from the two other subspecies. Of the four identified haplotypes for O. h. quadrasi, two haplotypes were from Negros Oriental (Ohq2 and Ohq3), and one haplotype was from Bohol (Ohq4). The isolates from the remaining seven provinces shared a common haplotype (Ohq1). The current study was able to show the relationship among O. hupensis subspecies and demonstrate the limited ability of mitochondrial 16S ribosomal molecular marker in differentiating O. h. quadrasi geographic strains in the Philippines.

Full text available upon request to the author

Article title: Geographic strain differentiation of Schistosoma japonicum in the Philippines using microsatellite markers

Authors: Kharleezelle J. Moendeg, Jose Ma. M. Angeles, Ryo Nakao, Lydia Leonardo, et al.

Publication title: PLoS Neglected Tropical Diseases 11(7), July 2017

Abstract:

Background: Microsatellites have been found to be useful in determining genetic diversities of various medically-important parasites which can be used as basis for an effective disease management and control program. In Asia and Africa, the identification of different geographical strains of Schistosoma japonicum, S. haematobium and S. mansoni as determined through microsatellites could pave the way for a better understanding of the transmission epidemiology of the parasite. Thus, the present study aims to apply microsatellite markers in analyzing the populations of S. japonicum from different endemic areas in the Philippines for possible strain differentiation. Methodology/ principal findings: Experimental mice were infected using the cercariae of S. japonicum collected from infected

Oncomelania hupensis quadrasi snails in seven endemic municipalities. Adult worms were harvested from infected mice after 45 days of infection and their DNA analyzed against ten previously characterized microsatellite loci. High genetic diversity was observed in areas with high endemicity. The degree of genetic differentiation of the parasite population between endemic areas varies. Geographical separation was considered as one of the factors accounting for the observed difference between populations. Two subgroups have been observed in one of the study sites, suggesting that co-infection with several genotypes of the parasite might be present in the population. Clustering analysis showed no particular spatial structuring between parasite populations from different endemic areas. This result could possibly suggest varying degrees of effects of the ongoing control programs and the existing gene flow in the populations, which might be attributed to migration and active movement of infected hosts from one endemic area to another. Conclusions/ significance: Based on the results of the study, it is reasonable to conclude that genetic diversity could be one possible criterion to assess the infection status in highly endemic areas. Genetic surveillance using microsatellites is therefore important to predict the ongoing gene flow and degree of genetic diversity, which indirectly reflects the success of the control program in schistosomiasis-endemic areas.

Full text available upon request to the author

Article title: A review of the current taxonomic status of foliose Bangiales (Rhodophyta) in the Philippines

Authors: Richard V. Dumilag, Zae-Zae Aguinaldo, Cynthia Mintu, Myrna Quinto, et al.

Publication title: Phytotaxa 312(1): 47-49, July 2017

Abstract:

Causes of taxonomic confusion are lamentably well known in foliose Bangiales. A magnitude of these uncertainties stems from the paucity of available taxonomic traits in morphologically homoplastic species. At present, the taxonomic identity and systematics of many of the Philippine foliose Bangiales are in a state of flux. A critical

examination of published literature on Philippine records of 10 species of foliose Bangiales has rendered the need for re-confirmation of the presence of Porphyra atropurpurea, Porphyra marcosii, Pyropia denticulata, and Pyropia suborbiculata while records of Porphyra umbilicalis, Pyropia vietnamensis, Wildemania variegata, and the invalid name Porphyra crispata have been omitted from the list. Currently, there are only two confirmed species of foliose Bangiales in the Philippines, which are Pyropia acanthophora and Pyropia tanegashimensis. Thus, this review exhorts a re-examination of collected Philippine foliose Bangiales materials using both morphological and molecular analysis.

Full text available upon request to the author

Article title: Molecular phylogeny of the Achatinoidea (Mollusca: Gastropoda)
Authors: Ian Kendrich C. Fontanilla, Fred Naggs, Christopher M. Wade
Publication title: Molecular Phylogenetics and Evolution 114, June 2017

Abstract:

This study presents a multi-gene phylogenetic analysis of the Achatinoidea and provides an initial basis for a taxonomic revaluation of family level groups within the superfamily. A total of 5028 nucleotides from the nuclear rRNA, actin and histone 3 genes and the 1st and 2nd codon positions of the mitochondrial cytochrome c oxidase subunit I gene were sequenced from 24 species, representing six currently recognised families. Results from maximum likelihood, neighbour joining, maximum parsimony and Bayesian inference trees revealed that, of currently recognised families, only the Achatinidae are monophyletic. For the Ferussaciidae, Ferussacia folliculus fell separately to Cecilioides gokweanus and formed a sister taxon to the rest of the Achatinoidea. For the Coeliaxidae, Coeliaxis blandii and Pyrgina umbilicata did not group together. The Subulinidae was not resolved, with some subulinids clustering with the Coeliaxidae and Thyrophorellidae. Three subfamilies currently included within the Subulinidae based on current taxonomy likewise did not form monophyletic groups.

Full text available upon request to the author

Article title: DNA barcoding, population genetics, and phylogenetics of the illegally hunted Philippine Duck Anas luzonica (Aves: Anseriformes: Anatidae)

Authors: Arde Mingoa Licuanan, Mariano Roy Duya, Perry S. Ong, Ian Kendrich Carandang Fontanilla

Publication title: Journal of Threatened Taxa 9(5): 10141, May 2017

Abstract:

DNA barcoding is extensively used as a species identification and delineation tool. The aim of this study was to generate a barcode profile for mitochondrial cytochrome c oxidase subunit 1 (COI) in the Philippine Duck Anas luzonica, a dabbling duck species endemic to the Philippines that is classified as 'Vulnerable' by the International Union for Conservation of Nature (BirdLife International 2016). COI barcodes were successfully obtained using muscle tissue samples from 46 A. luzonica individuals confiscated from illegal hunters in Pantabangan, Nueva Ecija. Analysis of TrN+Γ+I distances among the Anas luzonica COI sequences and those of 25 other Anas species revealed that COI barcodes cannot generally delineate hybridizing species. While Anas luzonica was differentiated from other species it is known to hybridize with and formed a monophyletic group in the neighbor-joining tree generated, sampling from areas of sympatry is needed since individuals were obtained from only one sampling site. The population structure of the Anas luzonica population was also examined using mitochondrial DNA control region and COI sequences. The population had high haplotype diversity and low nucleotide diversity, an indication that a bottleneck event had occurred, which is likely due to extreme hunting pressures and habitat destruction. The population under study exhibited high genetic diversity. Given that the samples for this study came from a single locality, sampling from other localities is required to determine whether other populations are facing the risk of reduced fitness (inbreeding depression).

Full text available upon request to the author

Article title: First record of the Charru mussel Mytella charruana d'Orbignyi, 1846 (Bivalvia: Mytilidae) from Manila Bay, Luzon, Philippines

Authors: Benjamin Vallejo, Jennifer Conejar-Espedido, Leanna Manubag, Kevin Carlo, et al.

Publication title: BioInvasions Records 6(1), January 2017

Abstract:

This study reports the presence of the Charru mussel Mytella charruana d'Orbignyi, 1846 (Bivalvia: Mytilidae) in Manila South Harbor, Manila Bay, Luzon Island, Philippines. In 2014, mussels previously identified as Mytilus spp. were reported in Manila Bay. The species was detected as part of an ecological dynamics study of previously-recorded marine non-indigenous mollusc species. DNA barcoding results suggest that the previously identified Mytilus are in fact Mytella charruana with an average identity match of 94%. The trends in abundance of Mytella during the 2014–2015 sampling season are described and the potential of this new species to become invasive and competitive with native Perna viridis (Linnaeus, 1758).

Full text available upon request to the author

Article title: Determining species identity from confiscated pangolin remains using DNA barcoding

Authors: Adrian U. Luczon, Perry S. Ong, Jonas Quilang, Ian Kendrich Carandang Fontanilla

Publication title: Mitochondrial DNA Part B 1(1): 763 -766, October 2016

Abstract:

Illegal wildlife trade is one of the key threats to biodiversity. A requisite in combating illegal wildlife trade is through effective and efficient identification of confiscated wildlife or wildlife remains. This can be done through DNA barcoding. In this study, DNA barcoding was employed on several cases of poaching in the Philippines involving 85 unidentified pangolin remains. Of these, 73 specimens confiscated from Palawan were identified as the Palawan endemic Manis culionensis, but no deep divergences were observed, suggesting that the samples originated from a single locality. The other 12 individuals, which were part of a large haul of pangolin carcasses recovered from a foreign fishing vessel that ran aground in Tubattaha

Reefs, Philippines, were identified as the Malayan Pangolin, M. javanica. They split into two groups with 3.3% mean genetic distance, suggesting at least two geographic origins.

Full text available upon request to the author

Article title: Review Schistosomiasis In The Philippines: Challenges And Some Successes In Control

Authors: Lydia Leonardo, Yuichi Chigusa, Mihoko Kikuchi, Naoko Kato-Hayashi, et al.

Publication title: The Southeast Asian Journal of Tropical Medicine and Public Health 47(4), August 2016

Abstract:

Schistosomiasis is a snail-borne neglected tropical disease affecting 78 countries and territories in Africa, Asia, South America and the Middle East.Three species are highly pathogenic to man namely Schistosoma japonicum, S. mansoni and S. haematobium. In the Philippines, the endemic species is S. japonicum to which 2.5 million Filipinos are directly exposed. This paper describes schistoso-miasis in the Philippines, the status of the disease, the efforts in controlling it, the numerous problems in the implementation of the control program and good practices developed in endemic areas that have contributed to even limited success and possible prospects in control of the disease. It traces the history of the control program from the time that the disease was discovered in 1906 and cites various administrative orders that provided for the implementation of the different components of the program. Much of the information contained in this paper were collated from the program implementation review of the control program in 2012, consultative meetings conducted in 2013 with health officials involved in the program, reports delivered in the 15 th meeting of the RNAS+ in July 2015, personal communications with program implementers in endemic areas visited in researches of the principal author, and her research team. The principal author was involved in all these activities and wrote the final reports.

Full text available upon request to the author

Article title: Vectors and Spatial Patterns of Angiostrongylus cantonensis in Selected Rice-Farming Villages of Muñoz, Nueva Ecija, Philippines

Authors: Angelica Tujan, Ian Kendrich Carandang Fontanilla, Vachel Gay Paller

Publication title: Journal of Parasitology Research 2016(2): 1-7, May 2016

Abstract:

In the Philippines, rats and snails abound in agricultural areas as pests and source of food for some of the local people which poses risks of parasite transmission to humans such as Angiostrongylus cantonensis . This study was conducted to determine the extent of A. cantonensis infection among rats and snails collected from rice-farming villages of Muñoz, Nueva Ecija. A total of 209 rats, 781 freshwater snails, and 120 terrestrial snails were collected for the study. Heart and lungs of rats and snail tissues were examined and subjected to artificial digestion for parasite collection. Adult worms from rats were identified using SSU rDNA gene. Seven nematode sequences obtained matched A. cantonensis . Results revealed that 31% of the rats examined were positive with A. cantonensis . Rattus norvegicus and R. tanezumi showed prevalence of 46% and 29%, respectively. Furthermore, only Pomacea canaliculata (2%) and Melanoides maculata (1%) were found to be positive for A. cantonensis among the snails collected. Analysis of host distribution showed overlapping habitats of rats and snails as well as residential and agricultural areas indicating risks to public health. This study presents a possible route of human infection for A. cantonensis through handling and consumption of P. canaliculata and M. maculata or crops contaminated by these snails.

Full text available upon request to the author

Article title: Characterization of an isolate of Heterorhabditis bacteriophora (Nematoda: Heterorhabditidae) from the Northern Territory, Australia, using morphology and molecular data

Authors: John Henry Hernandez Sagun, Kerrie A. Davis, Ian Kendrich Carandang Fontanilla, Merab Antone Chan

Publication title: Zootaxa 4040(1): 17, November 2015

Abstract:

An entomopathogenic nematode, Heterorhabditis H39, was found in Darwin, Australia. Based on morphological and mor-phometric similarities, and molecular characterisation, it is an isolate of Heterorhabditis bacteriophora. Males, hermaphrodites, females and juveniles showed important similarities on most characters that define H. bacteriophora. The morphometrics of the infective juvenile of Heterorhabditis H39 are similar to those of H. bacteriophora, including average body length (562 (537-587) vs 570 (520-600) µm), maximum body width (21 (19-22) vs 24 (21-31) µm), distance from the anterior end to the EP (96 (87-104) vs 104 (94-109) µm) and tail length (101 (94-111) vs 91 (83-99) µm). The morphology of the spicules and gubernaculum of male Heterorhabditis H39 are indistinguishable from those of H. bacteriophora. The biology and life cycle of Heterorhabditis H39 are similar to those of other Heterorhabditis species. The Neighbour-Joining Tree based on 475 nucleotides of the SSU rRNA gene showed that Heterorhabditis H39 formed a monophyletic group with other H. bacteriophora isolates with a bootstrap value of 100. Thus, phylogenetic study of SSU sequence data provided strong evidence that Heterorhabditis H39 is an isolate of H. bacteriophora. This is the first record of H. bacteriophora in northern Australia.

Full text available upon request to the author

Article title: A new Helicostyla species (Bradybaenidae: Helicostylinae) from Patnanungan Island, Philippines

Authors: Emmanuel Ryan C. de Chavez, Ian Kendrich Carandang Fontanilla, Gizelle Batomalaque, Satoshi Chiba, et al.

Publication title: Asia Life Sciences 24(1): 37-49, January 2015

Abstract:

A new species of land snail, Helicostyla amagaensis de Chavez, belonging to Subfamily Helicostylinae, Family Bradybaenidae is described from a native dipterocarp forest in Patnanungan Island, Polillo Group of Islands, Philippines. This new species differs from other congeners by its ovate-globose, cream white shell with single chestnut brown band. Aperture is ovate and moderately oblique with

reddish-brown streak around the aperture outer lip. Penis is long with inner oblique striations terminating towards a leaf-like stimulator. Vas deferens is short and flagellum is absent. DNA barcoding technique using Cytochrome c oxidase I subunit (COI) revealed H. amagaensis has closest sequence affinity with Helicostyla woodiana. Neighbor joining and maximum parsimony trees showed 100% bootstrap support for the inclusion of this new species as a member of the genus Helicostyla. This is the latest Helicostyla discovered in the Philippines and the third helicostyline snail that is endemic to the Polillo Group of Islands.

Full text available upon request to the author

Article title: An Updated Survey and Biodiversity Assessment of the Terrestrial Snail (Mollusca: Gastropoda) Species in Marinduque, Philippines

Authors: Benjamin O. Sosa III, Gizelle A. Batomalaque, Ian Kendrich C. Fontanilla

Publication title: Philippine Journal of Science 143(2): 199-210, December 2014

Abstract:

Marinduque is an island province of volcanic origin and is found in the southern portion of the Luzon Group of Islands. The island has an uneven topography but has experienced drastic deforestation in recent times. Records on the terrestrial snail species diversity in the Philippines in general and Marinduque in particular are sparse in the zoological literature. Previous literature noted only 13 species in Marinduque, which could be a gross underestimation of the terrestrial malacofaunal diversity of the island because the area was not systematically surveyed. This study aimed to assess the malacofaunal biodiversity of Marinduque and prepare a comprehensive list of snail taxa via opportunistic sampling. Sampling was conducted in 12 pre-determined areas of the island, with emphasis on minimally disturbed areas. This study reported ten (10) new records of stylommatophoran species and six (6) new records of terrestrial prosobranch species in Marinduque, which brings a total of 24 terrestrial snail species known to date (or 26 if two previously recorded species that were not encountered in this study are included).

Full text available upon request to the author

Article title: Restricted Genetic Variation in Populations of Achatina (Lissachatina) fulica outside of East Africa and the Indian Ocean Islands Points to the Indian Ocean Islands as the Earliest Known Common Source

Authors: Ian Kendrich Fontanilla, Ina Mikaella P. Sta Maria, James Rainier M. Garcia, Hermant Ghate, et al.

Publication title: PLoS ONE 9(9), September 2014

Abstract:

The Giant African Land Snail, Achatina (= Lissachatina) fulica Bowdich, 1822, is a tropical crop pest species with a widespread distribution across East Africa, the Indian subcontinent, Southeast Asia, the Pacific, the Caribbean, and North and South America. Its current distribution is attributed primarily to the introduction of the snail to new areas by Man within the last 200 years. This study determined the extent of genetic diversity in global A. fulica populations using the mitochondrial 16S ribosomal RNA gene. A total of 560 individuals were evaluated from 39 global populations obtained from 26 territories. Results reveal 18 distinct A. fulica haplotypes; 14 are found in East Africa and the Indian Ocean islands, but only two haplotypes from the Indian Ocean islands emerged from this region, the C haplotype, now distributed across the tropics, and the D haplotype in Ecuador and Bolivia. Haplotype E from the Philippines, F from New Caledonia and Barbados, O from India and Q from Ecuador are variants of the emergent C haplotype. For the non-native populations, the lack of genetic variation points to founder effects due to the lack of multiple introductions from the native range. Our current data could only point with certainty to the Indian Ocean islands as the earliest known common source of A. fulica across the globe, which necessitates further sampling in East Africa to determine the source populations of the emergent haplotypes.

Full text available upon request to the author

Article title: Genetic diversity of the Critically Endangered Philippine Eagle Pithecophaga jefferyi (Aves: Accipitridae) and notes on its conservation

Authors: Adrian U. Luczon, Ian Kendrich C. Fontanilla, Perry S. Ong, Basiao Zu, et al.

Publication title: Journal of Threatened Taxa 6: 6335-6344, September 2014

Abstract:

The Philippine Eagle Pithecophaga jefferyi is a diurnal raptor endemic to the Philippines. Its distribution is restricted to remaining forests on the islands of Luzon, Samar, Leyte and Mindanao. The Philippine Eagle is classified as a Critically Endangered species under the IUCN Red List, with a high end estimated population of only 500 breeding pairs in the wild. Population decline has been attributed to continuing deforestation, particularly since the mid-1900s, and hunting. This study aimed to identify the effects of population decline on the genetic structure of the present population of the Philippine Eagle by sequencing 1132bp of the mitochondrial control region from 22 individuals. Control region haplotype diversity ($h = 0.8960 \pm 0.05590$) and nucleotide diversity ($\pi = 0.006194 \pm 0.003372$) are comparable with other accipitrid species. Maximum likelihood trees and network analysis show that the Luzon and Samar individuals come from different lineages, but both shared a common ancestral population with the Mindanao population. The genetic diversity, multimodal mismatch distribution for the control region and high frequency of lower class modes all indicate a recent bottleneck for the Philippine Eagle population. Possible strategies for conservation are discussed.

Full text available upon request to the author

Article title: Identification of Angiostrongylus cantonensis and other nematodes using the SSU rDNA in Achatina fulica populations of Metro Manila

Authors: M. A. Constantino Santos, Z. U. Basiao, Christopher M. Wade, Brian S. Santos, et al.

Publication title: Tropical Biomedicine 31(2): 327-35, June 2014

Abstract:

Angiostrongylus cantonensis is a parasitic nematode that causes eosinophilic meningitis in humans. Accidental infection occurs by consumption of contaminated intermediates, such as the giant African land snail, Achatina fulica. This study surveyed the presence of A. cantonensis juveniles in A. fulica populations from 12

sites in Metropolitan Manila, Philippines using the SSU rDNA. Fourteen distinct sequences from 226 nematodes were obtained; of these, two matched A. cantonensis and Ancylostoma caninum, respectively, with 100% identity. Exact identities of the remaining twelve sequences could not be determined due to low percent similarities. Of the sequenced nematodes, A. cantonensis occurred with the highest frequency (139 out of 226). Most of these (131 out of 139) were collected in just one area in Quezon City. Nematode infection of A. fulica in this area and two others from Makati and another area in Quezon City, respectively, were highest, combining for 95% of the total infection. Ancylostoma caninum, on the other hand, was detected in four different sites. A. caninum is a canine parasite, and this is the first report of the nematode in A. fulica. These results cause public health concerns as both A. cantonensis and A. caninum are zoonotic to humans.

Full text available upon request to the author

Article title: Biodistribution of the Informal Group Basommatophora in the Philippines

Authors: Patrick Noel, Y. Young, Ian Kendrich C. Fontanilla

Publication title: Science Diliman 26(1): 53-76, January-June 2014

Abstract:

Basommatophora is an informal group within the molluscan subclass Pulmonata comprising of air-breathing freshwater snails that are typically characterized by eyespots located at the base of two noncontractile tentacles and two external genital orifices. They also have varied shell structures and habitats, not only within the group but also within families. Families of the Basommatophora are highly ubiquitous and may play a role in the life cycles of various parasites of humans and animals. Basommatophora has a worldwide geographical distribution across freshwater, terrestrial and marine habitats. However, little is known on their distribution in the Philippines. This report focuses on describing the biogeographical distribution of the basommatophorans in the Philippines through data gathered from museum collections, foreign databases accessed online, and identification of species found in various literatures. A qualitative description of the distribution of

each Basommatophora family in the Philippines is given by distribution maps, indicating locations where specimens were collected and/or identified. A total of 336 counts of basommatophorans from 22 genera were encountered from available literature, museums and public databases. The majority of the occurrences are from the genera Siphonaria. The data and maps generated describe most of the distribution to be in Luzon, with Visayas and Mindanao having close counts with each other. The Philippines has the third most occurrences and genera of basommatophorans of all tropical countries in the world. However, the true diversity of the group could be higher if a more systematic sampling of the archipelago is conducted. Keywords: Basommatophora, Philippines, biogeographical distribution
Full text available upon request to the author

Article title: DNA barcoding using cytochrome oxidase I (COI) of pulmonate gastropods from Batan Island, Batanes, Philippines
Authors: Gizelle Batomalaque, Paul Ryan Littaua Sales, Ian Kendrich C. Fontanilla
Publication title: Asia Life Sciences 22(2): 341-357, July 2013

Abstract:
DNA barcoding has emerged as a powerful tool for species identification, with the cytochrome c oxidase subunit I gene (COI) gene as the marker of choice for animals. In the Philippines, barcoding has focused primarily on fish, birds and plants, with less emphasis on snails. This study reports, for the first time, the COI sequences of pulmonates collected from Batan Is., Batanes. Five species belonging to five different families were sequenced for the 655 bp partial coding region of the COI gene. These are Eulota mighelsiana (Family Bradybaenidae), Ryssota sagittifera batanica (Family Helicarionidae), Satsuma batanica (Family Camaenidae), Trochornorpha troilus (Family Trochomorphidae) and Sarasinula plebeia (Family Veronicellidae). All available COI sequences of species under the identified families were obtained from GenBank. A total of 377 sequences, with 589 bp length, were analyzed from 136 species. Of the five species from Batan Is., only S. batanica had a conspecific match (99.7% similarity) from GenBank. The other four are novel. Base frequencies and GC

contents are relatively similar for all families. An apparent bias against C was observed and most variations occurred at the 3rd codon position.

Full text available upon request to the author

Article title: DNA Barcoding of Birds in the University of the Philippines Diliman Campus, with Emphasis on Striated Grassbirds Megalurus palustris

Authors: Adrian U. Luczon, Andrew F. Torres, Jonas Quilang, Perry S. Ong, et al.

Publication title: Philippine Journal of Science 142(1): 1-11, June 2013

Abstract:

DNA barcoding is increasingly being used by researchers across the globe to aid in the identification of species. Using this taxonomic tool on bird species in an urban green space within Manila, i.e. the University of the Philippines Diliman campus, Luzon, Philippines, DNA barcodes of eleven species were generated. Different haplotypes for some of the species were observed. Using BLAST, the cytochrome oxidase subunit 1 (COI) sequence of every species from this study was correctly matched with the corresponding species having a COI record in Genbank, with the exception of the Striated Grassbird Megalurus palustris, which is a new COI record. The three distinct haplotypes for M. palustris were then compared with COI sequences from other members of the sylviid " Old World Warblers " to determine the effectiveness of the DNA barcode in discriminating it with other species. Results show that COI was successful in placing M. palustris as a distinct taxon.

Full text available upon request to the author

Article title: First report of Angiostrongylus cantonensis in the Giant African Land Snail Achatina fulica in French Polynesia detected using the SSU rRNA gene

Authors: Ian Kendrich C. Fontanilla and Christopher M. Wade

Publication title: Tropical Biomedicine 29(4): 642-5, December 2012

Abstract:

The 5' end of the small subunit ribosomal RNA gene was used to determine whether 3rd larval stage Angiostrongylus cantonensis are present in populations of the giant African land snail Achatina fulica from French Polynesia. Two populations, one from

Moaroa Valley, Tahiti (n=5) and the other from Haapiti Valley, Moorea (n=10), were examined. All snails from Tahiti were infected with nematodes, with parasite load ranging from 12 to 28. A total of 92 nematodes were found, of which 91 were positively identified as A. cantonensis. No nematodes were found in the snails from Moorea. We report for the first time the presence of A. cantonensis in A. fulica snails from French Polynesia, indicating a viable route of human infection of A. cantonensis in the region through the handling of A. fulica or consumption of the snail or contaminated food crops associated with the snail.

Full text available upon request to the author

Article title: Distribution of MN blood group types in local populations in Philippines

Authors: Anna Elvira S. Arcellana, Ruth Marian Guzman, Ian Kendrich C. Fontanilla

Publication title: Journal of Genetics 90(3), December 2011

Abstract:

No available

Full text available upon request to the author

Article title: DNA Barcoding of the Philippine Endemic Freshwater Sardine Sardinella tawilis (Clupeiformes: Clupeidae) and Its Marine Relatives

Authors: Jonas Quilang, Brian S. Santos, Perry S. Ong, Zubaida U. Basiao, et al.

Publication title: Philippine Agricultural Scientist 94(3), October 2011

Abstract:

Sardinella tawilis (Herre, 1927), the only freshwater sardine in the world, is endemic to Taal Lake, Philippines. It is a major fishery resource in the area. In this study, DNA barcoding using cytochrome c oxidase subunit I (COI) gene was performed on Sardinella tawilis and its marine relatives S. fimbriata, S. jussieu, S. lemuru and Nematalosa nasus. Additional sequences from S. albella, S. atricauda, S. gibbosa S. jussieu, S. lemuru, S. longiceps and S. melanura were obtained from GenBank. A total of 54 sequences were analyzed. The Kimura 2-parameter (K2P) distance model was used to compute the divergences of sequences within and between species and

to generate a Neighbour-joining (NJ) tree. The mean intraspecific genetic distance was 0.3%, whereas the mean interspecific genetic distance was 15.2%. The genetic distance of S. tawilis from other Sardinella species ranged from 16.4% to 19.3%. S. tawilis also formed a distinct cluster in the NJ tree that is well-separated from the other species. These findings contrast with the suggestion in previous studies that S. tawilis and S. albella are ecomorphs of the same species and are not truly differentiated species based on mitochondrial control region sequence and multivariate analysis of morphological characters. This study is the first to report the occurrence of S. jussieu in the Philippines. Out of the five S. jussieu COI sequences generated in this study, two clustered with S. fimbriata, while the other three clustered with S. jussieu sequences from GenBank. Although S. fimbriata and S. jussieu are morphologically distinct based on gill raker counts, the clustering of two specimens of S. jussieu with S. fimbriata could be due to introgressive hybridization. COI sequences of S. atricauda and S. melanura from GenBank are identical. Interspecific genetic distances between some pairs of marine Sardinella are very low (0-1.6%). Further taxonomic studies using other mitochondrial and nuclear regions should be done to differentiate one species from the other and to establish their evolutionary relationships.

Full text available upon request to the author

Article title: DNA barcoding of fishes of Laguna de Bay, Philippines

Authors: Luis Miguel Aquino, Jazzlyn M. Tango, Reynand Jay C. Canoy, Ian Kendrich C. Fontanilla, et al.

Publication title: Mitochondrial DNA 22(4): 143-53, August 2011

Abstract:

Laguna de Bay, the largest lake in the Philippines, is an important part of the country's fisheries industry. It is also home to a number of endemic fishes including Gobiopterus lacustris (Herre 1927) of family Gobiidae, Leiopotherapon plumbeus (Kner 1864) of family Terapontidae, Zenarchopterus philippinus (Peters 1868) of family Hemiramphidae and Arius manillensis Valenciennes 1840 of family Ariidae. Over the years, a steady decline has been observed in the abundance and diversity of

native fishes in the lake due to anthropogenic disturbances. In this study, a total of 71 specimens of 18 different species belonging to 18 genera, 16 families, and seven orders were DNA barcoded using the mitochondrial cytochrome c oxidase subunit I (COI) gene. All of the fish species were discriminated by their COI sequences and one endemic species G. lacustris, showing deep genetic divergence, was highlighted for further taxonomic investigation. Average Kimura 2-parameter genetic distances within species, family, and order were 1.33%, 18.91%, and 24.22%, respectively. These values show that COI divergence increases as taxa become less exclusive. All of the COI sequences obtained were grouped together according to their species designation in the Neighbor-joining tree that was constructed. This study demonstrated that DNA barcoding has great potential as a tool for fast and accurate species identification and also for highlighting species that warrant further taxonomic investigation.

Full text available upon request to the author

Article title: DNA barcoding of the ichthyofauna of Taal Lake, Philippines

Authors: Sean V. L. Aquilino, Jazzlyn M. Tango, Ian Kendrich C. Fontanilla, Roberto Pagulayan, et al.

Publication title: Molecular Ecology Resources 11(4): 612-9, July 2011

Abstract:

This study represents the first molecular survey of the ichthyofauna of Taal Lake and the first DNA barcoding attempt in Philippine fishes. Taal Lake, the third largest lake in the Philippines, is considered a very important fisheries resource and is home to the world's only freshwater sardine, Sardinella tawilis. However, overexploitation and introduction of exotic fishes have caused a massive decline in the diversity of native species as well as in overall productivity of the lake. In this study, 118 individuals of 23 native, endemic and introduced fishes of Taal Lake were barcoded using the partial DNA sequence of the mitochondrial cytochrome c oxidase subunit I (COI) gene. These species belong to 21 genera, 17 families and 9 orders. Divergence of sequences within and between species was determined using Kimura 2-parameter (K2P) distance model, and a neighbour-joining tree was generated with 1000

bootstrap replications using the K2P model. All COI sequences for each of the 23 species were clearly discriminated among genera. The average within species, within genus, within family and within order percent genetic divergence was 0.60%, 11.07%, 17.67% and 24.08%, respectively. Our results provide evidence that COI DNA barcodes are effective for the rapid and accurate identification of fishes and for identifying certain species that need further taxonomic investigation.

Full text available upon request to the author

Article title: DNA barcodes of Philippine accipitrids

Authors: Perry S. Ong, Adrian U. Luczon, Jonas Quilang, Anna Mae Tatoy Sumaya, et al.

Publication title: Molecular Ecology Resources 11(2): 245-254, March 2011

Abstract:

DNA barcoding is a molecular method that rapidly identifies an individual to a known taxon or its closest relative based on a 650-bp fragment of the cytochrome c oxidase subunit I (COI). In this study, DNA barcodes of members of the family Accipitridae, including Haliastur indus (brahminy kite), Haliaeetus leucogaster (white-bellied sea eagle), Ichthyophaga ichthyaetus (grey-headed fish eagle), Spilornis holospilus (crested serpent-eagle), Spizaetus philippensis (Philippine hawk-eagle), and Pithecophaga jefferyi (Philippine eagle), are reported for the first time. All individuals sampled are kept at the Philippine Eagle Center in Davao City, Philippines. Basic local alignment search tool results demonstrated that the COI sequences for these species were unique. The COI gene trees constructed using the maximum-likelihood and neighbour-joining (NJ) methods supported the monophyly of the booted eagles of the Aquilinae and the sea eagles of the Haliaeetinae but not the kites of the Milvinae.

Full text available upon request to the author

Article title: DNA barcodes of the suckermouth sailfin catfish Pterygoplichthys (Siluriformes: Loricariidae) in the Marikina River system, Philippines: Molecular perspective of an invasive alien fish species

Authors: Joycelyn Cagatin Jumawan, Benjamin Vallejo, Corazon Buerano, Annabellee Herrera, et al.

Publication title: Journal of Materials Science Letters 4(2): 103-113, 2011

Abstract:

DNA barcoding for accurate identification of invasive alien fish species is relatively unexplored. In this study, partial sequence (655 bp) of the mitochondrial gene COI (cytochrome c oxidase subunit I) was used to delineate between two species of exotic suckermouth sailfin catfish Pterygoplichthys – P. pardalis and P. disjunctivus and their intergrades, which dominate the ichthyofauna of the Marikina D River system, Philippines. Individuals were assigned to groups using an abdominal pattern scheme, and COI gene sequence divergence analysis was determined using Kimura 2-parameter distances. Results revealed two major clusters which were inconsistent with the abdominal pattern categories and were characterized by low genetic divergence (mean 0.2%); one cluster having shared genealogy of individuals pre-identified as P. pardalis and the intergrades, and another consisting mostly of P. disjunctivus. From the samples, six haplotypes with low genetic divergence (mean 0.5%) were identified, suggesting that the haplotypes belong to a single species despite abdominal pattern variations. Overall, the DNA barcodes do not complement the morphology-based identification of the two species in the river system. The results support the possibility of introgressive hybridization between P. pardalis and P. disjunctivus and the need to reassess taxonomic assignment of the two species using abdominal patterns as basis for species distinction. It is recommended that multiple molecular tools be used in future studies and that native Pterygoplichthys species and other hypostomine loricariids be subjected to DNA Vol. 4 | No. 2 | 2011 Philippine Science Letters 103

Full text available upon request to the author

Article title: Geometric Morphometric Analysis and Gill Raker Count Variation of Populations of the Endemic Philippine Silver Perch, Leiopotherapon plumbeus (Perciformes: Terapontidae)

Authors: Brian S. Santos, Ian Kendrich C. Fontanilla, Jonas Quinalang

Publication title: Philippine Agricultural Scientist 93(4), December 2010

Abstract:

Geometric morphometrics has been applied in various studies to determine shape variation in fish populations. In this study, landmark-based geometric morphometrics was used to examine shape variation in native and translocated populations of Leiopotherapon plumbeus (Kner, 1864), an endemic and economically important fish in the Philippines. A total of 844 specimens were collected from seven localities, namely, Laguna de Bay (Binangonan and Tanay areas), Sampaloc Lake, Taal Lake, Paoay Lake, Maasin River in Candaba Swamp, and Lake Buhi. L. plumbeus in Taal Lake, Sampaloc Lake and Lake Buhi were transplanted from Laguna de Bay, whereas those in Laguna de Bay, Paoay Lake and Maasin River were native to these areas. Shape variation in the samples was greatest in the head, followed by the body depth. Specimens from the Binangonan and Tanay areas of Laguna de Bay were the most similar morphologically. Specimens from Paoay Lake were the most distinct which could be due to the geographic isolation of L. plumbeus in this lake from all the other populations. Variation in gill raker count, the most discriminating meristic trait in a previous study, was also determined. Specimens from Binangonan and Tanay had the most number of gill rakers, whereas those from Paoay had the least. Variations in body shape and gill raker counts could be due to differences in feeding lifestyles in different habitats as well as differences in physico-chemical characteristics of the water bodies. Further studies are needed, however, to verify these findings and to determine the physico-chemical as well as genetic factors that could have contributed to such variation.

Full text available upon request to the author

Article title: Survey and spatial distribution of shoreline malacofauna in Grande Island, Subic Bay

Authors: Gizelle Batamalaque and Ian Kendrich C. Fontanilla

Publication title: Philippine Journal of Science 139(2): 149-159, December 2010

Abstract:

Grande Island, Subic Bay is an excellent site for studying spatial distributions on a local scale because of its topographic heterogeneity. This study aimed to provide a systematic survey and spatial distribution of shoreline malacofauna of the island using a total of 956 continuous 2 x 2 m plots. Substrate types were classified as sand, sand-pebble, rock-sand, rock-pebble, pebble-rock-coral rubble, boulder, and wood. One hundred mollusk species were identified from 44, 465 individuals with 54 additional individuals still unresolved. Mollusks were found to be distributed according to the substrate type (composition and particle size) and are independent of the total area sampled. Substrates that are loose or unstable tend to have only few species while those that are compact have more species. Only bivalves were found in the sand substrate. Planaxids, nerites, trochids, and siphonarids were the dominant groups in substrates with rocks, pebbles, and coral rubble. Nudibranchs only occurred in rocky substrates. Nacellids and littorinids predominate particularly in boulders. Littorinids were also numerous in woody substrates. Juvenile trochids and planaxids were most abundant in regions with calm water while Cellana species and adult trochids were particular in areas exposed to strong currents. The morphological adaptations of different species enabled them to occur in specific habitat types.

Full text available upon request to the author

Article title: The new family Diapheridae, a new species of Diaphera Albers from Thailand, and the position of the Diapheridae within a molecular phylogeny of the Streptaxoidea (Pulmonata: Stylommatophora)

Authors: Jirasak Sutjarit, Fred Naggs, Christopher M. Wade, Ian Kendrich C. Fontanilla

Publication title: Zoological Journal of the Linnean Society 160(1): 1-16, August 2010

Abstract:

The Streptaxoidea are an ancient and species diverse group that is poorly understood. Examination of the reproductive anatomy of Diaphera showed it to be notably distinct from that of most other streptaxid genera but to exhibit similarities with the reproductive anatomy of Sinoennea (Enneinae), Careoradula (Strepaxinae),

Discartemon (Strepaxinae), Augustula (Strepaxinae), and a species of Imperturbatia (Gibbinae). Our molecular phylogenetic analysis placed the two genera with high-spired shells, Sinoennea and Diaphera, in an isolated position as a sister group to the Streptaxidae sensu stricto. This basal divergence within the Streptaxoidea provides support to the proposed recognition of a new family, the Diapheridae. None of the genera possessing low-spired shells, Careoradula, Discartemon, Augustula, and Imperturbatia, were available for inclusion in the molecular analysis and we therefore provisionally restrict the Diapheridae to Diaphera and Sinoennea. However, based on their reproductive anatomy Careoradula, Discartemon, Augustula and a species of Imperturbatia may cluster with the Diapheridae when included in a molecular analysis.© 2010 The Linnean Society of London, Zoological Journal of the Linnean Society, 2010, 160, 1–16.

Full text available upon request to the author

Article title: The small subunit (SSU) ribosomal (r) RNA gene as a genetic marker for identifying infective 3rd juvenile stage Angiostrongylus cantonensis

Authors: Ian Kendrich C. Fontanilla and Christopher M. Wade

Publication title: Acta Tropica 105(2): 181-6, March 2008

Abstract:

We have developed a molecular method using PCR-direct sequencing to identify the infective 3rd juvenile stage of Angiostrongylus cantonensis, a nematode parasite of rodents that can accidentally infect humans and cause eosinophilic meningitis. We demonstrate that the 5' end of the small subunit (SSU) ribosomal (r) RNA gene is a suitable marker to identify A. cantonensis and distinguish it from other closely related Angiostrongylus species. When the SSU rRNA marker was employed on nematode populations extracted from the black slug Laevicaulis altae collected in 2 test sites in the Philippines, the infective 3rd juvenile stage A. cantonensis was detected without difficulty. The phylogenetic position of other non-angiostrongylid nematodes isolated was also determined. The molecular technique developed in this study provides a rapid and accurate method for the identification of A. cantonensis when morphological identification proves difficult or inadequate.

Full text available upon request to the author

May T. Lim

Sex: Female

Education:

Doctor of Philosophy in Physics, University of the Philippines, 2003

Field of Specialization

Computational statistical physics (Monte Carlo methods, agent-based models, networks)

Researches:

Article title: Modeling the residential distribution of enrolled students to assess boundary-induced disparities in public school access

Authors: Louie John M. Rubio, Damian N. Dailisan, Maria Jeriesa P. Osorio, Clarissa C. David, et al.

Publication title: PloS one 14(10), 2019

Abstract:

Given school enrollments but in the absence of a student residence census, we present a gravity-like model to infer the residential distribution of enrolled students across various administrative units. Multi-scale analysis of the effects of aggregation across different administrative levels allows for the identification of administrative units with sub-optimally located schools and highlights the challenges in allocating resources. Using this method, we verify that the current scheme of free cross-

enrollment across administrative boundaries is needed in achieving universal education in the Philippines.

Full text available upon request to the author

Article title: Vehicular traffic modeling with greedy lane-changing and inordinate waiting

Authors: Damian N. Dailisan and May T. Lim

Publication title: Physica A: Statistical Mechanics and its Applications 521: 715-723, 2019

Abstract:

Lane changing and vehicular slowdowns are known to impact traffic flow. Using a modified Nagel–Schreckenberg cellular automata model for two vehicle types: blocking (eg cars) and non-blocking (eg motorcycles), we determined the thresholds at which the interplay of lane changing, random and non-random slowdowns strongly impact vehicle speeds. Lane changing improves speed with diminishing returns as vehicles opt to change lanes. At the same time, lane changing is detrimental to the overall speed when lane straddling occurs. Increasing random slowdowns beyond a critical value (in the case of motorcycles, slowdown values of p slow≈[0. 2, 0. 3, 0. 4] for densities ϱ=[0. 20, 0. 15, 0. 10] respectively) can force crossover from free flowing traffic into a state where interactions between vehicles reduce the average speed.

Full text available upon request to the author

Article title: Agent-based modeling of lane discipline in heterogeneous traffic

Authors: Damian N. Dailisan and May T. Lim

Publication title: Physica A: Statistical Mechanics and its Applications 457: 138-147, 2016

Abstract:

Designating lanes for different vehicle types is ideal road safety-wise. Practical considerations, however, require road sharing. Using a modified Nagel–Schreckenberg cellular automata model for two vehicle types (cars and motorcycles),

we analyzed the interplay of lane discipline, lane changing, and vehicle density. In the absence of lane changing, the transition between free flow and congested states occurs at a higher vehicle (road occupation) density when the ratio of cars to motorcycles is increased. When lane changing is allowed, the smaller motorcycles tend to fill in unused spaces, until the point when the wider cars effectively block their way at high vehicle densities. When the condition of lane discipline is not imposed, i.e. staying wholly within lane boundaries is not required, further improvement in throughput becomes possible at the cost of required driver attentiveness.

Full text available upon request to the author

Article title: Siting marine protected areas based on habitat quality and extent provides the greatest benefit to spatially structured metapopulations

Authors: Reniel B. Cabral, Steven D. Gaines, May T. Lim, Michael P. Atrigenio, et al.

Publication title: Ecosphere 7(11): e01533, 2016

Abstract:

Connectivity and its role in the persistence and sustainability of marine metapopulations are attracting increased attention from the scientific community and coastal resource managers. Whether protection should prioritize the connectivity structure or demographic characteristics of a given patch is still unclear. We design a three−stage population model to analyze the relative importance of sources, sinks, quality and extent of juvenile and adult habitat, and node centralities (eigenvector, degree, closeness, and betweenness) as a basis for prioritizing sites. We use a logistic−type stage−structured model to describe the local dynamics of a population with a sessile adult stage and network models to elucidate propagule−exchange dynamics. Our results show that the coupled states of habitat extent and quality, which determine population carrying capacity, are good criteria for protection strategy. Protecting sites on the basis of sources, sinks, or other centrality measures of connectivity becomes optimal only in limited situations, that is, when larval production is not dependent on the adult population. Our findings are robust to a diverse set of larval pathway structures and levels of larval retention, which

indicates that the network topology may not be as important as carrying capacity in determining the fate of the metapopulation. Protecting extensive, good quality habitat can help achieve both conservation and fisheries objectives.

Full text available upon request to the author

Article title: Growing the physics community in the Philippines in a changing landscape

Authors: May T. Lim, Jose Perico H. Esguerra

Publication title: AIP Conference Proceedings 1697(1): 060037, 2015

Abstract:

Since the participation of the Philippines in the 3rd IUPAP International Conference on Women in Physics in 2008, the biggest change in the environment has happened online: Social media use is now pervasive. After the change in country leadership in 2010, policy directions were taken that directly affected the science research agenda, which in turn changed the research funding landscape. The uptake of government scholarship support for physics degrees continues to be popular with bachelor's and master's students regardless of gender. The country has also adopted the K–12 education system, and its impact on university employment remains to be seen.

Full text available upon request to the author

Article title: Quantifying regional differences in the length of Twitter messages

Authors: Christian M. Alis, May T. Lim, Helen Susannah Moat, Daniele Barchiesi, et al.

Publication title: PloS one 10(4): e0122278, 2015

Abstract:

The increasing usage of social media for conversations, together with the availability of its data to researchers, provides an opportunity to study human conversations on a large scale. Twitter, which allows its users to post messages of up to a limit of 140 characters, is one such social media. Previous studies of utterances in books, movies and Twitter have shown that most of these utterances, when transcribed, are much shorter than 140 characters. Furthermore, the median length of Twitter messages was

found to vary across US states. Here, we investigate whether the length of Twitter messages varies across different regions in the UK. We find that the median message length, depending on grouping, can differ by up to 2 characters.

Full text available upon request to the author

Article title: Modelling the impacts of fish aggregating devices (FADs) and fish enhancing devices (FEDs) and their implications for managing small-scale fishery

Authors: Reniel B. Cabral, Porfirio M. Aliño, May T. Lim

Publication title: ICES Journal of Marine Science 71(7): 1750-1759, 2014

Abstract:

Fish aggregating devices (FADs) are deployed to aggregate fish over a limited area to improve fish catch. Fish enhancing devices (FEDs), which are FADs deployed in no-fishing areas, are fast gaining popularity as a fisheries management tool in the western Pacific. Yet, the impacts of utilizing FADs and FEDs are not yet well understood. In this work, we used a mean-field model to assess the effects of utilizing FADs and FEDs on stock biomass and catch. Our results indicate that using FADs enhances catch per boat when total fishing pressure is low, but can exacerbate fishery collapse when fishing effort is high. On the other hand, a FED-based system can increase the resistance of the fishery to collapse. A FED-based fishery may thus serve as pelagic marine protected areas and/or refugia. In a quota-based system, where fishing time is tied to catch quota, a phase transition occurs: both catch and biomass abruptly shift to low levels without warning. Deploying FADs to act as FEDs in a high quota fishery can prevent this phase transition resulting to a stabilizing effect.

Full text available upon request to the author

Article title: Adaptation of fictional and online conversations to communication media

Authors: Christian M. Alis and May T. Lim

Publication title: European Physical Journal B 85(12), 2012

Abstract:

Conversations allow the quick transfer of short bits of information and it is reasonable to expect that changes in communication medium affect how we converse. Using conversations in works of fiction and in an online social networking platform, we show that the utterance length of conversations is slowly shortening with time but adapts more strongly to the constraints of the communication medium. This indicates that the introduction of any new medium of communication can affect the way natural language evolves.

Full text available upon request to the author

Article title: Crowding effects in vehicular traffic

Authors: Jay Samuel L. Combinido and May T. Lim

Publication title: PloS one 7(11): e48151, 2012

Abstract:

While the impact of crowding on the diffusive transport of molecules within a cell is widely studied in biology, it has thus far been neglected in traffic systems where bulk behavior is the main concern. Here, we study the effects of crowding due to car density and driving fluctuations on the transport of vehicles. Using a microscopic model for traffic, we found that crowding can push car movement from a superballistic down to a subdiffusive state. The transition is also associated with a change in the shape of the probability distribution of positions from a negatively-skewed normal to an exponential distribution. Moreover, crowding broadens the distribution of cars' trap times and cluster sizes. At steady state, the subdiffusive state persists only when there is a large variability in car speeds. We further relate our work to prior findings from random walk models of transport in cellular systems.

Full text available upon request to the author

Article title: Polarity-driven geometrical cluster growth model of budding yeast

Authors: Reniel B. Cabral and May T. Lim

Publication title: International Journal Of Modern Physics. C, Computational Physics, Physical Computation 21(9):1169, 2010

Abstract:

We present a polarity-driven activator-inhibitor model of budding yeast in a two-dimensional medium wherein impeding metabolites secretion (or growth inhibitors) and growth directionality are determined by the local nutrient level. We found that colony size and morphological features varied with nutrient concentration. A branched-type morphology is associated with high impeding metabolite concentration together with a high fraction of distal budding, while opposite conditions (low impeding metabolite concentration, high fraction of proximal budding) promote Eden-type patterns. Increasing the anisotropy factor (or polarity) produced other spatial patterns akin to the electrical breakdown under varying electric field. Rapid changes in the colony morphology, which we conjecture to be equivalent to a transition from an inactive quiescent state to an active budding state, appeared when nutrients were limited.

Full text available upon request to the author

Article title: Modeling U-turn traffic flow

Authors: Jay Samuel L. Combinido and May T. Lim

Publication title: Physica A: Statistical Mechanics and its Applications 389(17): 3640-3647, 2010

Abstract:

Median U-turns are sometimes installed to improve the traffic flow at busy intersections by eliminating left turns. Using a microscopic traffic model, we confirmed the presence of transitions from free flow to congested flow with increasing car inflow density. In addition, our proposed rules inside a U-turn curve, which accounted for safety issues and an asymmetric lane changing behavior (outer-to-inner vs. inner-to-outer lane transitions), predicted the speed distribution of cars after the U-turn curve. We found that U-turn curves installed for improving traffic flow at busy intersections produced their desired effects only when there is minimal interaction between cars.

Full text available upon request to the author

Article title: Effect of variable fishing strategy on fisheries under changing effort and pressure: An agent-based model application

Authors: Reniel B. Cabral, Rollan C. Geronimo, May T. Lim, Porfirio M. Aliño

Publication title: Ecological Modelling 221(2): 362-369, 2010

Abstract:

An agent-based model was used to evaluate the response of a two-species fish community to fishing boat exploration strategies, namely: boats following high-yield boats (Cartesian); boats fishing at random sites (stochast-random); and boats fishing at least exploited sites (stochast-pressure). At low fishing pressure, the stochast-random mode yielded a high average catch per boat while sustaining fish biomass. At high fishing pressure, the Cartesian mode was more effective. For the Cartesian strategy, fish biomass exhibited four distinct behaviors with increasing number of boats. In the first phase, the fish biomass dropped with increasing number of boats due to a corresponding rise in biomass extraction. Rapid exploitation occurred in the second phase, when two or more boats occupied the same initial area, that led to the faster abandonment of those sites which then underwent biomass recovery. In the third phase, adding more boats resulted in a fluctuating stock biomass, where the combined effects of initial spatial distribution of boats and rapid localization led to either full stock recovery when boats were eventually confined to a single location due to spillovers, or stock extirpation when the entire area became fully occupied. Beyond the third phase, stock extirpation was assured. In order to break the pattern of localization (bandwagon effect), we introduced stochast-random intruders in a Cartesian-dominated fishery. Adding a single intruder changed the patchy-structured stock biomass pattern of a purely Cartesian fishery to a uniformly explored stock biomass pattern because of the additional spatial information provided by the intruder. Consequently, the average catch per boat increased but at the expense of a disproportionate decline in equilibrium biomass.

Full text available upon request to the author

Article title: Preferential detachment in broadcast signaling networks: Connectivity and cost trade-off

Authors: May Lim, Dan Braha, Sanith Wijesinghe, Stephenson Tucker, et al.

Publication title: EPL (Europhysics Letters) 79(5): 58005, 2007

Abstract:

We consider a network of nodes distributed in physical space without physical links communicating through message broadcasting over specified distances. Typically, communication using smaller distances is desirable due to savings in energy or other resources. We introduce a network formation mechanism to enable reducing the distances while retaining connectivity. Nodes, which initially transmit signals at a prespecified maximum distance, subject links to preferential detachment by autonomously decreasing their transmission radii while satisfying conditions of zero communication loss and fixed maximum node-hopping distance for signaling. Applied to networks with various spatial topologies, we find cost reductions as high as 90% over networks that are restricted to have all nodes with equal transmission distance.

Full text available upon request to the author

Article title: Global pattern formation and ethnic/cultural violence

Authors: May Lim, Richard Metzler, Yaneer Bar-Yam

Publication title: Science 317(5844): 1540-1544, 2007

Abstract:

We identify a process of global pattern formation that causes regions to differentiate by culture. Violence arises at boundaries between regions that are not sufficiently well defined. We model cultural differentiation as a separation of groups whose members prefer similar neighbors, with a characteristic group size at which violence occurs. Application of this model to the area of the former Yugoslavia and to India accurately predicts the locations of reported conflict. This model also points to imposed mixing or boundary clarification as mechanisms for promoting peace.

Full text available upon request to the author

Article title: Primary spherical aberration in two-color (two-photon) excitation fluorescence microscopy with two confocal excitation beams
Authors: May Lim and Caesar Saloma
Publication title: Applied optics 42(17): 3398-3406, 2003

Abstract:
We study the effects of primary spherical aberration on the three-dimensional point spread function (PSF) of the two-color (two-photon) excitation (2CE) (2PE) fluorescence microscope with two confocal excitation beams that are separated by an angle θ. The two excitation wavelengths λ1 and λ2 are related to the single-photon excitation wavelength λ*e* by: $1/\lambda e = 1/\lambda 1 + 1/\lambda 2$. The general case is considered where both focused beams independently suffer from spherical aberration. For $\theta = 0$, $\pi/2$, and π, the resulting deterioration of the PSF structure is evaluated for different values of the spherical aberration coefficients via the Linfoot's criteria of fidelity, structural content, and correlation quality. The corresponding degradation of the peak 2CE fluorescence intensity is also determined. Our findings are compared with that of the 2PE fluorescence ($\lambda 1 = \lambda 2$) under the same aberration conditions. We found that the 2CE microscope is more robust against spherical aberration than its 2PE counterpart, with the $\pi/2$ configuration providing the clearest advantage. The prospect of aberration correction in the two-beam 2CE microscope is also discussed.
Full text available upon request to the author

Article title: Self-organized queuing and scale-free behavior in real escape panic
Authors: Caesar Saloma, Gay Jane Perez, Giovanni Tapang, May Lim, et al.
Publication title: Proceedings of the National Academy of Sciences 100(21): 11947-11952, 2003

Abstract:
Numerical investigations of escape panic of confined pedestrians have revealed interesting dynamical features such as pedestrian arch formation around an exit, disruptive interference, self-organized queuing, and scale-free behavior. However,

these predictions have remained unverified because escape panic experiments with real systems are difficult to perform. For mice escaping out of a water pool, we found that for a critical sampling rate the escape behavior exhibits the predicted features even at short observation times. The mice escaped via an exit in bursts of different sizes that obey exponential and (truncated) power-law distributions depending on exit width. Oversampling or undersampling the mouse escape rate prevents the observation of the predicted features. Real systems are normally subject to unavoidable constraints arising from occupancy rate, pedestrian exhaustion, and nonrigidity of pedestrian bodies. The effect of these constraints on the dynamics of real escape panic is also studied.

Full text available upon request to the author

Article title: Direction-sensitive subwavelength displacement measurements at diffraction-limited spatial resolution

Authors: Peter John Rodrigo, May Lim, Caesar Saloma

Publication title: Optics letters 27(1): 25-27, 2002

Abstract:

Direction-sensitive displacement measurements at diffraction-limited spatial resolution are demonstrated with an interferometric optical-feedback semiconductor laser confocal imaging system. Subwavelength axial movements of the reflecting sample, including the directions of motion, are detected within the depth of field. A comparison of theory and actual instrument performance is presented.

Full text available upon request to the author

Article title: Gravity-assisted segregation of granular materials of equal mass and size

Authors: Johnrob Bantang, May Lim, Christopher Monterola, Caesar Saloma

Publication title: Physical Review E 66(4): 041306, 2002

Abstract:

High-resolution segregation is demonstrated for elastic granular materials of the same mass and size. Each grain starts at a randomly selected position in the entrance facet of a cylinder, accelerates downwards due to gravity, and then bounces against a massive obstacle with a collision cross section that is proportional to the facet size. Bounce dynamics of the falling grain is a function of its relative elasticity with the obstacle. Subsequent collisions of the grain with the wall are assumed to be perfectly elastic. In the absence of interparticle collisions, grain focusing occurs at points along the cylinder axis. In the absence of rotation, focusing occurs regardless of the initial locations and (downward) velocities of the grains at the entrance facet. The focus location depends only on the coefficient of restitution of the falling particle and the obstacle size. Grains arrive at the focus in temporally localized bursts even if released simultaneously from the facet. Efficient segregation is, therefore, achieved without additional mechanical work (e.g., shaking, spinning) on the system configuration.

Full text available upon request to the author

Article title: Accurate forecasting of the undecided population in a public opinion poll

Authors: Christopher Monterola, May Lim, Jerrold Garcia, Caesar Saloma

Publication title: Journal of Forecasting 21(6): 435-449, 2002

Abstract:

The problem of pollsters is addressed which is to forecast accurately the final answers of the undecided respondents to the primary question in a public opinion poll. The task is viewed as a pattern-recognition problem of correlating the answers of the respondents to the peripheral questions in the survey with their primary answers. The underlying pattern is determined with a supervised artificial neural network that is trained using the peripheral answers of the decided respondents whose primary answers are also known. With peripheral answers as inputs, the trained network outputs the most probable primary response of an undecided respondent. For a poll conducted to determine the approval rating of the (former) Philippine president, J. E. Estrada in December 1999 and March 2000, the trained

network predicted with a 95% success rate the direct responses of a test population that consists of 24.57% of the decided population who were excluded in the network training set. For the undecided population (22.67% of December respondents; 23.67% of March respondents), the network predicted a final response distribution that is consistent with the approval/disapproval ratio of the decided population.

Full text available upon request to the author

Article title: Confocality condition in two-color excitation microscopy with two focused excitation beams

Authors: May Lim and Caesar Saloma

Publication title: Optics communications 207(1): 121-130, 2002

Abstract:

We evaluate the point spread function (PSF) of the two-color excitation (2CE) microscope when the confocality condition is not strictly satisfied by the two focused excitation beams which are separated by an angle $\theta \neq 0$. The 2CE wavelengths $\lambda 1$ and $\lambda 2$ are related to the single-photon excitation wavelength λe of the sample according to: $1/\lambda e = 1/\lambda 1 + 1/\lambda 2$. Spatio-temporal simultaneity for the two excitation beams is essential in 2CE ($\lambda 1 \neq \lambda 2$). Only aberration-free misalignment of the geometrical foci is considered and the degradation of the peak 2CE fluorescence intensity (F2cp) is determined as a function of the focus separation for $\theta = 0, \pi/2$ and π. The deterioration of the fluorescence PSF is also evaluated using the Linfoot's criteria of fidelity, structural content and correlation quality. We compare the 2CE PSF behavior with that of the two-photon excitation (2PE) fluorescence ($\lambda 1 = \lambda 2$) under the same misalignment settings. At $\theta = \pi/2$, the F2cp degrades less rapidly than the peak 2PE fluorescence intensity (F2pp) for misalignments that are confined within the focal plane of the focusing lens L1 for $\lambda 1$. At $\theta = \pi$,F2cp and F2pp degrade in a similar manner. For misalignments along the optical axis of L1 and at $\theta = \pi/2$, the F2cp degrades monotonically while the F2pp degradation is accompanied by fluctuations caused by two-beam interference. Our calculations reveal that 2CE imaging is more resilient to the ill-effects of misalignment than the two-beam 2PE.

Full text available upon request to the author

Article title: Streaming, disruptive interference and power-law behavior in the exit dynamics of confined pedestrians

Authors: Gay Jane Perez, Giovanni Tapang, May Lim, Caesar Saloma

Publication title: Physica A: Statistical Mechanics and its Applications 312(3): 609-618, 2002

Abstract:

We analyze the exit dynamics of pedestrians who are initially con(ned in a room. Pedestrians are modeled as cellular automata and compete to escape via a known exit at the soonest possible time. A pedestrian could move forward, backward, left or right within each iteration time dependingon adjacent cell vacancy and in accordance with simple rules that determine the compulsion to move and physical capability relative to his neighbors. The arching signatures of jammingwere observed and the pedestrians exited in bursts of various sizes. Power-law behavior is found in the burst-size frequency distribution for exit widths w greater than one cell dimension (w ¿ 1). The slope of the power-law curve varies with w from –1:3092 (w = 2) to –1:0720 (w = 20). Streamingwhich is a di8usive behavior, arises in large burst sizes and is more likely in a single-exit room with w = 1 and leads to a counterintuitive result wherein an average exit throughput Q is obtained that is higher than with w = 2; 3, or 4. For a two-exit room (w = 1), Q is not greater than twice the yield of a single-exit room. If the doors are not separated far enough (¡ 4w), Q becomes even signi(cantly less due to a collective slow-down that emerges amongpedestrians crossingin each other's path (disruptive interference e8ect). For the same w and door number, Q is also higher with relaxed pedestrians than with anxious ones.

Full text available upon request to the author

Article title: Noise-enhanced measurement of weak doublet spectra with a Fourier-transform spectrometer and a 1-bit analog-to-digital converter

Authors: May Lim and Caesar Saloma

Publication title: Applied Optics 40(11): 1767-1775, 2001

Abstract:

We demonstrate an efficient noise dithering procedure for measuring the power spectrum of a weak spectral doublet with a Fourier-transform spectrometer in which the subthreshold interferogram is measured by a 1-bit analog-to-digital converter without oversampling. In the absence of noise, no information is obtained regarding the doublet spectrum because the modulation term s(x) of its interferogram is below the instrumental detection limit B, i.e., |s(x)| < B, for all path difference x values. Extensive numerical experiments are carried out concerning the recovery of the doublet power spectrum that is represented by s(x) = (s(0)/2)exp(-pi(2)x(2)/beta) [cos(2pif(1)x) + cos(2pif(2)x)], where s(0) is a constant, beta is the linewidth factor, and ?f? = (f(1) + f(2))/2. Different values of ?f?, s(0), and beta are considered to evaluate thoroughly the accuracy of the procedure to determine the unknown values of f(1) and f(2), the spectral linewidth, and the peak values of the spectral profiles. Our experiments show that, even for short observation times, the resonant frequencies of s(x) could be located with high accuracy over a wide range of ?f? and beta values. Signal-to-noise ratios as high as 50 are also gained for the recovered power spectra. The performance of the procedure is also analyzed with respect to another method that recovers the amplitude values of s(x) directly.

Full text available upon request to the author

Article title: Enhancement of low-resolution Raman spectra by simplex projection

Authors: May Lim and Caesar Saloma

Publication title: Optics communications 186(4-6): 237-243, 2000

Abstract:

We demonstrate the enhancement of low-resolution spontaneous Raman spectra by simplex projection which extrapolates the high-frequency components that are lost when the entrance slit width *w* of the grating spectrometer is widened to increase the optical throughput. The improvement in the signal-to-noise ratio of the measured Raman spectrum is accompanied by an unwanted but inevitable decrease in the resolving power of the spectrometer. Spectral extrapolation by simplex projection [Opt. Commun. 176 (2000) 373] is applied to the linearly deconvolved low-frequency

Fourier transform of the measured Raman spectrum, to recover accurately and rapidly the information (peak locations and profiles) that are lost. The weak Raman spectrum of CCl4 is utilized as the test signal. In terms of the Linfoot's criteria, the combination of simplex projection and linear deconvolution succeeded in enhancing a low-resolution Raman spectrum (w=150μm) to obtain information that are available in raw spectra measured at w=75μm. The recovery performance is superior to what could be achieved via linear deconvolution alone.

Full text available upon request to the author

Article title: Spectral extrapolation by simplex projection

Authors: May Lim, Gemma Narisma, Caesar Saloma

Publication title: Optics Communications 176(4-6): 373-385, 2000

Abstract:

Rapid and accurate recovery of the lost high-frequency components in the undersampled representation of a bandlimited signal $s(x)$ is demonstrated using the simplex projection method (SPM). The spectral extrapolation technique is effective if: 1) Fourier spectrum $S(f)$ of $s(x)$ contains features that are exhibited regularly within the signal bandwidth, and 2) Fourier transform $\{S(m)\}$ of the undersampled representation of $s(x)$ contains sufficient information about the said regularities. The SPM is utilized to determine the various features contained in $\{S(m)\}$ and to establish their possible pattern of appearance. The performance of the recovery procedure is tested as a function of the sampling rate. Two test signals with distinctly different Fourier spectrum profiles are considered: 1) Interferogram of a spectral doublet, and 2) Four-point object. In both cases, the bandwidth of $s(x)$ is known a priori and used to determine the number of unknowns to be solved. For an undersampled interferogram that contains only 54% of the energy of the spectral doublet, 42 unknown components have been calculated to decrease the normalized mean-square error of the interpolated signal by 75% relative to the undersampled data. The extrapolation technique is shown to be robust to the presence of additive noise in $S(f)$.

Full text available upon request to the author

Article title: Direct signal recovery from threshold crossings

Authors: May Lim and Caesar Saloma

Publication title: Physical Review E 58(5): 6759, 1998

Abstract:

We present a method for directly obtaining the 2 M equally sampled amplitude values of the analog input signal s (t) from the 2 M locations {t i} where it intersects with a reference signal r (t)= A cos (2 π f r t). Until now, high-accuracy signal recovery in sinusoid-crossing sampling had been achieved only indirectly using spectral methods. The recovery requirements are (1)| s (t)|< A and (2) W<~ 2 f r where W is the bandwidth of s (t). The recovery method is evaluated as a function of the accuracy in which the crossings are located, and the sampling period T= 2 M Δ, where Δ= 1/2 f r. Its performance is also compared with other direct interpolation schemes.

Full text available upon request to the author

Marie Paz E. Morales

Sex: Female

Education:

Doctor of Philosophy in Science Education (Physics), De La Salle University, 2013

Master of Science in Teaching (Physics), De La Salle University, 2001

Bachelor of Science in Physics for Teachers, Philippine Normal University, 1996

Field of Specialization

Physics--Study and Teaching

Researches:

Article title: Assessment practices in Philippine higher STEAM education

Authors: Celina P. Sarmiento, Marie Paz E. Morales, Levi E. Elipane, Brando C. Palomar

Publication title: Journal of University Teaching & Learning Practice 17(5): 18, 2020

Abstract:

The study explored practices of the sampled higher education Philippine STEAM educators in assessing learners. Data sourced from the database of a state-funded research on Philippine STEAM education using a Classroom Observation Protocol, included 106 STEAM teachers from purposely selected institutions drawn from 14 regions. Systematic data analysis (through data condensation, data display, and drawing and verifying conclusions) revealed that STEAM teachers used both appropriate traditional and authentic assessment tools and strategies with inclusive

integration of technology. Furthermore, results showed that STEAM teachers' best assessment practices may be categorised as: 1) assessment for career or industry readiness, 2) mounting assessment system to support instruction, and 3) collective and reflective assessment process. COVID-19 pandemic implications and policy recommendations are also offered, which may enhance assessment practices and suggest a perspective in crafting and recommending national and international standards and guidelines on assessment literacy among higher STEAM educators.

Full text available upon request to the author

Article title: VUCAD2: A Focus on the D's

Authors: Marie Paz E. Morales

Publication title: Asia Pacific Higher Education Research Journal (APHERJ) 7(1), 2020

Abstract:

They found that D's are present and are aggravated by the fact that the community lacks proper discipline in waste disposal that consequently deliver a big impact in the environment. Information on such Ds may later reach "acumen," described as building personal and team capacity for leadership judgement, agility and decision making about business and people matters, as well as leveraging team diversity and talents (Woodward, 2017).

The D's (disruption and diversity) are very evident in all human activities in this era. VUCAD2 realities traverse the domains of education exhibiting wider perspective of the changing environmental challenges. Hence, we are not called just to train fully grown minds, but we are to act to grow bigger minds to pathom Volatility, Uncertainty, Complexity, Ambiguity, Disruption and Diversity in Education through research and other research-related activities (Carvan, 2015).

Full text available upon request to the author

Article title: Profiling the Research Culture of Philippine Higher Education Institutions

Authors: Portia Roxas-Soriano, Marie Paz E. Morales, Wilma S. Reyes

Publication title: EDUCARE 13(1): 1-16, 2020

Abstract:

This survey study conducted some years ago critically examined the research culture profile of the six out of seven member institutions of the Philippines' SUCs (State Universities and Colleges) in the NCR (National Capital Region). A content validated, researcher-developed survey instrument determined the information necessary to profile the research culture of the participant universities. Results of the study showed that accordingly, the participant-SUCs, whether clustered as teaching-intensive or research-intensive, seek to establish an operational research center to manage all related activities. The idea of a stand alone research center provides autonomy to the center that probably enables a more efficient and effective research management. This management shift considerably influences the research culture profile defined in three senses: development; environment; and beliefs, skills, and custom, which primarily provide the entirety of research capability of the university. Finally, attempts to improve the research culture profile should sustain the balance of the trifocal nature of the university: teaching service; community outreach provision; and research culture to completely bring out the university's true essence. With a strong faculty profile, international linkages, and collaboration may be easily forged, which will eventually help build research culture profile in the context of teaching and community service. It takes also serious and strategic efforts to build a culture of research within the university and unique to the university without leaving behind the core purpose of a university–to teach and help improve the community.

Full text available upon request to the author

Article title: Continuity of Learning

Authors: Marie Paz E. Morales

Publication title: The Normal Lights 14(2), 2020

Abstract:

Agenda 2030 has flourished as the aim of the decade. In the field of education, this global aim targets to achieve Sustainable Development Goal# 4 themed as "Ensuring inclusive and equitable education and promote lifelong learning opportunities for

all." As such, this theme encompases sub-components to improve global education. These sub-components include better access to education by inclusion of a year of free pre-primary education, equity and inclusion (for gender and those with disabilities), and quality and learning outcomes (underscoring quality and empowered teachers to help foster creativity and knowledge, and ensures acquisition of defined skills in an educational setting that also emphasizes human rights education). Finally, all actions towards achievement of these sub-components are laid out within lifelong learning approaches (The 2030 Agenda for Sustainable Development and the SDGs, 2020).

Full text available upon request to the author

Article title: A Learned Society through LifeLong Learning Approach

Authors: Marie Paz E. Morales

Publication title: Asia Pacific Higher Education Research Journal (APHERJ) 7(2), 2020

Abstract:

Higher Education Research Journal, 7 (2), pp. 29-46. and tertiary programs. Borrico (2020) investigated the registered nurses' perception towards Continuing Nursing Education (CNE). He found, however, that most participants voluntarily participate in CNE through selffinancing schemes. They seem to be motivated by the promise of promotion, but some hindering factors include high course fees, limited time, and unavailability of preferred courses. Borrico (2020) recommended that WHO placed emphasis on the need for strategic planning with regard to continuing professional education for nurses.

Full text available upon request to the author

Article title: Self-professed Proficiency of Philippine Higher Education (PHE) Teachers of STEAM Disciplines

Authors: Marie Paz E. Morales, Caesar P. Palisoc, Ruel A. Avilla, Celina P. Sarmiento, et al.

Publication title: Philippine Journal of Science 149(2): 415-426, 2020

Abstract:

This study determined the self-professed proficiency of Philippine higher education (PHE) teachers of science, technology, engineering, agri/fisheries, and mathematics (STEAM) disciplines. Through the lens of technological pedagogical content knowledge (TPACK) framework and the standards of teaching the disciplines in STEAM in advance and higher learning as spelled out in the indicators of proficiency used in this research, the study informed the status of teacher quality in the different disciplines of STEAM. Sampled (Tier 1: stratified random sampling for 156 schools; Tier 2: complete enumeration) 1940 teachers (representing the different STEAM disciplines) took the online survey in January–December 2018. Selected teachers from the set provided interviews and classroom observations for data triangulation. Data analysis (i.e. programmed scoring framework, descriptive statistics, percentile rank, and t-test) determined that self-rated proficiency defined their competence. In terms of the aforementioned framework and standard, they perceived themselves as "Highly Proficient to Distinguished" teachers. The qualitative data worked with these findings, but some coupled with student achievement (through licensure performance) revealed that teachers may have over-rated themselves. Males and females do not register significant differences in their perception of proficiency. School type (private and government-owned) do not index significant differences as well, except in Community Linkages and TPACK as a whole. These findings may inform policy creation to build a stronger Philippine Workforce 4.0. In fact, the tool (proficiency instrument) may be envisioned to initiate a highly structured micro-credentialing system of STEAM education in the country.

Full text available upon request to the author

Article title: Sustaining Quality in the New Normal

Authors: Marie Paz E. Morales

Publication title: The Normal Lights 14(1), 2020

Abstract:

Amidst the current situation where everyone faces significant changes in all sorts of activities (teaching and learning, research, recreation, and even survival), all of us

seek to sustain quality in everything we traditionally engage in. We also strive to pursue quality in the new endeavors we are about to partake as brought about by the recent events. Our 14th issue this June 2020 includes 10 articles crafted by esteemed authors during this time of transition to what everyone calls,"the new normal". We emphasize that these articles represent the concept of quality amidst adversity. Themed as such, we categorize that the 10 articles present how authors sustain quality in the education domain, in the curriculum, in the process through pedagogy and tools, and what may be thought of as plans and activities within "the new normal".

Full text available upon request to the author

Article title: Teacher support material in physics for the explicit-reflective instruction of the nature of science

Authors: MH Baltazar, MP Morales

Publication title: Empowering Science and Mathematics for Global Competitiveness: Proceedings of the Science and Mathematics International Conference (SMIC 2018): 197, 2018

Abstract:

Nature of Science (NOS) is one of the components of scientific literacy that is poorly represented in science curriculum materials in the Philippines. Thus, the main goal of this study was to find out how the Nature of Science (NOS) would develop basic scientific literacy through the developed Teacher Support Material (TSM) for the explicit-reflective instruction of the nature of science for K to 12. The Student Understanding of Science and Scientific Inquiry (SUSSI) revealed that both the student and teacher respondents held naïve views on scientific laws versus theories, social and cultural influence on science. Based on the findings of NOS, teacher support material was designed, developed and validated. The material was implemented to Grade 9 students where the participants demonstrate changed levels of NOS literacy using the Test of Basic Scientific Literacy (TBSL). On the other hand, the use of TSM was effective in enhancing the scientific literacy of students. Suggestions for further studies were made, which include the use of explicit-

reflective instruction of NOS in the present curriculum as an innovative approach of promoting common and accurate views of NOS in science classrooms.

Full text available upon request to the author

Article title: Novel written task as a formative assessment strategy in physics

Authors: RC Dalmacio, MP Morales

Publication title: Empowering Science and Mathematics for Global Competitiveness: Proceedings of the Science and Mathematics International Conference (SMIC 2018), 2018

Abstract:

This study investigated the incorporation of a formative assessment strategy called the Novel Written Task (NWT) in Physics instructions and its impact on the cognitive learning achievement of seventy-eight Grade 10 students. The researcher-designed 5E lessons integrated the assessment activities in the three physics modules (Electricity and Magnetism, Electromagnetic Spectrum, and Optics). Achievement tests and short quizzes measured the effect of the intervention throughout the course. NWT results revealed low consistency in students' factual knowledge and reasoning, their misconceptions, common errors, and overgeneralizations. The students exhibited significant learning gains during formative and summative evaluations with small to large effect sizes. Findings also revealed meaningful improvement in the higher-order cognitive process skills of the students.

Full text available upon request to the author

Article title: The Role of Qualitative Research in Education 4.0: Reflections from a State-Funded Model-Building Qualitative Research

Authors: Marie Paz Morales

Publication title: World Conference on Qualitative Research 1:337-339, 2019

Abstract:

The major shift in educational contour brought about by the Fourth Industrial Revolution (4IR) challenges every component of the traditional educational landscape (Morales, Anito, Avilla, Abulon, et al., 2019; Shahroom & Hussin, 2018;

Chao, 2017). In higher education, the relevance of qualitative research in Education 4.0 is a significant point of interest. This paper primarily presents our reflection points after conducting a three-tier qualitative data analysis, which is a component of a state-funded research project (Morales, Anito, Avilla, Sarmiento, et al., 2019).
Full text available upon request to the author

Article title: Education under FIRe
Authors: Marie Paz Escano Morales
Publication title: The Normal Lights 13(1), 2019

Abstract:
FIRe or the Fourth Industrial Revolution era is currently designing the landscape of the many aspects of society including education and the job market. Generation z learners (within age range 13-19)(EAB, 2018) may eventually find their niche (the future) in the workfield only if equipped with the 21st century skills. These skills (eg, critical and creative thinking, design thinking, time management, personal and social capabilities with ethical and intercultural understanding [Australian Curriculum, Assessment and Reporting Authority, 2016; Taylor, 2016]) with the now known liquid skills (eg, verbal communication, creative and critical thinking, active listening, and a disposition towards lifelong learning [Infosys, 2016]) require a new learning paradigm that may be able to bring the learners to 21st century-skilled state. Popularly as Education 4.0, this new education paradigm sets the education terrain to a system that focuses on the following attributes: remote and self-paced learning, personalized teaching and learning, field experiences, internships and mentoring, collaborative work for task completion, exposure to data interpretation, digital tests, inputs to designing and updating the curriculum, and re-skilling and upskilling of teachers (Education 4.0-Mobile Learning, 2017; Fisk, 2017).
Full text available upon request to the author

Article title: Towards Education 4.0
Authors: Marie Paz Escano Morales
Publication title: The Normal Lights 12(1), 2018

Abstract:

Education 4.0 (E4) framework known as "The Dawn of Digital Monarchy" is believed to direct Generation Z (13-19 years old) learners to the new skill set that would be required by the jobsof-the-future. These skills include: new media literacy, virtual collaboration, cognitive load management, social intelligence, computational training, transdisciplinary, design mindset, novel and adaptive thinking, and sense making (Dockkweiler, 2018). A leapfrog to such framework emphasizes the vision of Education 4.0—innovation society and knowledge economy—an imperative for the success of Industrial Revolution 4.0 (IR4) that features cyber-physical systems (Renjen, 2018; Van Duuren, 2017). Drivers to the goals of Education 4.0 may include STEM learning, learning by doing, rote to rigor, and team learning.

Full text available upon request to the author

Article title: Education for the Generation Z

Authors: Marie Paz Escano Morales

Publication title: The Normal Lights 12(2), 2018

Abstract:

"New Collar Workforce" or Workforce 4.0, is the new buzz to describe the envisioned 21st century workers (Boisvert, 2018) with enhanced creative and critical thinking skills coupled with new skill set inclusive of emotional intelligence and cognitive flexibility (How to ensure your workforce is ready for Industry 4.0, 2018). Thus, a shift in education paradigm, termed as "Education 4.0 (E4. 0)"(Hussin, 2018) may be on its way to align the current skill set of the workforce to those envisioned learning outcomes. This new vision of learning (E4. 0) features learners learning the skills and the know-how of sourcing these skills and knowledge. The new paradigm sets forth a learning environment built around the new breed of learners with database-indulged performance tracking and monitoring. This condition gears all education efforts towards excellence and quality.

Full text available upon request to the author

Article title: Exploring Teachers' Beliefs and Science Curricular Alignment: Cases of Senior High School Philippine STEM Teachers

Authors: Zaldy Jose Lazara Jr, Marie Paz Morales

Publication title: Journal of Educational and Human Resource Development 6: 120-132, 2018

Abstract:

This study determined the efficacy beliefs of completely enumerated STEM (Science, Technology, Engineering and Mathematics) teachers in a government-owned school in Rizal Province, Philippines and their role in the alignment of the intended, enacted and received Grade 11 science curriculum during the AY 2017-2018. Descriptive case study (qualitative research design) utilizing both qualitative and quantitative strategies, thoroughly examined the STEM curriculum and the teacher participants' teaching efficacy beliefs. Proper alignment of the intended and teacher efficacy beliefs-influenced enacted curriculum confirmed from the class interaction and students' engagement, resulted to a high passing rate of students in their final examination and a high percentage of students who obtained passing grades (received curriculum). These high level of efficacy beliefs helped the teacher cases come up with a better enacted curriculum consistent with the intended curriculum, which stimulated the received curriculum. These results may inform STEM teacher-trainings and in-service programs curricular assessment and evaluation as well, for improved implementation of the curricular reform. Furthermore, identification of congruence and gaps within the intended, enacted and received curriculum can be done to analyze the current status of the curriculum. Significantly, results may improve enacting the new curriculum (K to 12) that may better highlight the spiral progression of content standards and learning competencies for each grade level and emphasize connections and inter-relations in STEM to better prepare our Generation Z learners for the new industrial era.

Full text available upon request to the author

Article title: Science fluency in primary school: Student transition from Filipino to English language learning

Authors: Maribel D. Ganeb, Marie Paz E. Morales

Publication title: Issues in Educational Research 28(3): 596-612, 2018

Abstract:

This study critically explored Filipino third graders' fluency in science to determine their readiness to comprehend and understand fourth level science, which is taught in English. This mixed design case research purposively sampled 30 third graders from a government-owned elementary school. An oral reading technique using a pre-selected science text passage determined the participants' fluency in science in terms of word recognition and decoding, reading speed, and reading prosody. The results show that our third graders registered low ratings in all the three components of reading fluency. They are categorised as instructional readers of common terms, but are frustrated readers of science terms. They have very low reading speed and based on their reading prosody, more than half of these learners are labelled as non-fluent readers. This resulting dysfluency may be sourced from non-congruence of the complex morpheme and phonemes of English medium compared to the home language of the learners (Filipino). The home language of learners in the Philippines depends on ethno-linguistics grouping, thus a comparative study may be done to extract more information on how to align and help our learners be ready to accommodate level 4 science.

Full text available upon request to the author

Article title: Influence of Physical Activities to Science Performance

Authors: RS Wilson, DR Constantino, Marie Paz E. Morales, Ruel A. Avilla

Publication title: Asia Pacific Journal of Multidisciplinary Research 5(4), 2017

Abstract:

This study explored the physical activities of fifth and sixth graders that projected correlations to science performance and how these physical activities may be utilized for classroom purposes in the context of science-related play activities. Descriptive survey correlational design directed the data collection and analysis of the physical activities of purposively selected 133 fifth and sixth graders. Primarily, the study used a researcher-developed and validated instrument (Physical Activity Questionnaire [PAQ]), and standard instruments: Philippine National Physical

Activity Guide (PNPAG) and General Physical Activity Questionnaire (GPAQ). The latter classified the physical activities into five domains which directed the interpretation of the participants" responses. The Pearson-r Moment of Correlation described the level of correlation of the frequency of engagement to physical activities (limited to local and localized activities) and the science grade of the respondents. Results show that each of the physical activity domains showed specific correlations to science performance of the respondents. For further research, enrichment of the relationship of the physical activities and the science performance may focus on possible moderating variables like economic status, and time allotment for physical activities.

Full text available upon request to the author

Article title: Touching varied elements for Quality Education

Authors: Marie Paz E. Morales

Publication title: The Normal Lights 10(1), 2017

Abstract:

Research-based articles have guided scientific readers in their search for truth and understanding about the world they live in through the veracity and dedication that come with creating academic literature. Particularly for Philippine education, The Normal Lights has continuously provided substantial researches and newfound knowledge for use of teachers and those who seek to quench their thirst for ideas. In this issue, we offer 10 distinguished research articles, meticulously produced with varying intentions and inspirations for their conduct. Out of the 10 articles, half are single-authored ones, four are multipleauthored articles (teams of three), and one, a co-authored paper. In terms of coverage, three of the articles similarly looked into reading skills, techniques, and comprehension of elementary children. The remaining seven are: on peace education framework and its relevance; an eye-opening article on the misalignment of student teaching programs (STPs) of selected teacher education institutions (TEIs) with professional standards for teachers; definition and achievement of "academic success" based on the American School Counselors Association (ASCA) academic development standards; a useful

instructional framework for teaching Abstract Algebra online; parental involvement in primary and secondary education; the significance of spiritual intelligence among Philippine Normal University pre-service students; and the attainment of intergroup forgiveness through recategorization and emergence of a superior identity.

Full text available upon request to the author

Article title: Writing Research for our Readers

Authors: Marie Paz E. Morales

Publication title: The Normal Lights 10(2), 2017

Abstract:

In all its steps, the writing process involves thinking which is actually the hardest part of writing. As researcher-writers, we are expected to be patient, and we consider critiques to better our craft. The reflective process through which our articles are refined entails revisions, rephrasing, proper citations, formatting, and so on. Above all these processes is the underlying message we, as authors, send to our readers.

Academic journal writing is a balance between what the authors want to share and what is expected from the authors by editors and readers. Effective writers are sensitive to what captures the interests of fellow researchers and are able to influence them through their words. The Normal Lights, as an educational scientific journal, serves as a platform for such forms of writing that disseminates relevant and timely researches in teacher education. The Philippine Normal University-Publication Office proudly presents in this volume 10 carefully selected articles that delineate its educational objectives.

Full text available upon request to the author

Article title: On Quality Assurance in Education

Authors: Marie Paz E. Morales

Publication title: The Normal Lights 11(2), 2017

Abstract:

Quality assurance as described by Bucki (2017) is a methodology used in developing products and services that ensure a level of quality, which encompasses the processes and procedures that systematically monitor several aspects in terms of

quality standards. This category is most sought after in all agencies and organizations, even in the academe. Quality assurance in the academe may be related to facets of knowledge generation, knowledge management, and stakeholders' satisfaction. Consequently, institutions of basic and higher learning play a significant role in a knowledgebased society where growth of data and technologies are rapidly occurring. These are agencies that serve as knowledge reservoir, which capitalize through information products (eg documents, databases, softwares) or by knowledge exchange, which are codified in records (eg publications, reports, documents, etc.). In fact, OECD (2004) spells out the role of institutions in the perspective of knowledge management as a productive tool for knowledge creation, innovation and sustainability (Hasan, et al., 2006; Armbrecht et al, 2001; Suh, Sohn & Kwak, 2004); knowledge flow and transfer (Armbrecht et al., 2001); and technical information systems (Armbrecht et al., 2001).

Full text available upon request to the author

Article title: Cultural Historical Activity Theory (CHAT): Influenced Case Research of a Philippine Physics Class

Authors: Marie Paz E. Morales

Publication title: The Asia-Pacific Education Researcher 26(1): 85-96, 2017

Abstract:

The study critically explored the case of Pangasinan learners' physics learning process using culture and language-influenced curriculum materials in physics (CLI-CMP). Case research using cultural historical activity theory (CHAT) designed the study to provide unique ideas on how socio-cultural theory, a recent field of study of Physics Education Research, works best and contributes through a bottom-up approach to the body of knowledge in this research area. Sampled 48 grade 10 participants and their physics teacher, a Pangasinan native, used the designed CLI-CMP for 10 weeks to determine how effective the tool is in addressing student misconceptions in physics. Data gathered from the design and development of the CLI-CMP, classroom observations, interviews, and focus-group-discussions extracted information on how the customized curriculum materials provided means of meaning making and conceptual change, which may eventually lead to achieving

scientific literacy. The results show that better conceptual understanding observed in the physics class may be significantly due to the socio-culturally influenced curriculum materials. Further analysis using CHAT framework (methodical level) determined the coherence and progressive characteristics of the activities in a particular physics unit which matched Engeström's expansive learning cycle and served as a suited tool to mediate the subject to the object and to the goal attainment. Exploration of the learning process using the epistemological level of analysis of CHAT framework provided how the mediating tool may have addressed the noted student misconception emphasizing learning science as participatory to the community and socio-culturally influenced.

Full text available upon request to the author

Article title: Organizing and Systematizing Knowledge Management through an Automated University-based Research Portal

Authors: Marie Paz E. Morales, Edna Luz R. Abulon, Roxan C. Ermita, Adonis P. David

Publication title: Asia Pacific Journal of Multidisciplinary Research 5(3), 2017

Abstract:

Grounded on the need for higher education institutions to promote and practice knowledge management and research culture through technology, the present study reports the development of a web-based research portal in one government-owned university. To address the objectives of designing, developing, and evaluating the research portal, the study implemented three phases: Phase 1 focused on the planning and designing of the research portal; phase 2 involved the development and try-out of the research portal; and phase 3 refers to the evaluation of the research portal. The output of the design and development phases is a web-based research portal that has automated features on research procedures, publication processes, database management, and research dissemination and utilization. The results of the quantitative part of the evaluation phase indicate that the research portal has high to excellent quality in terms of the following features: construction and features; design and aesthetics; completeness; accuracy; functionality; usefulness; and user-friendliness. The high to excellent rating may be sourced from the novelty of the

program, but the platform's user-friendly features encouraged users of all ages, to make their research activities more manageable and more efficient. Qualitative comments from the evaluation of the portal supported the quantitative results although certain limitations were identified for the enhancement of the research portal. Researchers recommend that the web-based research portal be fully operational and be made accessible to various stakeholders while continually monitoring, evaluating, and enhancing its design and features.

Full text available upon request to the author

Article title: Tracing the science education graduates

Authors: Eden V. Evangelista, Marie Paz E. Morales

Publication title: International Journal of Research Studies in Education 6(2): 69-80, 2017

Abstract:

Retrospective analysis and evaluation through tracer studies is one of the most common ways to self-initiated University's self-evaluation scheme to determine adequacy, relevance and alignment of its curricular offerings to the national and international standards for better human resource of the country. The current tracer study determined the same domains through descriptive survey design in order to evaluate the science education curricular program of the graduate education offered by the country's premier teacher education institution. With about 41% retrieval rate; data from the 15 outcomes or products of the aforecited program provided the following: satisfaction (M= 2.82) to high satisfaction (M= 3.11, 3.38) with the University's facilities, services, and learning environment respectively; high extent of skill-use (knowledge and technical, research, problem-solving, human relations) in their professional careers; and strong agreement on adequacy (M= 4.29) and relevance (M= 4.17) of the curricular program. Though the products of the program highly regard the program for its relevance and adequacy, more improvement is seen to be done on the other aspects such as the number of graduates produced each year to compensate and fill in the big gap produced by the curricular transition in the

national scene. Better mobility may also be achieved if the programs would consider ASEAN and international touch.

Full text available upon request to the author

Article title: Investigating The Effects Of Customized Cognitive Fitness Classroom On Students Physics Achievement And Integrated Science Process Skills

Authors: Joefrey R. Chan, Marie Paz E. Morales

Publication title: International Journal of Research Studies in Education 6(3): 81-95, 2017

Abstract:

Cognitive fitness, a product of neuroscience research that offers activities that fits how the brain learns best may offer insights to students' learning of science concepts. The study critically explored the effect of customized cognitive fitness classroom activities on the academic achievement of students in physics and their integrated science process skills (ISPS).

Full text available upon request to the author

Article title: "Yin" in a Guided Inquiry Biology Classroom–Exploring Student Challenges and Difficulties

Authors: Jed Aries F. Castro and Marie Paz E. Morales

Publication title: Journal of Turkish Science Education 14(4): 48-65, 2017

Abstract:

Student encountered challenges in performing guided inquiry learning (GIL) activities are a minority literature in science education, but may provide valuable inputs to developing science process skills vital to scientific literacy. This study determined the challenges and difficulties by science-oriented students in performing GIL activities in biology. Cluster sampling determined the participants in the pre-survey (69 grade 8 students) and the actual investigation (30 grade 8 students). A validated survey questionnaire pre-identified the six major difficulties of the students. Validated student and expert questionnaires assessed the level of difficulty in each of the task on the six pre-identified challenges. Results show that

science-oriented students and the experts assessed the following with a fair difficulty level: background knowledge; performance of laboratory procedure; managing extended activities; designing an experiment; and writing a laboratory report. The same group assessed the task–data analysis to be "difficult." The upper (high average to superior IQ) group and lower (average to above average) groups of science oriented students provided a non-significant difference in their difficulty assessment of all the tasks. However, replicating the study to include low cognition students from non-science oriented schools may provide a wider perspective of these student-encountered difficulties and challenges in GIL.

Full text available upon request to the author

Article title: Exploring gender disparities in science and mathematics classrooms in the basic education

Authors: ME Morales, Ruel A. Avilla, Allen A. Espinosa

Publication title: International Journal of Research Studies in Education 5(3): 39-58, 2016

Abstract:

The present study assessed gender equality in science and mathematics classrooms in terms of instructional language, classroom materials, teaching aids, textbooks, curriculum, activities, and interactions as well as classroom management. Mixed methods research was 7 employed in the study. Quantitative data were gathered using the Observation Protocol for Gender Equity in Classroom (Espinosa & Morales, 2015). Interviews, focus group discussions and classroom observations generated the qualitative data in the study. Participants in the study were conveniently selected by the researchers. Analysis of the interview transcripts showed agreement and disagreement with the observation reports. However, in most instances, participants believed that equality in gender should always prevail in the classroom and that if disparity manifests, both the student and the teacher are responsible in maintaining equality in the classroom.

Full text available upon request to the author

Article title: Exploring the Impact of Culture-and Language-Influenced Physics on Science Attitude Enhancement

Authors: Marie Paz E. Morales

Publication title: Journal of Science Education and Technology 25(1): 34-49, 2016

Abstract:

"Culture," a set of principles that trace and familiarize human beings within their existential realities, may provide an invisible lens through which reality could be discerned. Critically explored in this study is how culture- and language-sensitive curriculum materials in physics improve Pangasinan learners' attitude toward science. Their cultural preference or profile defined their cultural dimensions, epistemological beliefs, and views on integration of culture and language in the teaching and learning processes. The culture- and language-influenced curriculum materials in physics were heavily influenced by Pangasinan learners' cultural preference or profile. Results of the experimental participants' pretest and posttest on science attitude measure, when compared, showed significant statistical difference. Assessment of science attitude enhancement favored the experimental group over the control group. Qualitative data gathered from postimplementation interviews, focus group discussions, and journal log entries indicated the same trend in favor of the experimental participants. The study yielded that culture and language integration in the teaching and learning processes of physics concepts allowed students to develop positive attitude to science, their culture, and native language.

Full text available upon request to the author

Article title: Does gender inequality influence interest in pursuing a career in science or mathematics teaching?

Authors: Marie Paz E. Morales, Ruel A. Avilla, Allen A. Espinosa

Publication title: Issues in Educational Research 26(1): 65-81, 2016

Abstract:

The present study explored gender inequality in K to 12 basic education, based on the experiences of first year pre-service science and mathematics teachers. It also

determined if pre-service teachers' pursuit of a career in science or mathematics teaching was related to gender influences. A survey instrument was used to gather data for the study. Data were then subjected to descriptive statistics, multiple regression and Pearson moment correlation analyses. Results showed that the majority of students experienced gender inequality in their K to 12 basic education. However, they agreed that they still pursued a career in science or mathematics teaching based on factors such as teacher-student interaction, teaching strategy, verbal teacher response and instructional materials. Gender inequality therefore is not a great predictor of career choice in science and/or mathematics teaching. However, to increase enrolments in the course, in-service science and mathematics teachers should focus on enhancing and developing the factors which influence the students' career choices.

Full text available upon request to the author

Article title: Exploring indigenous game-based physics activities in pre-service physics teachers' conceptual change and transformation of epistemic beliefs

Authors: Marie Paz Escaño Morales

Publication title: Eurasia Journal of Mathematics, Science and Technology Education 13(5), 2016

Abstract:

Laro-ng-Lahi (Indigenous Filipino game) based physics activities invigorated the integration of culture in the pre-service physics education to develop students' epistemic beliefs and the notion of conceptual understanding through conceptual change. The study conveniently involved 28 pre-service undergraduate physics students enrolled in an introductory physics course in a Philippine university. Context-culture-based framework dictated how the traditional Filipino games blend with Newtonian concept formation to motivate conditions and conceptual ecology for conceptual change to occur. These physics activities conducted by the participants in each session directed their explicit learning of Mechanics concepts. Pre-post-test design using the Force Concept Inventory and Epistemological Beliefs Assessment for Physical Science detected the participants' conceptual change and

epistemic beliefs improvement respectively. Qualitative data from student interviews and journal insights supplemented the quantitative data. Results showed that these physics activities indicated significant change in the students' conception interpreted as conceptual change. The study also indicated incremental development of epistemic beliefs, however, the progress observed was not statistically significant. Consequently, it is recommended that sustained and prolonged exposure of pre-service undergraduate physics students to culture-influenced instructional designs may lead to eventually developing sophisticated epistemic belief systems consequently providing better teaching and learning framework and service for quality education.

Full text available upon request to the author

Article title: Examining teachers' conception of and needs on action research

Authors: Marie Paz E. Morales, Edna Luz R. Abulon, Portia R. Soriano, Adonis P. David, et al.

Publication title: Issues in Educational Research 26(3): 464-489, 2016

Abstract:

Action research is viewed as a path towards better student achievement. This track may be attained through the reflective nature instilled in the teacher that sparks initiatives to promote better classroom practices in the aspects of pedagogy, assessment, and parental involvement. This descriptive survey explores Filipino teachers' conceptions of and needs on action research which may be barriers to implementing action research in their classrooms. Participants were randomly selected science and mathematics teachers in government schools in the Philippine's capital city. Their concepts about action research were investigated by a survey and interviews, which indicated that they had positive views about action research helping to develop student learning in science and mathematics, and promote lifelong learning. Teachers' prior concepts on its long-lasting impacts transcend from instructional practice to addressing student problems. Furthermore, their perceived moderate level of difficulty in conducting action research indicated some areas needing professional development programs, such as statistics, data organisation, literature searching, and writing reports. Recommendations include professional development training programs to address issues in classroom practices through action research and for the Philippine government to review workloads of teachers and provide them with better opportunities for theory-practice-influenced teaching.

Full text available upon request to the author

Article title: Participatory action research (par) cum action research (ar) in teacher professional development: A literature review

Authors: Marie Paz E. Morales

Publication title: International Journal of Research in Education and Science 2(1): 156-165, 2016

Abstract:

This paper reviews Participatory Action Research as an approach to teacher professional development. It maps the origins of Participatory Action Research (PAR) and discusses the benefits and challenges that have been identified by other researchers in utilizing PAR approaches in conducting research. It draws ideas of combining the features of Action Research (AR) and Participatory Action Research (PAR) to plot research cell design or teacher network design to enhance research for action, action for research and creation of knowledge and theories while solving problems occurring in classroom settings. The discussion focuses on reflective practice and andragogy as the featured characteristics of AR and PAR. These are noted to develop quality teachers to attain quality learning and quality assurance. The review also provides probable benefits of PAR framework to Philippine education; probable challenges and issues that may arise in the implementation; and future directions of PAR implementation in the Philippines aimed to attain education quality through teacher quality.

Full text available upon request to the author

Article title: Are we there yet - Exploring on the Job training of the Philippine Pre-Service Biology Students

Authors: Eden V. Evangelista, Marie Paz E. Morales

Publication title: International Journal Of Biology Education 4(1): 44-62, 2015

Abstract:

Critical assessment using Context-Input-Process-Product (CIPP) model of the research- and laboratory-based on-the-job training (OJT) program of pre-service biology teacher highlights this study. Researcher-made instrument anchored on CIPP

checklist and interview protocols deduced pertinent data from the third year pre-service biology teachers in two consecutive years. Results show that OJT students assessed the OJT program as 'effective' in the aspects of context and input. Furthermore, they evaluated the process and product of the OJT program as 'very effective'. Overall, a significant difference occurred in the program assessment rating of the OJT students for the two consecutive years, in favor of the most recent year as an improved OJT program. All the aspects of the CIPP model significantly change for better assessment in the recent year except for the product construct. Qualitatively, verbal comments and interview responses of the participants provided good qualities of the OJT program that needs to be sustained for better implementation of theory-practice framework. OJT students' negatively stated verbal comments, however, provided inputs for enhancement of the OJT program in order to help pre-service education train for scientifically literate students to ultimately reach the goal of sustainable development and lifelong learning of Filipino learners.

Full text available upon request to the author

Article title: Promoting physics in action thru Laro Ng Lahi-Based physics activities
Authors: Marie Paz Escaño Morales
Publication title: International Journal of Learning and Teaching 7(1), 2015

Abstract:

Culture and game-based physics activities are anticipated to promote active and fun learning of physics concepts. The study features non-conventional design and development of physics activities using traditional Filipino games also known as "Laro ng Lahi". These non-conventional processes in the development comprise literature reviews, document analyses, and interviews. The eight developed "Laro ng Lahi"-based physics activities are presented as activity pack intended for highschool physics and introductory physics students. Key features of these activities include standard and synchronized rules and game mechanics, aligned and matched competencies in the K+12 science curriculum, inclination to student conceptual development, penchant for the preservation of Filipino culture and traditions,

comprehensible texts and procedures and use of locally-available or indigenous materials. Results of the development study show that the "Laro ng Lahi"-based physics activities are content valid based on expert ratings (4.74 out of 5) with moderate to substantial agreement for the inter-rater reliability and an excellent over-all reliability index (0.90) suggesting a good and standard supplementary and support material for classroom use and for a wider goal of promoting active physics learning – Physics in Action.

Full text available upon request to the author

Article title: Influence of culture and language sensitive physics on science attitude enhancement

Authors: Marie Paz E. Morales

Publication title: Cultural Studies of Science Education 10(4): 951-984, 2015

Abstract:

The study critically explored how culture and language sensitive curriculum materials in physics improve Pangasinan learners' attitude towards science. Their cultural dimensions, epistemological beliefs, and views on integration of culture and language in the teaching and learning process determined their cultural preference or profile. Design and development of culture and language sensitive curriculum materials in physics were heavily influenced by these learners' cultural preference or profile. Pilot-study using interviews and focus group discussions with natives of Pangasinan and document analysis were conducted to identify the culture, practices, and traditions integrated in the lesson development. Comparison of experimental participants' pretest and posttest results on science attitude measure showed significant statistical difference. Appraisal of science attitude enhancement favored the experimental group over the control group. Qualitative data deduced from post implementation interviews, focus group discussions, and journal log entries showed the same trend in favor of the experimental participants. The study revealed that culture and language integration in the teaching and learning process of physics concepts enabled students to develop positive attitude to science, their culture, and native language.

Full text available upon request to the author

Article title: Development and Validation of Culture-Sensitive Physics Learning Environment Survey (CS-PLES)

Authors: Marie Paz E. Morales

Publication title: Journal of Educational Sciences 9(2): 66-79, 2014

Abstract:

The study combined qualitative approaches with quantitative research design to come up with a survey instrument called Culture-Sensitive Physics Learning Environment Survey (CS-PLES). This survey instrument is intended to extract the learners' beliefs and expectations on the integration of culture and language in the teaching and learning process of physics concepts. Significant contribution of the instrument can be traced to establishing and defining the constructs and categories on how curriculum localization and context-based science learning can be developed aligned with students' expectations and beliefs. The development process employed non-conventional processes adopted from literature which included pilot study to identify pre-deterministic constructs and specific categories for the items to be included in the survey. Data analysis included descriptive statistics and factor analysis to establish the categories or constructs of the survey instruments. Reliability measures of the instrument and its respective constructs were established for standardization. These categories were intended to aid researchers for an in-depth analysis when the instrument is administered for its purpose. The raw statistical categories were qualitatively paralleled with the pre-deterministic constructs to establish congruence of the survey tool to Instructional Congruence Framework (ICF).

Full text available upon request to the author

Article title: Culture and language sensitivity Physics on student concept attainment

Authors: Marie Paz E. Morales

Publication title: International Journal of Learning and Teaching 6(1): 1-12, 2014

Abstract:

The purpose of the study was to determine gain in student concept attainment of Filipino learners through culture and language sensitive Physics. Filipino learners were profiled culturally through cultural dimensions, epistemological beliefs and students' views on integration of culture and language in the teaching and learning process. The categories of cultural profile (cultural dimension, epistemological beliefs, and student views on integration of culture and language) which uniquely described the participant ethnic groups as distinct learners with distinct cultural characteristics were the major bases in customizing culturally sensitive curriculum materials (CS-CMIP: Culturally Sensitive Curriculum Material in Physics). The CS-CMIP's were used to establish cultural and language sensitive physics to determine attainment of physics concepts of the experimental participants. Pre-test and post-test comparisons of the concept attainment of the experimental participants showed significant statistical differences. Qualitative data deduced from interviews, focus-group-discussions, journal logs, and classroom observations showed the same trend in favor of the experimental participants. Insights deduced from the study i ncluded the idea that to grasp the larger part of the whole, one must take the bits and pieces at a time. Being local does not mean being behind, but attaining the unique identity to reveal a distinctive kind of learner globally. Learning physics through culture and language background ensures preservation of the tradition of the ethnic group while disclosing to the outside world the uniqueness of the group –being global by being local.

Full text available upon request to the author

Article title: Spark inspired Science classroom

Authors: Marie Paz E. Morales

Publication title: INTED2014 Proceedings: 3801-3809, 2014

Abstract:

Mixed method was employed to critically explore how a specific PASCO-designed technology (SPARK Science Learning System) is meaningfully integrated into the teaching of selected topics in Earth and Environmental Science. It is focused on the feasibility as well as the effectiveness of using the SPARK Science Learning System

as a primary tool in learning science that leads to learning and achievement of the students. Correlation of the ability of the technology to develop high intrinsic motivation to student achievement was used to design framework on how to meaningfully integrate SPARK Science Learning System in teaching Earth and Environmental Science. Research instruments used in this study were adopted from standardized questionnaires available from literature. Achievement test and SPARK Science Learning System evaluation were developed and validated for the purpose of deducing data needed for the study. Interviews were done to delve into the deeper thoughts and emotions of the participants. Data culled from these interviews would be used to validate all numerical data deduced from the study. Cross-case analysis of the data was done to reveal some recurring themes, problems and benefits derived by the students in using the SPARK Science Learning System to further establish its effectiveness in the curriculum as a forerunner to the shift towards the 21st Century Learning.

Full text available upon request to the author

Article title: Modelling spark integration in Science classroom
Authors: Marie Paz E. Morales
Publication title: Asia Pacific Journal of Multidisciplinary Research 2(1), 2014

Abstract:

The study critically explored how a PASCO-designed technology (SPARK ScienceLearning System) is meaningfully integrated into the teaching of selected topics in Earth and Environmental Science. It highlights on modelling the effectiveness of using the SPARK Learning System as a primary tool in learning science that leads to learning and achievement of the students. Data and observation gathered and correlation of the ability of the technology to develop high intrinsic motivation to student achievement were used to design framework on how to meaningfully integrate SPARK ScienceLearning System in teaching Earth and Environmental Science. Research instruments used in this study were adopted from standardized questionnaires available from literature. Achievement test and evaluation form were developed and validated for the purpose of deducing data needed for the study. Interviews were done to delve into the deeper thoughts and emotions of the respondents. Data from the interviews served to validate all

numerical data culled from this study. Cross-case analysis of the data was done to reveal some recurring themes, problems and benefits derived by the students in using the SPARK ScienceLearning System to further establish its effectiveness in the curriculum as a forerunner to the shift towards the 21st Century Learning.
Full text available upon request to the author

Article title: Influential Factors in Modeling SPARK Science Learning System
Authors: Marie Paz Escaño Morales
Publication title: International Journal of Learning, Teaching and Educational Research 4(1), 2014

Abstract:
The study is focused on the exploration of influential factors in modelling PASCO-designed technology in science classes. Mixed method was employed to critically explore how the SPARK Science Learning System is meaningfully integrated into the teaching of selected topics in Earth and Environmental Science. It is focused on the feasibility as well as the effectiveness of using the SPARK Science Learning System as a primary tool in learning science that leads to learning and achievement of the students. Correlation of the ability of the technology to develop high intrinsic motivation to student achievement was utilized to identify important factors in designing framework on how to meaningfully integrate SPARK Science Learning System in teaching Earth and Environmental Science. Research instruments used in this study were adopted from standardized questionnaires available from literature. Achievement test and SPARK Science Learning System evaluation form were developed and validated for the purpose of deducing data needed for the study. Interviews were done to cull the deeper thoughts and emotions of the participants. Data deduced from these interviews were used to validate all numerical data extracted from the study. Analysis of the data was done to disclose some recurring themes, problems and benefits derived by the students in using the SPARK Science Learning System to further institute its effect in the curriculum as a precursor to towards envisioning the 21 st century learning.
Full text available upon request to the author

Article title: Non-Traditional Design and Development of Culture and Language Sensitive–Curriculum Material Evaluation Tool

Authors: MP Morales
Publication title: Asia Pacific Journal of Education, Arts, and Sciences 1(2), 2014

Abstract:
The study critically explored nonconventional processes on development and validation of an evaluation instrument entitled:"Culture and Language Sensitive-Curriculum Material Evaluation Tool." This is an evaluation tool intended to assess and evaluate culture and language sensitive curriculum materials in physics and other sciences. The nontraditional processes highlighted the use of empirical data from pilot study to come up with the statements and constructs for the instrument congruent to instructional congruence framework. Averages of ratings of experts of the evaluation instrument were found to be within the highest range of the 5-point Likert scale (4.74 and 4.98). Aiken's content validity coefficient ranged from 0.94 to 0.99. Inter-rater Kappa coefficient was 0.83 rated as excellent agreement of raters while inter-class coefficient was 0.71 (single) and 0.98 (average) rated as very strong (single) and almost perfect agreement (average) respectively. Reliability was established qualitatively and quantitatively. Overall reliability measure was rated excellent using Cronbach's alpha with a coefficient of 0.99. Each of the construct's reliability coefficients was found to be 0.98 rated as excellent.
Full text available upon request to the author

Article title: Cultural and Epistemological Profile of Filipino Learners
Authors: Marie Paz Escano Morales
Publication title: Electronic Journal of Science Education 18(6): 6, 2014

Abstract:
Several researches identified that many students find physics the most difficult science subject. The quest to find ways to make learning physics more meaningful and interesting has lasted for decades. Even with all the new strategies and pedagogies being used, many students still find the subject formidable. This study critically explored the learning characteristics of Filipino physics students which will serve as baseline data for curriculum design. Value Survey Module 2008 (VSM 08) and Epistemological Beliefs Assessment for Physical Sciences (EBAPS) were used to determine the cultural dimension indices and the epistemological beliefs of 385 participants grouped according to ethnicity. Percentage contributions of the three

identified ethnic groups (Tagalog, Bicol and Pangasinan) were determined by taking the population ratio of each ethnic group with the total population of the three ethnic groups. Hofstede's cultural interpretation and education perspective interpretation of cultural values and beliefs were used to deduce the significance of the cultural dimension indices of the sample ethnic groups. EBAPS axes interpretation was also deduced per ethnic group to establish the distinct epistemology of all three ethnic groups. In comparing the ethnic groups per cultural dimension index and per EBAPS axes the study noted the similarities and differences of the learning characteristics of the different learners in cultural perspective. Each ethnic group showed unique and distinct cultural dimensions and epistemology. The Pangasinan learners were culturally tagged as student-centered, while Bicol and Tagalog learners as teacher centered

Full text available upon request to the author

Article title: The impact of culture and language sensitive physics on concept attainment

Authors: Marie Paz Escaño Morales

Publication title: International Journal of Learning, Teaching and Educational Research 2(1), 2014

Abstract:

The study was designed to determine gains in student concept attainment of Pangasinan learners of the Philippines through culture and language sensitive Physics. Pangasinan learners were culturally profiled by determining the cultural dimensions, epistemological beliefs and students' views on integration of culture and language in the teaching and learning process. The unique cultural profile of the Pangasinan learners was used to design culture and language sensitive curriculum materials in physics. The designed culture and language sensitive curriculum materials presented physics lessons and activities using the traditions, beliefs, practices, artifacts and the native language of Pangasinan. Implementation of these curriculum materials was done to determine if integration of culture and language would result in better attainment of physics concepts of the experimental participants. Pre-test and post-test comparisons of the concept attainment of the experimental participants showed significant statistical differences in favor of the experimental participants. The group showed better concept development with

greater percentages of correct responses in the concept tests administered to the participants. Qualitative data deduced from interviews, focus-group-discussions, journal logs, and classroom observations showed the same trend in favor of the experimental participants. Insights deduced from the study included the idea that the use of native language must be complemented by the use of culture of the learner to achieve better concept attainment in physics.

Full text available upon request to the author

Henry N. Adorna

Sex: Male

Education:

Doctor of Philosophy in Mathematics, University of the Philippines Diliman, 2002

Master of Science in Mathematics, University of the Philippines Diliman

Bachelor of Science in Mathematics, FEATI University

Field of Specialization

Biocomputing

Bioinformatics

Data mining

Directed graphs

Graph theory

Traffic information systems

Bibliographic systems

Researches:

Article title: Snapse: A Visual Tool for Spiking Neural P Systems

Authors: Aleksei Dominic C. Fernandez, Reyster M. Fresco, Francis George C. Cabarle, Ren Tristan A. de la Cruz, et al.

Publication title: Processes 9(1): 72, 2021

Abstract:

Spiking neural P (SN P) systems are models of computation inspired by spiking neurons and part of the third generation of neuron models. SN P systems are equivalent to Turing machines and are able to solve computationally hard problems using a space-time trade-off. Research in SN P systems theory is especially active,

more so in recent years as more efforts are directed towards their real-world applications. Usually, SN P systems are represented visually as a directed graph and simulated through mainly text-based simulations or tables. Thus, there is a need for tools that can simulate and create SN P Systems in a visual and easy-to-use manner. Snapse is such a tool which aims to hasten the speed and ease at which researchers may create and experiment with SN P systems. Furthermore, visual tools such as Snapse can help further bring SN P systems outside of theoretical computer science.
Full text available upon request to the author

Article title: Homogeneous spiking neural P systems with structural plasticity
Authors: Ren Tristan A. de la Cruz, Francis George C. Cabarle, Ivan Cedric H. Macababayao, Henry N. Adorna, et al.
Publication title: Journal of Membrane Computing 3:10-21, 2021

Abstract:
Spiking neural P system (SNP system) is a model of computation inspired by the mechanism of spiking neurons. An SNP system is a directed graph of neurons that can communicate with each other using an object known as a spike (the object spike represents action potential or nerve impulse). Spiking neural P systems with structural plasticity (SNPSP system) is a variant of the SNP system model. It incorporates the concept of structural plasticity to the SNP system model. SNPSP systems have the ability to add and delete connections between neurons. In SNPSP systems, the behavior of a neuron can be "programmed" by giving it a set of rules. Different set of rules will result in different behaviors. In this work, we show that it is possible to construct a universal SNPSP system where all the neurons in the system use the same set of rules. Such systems are called homogeneous SNPSP systems.
Full text available upon request to the author

Article title: A return to stochasticity and probability in spiking neural P systems
Authors: Prometheus Peter L. Lazo, Francis George C. Cabarle, Henry N. Adorna, Jan Michael C. Yap
Publication title: Journal of Membrane Computing 2021

Abstract:

This work continues the investigations of introducing probabilities to spiking neural P systems, SN P systems in short—membrane computing models inspired from biological spiking neurons. A particular interest for SN P systems in this work is the nondeterministic selection of applicable firing rules. Rules represent the possible reactions of a neuron to the number of electrical impulses, or spikes, present. Intuitively, having nondeterministic selection can be interpreted as having a random choice with equal probabilities for all options. This seems unnatural in some biological sense, since some reactions are more active than others in general as emphasized in Obtułowicz and Păun, BioSystems 70(2):107–121, 2003. Results found that the stochastic process introduced to the nondeterministic selection of firing rules also applies to application of rules in general whether the rule is for firing or forgetting and whether a single rule is applicable or multiple. This work proposes SN P systems with stochastic application of rules, ⋆SN P systems in short. SN P systems are variants which introduce a stochastic process a priori to the application of rules in SN P systems.

Full text available upon request to the author

Article title: A polynomial time algorithm for the 2-Poset Cover Problem
Authors: Ivy Ordanel, Proceso Fernandez Jr, Henry Adorna
Publication title: Information Processing Letters 169: 106106, 2021

Abstract:
Given a set ϒ of linear orders, we say that a poset H a< b=(V,<) is a halfspace of ϒ if its set of linear extensions L (H a< b)⊂ ϒ and a< L b for every L∈ L (H a< b) and b< L a for every L∈ ϒ∖ L (H a< b). In this paper, we devise an efficient algorithm to expand the halfspace and determine a maximal poset P in ϒ that supercovers it, that is, L (H a< b)⊆ L (P)⊆ ϒ. Moreover, the said algorithm paves the way for the improvement of the existing exponential running time solution in literature for the 2-Poset Cover Problem to a polynomial running time solution.

Full text available upon request to the author

Article title: Approximation and Computational Complexity of Some Hammock Variations of the Poset Cover Problem
Authors: Ivy D. Ordanel, Proceso L. Fernandez Jr, Richelle Ann B. Juayong, Henry N. Adorna

Publication title: INGENIARE-Revista Chilena de Ingeniería 28(1), 2020

Abstract:
Sequential data such as logs may contain a wealth of information that can be mined to discover knowledge about the objects in the data or about the system that generates the data. One interesting aspect of the objects in the data is their dependencies or ordering. The task of determining such is more commonly referred to as mining posets–a data mining task that is relevant in bioinformatics, process model mining, web mining, network management and intrusion detection, and preference-based service (Pei et al. 2006).
Full text available upon request to the author

Article title: Distributed computation of a k P systems with active membranes for SAT using clause completion
Authors: Kelvin Buño and Henry Adorna
Publication title: Journal of Membrane Computing 2: 108-120, 2020

Abstract:
In a work presented by Gazdag and Kolonits from 2013, it was shown that SAT can be solved in linear time in the number of variables using the clause completion method on a non-distributed P system with active membranes. A distributed P system with active membranes using the clause completion method solving SAT (denoted as k-$\Delta(n)\Delta(n)$) is presented in this work. k-$\Delta(n)\Delta(n)$ is a weak uniform solution to SAT that runs in linear time with respect only to the number of variables, n, of the Boolean formula $\varphi\varphi$. For the 2-component solution, 2-$\Delta(n)\Delta(n)$, we show that the communication cost is constant. But, increasing the number of components in k-$\Delta(n)\Delta(n)$, $k\geq 3k\geq 3$, would make the communication cost dependent on not just the number of components and the number of variables, but as well as the number of satisfying assignments to $\varphi\varphi$. We report that an exponential amount of resources (in terms of alphabet size and rules) are necessary to construct k-$\Delta(n)\Delta(n)$ solving SAT to obtain these reasonable communication costs.
Full text available upon request to the author

Article title: A survey of results on evolution–communication P systems with energy
Authors: Richelle Ann B. Juayong, Henry N. Adorna

Publication title: Journal of Membrane Computing 2(1): 59-69, 2020

Abstract:
We survey results related to the attempt to define communication complexity to P systems. Our P system model would be Evolution–Communication P systems with energy introduced in 2010. Some insights and research directions are suggested towards the end of the paper.
Full text available upon request to the author

Article title: Computing with SN P systems with I/O mode
Authors: Henry N. Adorna
Publication title: Journal of Membrane Computing 2(4): 230-245, 2020

Abstract:
P systems were introduced more than two decades ago by Gheorghe Păun. They are known as nondeterministic maximally parallel computing models. Most of their variants are proved to be capable of solving NP problems in polynomial time. This work focuses on using neural-like P systems to simulate uniform sequential computing models. In particular, we consider a so-called Spiking Neural P module (SN P module) computing finite-state functions. We define and characterize a so-called (SN) P automatic sequence by SN P modules.
Full text available upon request to the author

Article title: On Finding Two Posets that Cover Given Linear Orders
Authors: Ivy Ordanel, Proceso Fernandez and Henry Adorna
Publication title: Algorithms 12(10): 219, 2019

Abstract:
The Poset Cover Problem is an optimization problem where the goal is to determine a minimum set of posets that covers a given set of linear orders. This problem is relevant in the field of data mining, specifically in determining directed networks or models that explain the ordering of objects in a large sequential dataset. It is already known that the decision version of the problem is NP-Hard while its variation where the goal is to determine only a single poset that covers the input is in P. In this study, we investigate the variation, which we call the 2-Poset Cover Problem, where the goal is to determine two posets, if they exist, that cover the given linear orders. We

derive properties on posets, which leads to an exact solution for the 2-Poset Cover Problem. Although the algorithm runs in exponential-time, it is still significantly faster than a brute-force solution. Moreover, we show that when the posets being considered are tree-posets, the running-time of the algorithm becomes polynomial, which proves that the more restricted variation, which we called the 2-Tree-Poset Cover Problem, is also in P.

Full text available upon request to the author

Article title: Sequential spiking neural P systems with local scheduled synapses without delay

Authors: Alia Bibi, Fei Xu, Henry N, Adorna, Francis George C, Cabarle

Publication title: Complexity 2019

Abstract:

Spiking neural P systems with scheduled synapses are a class of distributed and parallel computational models motivated by the structural dynamism of biological synapses by incorporating ideas from nonstatic (i.e., dynamic) graphs and networks. In this work, we consider the family of spiking neural P systems with scheduled synapses working in the sequential mode: at each step the neuron(s) with the maximum/minimum number of spikes among the neurons that can spike will fire. The computational power of spiking neural P systems with scheduled synapses working in the sequential mode is investigated. Specifically, the universality (Turing equivalence) of such systems is obtained.

Full text available upon request to the author

Article title: Handling non-determinism in spiking neural P systems: Algorithms and simulations

Authors: Jym Paul Carandang, Francis George C Cabarle, Henry Natividad Adorna, Nestine Hope S Hernandez, et al.

Publication title: Fundamenta Informaticae 164(2-3): 139-155, 2019

Abstract:

Spiking Neural P system is a computing model inspired on how the neurons in a living being are interconnected and exchange information. As a model in embrane computing, it is a non-deterministic and massively-parallel system. The latter makes

GPU a good candidate for accelerating the simulation of these models. A matrix representation for systems with and without delay have been previously designed, and algorithms for simulating them with deterministic systems was also developed. So far, non-determinism has been problematic for the design of parallel simulators. In this work, an algorithm for simulating non-deterministic spiking neural P system with delays is presented. In order to study how the simulations get accelerated on a GPU, this algorithm was implemented in CUDA and used to simulate non-uniform and uniform solutions to the Subset Sum problem as a case study. The analysis is completed with a comparison of time and space resources in the GPU of such simulations.

Full text available upon request to the author

Article title: Generating context-free languages using spiking neural P systems with structural plasticity

Authors: Ren Tristan A. de la Cruz, Francis George Cabarle, Henry N. Adorna

Publication title: Journal of Membrane Computing 1(3): 161-177, 2019

Abstract:

Spiking neural P system (SNP system) is a model of computation inspired by networks of spiking neurons. An SNP system is a network of neurons that can send an object, known as a spike, to each other. Spiking neural P system with structural plasticity (SNPSP system) is a variant of the classical SNP system. SNPSP system that incorporates the ideas of synaptogenesis (creating new synapses) and synaptic pruning (deletion of existing synapses), collectively known as structural plasticity, as features of the model. This gives SNPSP systems the ability to change their own structure/topology. In this work, we use SNPSP systems to generate context-free languages. We create a procedure for constructing an SNPSP system given a context-free grammar in Greibach normal form (GNF). The resulting SNPSP system essentially simulates the way in which a context-free grammar in GNF is used to generate languages. We use modules known as arithmetic-memory modules, also created using SNPSP systems, to perform arithmetic operations which are needed for the simulation.

Full text available upon request to the author

Article title: Matrix representation and simulation algorithm of spiking neural P systems with structural plasticity

Authors: Zechariah B. Jimenez, Francis George C. Cabarle, Ren Tristan A. de la Cruz, Kelvin C. Buño, et al.

Publication title: Journal of Membrane Computing 1(3): 145-160, 2019

Abstract:

In this paper, we create a matrix representation for spiking neural P systems with structural plasticity (SNPSP, for short), taking inspiration from existing algorithms and representations for related variants. Using our matrix representation, we provide a simulation algorithm for SNPSP systems. We prove that the algorithm correctly simulates an SNPSP system: our representation and algorithm are able to capture the syntax and semantics of SNPSP systems, e.g. plasticity rules, dynamism in the synapse set. Analyses of the time and space complexity of our algorithm show that its implementation can benefit using parallel computers. Our representation and simulation algorithm can be useful when implementing SNPSP systems and related variants with a dynamic topology, in software or hardware.

Full text available upon request to the author

Article title: Optimal Deterministic Algorithm for Hammock (2, 2)-Poset Cover Problem

Authors: I. Ordanel and H. Adorna

Publication title: Philippine Journal of Science 147(7): 733-748, 2018

Abstract:

Consider the ordering of different tasks in Figure 1. Suppose a teacher gives those tasks to students and the students need to finish all of them. From the graph, there are some tasks that are dependent on other tasks. For example, Tasks 2, 3, and 4 need to be accomplished first before proceeding on Task 5. There are also some tasks that do not have dependencies. For example, Task 6 is not dependent on Task 7, so it does not matter which one between them will be started first. With this ordering, one student can do all the tasks in the following order: Task 1→ Task 2→ Task 3→ Task 4→ Task 5→ Task 6→ Task 7→ Task 8. Another student can accomplish all the task as follows: Task 1→ Task 3→ Task 2→ Task 4→ Task 5→ Task 7→ Task 6→ Task 8. There

are actually 12 possible ways on which a student can finish all the tasks. This is a typical scenario–an ordering is given and the flow of events must follow from them.
Full text available upon request to the author

Article title: On Distributed Solution to SAT by Membrane Computing
Authors: Henry N. Adorna, Linqiang Pan, Bosheng Song
Publication title: International Journal of Computers Communication & Control 13(3): 303-320, 2018

Abstract:
Tissue P systems with evolutional communication rules and cell division (TPec, for short) are a class of bio-inspired parallel computational models, which can solve NP-complete problems in a feasible time. In this work, a variant of TPec, called -distributed tissue P systems with evolutional communication and cell division (, for short) is proposed. A uniform solution to the SAT problem by under balanced fixed-partition is presented. The solution provides not only the precise satisfying truth assignments for all Boolean formulas, but also a precise amount of possible such satisfying truth assignments. It is shown that the communication resource for one-way and two-way uniform -P protocols are increased with respect to ; while a single communication is shown to be possible for bi-directional uniform -P protocols for any . We further show that if the number of clauses is at least equal to the square of the number of variables of the given boolean formula, then for solving the SAT problem are more efficient than TPec as show in\cite {bosheng2017}; if the number of clauses is equal to the number of variables, then for solving the SAT problem work no much faster than TPec.
Full text available upon request to the author

Article title: On simulating cooperative transition P systems in evolution–communication P systems with energy
Authors: Richelle Ann B. Juayong, Henry N. Adorna
Publication title: Natural Computing 17(2): 333-343, 2018

Abstract:
In this paper, we investigate simulations of transition P systems (TP systems) in evolution–communication P systems with energy (ECPe systems). We only focus on

TP systems where an object that triggers a cooperative rule also triggers a non-cooperative rule. In this way, the presence of a rule trigger always implies that a rule will be applied. In our constructed ECPe systems, a transition in the TP system is simulated by a *k*-step computation where *k* is a factor of the cardinality of the alphabet in the original system. Also, the maximum energy needed for communication rules depends on the number of copies of a trigger in a cooperative rule.

Full text available upon request to the author

Article title: A quick survey of tissue-like P systems

Authors: Bosheng Song, Yingxin Hu, Henry N. Adorna, Fei Xu

Publication title: Romanian Journal of Information Science and Technology 21(3): 310-321, 2018

Abstract:

Membrane computing is a branch of natural computing, which abstracts from the architecture and the functioning of living cells. The models investigated in membrane computing are distributed and parallel computing devices, which are generically called P systems. Three main families have been considered until now: cell-like P systems, tissuelike P systems and neural-like P systems. In this work, we first present the definitions of tissue-like P systems and several variants of these systems, then some results about Turing universality and computational efficiency are recalled. Finally, a computational complexity theory within the framework of tissue-like P systems is introduced, polynomial complexity classes associated with several variants of tissue-like P systems are defined and some relevant results are presented. Different borderlines between efficiency and non-efficiency on the basis of the length of communication rules are presented.

Full text available upon request to the author

Article title: Solving the N-Queens problem using dP systems with active membranes

Authors: Kelvin C. Buño, Francis George C. Cabarle, Marj Darrel Calabia, Henry N. Adorna

Publication title: Theoretical Computer Science 736: 1-14, 2018

Abstract:

The N-Queens problem consists of placing *N* queens on an N×N chessboard such that no two queens threaten each other (i.e. same row, column, or diagonal). P systems solutions to the N-Queens problem and related problems (e.g. SAT) are often in a *nondistributed way*, i.e. the complete input to the problem enters the system through a single input membrane and the problem is solved. dP systems involve using more than one P system to solve problems in a *distributed way*, i.e. the problem input is partitioned and each partition enters the system using distinct components (which are also P systems). In this work, we solve the N-Queens problem using dP systems where the components are P systems with active membranes. Our 2-component and 3-component solutions partition the elements of the input multiset based on the clauses they represent. Compared to the nondistributed solution, our 2-component and 3-component solutions reduce the computation time by a half and by a third, respectively. Besides the analysis of the computation time, we also analyze communication costs. ComN, indicating the number of computation steps where communication occurred, is constant for both solutions. ComR, the number of intercomponent communication rules used, and ComW, the number of objects communicated, are in terms of *S*, where *S* is the number of solutions to the problem instance.

Full text available upon request to the author

Article title: Sparse-matrix Representation of Spiking Neural P Systems for GPUs

Authors: Miguel A. Martınez-del-Amor, David Orellana-Martın, Francis G.C. Cabarle, Henry N. Adorna, et al.

Publication title: Proc. of 15th Brainstorming Week on Membrane Computing. Seville, Spain: Fénix Editora: 161-170, 2017

Abstract:

Current parallel simulation algorithms for Spiking Neural P (SNP) systems are based on a matrix representation. This helps to harness the inherent parallelism in algebraic operations, such as vector-matrix multiplication. Although it has been convenient for the first parallel simulators running on Graphics Processing Units (GPUs), such as CuSNP, there are some bottlenecks to cope with. For example, matrix representation of SNP systems with a low-connectivity-degree graph lead to

sparse matrices, ie containing more zeros than actual values. Having to deal with sparse matrices downgrades the performance of the simulators because of wasting memory and time.

However, sparse matrices is a known problem on parallel computing with GPUs, and several solutions and algorithms are available in the literature. In this paper, we briefly analyse some of these ideas and apply them to represent some variants of SNP systems. We also conclude which variant better suit a sparse-matrix representation.

Full text available upon request to the author

Article title: CuSNP: Spiking neural P systems simulators in CUDA

Authors: Jym Paul Carandang, John Matthew B. Villaflores, Francis George C. Cabarle, Henry N. Adorna, et al.

Publication title: Romanian Journal of Information Science and Technology (ROMJIST) 20 (1): 57-70, 2017

Abstract:

Spiking neural P systems (in short, SN P systems) are models of computation inspired by biological neurons. CuSNP is a project involving sequential (CPU) and parallel (GPU) simulators for SN P systems. In this work, we report the following results: a P-Lingua le parser is included, for ease of use when performing simulations; extension of the matrix representation of SN P systems to include delay; comparison and analysis of our simulators by simulating two types (bitonic and generalized) of parallel sorting networks; extension of supported types of regular expressions in SN P systems. Our GPU simulator is better suited for generalized sorting as compared to bitonic sorting networks, and the GPU simulators run up to 50 faster than our CPU simulator. Finally, we discuss our experiments and provide directions for further work.

Full text available upon request to the author

Article title: Spiking neural P systems with scheduled synapses

Authors: Francis George C. Cabarle, Henry N. Adorna, Min Jiang, Xiangxiang Zeng

Publication title: IEEE Transactions on Nanobioscience 16(8): 792-801, 2017

Abstract:

Spiking neural P systems (SN P systems) are models of computation inspired by biological spiking neurons. SN P systems have neurons as spike processors, which are placed on the nodes of a directed and static graph (the edges in the graph are the synapses). In this paper, we introduce a variant called SN P systems with scheduled synapses (SSN P systems). SSN P systems are inspired and motivated by the structural dynamism of biological synapses, while incorporating ideas from nonstatic (i.e., dynamic) graphs and networks. In particular, synapses in SSN P systems are available only at specific durations according to their schedules. The SSN P systems model is a response to the problem of introducing durations to synapses of SN P systems. Since SN P systems are in essence static graphs, it is natural to consider them for dynamic graphs also. We introduce local and global schedule types, also taking inspiration from the above-mentioned sources. We prove that SSN P systems are computationally universal as number generators and acceptors for both schedule types, under a normal form (i.e., a simplifying set of restrictions). The introduction of synapse schedules for either schedule type proves useful in programming the system, despite restrictions in the normal form.

Full text available upon request to the author

Article title: Robustness diagram with loop and time controls for system modelling and scenario extraction with energy system applications

Authors: Jasmine Malinao, Florian Judex, Tim Selke, Gerhard Zucker, et al.

Publication title: Energy Procedia 88: 537-543, 2016

Abstract:

In this research, we introduce an extension of Robustness Diagrams for modelling complex systems such as energy systems. We provide a construction scheme of this extension for the inclusion of looped and time-dependent substructures for an effective modelling framework. The latter set of substructures is introduced in this work as “reset-bound subsystems”. We introduce a scenario extraction algorithm to

obtain behavioral profiles from the models. Lastly, we apply our scheme to create a model of a real-world energy system and use the proposed algorithm to extract a scenario describing one process done by the system being modelled.
Full text available upon request to the author

Article title: Notes on spiking neural P systems and finite automata
Authors: Francis George C. Cabarle, Henry N. Adorna, Mario J. Pérez-Jiménez
Publication title: Natural Computing 15(4): 533-539, 2016

Abstract:
Spiking neural P systems (in short, SN P systems) are membrane computing models inspired by the pulse coding of information in biological neurons. SN P systems with standard rules have neurons that emit at most one spike (the pulse) each step, and have either an input or output neuron connected to the environment. A variant known as SN P modules generalize SN P systems by using extended rules (more than one spike can be emitted each step) and a set of input and output neurons. In this work we continue relating SN P modules and finite automata. In particular, we amend and improve previous constructions for the simulatons of deterministic finite automata and state transducers. Our improvements reduce the number of neurons from three down to one, so our results are optimal. We also simulate finite automata with output, and we use these simulations to generate automatic sequences.
Full text available upon request to the author

Article title: Sequential spiking neural P systems with structural plasticity based on max/min spike number
Authors: Francis George C. Cabarle, Henry N. Adorna, Mario J. Pérez-Jiménez
Publication title: Neural Computing and Applications 27(5): 1337-1347, 2016

Abstract:
Spiking neural P systems (in short, SNP systems) are parallel, distributed, and nondeterministic computing devices inspired by biological spiking neurons. Recently, a class of SNP systems known as SNP systems with structural plasticity (in

short, SNPSP systems) was introduced. SNPSP systems represent a class of SNP systems that have dynamism applied to the synapses, i.e. neurons can use plasticity rules to create or remove synapses. In this work, we impose the restriction of sequentiality on SNPSP systems, using four modes: max, min, max-pseudo-, and min-pseudo-sequentiality. We also impose a normal form for SNPSP systems as number acceptors and generators. Conditions for (non)universality are then provided. Specifically, acceptors are universal in all modes, while generators need a nondeterminism source in two modes, which in this work is provided by the plasticity rules.

Full text available upon request to the author

Article title: Relating computations in non-cooperative transition P systems and evolution-communication P systems with energy

Authors: Richelle Ann B. Juayong and Henry N Adorna

Publication title: Fundamenta Informaticae 136(3): 209-217, 2015

Abstract:

This paper explores the relation of computations in Evolution-Communication P systems with energy (ECPe systems) and non-cooperative Transition P systems without dissolution (TP systems). We have shown that for every non-cooperative TP system, we can construct an ECPe system that,(i) generates the same language, and (ii) each halting computation that takes τ steps in the TP system can be simulated in at most 3τ+ 1 steps in its corresponding ECPe system.

Full text available upon request to the author

Article title: Spiking neural P systems with structural plasticity

Authors: Francis George C. Cabarle, Henry N. Adorna, Mario J. Pérez-Jiménez, Tao Song

Publication title: Neural Computing and Applications 26(8): 1905-1917, 2015

Abstract:

Spiking neural P (SNP) systems are a class of parallel, distributed, and nondeterministic computing models inspired by the spiking of biological neurons. In this work, the biological feature known as structural plasticity is introduced in the framework of SNP systems. Structural plasticity refers to synapse creation and deletion, thus changing the synapse graph. The "programming" therefore of a brain-like model, the SNP system with structural plasticity (SNPSP system), is based on how neurons connect to each other. SNPSP systems are also a partial answer to an open question on SNP systems with dynamism only for synapses. For both the accepting and generative modes, we prove that SNPSP systems are universal. Modifying SNPSP systems semantics, we introduce the spike saving mode and prove that universality is maintained. In saving mode, however, a deadlock state can arise, and we prove that reaching such a state is undecidable. Lastly, we provide one technique in order to use structural plasticity to solve a hard problem: a constant time, nondeterministic, and semi-uniform solution to the NP-complete problem Subset Sum.

Full text available upon request to the author

Article title: Reoptimization of Motif Finding Problem

Authors: Jhoirene B. Clemente, Jeffrey A. Aborot, Henry N. Adorna

Publication title: Proceedings of the International MultiConference of Engineers and Computer Scientists 1, 2014

Abstract:

One of the approaches in solving NP-hard problems is through reoptimization. In this technique, we solve a locally modified instance of a problem by making use of known solution to its original instance instead of obtaining a solution from scratch. In this paper, we present a reoptimization of motif finding problem. Since the problem is showed to be self-reducible, we can use a self-reduction method to solve the reoptimization variant of the problem. Using the method, we have improved the approximation ratio of the algorithm solving the reoptimized version as compared to the non-reoptimized counterpart. Moreover, we showed that if a certain problem is

self-reducible, any problem that obtains a polynomial-time reduction to it is also self-reducible.

Full text available upon request to the author

Article title: A GPU simulation for evolution-communication P systems with energy having no antiport rules

Authors: Zylynn F. Bangalan, Krizia Ann N. Soriano, Richelle Ann B. Juayong, Francis George C. Cabarle, et al.

Publication title: Proceedings of the Eleventh Brainstorming Week on Membrane Computing: 25-50, 2013

Abstract:

Evolution-Communication P system with energy (ECPe systems) is a cell- like variant P system which establishes a dependence between evolution and communi-cation through special objects, called `energy,' produced during evolution and utilized during communication. This paper presents our initial progress and e orts on the im- plementation and simulation of ECPe systems using Graphics Processing Units (GPUs). Our implementation uses matrix representation and operations presented in a previous work. Speci cally, an implementation of computations on ECPe systems without antiport rules is discussed.

Full text available upon request to the author

Article title: The Reduction-Buildup Algorithm (RBA) for Efficient Support Set Construction

Authors: Jasmine A. Malinao, Richelle Ann B. Juayong, Unaiza M. Garnica, Henry N. Adorna

Publication title: Philippine Information Technology Journal 3(1): 43-47, 2012

Abstract:

The Reduction-Buildup Algorithm (RBA) is introduced in this study to be able to generate a minimal support set for a given conflict-free binary 2– tagged data set S of n dimen-sions. A support set ϕ, where $|\phi| \leq n$, is a set of dimensions obtained from S

which forms another conflict-free data set. Finding this set has been proven to be NP-complete in. Unlike previous literatures that have transformed the orig-inal data set into another form prior to deriving a minimal support set, RBA shows that such a set can still be achieved in a comparable running time and utilizing lesser computation space even in the absence of this transformation.

Full text available upon request to the author

Article title: Strong Spanned Patterns Generation Using Subsequence Cover Problem Reduction and the Term-Product Operation

Authors: Jasmine A. Malinao, Richelle Ann B. Juayong, Nestine Hope S. Fernandez, Henry N. Adorna

Publication title: Philippine Journal of Science 141(2): 127-139, 2012

Abstract:

The Strong Spanned Patterns-Trie Construction (SSP-TC) algorithm is introduced to efficiently generate a set of strong spanned patterns of a given conflict-free binary k-tagged data set obtained by the use of the Approximate Crisp Theory Set Formation (ACTSF) methodology that we proposed in our previous work. In our previous work, we have shown that such a set with this characteristic can be obtained using the SSP-trie data structure in O (mn2). In this paper, we present and prove the correctness of the SSP-TC algorithm that generates this set through parallel computations in O (mn) implemented in this trie structure. We were also able to reduce the problem of generating a set of strong spanned patterns into a problem known as the Subsequence Cover Problem (SubCP). We obtain a solution to this reduct through the use of the SSP-TC algorithm and the SSP-Trie data structure whose input is from the components of the Term-Product Matrix introduced in this paper. To illustrate the classification performance of the generated set of patterns using the proposed concepts and methods, we use two data sets publicly-made-available in University of California Irvine (UCI) Machine Learning Repository and show that we achieve better rates of classification on the test sets of the two data sets compared with the results in literature.

Full text available upon request to the author

Article title: A Quantitative Analysis-based Algorithm for Optimal Data Signature Construction of Traffic Data Sets

Authors: Jasmine A. Malinao, Richelle Ann B. Juayong, Rona May U. Tadlas, Jhoirene B. Clemente, et al.

Publication title: Information and Media Technologies 7(3): 949-955, 2012

Abstract:

In this paper, a new set of m-dimensional Power Spectrum-based data signatures is derived to obtain better Vector Fusion 2-dimensional visualizations of a time series and periodic n-dimensional traffic data set as compared with visualizations produced from using the entire set of n-dimensional Power Spectrum representations in literature, where m≪ n. We were able to ascertain that 4-dimensional data signatures provide empirically optimal representations with respect to the data set used. We have achieved≈ 97.6% reduction in terms of data representation of the original nD data set with the signatures. We propose an algorithm that determines how good the selected set of m-dimensional signatures represents the n-dimensional data set in 2 dimensions in quantitative terms. We use the Vector Fusion visualization algorithm in transforming each signature from m dimensions into 2 dimensions. An improved set of qualitative criterion is drawn to measure the goodness of the 2-dimensional data signature-based visual representation of the original n-dimensional data set. Finally, we provide empirical testing, discuss the results, and conclude the contributions of the proposed methods.

Full text available upon request to the author

Article title: Traffic Density Modeling on NLEX Time Series Data Segment

Authors: Reynaldo G. Maravilla Jr, Elise Raina A. Tabanda, Jasmine A. Malinao, Henry N. Adorna

Publication title: Philippine Information Technology Journal 5(2): 14-18, 2012

Abstract:

Traffic density-based analysis provides a more effective representation of congestion than volume-based analysis. However, existing propositions on determining densities proved to be inefficient according to traffic engineering experts in the National Center of Transportation Studies (NCTS). In this study, we made use of a similar density model, this time considering the space of the road segment as an important factor. With the data set provided by NCTS, careful preprocessing yielded valid traffic flow characteristics that were used in modeling traffic flow behavior. Relationships between these characteristics are also observed through established traffic models. With those models, we deter-mined the traffic flow behavior of North Luzon Expressway Balintawak-North Bound segment.

Full text available upon request to the author

Article title: Data signatures for traffic data analysis

Authors: Jasmine A. Malinao, Richelle Ann B. Juayong, Francis James O. Corpuz, Jan Michael C. Yap, et al.

Publication title: Philippine Information Technology Journal 3(1): 12-17, 2012

Abstract:

With the advent of the Information Age, interpretation of huge amounts of data always poses big problem to data analysts. Methodologies had been created to try to mine useful and, possibly, novel information from data sources of massive sizes. We use the concept of Data Signatures to accomplish these difficult tasks. Data sets are processed by combinations of algorithms with a common aim of creating smaller and more compact representation or summarization of the latent characteristics of the data sets. We investigate the effectiveness of Power Spectrum signatures to analyze traffic volume data. We show that this method is successful in data repre-sentation, detection of common patterns, determination of outliers, and realization of unexpected and novel information from the data set through the help of domain experts from the National Center for Transportation Studies (NCTS).

Full text available upon request to the author

Article title: Characterizing classes of potential outliers through traffic data set data signature 2D nMDS projection

Authors: Erlo Robert F. Oquendo, Jhoirene B. Clemente, Jasmine A. Malinao, Henry N. Adorna

Publication title: Philippine Information Technology Journal 4(1): 37-42, 2012

Abstract:

This paper presents a formal method for characterizing the potential outliers from the data signature projection of traffic data set using Non-Metric Multidimensional Scaling (nMDS) visualization. Previous work had only relied on visual inspection and the subjective nature of this technique may derive false and invalid potential outliers. The identification of correct potential outliers had already been an open problem proposed in literature. This is due to the fact that they pinpoint areas and time frames where traffic incidents/accidents occur along the North Luzon Expressway (NLEX) in Luzon.

Full text available upon request to the author

Article title: On the simulations of evolution-communication P systems with energy without antiport rules for GPUs

Authors: Richelle Ann B. Juayong, Francis George C. Cabarle, Henry N. Adorna, Miguel Ángel Martínez del Amor

Publication title: Proceedings of the Tenth Brainstorming Week on Membrane Computing: 267-290, 2012

Abstract:

In this report, we present our initial proposal on simulating computations on a restricted variant of Evolution-Communication P system with energy (ECPe system) which will then be implemented in Graphics Processing Units (GPUs). This ECPe sys- tems variant prohibits the use of antiport rules for communication. Several possible levels of parallelizations for simulating ECPe systems computations on GPUs are emphasized. Our work is based on a localized matrix representation for

the mentioned variant given in a previous literature. Our proposal employs a methodology for forward computing also discussed in the said literature.

Full text available upon request to the author

Article title: Improving GPU simulations of spiking neural P systems

Authors: Francis George C. Cabarle, Henry N. Adorna, Miguel Ángel Martínez del Amor, Mario de Jesús Pérez Jiménez

Publication title: Romanian Journal of Information Science and Technology 15 (1): 5-20, 2012

Abstract:

In this work we present further extensions and improvements of a Spiking Neural P system (for short, SNP systems) simulator on graphics processing units (for short, GPUs). Using previous results on representing SNP system computations using linear algebra, we analyze and implement a compu- tation simulation algorithm on the GPU. A two-level parallelism is introduced for the computation simulations. We also present a set of benchmark SNP sys- tems to stress test the simulation and show the increased performance obtained using GPUs over conventional CPUs. For a 16 neuron benchmark SNP system with 65536 nondeterministic rule selection choices, we report a 2.31 speedup of the GPU-based simulations over CPU-based simulations.

Full text available upon request to the author

Article title: Spiking neural P system without delay simulator implementation using GPGPUs

Authors: Francis Cabarle, Henry Adorna, MA Martínez-del-Amor

Publication title: Eleventh Philippine Computing Science Congress: 35-43, 2011

Abstract:

This paper presents a parallel simulator for a type of P system known as spiking neural P system (SNP system) using general purpose graphics processing units (GPGPUs). GPGPUs, unlike the more conventional and general purpose, multi-core

CPUs, are used for parallelizable problems due to their architectural optimization for parallel computations.

Membrane computing or P systems on the other hand, are cell-inspired computational models which compute in a maximally parallel and non-deterministic manner. SNP systems, w/c compute via time separated spikes and whose inspiration was taken from the way neurons operate in living organisms, have been represented as matrices.

Full text available upon request to the author

Article title: Simulating Spiking Neural P systems without delays using GPUs

Authors: Francis Cabarle, Henry Adorna, Miguel A Martinez-del-Amor

Publication title: International Journal of Natural Computing Research (IJNCR) 2(2): 19-31, 2011

Abstract:

In this paper, the authors discuss the simulation of a P system variant known as Spiking Neural P systems (SNP systems), using Graphics Processing Units (GPUs). GPUs are well suited for highly parallel computations because of their intentional and massively parallel architecture. General purpose GPU computing has seen the use of GPUs for computationally intensive applications, not just in graphics and video processing. P systems, including SNP systems, are maximally parallel computing models taking inspiration from the functioning and dynamics of a living cell. In particular, SNP systems take inspiration from a type of cell known as a neuron. The nature of SNP systems allowed for their representation as matrices, which is an elegant step toward their simulation on GPUs. In this paper, the simulation algorithms, design considerations, and implementation are presented. Finally, simulation results, observations, and analyses using a simple but non-trivial SNP system as an example are discussed, including recommendations for future work.

Full text available upon request to the author

Article title: An Algorithm to Efficiently Generate an Approximation of a Theory Set

Authors: J. Malinao and H. Adorna

Publication title: Proceedings of 9th Philippine Computing Science Congress: 2-3, 2009

Abstract:

A theory set essentially consists of patterns that summarizes the observed inherent behavior of each cluster of observation in a data set. Furthermore, it is used in evaluating the cluster membership of new sets of data. Due to the large amount of computational resources needed to generate a theory set of a given data set, we propose an algorithm to approximate this set efficiently.

Full text available upon request to the author

Doralyn S. Dalisay

Sex: Female

Education:

Doctor of Philosophy in Microbiology, University of New South Wales, 2004

Master of Science in Biology, University of the Philippines, 1999

Bachelor of Science in Pharmacy, University of San Agustin, 1993

Field of Specialization

Chemistry

Natural Products

Liquid Chromatography-Mass Spectrometry (LC-MS)

Life Sciences and Spectroscopy

Researches:

Article title: Oceanapiside, a Marine Natural Product, Targets the Sphingolipid Pathway of Fluconazole-Resistant Candida glabrata

Authors: Doralyn Dalisay, Evan W. Rogers, Tadeusz F. Molinski

Publication title: Marine Drugs 19(3): 126, February 2021

Abstract:

Oceanapiside (OPS), a marine natural product with a novel bifunctional sphingolipid structure, is fungicidal against fluconazole-resistant Candida glabrata at 10 μg/mL (15.4 μM). The fungicidal effect was observed at 3 to 4 h after exposure to cells. Cytological and morphological studies revealed that OPS affects the budding patterns of treated yeast cells with a significant increase in the number of

cells with single small buds. In addition, this budding morphology was found to be sensitive in the presence of OPS. Moreover, the number of cells with single medium-sized buds and cells with single large buds were decreased significantly, indicating that fewer cells were transformed to these budding patterns, suggestive of inhibition of polarized growth. OPS was also observed to disrupt the organized actin assembly in C. glabrata, which correlates with inhibition of budding and polarized growth. It was also demonstrated that phytosphingosine (PHS) reversed the antifungal activity of oceanapiside. We quantified the amount of long chain-bases (LCBs) and phytoceramide from the crude extracts of treated cells using LC-ESI-MS. PHS concentration was elevated in extracts of cells treated with OPS when compared with cells treated with miconazole and amphotericin B. Elevated levels of PHS in OPS-treated cells confirms that OPS affects the pathway at a step downstream of PHS synthesis. These results also demonstrated that OPS has a mechanism of action different to those of miconazole and amphotericin B and interdicts fungal sphingolipid metabolism by specifically inhibiting the step converting PHS to phytoceramide.

Full text available upon request to the author

Article title: Metabolites from Marine Microorganisms, Micro, and Macroalgae: Immense Scope for Pharmacology

Authors: Noora Barzkar,1,* Saeid Tamadoni Jahromi,2,* Hadi Bolooki Poorsaheli,3,4 and Fabio Vianello

Publication title: Marine Drugs 17(8): 464, August 2019

Abstract:

Marine organisms produce a large array of natural products with relevance in drug discovery. These compounds have biological activities such as antioxidant, antibacterial, antitumor, antivirus, anticoagulant, anti-inflammatory, antihypertensive, antidiabetic, and so forth. Consequently, several of the metabolites have made it to the advanced stages of clinical trials, and a few of them are commercially available. In this review, novel information on natural products isolated from marine microorganisms, microalgae, and macroalgae are presented.

Given due research impetus, these marine metabolites might emerge as a new wave of promising drugs.

Full text available upon request to the author

Article title: Aminorifamycins and Sporalactams Produced in Culture by a Micromonospora sp. Isolated from a Northeastern-Pacific Marine Sediment Are Potent Antibiotics

Authors: David E. Williams, Doralyn Dalisay, Jessie Chen, Elena A. Polishchuck, et al.

Publication title: Organic Letters 19(4), February 2017

Abstract:

The new ansa macrolide antibiotics 1 to 4 have been isolated from cultures of a *Micromonospora* sp. obtained from a marine sediment. Rifamycins 1 and 2 are the first natural ansa macrolides to have a 3-amino substituent. Sporalactams A (3) and B (4) are comprised of a heterocylic core 5 and a 14-membered ansa bridge that are both unprecedented. Sporalactam B (4) shows selective and potent inhibition of *Mycobacterium tuberculosis*.

Full text available upon request to the author

Article title: Structures of Nahuoic Acids B-E Produced in Culture by a Streptomyces sp. Isolated from a Marine Sediment and Evidence for the Inhibition of the Histone Methyl Transferase SETD8 in Human Cancer Cells by Nahuoic Acid A

Authors: David E. Williams, Fanny Izard, Stéphanie Arnould, Doralyn S. Dalisay, et al.

Publication title: Journal of Organic Chemistry 81(4): 1324-32, February 2016

Abstract:

Nahuoic acids A-E (1-5) have been isolated from laboratory cultures of a Streptomyces sp. obtained from a tropical marine sediment. The structures of the new polyketides 2-5 were elucidated by analysis of spectroscopic data of the natural products and the chemical derivatives 6 and 7. Nahuoic acids 1-5 are in vitro

inhibitors of the histone methyltransferase SETD8, and nahuoic acid A (1) and its pentaacetate derivative 8 inhibit the proliferation of several cancer cells lines in vitro with modest potency. At the IC50 for cancer cell proliferation, nahuoic acid A (1) showed selective inhibition of SETD8 in U2OS osteosarcoma cells that reflect its selectivity against a panel of pure histone methyl transferases. A cell cycle analysis revealed that the cellular toxicity of nahuoic acid A (1) is likely linked to its ability to inhibit SETD8 activity.

Full text available upon request to the author

Article title: Peroxide Natural Products from Plakortis zyggompha and the Sponge Association Plakortis halichondrioides-Xestospongia deweerdtae: Antifungal Activity against Cryptococcus gattii

Authors: Matthew T. Jamison, Doralyn S. Dalisay, Tadeusz F. Molinski

Publication title: Journal of Natural Products 79(3); 555-63, March 2016

Abstract:

Cryptococcus gattii is a human pathogen and causative agent of a pernicious, sometimes fatal, disseminated fungal disease. Investigation of antifungal extracts of the marine sponge association Plakortis halichondrioides-Xestospongia deweerdtae and the sponge Plakortis zyggompha from the Bahamas led to the discovery and isolation of 6-epi-7,8-dihydroplakortide K (1), plakortide AA (2), and three new plakinic acids, N-P (4-6; unstable 1,2-dioxolanes bearing benzyl-substituted conjugated dienes), along with known plakinic acids L, K, and M.5 Chiroptical comparisons and DFT calculations of (13)C NMR chemical shifts were used to assign the absolute stereostructure of 4. The stereospecific base-promoted rearrangement-saponification of 1 to 10 was briefly investigated and showed tight kinetic control and stereospecific formation of the new C-2 stereocenter with inversion at C-3. Plakinic acid M and plakortides 9 and 11 exhibited antifungal activity against C. gattii (MIC90 = 2.4 to 36 μM), but plakinic acids N-P were inactive under the same conditions.

Full text available upon request to the author

Article title: Dirigent Protein-Mediated Lignan and Cyanogenic Glucoside Formation in Flax Seed: Integrated Omics and MALDI Mass Spectrometry Imaging

Authors: Doralyn S. Dalisay, Kye Won Kim, Choonseok Lee, Hong Yang, et al.

Publication title: Journal of Natural Products 78(6); 1231-42, June 2015

Abstract:

An integrated omics approach using genomics, transcriptomics, metabolomics (MALDI mass spectrometry imaging, MSI), and bioinformatics was employed to study spatiotemporal formation and deposition of health-protecting polymeric lignans and plant defense cyanogenic glucosides. Intact flax (Linum usitatissimum) capsules and seed tissues at different development stages were analyzed. Transcriptome analyses indicated distinct expression patterns of dirigent protein (DP) gene family members encoding (-)- and (+)-pinoresinol-forming DPs and their associated downstream metabolic processes, respectively, with the former expressed at early seed coat development stages. Genes encoding (+)-pinoresinol-forming DPs were, in contrast, expressed at later development stages. Recombinant DP expression and DP assays also unequivocally established their distinct stereoselective biochemical functions. Using MALDI MSI and ion mobility separation analyses, the pinoresinol downstream derivatives, secoisolariciresinol diglucoside (SDG) and SDG hydroxymethylglutaryl ester, were localized and detectable only in early seed coat development stages. SDG derivatives were then converted into higher molecular weight phenolics during seed coat maturation. By contrast, the plant defense cyanogenic glucosides, the monoglucosides linamarin/lotaustralin, were detected throughout the flax capsule, whereas diglucosides linustatin/neolinustatin only accumulated in endosperm and embryo tissues. A putative biosynthetic pathway to the cyanogens is proposed on the basis of transcriptome coexpression data. Localization of all metabolites was at ca. 20 μm resolution, with the web based tool OpenMSI enabling not only resolution enhancement but also an interactive system for real-time searching for any ion in the tissue under analysis.

Full text available upon request to the author

Article title: Branched dimerization of Tat peptide improves permeability to HeLa and hippocampal neuronal cells

Authors: I. Abrrey Monreal, Qian Liu, Katherine Tyson, Tyler Bland, et al.

Publication title: Chemical Communications 51(25): 5463-5466, February 2015

Abstract:

A dimeric branched peptide TATp-D designed as an analogue of the HIV-Tat protein transduction domain (TATp), a prototypical cell penetrating peptide (CPP), demonstrates significantly enhanced cell uptake at 0.25 to 2.5 μM. Live cell confocal laser scanning microscopy revealed that multivalency dramatically improved the permeation potency of TATp-D to HeLa and primary hippocampal neuronal cells. The observed enhanced ability of TATp-D to translocate through the membrane is highlighted by a non-linear dependence on concentration, exhibiting the greatest uptake at sub-micromolar concentrations as compared to TATp. Multimerization *via* bis-Fmoc Lysine offered a synthetically straightforward method to investigate the effects of multivalent CPPs while offering orthogonal handles for cargo attachment, increasing the utility of CPPs at significantly lower concentrations.

Full text available upon request to the author

Article title: Non-host disease resistance response in pea (Pisum sativum) pods: Biochemical function of DRR206 and phytoalexin pathway localization

Authors: Herana Kamal Seneviratne, Doralyn S. Dalisay, Kye-Won Kim, Syed G. A. Moinuddin, et al.

Publication title: Phytochemistry 113: 140-8, May 2015

Abstract:

Continually exposed to potential pathogens, vascular plants have evolved intricate defense mechanisms to recognize encroaching threats and defend themselves. They do so by inducing a set of defense responses that can help defeat and/or limit effects of invading pathogens, of which the non-host disease resistance response is the most common. In this regard, pea (Pisum sativum) pod tissue, when exposed to Fusarium solani f. sp. phaseoli spores, undergoes an inducible transcriptional activation of

pathogenesis-related genes, and also produces (+)-pisatin, its major phytoalexin. One of the inducible pathogenesis-related genes is Disease Resistance Response-206 (DRR206), whose role in vivo was unknown. DRR206 is, however, related to the dirigent protein (DP) family. In this study, its biochemical function was investigated in planta, with the metabolite associated with its gene induction being pinoresinol monoglucoside. Interestingly, both pinoresinol monoglucoside and (+)-pisatin were co-localized in pea pod endocarp epidermal cells, as demonstrated using matrix-assisted laser desorption/ionization (MALDI) mass spectrometry imaging. In addition, endocarp epidermal cells are also the site for both chalcone synthase and DRR206 gene expression. Taken together, these data indicate that both (+)-pisatin and pinoresinol monoglucoside function in the overall phytoalexin responses.
Full text available upon request to the author

Article title: A multi-omics strategy resolves the elusive nature of alkaloids in Podophyllum species
Authors: Joaquim V. Marques, Doralyn S. Dalisay, Hong Yang, Choonseok Lee, et al.
Publication title: Molecular Biosystems 10(11): 2838-2849, August 2014

Abstract:
Podophyllum hexandrum and, to a much lesser extent *P. peltatum*, are sources of podophyllotoxin, extensively used as a chemical scaffold for various anti-cancer drugs. In this study, integrated omics technologies (including advanced mass spectrometry/metabolomics, transcriptome sequencing/gene assemblies, and bioinformatics) gave unequivocal evidence that both plant species possess a hitherto unknown aporphine alkaloid metabolic pathway. Specifically, RNA-seq transcriptome sequencing and bioinformatics guided gene assemblies/analyses *in silico* suggested presence of transcripts homologous to genes encoding all known steps in aporphine alkaloid biosynthesis. A comprehensive metabolomics analysis, including UPLC-TOF-MS and MALDI-MS imaging *in situ*, then enabled detection, identification, localization and quantification of the aporphine alkaloids, magnoflorine, corytuberine and muricinine, in the underground and aerial tissues. Interestingly, the purported presence of alkaloids in *Podophyllum* species has been

enigmatic since the 19th century, remaining unresolved until now. The evolutionary and phylogenetic ramifications of this discovery are discussed.

Full text available upon request to the author

Article title: Helvolic acid, an antibacterial nortriterpenoid from a fungal endophyte, Xylaria sp. of orchid Anoectochilus setaceus endemic to Sri Lanka

Authors: Pamoda B. Ratnaweera, David E. Williams, E. Dilip de Silva, Ravi L.C. Wijesundera, et al.

Publication title: Mycology 5(1): 23-28, March 2014

Abstract:

An endophytic fungus was isolated from surface sterilized leaf segments of *Anoectochilus setaceus,* an orchid endemic to Sri Lanka, and was identified as *Xylaria* sp. by morphological characters and DNA sequencing. Bioassay-guided chromatographic fractionation of the organic extract of a laboratory culture of this fungus led to the isolation of the known antibacterial helvolic acid. Helvolic acid was active against the Gram-positive bacteria, *Bacillus subtilis* [minimal inhibitory concentrations (MIC), 2 μg mL–1] and methicillin-resistant *Staphylococcus aureus* (MIC, 4 μg mL–1).

Full text available upon request to the author

Article title: Transgenic hybrid poplar for sustainable and scalable production of the commodity/specialty chemical, 2-phenylethanol

Authors: Michael A. Costa, Joaquim V. Marques, Doralyn S. Dalisay, Barrington Herman, et al.

Publication title: PLoS One 8(12): e83169, December 2013

Abstract:

Fast growing hybrid poplar offers the means for sustainable production of specialty and commodity chemicals, in addition to rapid biomass production for lignocellulosic deconstruction. Herein we describe transformation of fast-growing transgenic hybrid poplar lines to produce 2-phenylethanol, this being an important

fragrance, flavor, aroma, and commodity chemical. It is also readily converted into styrene or ethyl benzene, the latter being an important commodity aviation fuel component. Introducing this biochemical pathway into hybrid poplars marks the beginnings of developing a platform for a sustainable chemical delivery system to afford this and other valuable specialty/commodity chemicals at the scale and cost needed. These modified plant lines mainly sequester 2-phenylethanol via carbohydrate and other covalently linked derivatives, thereby providing an additional advantage of effective storage until needed. The future potential of this technology is discussed. MALDI metabolite tissue imaging also established localization of these metabolites in the leaf vasculature.

Full text available upon request to the author

Article title: Marine Sediment-Derived Streptomyces Bacteria from British Columbia, Canada Are a Promising Microbiota Resource for the Discovery of Antimicrobial Natural Products

Authors: Doralyn S. Dalisay, David E. Williams, Xiao Ling Wang, Ryan Centko, et al.

Publication title: PLoS One 8(10): e77078, October 2013

Abstract:

Representatives of the genus Streptomyces from terrestrial sources have been the focus of intensive research for the last four decades because of their prolific production of chemically diverse and biologically important compounds. However, metabolite research from this ecological niche had declined significantly in the past years because of the rediscovery of the same bioactive compounds and redundancy of the sample strains. More recently, a new picture has begun to emerge in which marine-derived Streptomyces bacteria have become the latest hot spot as new source for unique and biologically active compounds. Here, we investigated the marine sediments collected in the temperate cold waters from British Columbia, Canada as a valuable source for new groups of marine-derived Streptomyces with antimicrobial activities. We performed culture dependent isolation from 49 marine sediments samples and obtained 186 Streptomyces isolates, 47 of which exhibited antimicrobial activities. Phylogenetic analyses of the active isolates resulted in the identification of

four different clusters of bioactive Streptomyces including a cluster with isolates that appear to represent novel species. Moreover, we explored whether these marine-derived Streptomyces produce new secondary metabolites with antimicrobial properties. Chemical analyses revealed structurally diverse secondary metabolites, including four new antibacterial novobiocin analogues. We conducted structure-activity relationships (SAR) studies of these novobiocin analogues against methicillin-resistant Staphylococcus aureus (MRSA). In this study, we revealed the importance of carbamoyl and OMe moieties at positions 3" and 4" of novobiose as well as the hydrogen substituent at position 5 of hydroxybenzoate ring for the anti-MRSA activity. Changes in the substituents at these positions dramatically impede or completely eliminate the inhibitory activity of novobiocins against MRSA.

Full text available upon request to the author

Article title: N-Carbamoylation of 2,4-Diaminobutyrate Reroutes the Outcome in Padanamide Biosynthesis

Authors: Yi-Ling Du, Doralyn S. Dalisay, Raymond J. Andersen, Katherine S. Ryan

Publication title: Chemistry & Biology 20(8): 1002-1011, August 2013

Abstract:

Padanamides are linear tetrapeptides notable for the absence of proteinogenic amino acids in their structures. In particular, two unusual heterocycles, (S)-3-amino-2-oxopyrrolidine-1-carboxamide (S-Aopc) and (S)-3-aminopiperidine-2,6-dione (S-Apd), are found at the C-termini of padanamides A and B, respectively. Here we identify the padanamide biosynthetic gene cluster and carry out systematic gene inactivation studies. Our results show that padanamides are synthesized by highly dissociated hybrid nonribosomal peptide synthetase/polyketide synthase machinery. We further demonstrate that carbamoyltransferase gene padQ is critical to the formation of padanamide A but dispensable for biosynthesis of padanamide B. Biochemical investigations show that PadQ carbamoylates the rare biosynthetic precursor l-2,4-diaminobutyrate, generating l-2-amino-4-ureidobutyrate, the presumed precursor to the C-terminal residue of padanamide A. By contrast, the C-terminal residue of padanamide B may derive from glutamine. An unusual

thioesterase-catalyzed cyclization is proposed to generate the S-Aopc/S-Apd heterocycles.

Full text available upon request to the author

Article title: Nahuoic Acid A Produced by a Streptomyces sp Isolated From a Marine Sediment Is a Selective SAM-Competitive Inhibitor of the Histone Methyltransferase SETD8

Authors: David E. Williams, Doralyn S. Dalisay, Fengling Li, James Amphlett, et al.

Publication title: Organic Letters 15(2): 414-417, January 2013

Abstract:

The histone lysine monomethyltransferase SETD8 is an epigenetic regulator of cell cycle progression. Nahuoic acid A (1), a polyketide produced in culture by a Streptomyces sp. obtained from a tropical marine sediment, is the first known selective SAM-competitive inhibitor of SETD8. The structure of nahuoic acid A (1) has been elucidated by chemical transformation and detailed analysis of spectroscopic data.

Full text available upon request to the author

Article title: Tyrocidine a from a haliclona sponge derived Vibrio sp

Authors: J. Noro, John A Kalaitzis, De Williams, Doralyn S. Dalisay, et al.

Publication title: Planta Medica 78(11): 174, July 2012

Abstract:

Taxonomically diverse, sponge-associated microbial communities represent a rich source of potentially novel and bioactive natural products. In our search for bioactive compounds from sponge-associated microbes we isolated and identified a Vibrio sp. from a sample of Haliclona collected from Milne Bay, Papua New Guinea. The Vibrio strain was selected for further investigation on the basis of testing positive for the presence of non-ribosomal peptide synthetase (NRPS) coding genes in our PCR-based screen. Chemical investigation of this Vibrio sp. resulted in the isolation and identification of the NRPS product tyrocidine A, and its decapeptide

structure was confirmed by 1D and 2D NMR. Tyrocidine A displayed moderate activity against methicillin resistant S. aureus, E. coli and P. aeruginosa. The discovery of tyrocidine A from a marine Vibrio sp is intriguing from a microbiological viewpoint as it has long been known to be a product of the Gram-positive, soil-dwelling and spore forming Bacillus spp. Aspects of this, and the notion that the marine environment is a largely untapped source of bioactive natural products will be presented.

Full text available upon request to the author

Article title: Liposomal circular dichroism. Assignment of remote stereocenters in plakinic acids K and L from a Plakortis-Xestospongia sponge association

Authors: Doralyn S. Dalisay, Tim Quach, Tadeusz F. Molinski

Publication title: Organic Letters 12(7): 1524-27, April 2010

Abstract:

Two new omega-phenyl polyketide peroxides, plakinic acids K and L, were isolated from a two-sponge association of Plakortis halichondroides and Xestospongia deweerdtae. The absolute configurations of the remote dimethyl-branched stereocenters in plakinic acid K were assigned by degradation of plakinic acid K to a long-chain naphthamide and analysis by liposomal circular dichroism (L-CD) and comparison with synthetic standards.

Full text available upon request to the author

Article title: Padanamides A and B, Highly Modified Linear Tetrapeptides Produced in Culture by a Streptomyces sp Isolated from a Marine Sediment

Authors: David. E. Williams, Doralyn S. Dalisay, Brian O. Patrick, Teatulohi Matainaho, et al.

Publication title: Organic Letters 13(15): 3936-3939, August 2011

Abstract:

Two highly modified linear tetrapeptides, padanamides A (1) and B (2), are produced by laboratory cultures of a *Streptomyces* sp. obtained from a marine

sediment. Padanamide B is cytotoxic to Jurkat cells and a chemical genomics analysis using *Saccharomyces cerevisiae* deletion mutants suggested that padanamide A inhibits cysteine and methionine biosynthesis or that these amino acids are involved in the yeast's response to the peptide.

Full text available upon request to the author

Article title: Ptilomycalin A inhibits laccase and melanization in Cryptococcus neoformans

Authors: Doralyn S. Dalisay, Jonel P. Saludes, Tadeusz F. Molinski

Publication title: Bioorganic & Medicinal Chemistry 19(22): 6654-57, November 2011

Abstract:

The antifungal spirocyclic guanidine alkaloid, ptilomycalin A, from marine sponge Monanchora arbuscula, inhibits melanogenesis of Cryptococcus neoformans in vitro through inhibition of biosynthesis of laccase in the melanin biosynthetic pathway with an IC(50) of 7.3 μM.

Full text available upon request to the author

Article title: Use of Experimental Design for the Optimization of the Production of New Secondary Metabolites by Two Penicillium Species

Authors: Eli F. Pimenta, Aline M. Vita-Marques, Aristeu Tininis, Mirna H. R. Seleghim, et al.

Publication title: Journal of Natural Products 73(11): 1821-32, November 2010

Abstract:

A fractional factorial design approach has been used to enhance secondary metabolite production by two Penicillium strains. The method was initially used to improve the production of bioactive extracts as a whole and subsequently to optimize the production of particular bioactive metabolites. Enhancements of over 500% in secondary metabolite production were observed for both P. oxalicum and P. citrinum. Two new alkaloids, citrinalins A (5) and B (6), were isolated and identified from P. citrinum cultures optimized for production of minor metabolites.

Full text available upon request to the author

Article title: Synthesis and Chain-Dependent Antifungal Activity of Long-Chain 2H-Azirine-Carboxylate Esters Related to Dysidazirine
Authors: Colin K. Skepper, Doralyn S. Dalisay, Tadeusz F. Molinski
Publication title: Bioorganic & Medicinal Chemistry 20(6): 2029-32, March 2010

Abstract:
Analogues of the antifungal marine natural product (E)-dysidazirine were prepared and evaluated in broth ro-dilution assays against a panel of fungal pathogens. A simple structure-activity relationship was developed which provides insight into the mechanism of action of long-chain 2H-azirine carboxylates.
Full text available upon request to the author

Article title: Structure Elucidation at the Nanomole Scale. 3. Phorbasides G-I from Phorbas sp.
Authors: Doralyn S. Dalisay and Tadeusz F. Molinski
Publication title: Journal of Natural Products 73(4): 679-682, April 2010

Abstract:
Three new phorbasides (G-I), chlorocyclopropyl ene-yne macrolide glycosides, were isolated from the sponge Phorbas sp. in yields of 7-9.5 mug and fully characterized by MS, CD, and microcryoprobe NMR. The structures of the new compounds differ only in the nature of the sugar residues. The absolute configurations of the new compounds were correlated by ROESY and CD with the parent compounds phorbasides A and B.
Full text available upon request to the author

Article title: Zwittermicin A: Synthesis of Analogs and Structure-Activity Studies
Authors: Evan W. Rogers, Doralyn S. Dalisay, Tadeusz F. Molinski
Publication title: Bioorganic & Medicinal Chemistry 20(7): 2183-85, April 2010

Abstract:

Analogs and diastereomers of the natural product zwittermicin A were prepared. SAR studies of these compounds reveal the antifungal activity to be dependent singularly upon the natural constitution and configuration.

Full text available upon request to the author

Article title: Hemi-phorboxazole a: structure confirmation, analogue design and biological evaluation

Authors: Amos B. Smith III, Zhuqing Liu, Anne-Marie L Hogan, Doralyn S. Dalisay, et al.

Publication title: Organic Letters 11(16): 3766-9, August 2009

Abstract:

A synthesis providing totally synthetic (+)-hemi-phorboxazole A (1), proceeding in two steps (85% yield) from known vinyl iodide precursor (+)-2, has been achieved in conjunction with the design, synthesis, and biological evaluation of two hemi-phorboxazole analogues [(+)-3 and (-)-4] featuring ring replacements inscribed within the macrolide. Although hemi-phorboxazole A (1) displayed no activity when tested against Candida albicans and two human cancer cell lines, analogue (-)-4 exhibited significant tumor cell growth inhibitory activity in the nanomolar range against HCT-116 (colon) and SK-BR-3 (breast), while (+)-3 displayed promising antifungal activity against C. albicans.

Full text available upon request to the author

Article title: Isorhizochalin: a Minor Unprecedented Bipolar Sphingolipid of Stereodivergent Biogenesis from the Rhizochalina incrustata

Authors: Tatyana N. Makarieva, Alexander M. Zakharenko, Pavel S. Dmitrenok, Alla G. Guzii, et al.

Publication title: Lipids 44(12): 1152-62, December 2009

Abstract:

Isorhizochalin (1) was isolated as its peracetate from the EtOH extract of the sponge Rhizochalina incrustata. Its structure and absolute stereochemistry were elucidated

as (2S,3R,26R,27R)-2,27-diamino-3-O-beta-D: -galactopyranosyl-oxy-26-hydroxyoctacosan-18-one by extensive NMR, MS studies, chemical transformations, including micromolar-scale Baeyer-Villiger oxidation, and by analysis of CD spectra of isorhizochalinin perbenzoate (2b). Isorhizochalin is an unprecedented C-2 epimer of rhizochalin having an erythro configuration at the glycosylated 2-amino-3-alkanol alpha-terminus in contrast with a canonical threo configuration for other representatives of this structural group. Probable biogenesis of 1 is discussed in the context of known sphingolipid biosynthesis beginning with condensation of alanine with a fatty acyl CoA thioester. The aglycone, isorhizochalinin (2a), shows cytotoxicity against human leukemia HL-60 and THP-1 cells with IC(50) values of 2.90 and 2.20 microM, respectively.

Full text available upon request to the author

Article title: Structure elucidation at the nanomole scale. 2. Hemi-phorboxazole A from Phorbas sp

Authors: Doralyn S. Dalisay and Tadeusz F. Molinski

Publication title: Organic Letters 11(9): 1969-70, May 2009

Abstract:

Hemi-phorboxazole A, a minor truncated analogue of phorboxazole A from the marine sponge Phorbas sp., was isolated in a total yield of 16.5 microg (28 nmol). The structure was elucidated by application of integrated nanomole-scale natural product techniques, including cryomicroprobe NMR, (1)H-coupled HSQC, and circular dichroism (CD).

Full text available upon request to the author

Article title: Synthesis and Structure-Activity Relationships of Bengazole A Analogs

Authors: Roger J. Mulderc, Cynthia M. Shaferc, Doralyn S. Dalisay, Tadeusz F. Molinski

Publication title: Bioorganic & Medicinal Chemistry 19(11): 1928-2930, June 2009

Abstract:

Analogs of the potent antifungal agent, bengazole A, were prepared and evaluated against *Candida* spp. in both microbroth dilution and disk diffusion assays.
Full text available upon request to the author

Article title: Amplification of the Cotton effect of a single chromophore through liposomal ordering-stereochemical assignment of plakinic acids I and J
Authors: Doralyn S. Dalisay, Tim Quach, Gillian N. Nicholas, Tadeusz F. Molinski
Publication title: Angewandte Chemie (International ed. in English) 48(24): 4367-71, 2009

Abstract:
A dramatic effect is observed when acyclic N-(2-naphthamides) of medium-chain 1-amino-2-methylalkanes are partially ordered with the help of liposomes: the Cotton effect arising from pi-pi* transitions of the terminal naphthamide chromophor is enormously enhanced. This effect was exploited to assign the configuration of new polyketide peroxides such as 1 from the sponge Plakortis halichondroides.
Full text available upon request to the author

Article title: A Tetrachloro Polyketide Hexahydro-1H-isoindolone, Muironolide A, from the Marine Sponge Phorbas sp Natural Products at the Nanomole Scale
Authors: Doralyn S. Dalisay, Brandon I. Morinaka, Colin K. Skepper, Tadeusz F. Molinski
Publication title: Journal of the American Chemical Society 131(22): 7552-3, June 2009

Abstract:
Muironolide A, a new chemical entity with an unprecedented chlorinated hexahydro-1H-isoindolone skeleton, was isolated in only 90 microg yield from the same marine sponge, Phorbas sp. that also provided phorboxazoles A and B. The structure was solved by interpretation of NMR data obtained at 600 MHz with a 1.7 mm cryo-microprobe in combination with FTMS, exciton coupled CD, and stereochemical correlation with authentic standards prepared by Reformatsky

reaction of (-)-(1R,2S)-2-chloro-1-cyclopropanecarboxaldehyde. The absolute configuration of the chlorocyclopropane ring in 1 is opposite to that of co-occurring phorbasides A-F. Muironolide A is the first described macrolide bearing an esterified trichloromethyl carbinol, and may be produced by a cyanobacterium that also makes phorbasides.

Full text available upon request to the author

Article title: NMR Quantitation of Natural Products at the Nanomole Scale

Authors: Doralyn S. Dalisay and Tadeusz F. Molinski

Publication title: Journal of Natural Products 72(4): 739-44, April 2009

Abstract:

We describe a simple and accurate method for quantitation by solvent 13C-satellites (QSCS) of very small amounts of natural products using microprobe NMR spectroscopy. The method takes advantage of integration of 13C satellite peaks of deuterated solvents, in particular CDCl3, that have favorable intensities for measurements of samples in NMR microcoils and microprobe tubes in the 1-200 nanomole range.

Full text available upon request to the author

Article title: Structure Elucidation at the Nanomole Scale. 1. Trisoxazole Macrolides and Thiazole-Containing Cyclic Peptides from the Nudibranch Hexabranchus sanguineus

Authors: Doralyn S. Dalisay, Evan W. Rogers, Arthur S. Edison, Tadeusz F. Molinski

Publication title: Journal of Natural Products 72(4): 732-8, April 2009

Abstract:

A single specimen of Hexabranchus sanguineus, a nudibranch from the Indo-Pacific that is known to sequester kabiramides B and C and other trisoxazole macrolides, yielded new kabiramide analogues, 9-desmethylkbiramide B and 33-methyltetrahydrohalichondramide, and two new unexpected thiazole-containing cyclic peptides in submicromolar amounts. The structures of these cyclic peptides

were determined by analyses of 1D and 2D NMR spectra recorded with a state-of-the-art 1 mm (1)H NMR high-temperature superconducting microcryoprobe, together with mass spectra. In addition to two proline residues, each peptide contains a thiazole- or oxazole-modified amino acid residue, together with conventional amino acid residues. All of the amino acid residues were l, as determined by Marfey's analysis of the acid hydrolysates of the peptides. This is the first report of cyclic thiazole peptides from H. sanguineus. Since thiazole-oxazole-modified peptides are typically associated with cyanobacteria and tunicates, the finding may imply a dietary component of the H. sanguineus that was previously overlooked.

Full text available upon request to the author

Article title: Absolute configuration of the alpha,omega-bifunctionalized sphingolipid leucettamol A from Leucetta microrhaphis by deconvoluted exciton coupled CD

Authors: Doralyn S. Dalisay, Sachiko Tsukamoto, Tadeusz F. Molinski

Publication title: Journal of Natural Products 72(3): 353-9, March 2009

Abstract:

The configuration of leucettamol A (1), a known long-chain "two-headed" sphingolipid (dimeric sphingolipid) from the marine sponge Leucetta microrhaphis, was determined by conversion to an N,N',O,O'-tetrabenzoyl derivative, measurement of the exciton coupled circular dichroism spectrum (ECCD), and quantitative analysis by deconvolution of superposed exciton couplets. Contrary to the earlier assignment that claimed leucettamol A (1) was racemic, the CD approach unambiguously reveals the natural product is chiral and optically active and displays pseudo-C(2) symmetry. The configuration of each end of the chain has erythro stereochemistry with an absolute configuration of 2R,3S,28S,29R. We show that deconvolution ECCD reliably predicts erythro versus threo vicinal amino alcohols in all cases with greater sensitivity (<5 nmol) compared to (1)H NMR J-based methods and provides verification of optical purity and unequivocal elucidation of absolute configuration in this difficult class of natural products.

Full text available upon request to the author

Article title: (+)-Zwittermicin A: assignment of its complete configuration by total synthesis of the enantiomer and implication of D-serine in its biosynthesis
Authors: Evan W. Rogers, Doralyn S. Dalisay, Tadeusz F. Molinski
Publication title: Angewandte Chemie (International ed. in English) 47(42): 8086-9, 2008

Abstract:
No abstract available
Full text available upon request to the author

Article title: Drug development from marine natural products
Authors: Tadeusz F. Molinski, Doralyn S. Dalisay, Sarah L. Lievens, Jonel P. Saludes
Publication title: Nature reviews. Drug discovery 8(1): 69-85, January 2009

Abstract:
Drug discovery from marine natural products has enjoyed a renaissance in the past few years. Ziconotide (Prialt; Elan Pharmaceuticals), a peptide originally discovered in a tropical cone snail, was the first marine-derived compound to be approved in the United States in December 2004 for the treatment of pain. Then, in October 2007, trabectedin (Yondelis; PharmaMar) became the first marine anticancer drug to be approved in the European Union. Here, we review the history of drug discovery from marine natural products, and by describing selected examples, we examine the factors that contribute to new discoveries and the difficulties associated with translating marine-derived compounds into clinical trials. Providing an outlook into the future, we also examine the advances that may further expand the promise of drugs from the sea.
Full text available upon request to the author

Article title: Synthesis and Antifungal Activity of (-)-(Z)-Dysidazirine
Authors: Colin K. Skepper, Doralyn S. Dalisay, Tadeusz F. Molinski
Publication title: Organic Letters 10(22): 5269-71, November 2008

Abstract:
A short, flexible synthesis of the marine natural product (2 R)-(Z)-dysidazirine (-)-1 has been completed. (-)-1 shows significant antifungal activity across a panel of seven human pathogens, whereas the structural analogue (-)-2, featuring a terminal tert-butyl group, is essentially inactive.
Full text available upon request to the author

Article title: Analysis of the Pseudoalteromonas tunicata Genome Reveals Properties of a Surface-Associated Life Style in the Marine Environment
Authors: Torsten Thomas, Flavia F Evans, David Schleheck, Anne Mai-Prochnow, et al.
Publication title: PLoS One 3(9): e3252, September 2008

Abstract:
Colonisation of sessile eukaryotic host surfaces (e.g. invertebrates and seaweeds) by bacteria is common in the marine environment and is expected to create significant inter-species competition and other interactions. The bacterium Pseudoalteromonas tunicata is a successful competitor on marine surfaces owing primarily to its ability to produce a number of inhibitory molecules. As such P. tunicata has become a model organism for the studies into processes of surface colonisation and eukaryotic host-bacteria interactions.
Full text available upon request to the author

Article title: A mannose-sensitive haemagglutinin (MSHA)-like pilus promotes attachment of Pseudoalteromonas tunicata cells to the surface of the green alga Ulva australis
Authors: Doralyn S. Dalisay, Jeremy S. Webb, André Scheffel, Charles Svenson, et al.
Publication title: Microbiology (Reading) 152(10): 2875-2883, October 2006

Abstract:
This study demonstrates that attachment of the marine bacterium Pseudoalteromonas tunicata to the cellulose-containing surface of the green alga

Ulva australis is mediated by a mannose-sensitive haemagglutinin (MSHA-like) pilus. We have identified an MSHA pilus biogenesis gene locus in P. tunicata, termed msh/1/2JKLMNEGFBACDOPQ, which shows significant homology, with respect to its genetic characteristics and organization, to the MSHA pilus biogenesis gene locus of Vibrio cholerae. Electron microscopy studies revealed that P. tunicata wild-type cells express flexible pili peritrichously arranged on the cell surface. A P. tunicata mutant (SM5) with a transposon insertion in the mshJ region displayed a non-piliated phenotype. Using SM5, it has been demonstrated that the MSHA pilus promotes attachment of P. tunicata wild-type cells in polystyrene microtitre plates, as well as to microcrystalline cellulose and to the living surface of U. australis. P. tunicata also demonstrated increased pilus production in response to cellulose and its monomer constituent cellobiose. The MSHA pilus thus functions as a determinant of attachment in P. tunicata, and it is proposed that an understanding of surface sensing mechanisms displayed by P. tunicata will provide insight into specific ecological interactions that occur between this bacterium and higher marine organisms.

Full text available upon request to the author

Article title: Biofilm Development and Cell Death in the Marine Bacterium Pseudoalteromonas tunicata

Authors: Anne Mai-Prochnow, Flavia Evans, Doralyn S. Dalisay, Sacha Stelzer, et al.

Publication title: Applied and Environmental Microbiology 70(6): 3232-8, June 2004

Abstract:

The newly described green-pigmented bacterium Pseudoalteromonas tunicata (D2) produces target-specific inhibitory compounds against bacteria, algae, fungi, and invertebrate larvae and is frequently found in association with living surfaces in the marine environment. As part of our studies on the ecology of P. tunicata and its interaction with marine surfaces, we examined the ability of P. tunicata to form biofilms under continuous culture conditions within the laboratory. P. tunicata biofilms exhibited a characteristic architecture consisting of differentiated microcolonies surrounded by water channels. Remarkably, we observed a repeatable

pattern of cell death during biofilm development of P. tunicata, similar to that recently reported for biofilms of Pseudomonas aeruginosa (J. S. Webb et al., J. Bacteriol. 185:4585-4595, 2003). Killing and lysis occurred inside microcolonies, apparently resulting in the formation of voids within these structures. A subpopulation of viable cells was always observed within the regions of killing in the biofilm. Moreover, extensive killing in mature biofilms appeared to result in detachment of the biofilm from the substratum. A novel 190-kDa autotoxic protein produced by P. tunicata, designated AlpP, was found to be involved in this biofilm killing and detachment. A Delta alpP mutant derivative of P. tunicata was generated, and this mutant did not show cell death during biofilm development. We propose that AlpP-mediated cell death plays an important role in the multicellular biofilm development of P. tunicata and subsequent dispersal of surviving cells within the marine environment.

Full text available upon request to the author

Lanndon A. Ocampo

Sex: Male

Education:

Doctor of Philosophy in Industrial Engineering major in Operations Research, De La Salle University, 2014

Master of Science in Mathematics, University of San Carlos, 2020

Master of Engineering in Industrial Engineering, University of San Carlos, 2011

Bachelor of Science in Industrial Engineering, University of San Carlos, 2009

Field of Specialization

Mathematical Programming

Analytic Hierarchy Process

Manufacturing Systems

Fuzzy Set Theory

Supply Chain

Researches:

Article title: User Satisfaction Assessment of a Developed Temperature Monitoring System Based on A-Priori Information System Impact Model

Authors: Arneda Jean Gonzales, Celbert M. Himang, Melanie M. Himang, Rebecca Manalastas, et al.

Publication title: International Journal of Sociotechnology and Knowledge Development 13(2): 71-89, April 2021

Abstract:

Network downtimes are typically addressed by deploying a temperature monitoring system (TMS) designed to detect variations in temperature and signal users of an impending increase of temperature. The development of a TMS has been found to essentially monitor temperature states across various case applications, but a concurrent analysis of such system was not carried out despite the need to recognize user satisfaction for improvement of future TMS information system components. Thus, this paper seeks to design, implement, and analyze a TMS under the a-priori information system (IS) impact model, which incorporates the constructs on individual impact, organizational impact, information quality, and system quality, in an academic institution as case environment. It is found that all four constructs have a positive influence on the proposed TMS IS impact except for organizational impact. Under such a case, decision-makers are prompted to develop a product that anchors primarily on individual impact, information quality, and system quality to attain desired system outputs.

Full text available upon request to the author

Article title: Using the Interpretative Structural Modeling Approach for Understanding the Relationships of Drivers of Online Shopping: Evidence From a Developing Economy

Authors: Roy Jucip Tabañag Basar III, Honey Rose Borden, Manuel Lorenzo Busano III, Xelani Kaye Gonzales, et al.

Publication title: International Journal of Sociotechnology and Knowledge Development 13(2): 90-104, April 2021

Abstract:

The internet has paved the way for a revolution in the shopping industry via online platforms. As online shopping transactions become popular, it is increasingly important to understand the drivers that influence the consumers in availing such platforms. Furthermore, the differences between developed and developing economies are evident from socioeconomic, regulatory, and e-commerce disparities. Understanding such domain from a developing economies perspective is not well explored in the current literature. Thus, this study aims to identify the relationships

among drivers of consumers in pursuing online shopping in a developing economy (i.e., the Philippines) using interpretative structural modeling. The study identified six drivers: "convenience/ease of use," "competitive price," "product availability," "value of time," "access to more information," and "several payment options." Results show that all drivers, except for "competitive price," are closely interlinked to each other, such that initiatives must be simultaneously developed to address these drivers under resource constraints.

Full text available upon request to the author

Article title: The impact of social media marketing strategies on promoting sustainability of tourism with fuzzy cognitive mapping: a case of Kalanggaman Island (Philippines)

Authors: Kafferine Yamagishi, Lanndon Ocampo, Dharyll Prince Abellana, Reciel Ann Tanaid,

Publication title: Environment, Development and Sustainability, March 2021

Abstract:

The current literature has espoused the role of social media platforms in promoting tourism destinations. Despite such advances, limited works are reported on how social media foster the sustainability of tourist destinations. This work builds upon the argument that sustainable tourism (ST) agenda and initiatives can be integrated alongside the traditional competitive mission of social media marketing as a communications strategy of tourism stakeholders. With such an argument and the scarce literature on the topic, this paper analyzes the impact of social media strategies on marketing indicators contextualized within ST. In addressing this objective, a fuzzy cognitive mapping technique is adopted to examine the changes in marketing performance indicators given an initial set of activation values of social media marketing strategies. A case study in Kalanggaman Island (Philippines), an emerging tourist destination, is carried out to demonstrate the evaluation process. Three policy scenarios with interrelated social media marketing strategies are examined: minimal effort, moving visuals, and collaborative strategies. The minimal effort scenario increases counting metrics, comments, and Web traffic, while the

moving visuals scenario yields increases in reach, counting metrics, comments, and Web traffic. Finally, the collaborative strategies scenario enhances indicators on awareness, the share of voice, counting metrics, comments, and lead. The findings generated from the proposed framework provide policy- and decision-makers a platform for analyzing possible social media policies in disseminating the ST agenda.

Full text available upon request to the author

Article title: The future of farm tourism in the Philippines: challenges, strategies and insights

Authors: Kafferine Yamagishi, Cecil Gantalao, Lanndon Ocampo

Publication title: Journal of Tourism Futures, March 2021

Abstract:

Purpose This study aims to draw observations on the current status and potentials of the Philippines as a farm tourism destination and identify the underlying factors that inhibit farm tourism development. It intends to gauge the challenges that Filipino farmers face in diversifying farms and operating farm sites and uses these challenges in crafting strategies and policies for relevant stakeholders. It also provides Philippine farm tourism literature to address the limitations of references in the topic. Design/methodology/approach The study adopts an exploratory type of inquiry method and secondary data collection from various sources, such as published journal articles, news articles and reports, to gain insights and relevant information on farm tourism. The study also uses a threats, opportunities, weaknesses and strengths analysis approach to develop competitive farm tourism strategies. Findings The Philippines, with vast agricultural land, has the necessary base for farm tourism, and the enactment of the Farm Tourism Development Act of 2016 bridges this potential. With low agricultural outputs, the country draws relevance for farm tourism as a farm diversification strategy to supplement income in rural communities. While having these potentials, crucial initiatives in physical characteristics, product development, education and training, management and entrepreneurship, marketing and customer relations and government support must

be implemented. Farmers' lack of skills, training and capital investment potential to convert their farms into farm tourism sites serves as the major drawback. Thus, developing entrepreneurial and hospitality skills is crucial. Originality/value This work presents a historical narrative of initiatives and measures of the Philippine farm tourism sector. It also provides a holistic discussion and in-depth analysis of the current state, potentials, strategies and forward insights for farm tourism development.

Full text available upon request to the author

Article title: The use of the Delphi method with non-parametric analysis for identifying sustainability criteria and indicators in evaluating ecotourism management: the case of Penang National Park (Malaysia)

Authors: Marzieh Fallah and Lanndon Ocampo

Publication title: Environment Systems and Decisions 41(1): 1-18, March 2021

Abstract:

This paper attempts to develop criteria and indicators (C&I) for measuring the sustainability of ecotourism activities in Penang National Park (PNP) in Malaysia. In carrying out this objective, a Delphi process with Content Validity Ratios—a non-parametric tool—for generating a consensus for C&I sets was adopted with 30 academic and non-academic experts in sustainable tourism, ecotourism, and forestry. After four rounds of discussion, the panel members reached a consensus on a C&I set which consists of ecological (three criteria and seven indicators), social (three criteria and eight indicators), economic (two criteria and four indicators), and institutional (one criterion and two indicators) factors for ecotourism management. A consistency reliability test was also conducted, and the Cronbach's alpha values of criteria and indicators were reported to be acceptable. This C&I set enables the provision of a suitable approach for managing ecotourism in a sustainable manner in Penang National Park. It can serve as an instrument for the sustainability evaluation and monitoring of ecotourism management in PNP by the Department of Wildlife and Tourism Organization in Malaysia. The proposed approach and the resulting

C&I could be resonated with other national parks as ecotourism destinations with similar relevant characteristics of the PNP.

Full text available upon request to the author

Article title: A Critical Literature Analysis of the Relationships of Marketing and Strategic Planning Under Project Environments

Authors: Brian J. Galli, Miriam F. Bongo, Kafferine D. Yamagishi, Lanndon A. Ocampo

Publication title: International Journal of Service Science Management Engineering and Technology, 12(2): 1-24, March 2021

Abstract:

This paper investigates marketing and strategic planning issues, its relationship to project management, and the factors affecting these relationships. The authors perform an unstructured and structured literature review, which identified 83 articles that explore the critical variables in this paper. Factors are often seen as operational factors that are directed towards personnel tasked with daily operations. Notably, project management, when tasked with marketing and strategic planning, is challenged to cope with evolving situational alterations that require a different set of skills. Particularly, they contribute to several bodies of knowledge, including project management, decision-making, strategic planning, marketing, and leadership. The study builds on these bodies of knowledge and also addresses gaps identified in these research fields. They contribute to research on factors through various avenues for future research.

Full text available upon request to the author

Article title: A bi-level optimization for a make-to-order manufacturing supply chain planning: a case in the steel industry

Authors: Lanndon A. Ocampo

Publication title: Journal of Management Analytics, January 2021

Abstract:

No available

Full text available upon request to the author

Article title: Holistically addressing uncertainty in group decision-making: the case of a 'quasi-collaborative' group structure

Authors: Lanndon A. Ocampo, Eppie E. Clark, Anthony S.F. Chiu, Raymond R. Tan

Publication title: International Journal of Mathematics in Operational Research 16(3): 316-353, January 2020

Abstract:

This paper presents a methodology that holistically captures the uncertainty of judgment in 'quasi-collaborative' group decision-making in the context of the analytic hierarchy/network process. The proposed method is motivated mainly by the two uncertainty approaches that seemingly diverge in literature: the simulation approach and the fuzzy set theory (FST) approach. In the proposed method, FST is used to handle the judgmental uncertainty of individual decision-maker while simulation addresses randomness and uncertainty when individual judgments are aggregated as a group decision. An illustrative problem is presented in this paper along with a numerical experiment that attempts to compare the efficacy of the proposed methodology with existing methods. Results show that the method is more capable of handling uncertain group decisions through simulation runs and it can perform sensitivity analysis which is essential in testing robustness of judgment results. Finally, the proposed method can identify non-expert member of the group.

Full text available upon request to the author

Article title: Integrated multiphase sustainable product design with a hybrid quality function deployment – multi-attribute decision-making (QFD-MADM) framework

Authors: Lanndon A. Ocampo, John James T. Labrador, Ammabelle Marie B. Jumao-as, Alona Mae O. Rama

Publication title: Sustainable Production and Consumption 24: 62-78, October 2020

Abstract:

With quality function deployment (QFD) as its basis, the product design team is instrumental in promoting sustainability by incorporating relevant requirements in the early stages of the design process. The domain literature, however, contains significant gaps, especially for food products. First, the current literature fails to consider the requirements of all relevant stakeholders, which are crucial to sustainability. Second, while some offer various models of fuzzy QFD – multiple-attribute decision-making (QFD-MADM), they fail to comprehensively address the underlying interdependencies of decision parameters in the QFD. Furthermore, the majority of the works on QFD-MADM limit themselves to product planning while losing control over other subsequent phases of product development. Thus, this work attempts to advance these gaps by proposing an integrated multiphase fuzzy QFD-MADM framework that combines QFD, analytic hierarchy process (AHP), decision-making trial and evaluation laboratory (DEMATEL), and analytic network process (ANP) along with fuzzy set theory. A case study in a Philippine meat processing industry was implemented to demonstrate the proposed approach. The results of the case study show the crucial decision parameters for all phases, which would serve as inputs to design teams. Unlike previous models, the proposed framework preserves the transition of the priorities flow along with all four phases of product development. Thus, the stakeholder requirements are integrated into all product development stages, which is a strong indication that these requirements are addressed in each phase. Also, the proposed framework ensures that the uncertainty and the underlying complexities of interdependencies among decision parameters of the four phases of product design and development are addressed. The proposed framework contributes to sustainable product design literature in a manner that is comprehensive and analytical.

Full text available upon request to the author

Article title: Modeling the lockdown relaxation protocols of the Philippine government in response to the COVID-19 pandemic: An intuitionistic fuzzy DEMATEL analysis

Authors: Lanndon Ocampo and Kafferine Yamagishi

Publication title: Socio-Economic Planning Sciences 72: 100911, December 2020

Abstract:

The COVID-19 pandemic, which started at Wuhan, has shut down world economies, prompting governments to impose drastic lockdown measures of the economy and the society. As these measures are exhausted, non-COVID-19 related issues such as those associated with the mental and physical well-being of people under lockdowns became an emerging concern. As these issues are evident, not to mention the economic downturn, governments are currently looking at designing lockdown relaxation efforts by simultaneously considering both public health and economic restart. Without documented experiences to rely on, governments are resorting to trial-and-error approach in creating a lockdown exit strategy while preventing succeeding waves of cases that may overwhelm healthcare facilities. Thus, this work pioneers the use of the decision-making trial and evaluation laboratory (DEMATEL) method with intuitionistic fuzzy (IF) sets along with the domain of public health and the emerging COVID-19 pandemic. The DEMATEL handles the intertwined causal relationships among guideline protocols for the relaxation strategy. The intuitionistic fuzzy set theory addresses the vagueness and uncertainty of human judgments in the context of the DEMATEL. A case study of the Philippine government response for the lockdown exit is presented to evaluate the applicability of the proposed method. Findings reveal that compliance of minimum public health standards, limited movement of persons, suspension of physical classes, the prohibition of mass gatherings, non-operation of category IV industries, and non-operation of hotels or similar establishments are the most crucial protocols for such strategy. These findings offer practical insights for the government to allocate resources and impose measures to ensure their implementation, as well as for developing mitigation efforts to cushion their socio-economic impacts. Policy insights and avenues for future works are also discussed.

Full text available upon request to the author

Article title: An integrated grey-based multi-criteria decision-making approach for supplier evaluation and selection in the oil and gas industry

Authors: Mohamad Amin Kaviani, Amir Karbassi Yazdi, Lanndon Ocampo, Simonov Kusi-Sarpong Kybernetes

Publication title: Kybernetes 49(2), February 2019

Abstract:

The oil and gas industry is a crucial economic sector to both developed and developing economies. Delays in extraction and refining of these resources would adversely affect industrial players including that of the host countries. Supplier selection is one of the most important decisions taken by managers of this industry that affect their supply chain operations. However, determining suitable suppliers to work with has become a phenomenon faced by these managers and their organizations. Furthermore, identifying relevant, critical and important criteria needed to guide these managers and their organizations for supplier selection decisions has become even more complicated due to various criteria that be taken into consideration. With limited works in the current literature of supplier selection in the oil and gas industry having major methodological drawbacks, this paper attempts to develop an integrated approach for supplier selection in the oil and gas industry. To address this problem, this paper proposes a new uncertain decision framework. A grey-Delphi approach is first applied to aid in the evaluation and refinement of these various available criteria to obtain the most important and relevant criteria for the oil and gas industry. The grey systems theoretic concept is adopted to address the subjectivity and uncertainty in human judgments. The grey-Shannon Entropy approach is employed to determine the criteria weights, and finally, the grey-EDAS (Evaluation based on Distance from Average Solution) method is utilized for determining the ranking of the suppliers. To exemplify the applicability and robustness of the proposed approach, this study uses the oil and gas industry of Iran as a case in point. From the literature review, 21 criteria were established and using the grey-Delphi approach, 16 were finally considered. The four top-ranked criteria, using grey-Shannon Entropy, include warranty level and experience time, relationship closeness, supplier's technical level, and risks which are considered as the most critical and influential criteria for supplier evaluation in the Iranian oil and gas industry. The ranking of the suppliers is obtained, and the

best and worst suppliers are also identified. Sensitivity analysis indicates that the results using the proposed methodology are robust. The proposed approach would assist supply chain practicing managers including purchasing managers, procurement managers and supply chain managers in the oil and gas and other industries to effectively select suitable suppliers for cooperation. It can also be used for supplier selection problems in other industries. It can also be used for other multi-criteria decision-making (MCDM) applications. Future works on applying other MCDM methods and comparing them with the results of this study can be addressed. Finally, broader and more empirical works are required in the oil and gas industry. This study is among the first few studies of supplier selection in the oil and gas industry from an emerging economy perspective and sets the stage for future research. The proposed integrated grey-based MCDM approach provides robust results in supplier evaluation and can be used for future domain applications.

Full text available upon request to the author

Article title: A novel multiple criteria decision-making approach based on fuzzy DEMATEL, fuzzy ANP and fuzzy AHP for mapping collection and distribution centers in reverse logistics

Authors: Lanndon Ocampo, Celebrity Himang, Anil Kumar, M. Brezocnik

Publication title: Advances in Production Engineering and Management 14(3): 297-322, September 2019

Abstract:

The strategic location of reverse logistics facilities enables organizations to obtain optimal performance to collect end-of-line (EOL) products and distribute remanufactured products effectively and efficiently. The planning of facility location entails consideration of multiple essential criteria rather than optimizing a single criterion. This paper develops a methodological framework based on an integrated multiple criteria decision-making (MCDM) approach that captures the complexity of location planning for collection and distribution centers under fuzzy conditions utilizing decision making trial and evaluation laboratory (DEMATEL), analytic network process (ANP), and analytic hierarchy process (AHP). This novel approach

aids decision-makers to simultaneously select a separate location for collection and distribution through a holistic assessment of a location's viability for both purposes. It advances the reverse logistics literature by considering multiple criteria and their interrelationships in the location selection process, along with uncertainty and vagueness in decision making. Additionally, the proposed approach allows flexibility for decision-makers as they retain the control in picking a site based on its priority on being a collection or distribution center. Results show that government policies and regulations play a vital role in the facility location decision as they interact mostly with other criteria. Moreover, results also suggest that quantity and quality uncertainties for remanufacturing are significant factors that must be taken into consideration in the collection function, while economic and market-oriented issues are major concerns for a distribution function. This finding was observed through the application of the proposed methodological framework in a case study of the furniture industry in the Philippines. The practical implications of this study focus on being an aid in organizing and improving the operations of the reverse logistics sector of the Philippines. Finally, the proposed approach can be used to address general facility location problems in other industrial applications where tradeoffs among stakeholders or entities are well pronounced and decision-makers find it imperative that such tradeoffs must be carefully considered.

Full text available upon request to the author

Nathaniel P. Dugos

Sex: Male

Education:

Doctor of Philosophy in Chemical Engineering, De La Salle University

Master of Science in Chemical Engineering, De La Salle University

Field of Specialization

Carbon Capture and Storage

Tissue Engineering

Energy Engineering

Researches:

Article title: A Comprehensive Review on the Drying Kinetics of Common Tubers

Authors: Flordelisa H. Cosme-De Vera, Allan N. Soriano, Nathaniel P. Dugos, Rugi Vicente C. Rubi

Publication title: Applied Science and Engineering Progress 14(2): 146-155, 2021

Abstract:

Sun-drying has been conventionally used in the production of tuber-derived commodities such as cassava, potato, sweet potato, and yam. Recent developments in the drying process involves the use of different drying equipment to improve quality and profitability. The importance of drying parameters in the operation of drying equipment necessitates drying kinetic studies on common tubers. This article aims to review the drying kinetics studies conducted on common tubers. Particular

interest is on the effect of the drying process parameters like temperature and velocity of heating air medium, the physico-chemical pretreatment method, and sample preparation on the drying rate and time. The different best fit drying kinetic models for specific tubers have also been extensively studied. The role of drying process parameters and best fit model equations on the design of the drying equipment has been emphasized.

Full text available upon request to the author

Article title: Effect of Decellularization Parameters on the Efficient Production of Kidney Bioscaffolds

Authors: Tosha Mae Manalastas, Nathaniel Dugos, Gliceria Ramos, John Martin Mondragon

Publication title: Applied Biochemistry and Biotechnology May 2020

Abstract:

The most preferred decellularization technique in creating bioscaffolds for complex organs such as kidneys is through detergent perfusion. Detergents such as sodium dodecyl sulfate (SDS) flow to the kidneys to remove cells but using this technique alone requires long treatment times. Coupling this technique with sonication treatment decreases decellularization time but may cause damages in the microarchitecture of the kidney. This study evaluated the effects of decellularization parameters specifically SDS concentration (0.25%, 0.625%, and 1.0%wt/vol), flowrate (15, 30, and 45 mL/min), and sonicator power (0, 60, and 120 W) on the length of time needed to produce acellular and intact bioscaffolds. Decellularization was carried out by perfusing SDS to the renal artery of the cadaveric porcine kidney while exposed to sonication treatment. Results showed that a significant decrease in decellularization time was observed in producing acellular scaffold when perfusion decellularization was coupled with sonication. In addition, SDS concentration, SDS flowrate, and sonicator power had significant effects on the decellularization time while only sonicator power had a significant effect on the microarchitecture integrity of the scaffold. Lastly, H&E results showed that the produced bioscaffold showed

complete cell removal with only minimal to moderate disruptions on the microarchitecture of the kidney.

Full text available upon request to the author

Article title: Determination of Diffusion Coefficients and Antioxidant Activities of Ascorbic Acid in Guava Juice using Cyclic Voltammetry

Authors: K. B. A. Ang, C. M. Lee, H. M. O. Yu, M. Uy, et al.

Publication title: IOP Conference Series Materials Science Engineering 778:012037, 2020

Abstract:

Ascorbic acid is the most abundant antioxidant present in guava (*Psidiumguajava* L.). There had only been few studies concerning the determination of diffusion coefficient and antioxidant activity of ascorbic acid in guava juice using cyclic voltammetry specifically at varying temperatures. Thus, this study on the effect of temperature on diffusion coefficient and antioxidant activity on ascorbic acid found in guava was done using cyclic voltammetry. The temperatures tested were at 15°C, 25°C, 36°C, and 45°C. Electrodes used in the experiment were glassy carbon as the working electrode, platinum wire as the counter electrode, and Ag/AgCl electrode as the reference electrode. The results showed that the peak currents of ascorbic acid in guava juice at 15°C, 25°C, 36°C, and 45°C were -0.5720, -0.5380, -0.5000, and -0.4760 μA, respectively. The diffusion coefficients of the ascorbic acid were obtained using the Randles-Sevcik equation at all given temperatures and the values were 2.1489 x10–5, 2.1711 x10–5, 2.2070 x10–5, and 2.2250 x10–5 cm2/s, respectively. The antioxidant activities, in terms of concentration, at the said temperatures were found to be 0.3374, 0.3212, 0.3015, and 0.2899 mM, respectively. It is concluded that at higher temperature, ascorbic acid in guava juice has a higher diffusion coefficient but lower antioxidant activity. The present results can be used by other researchers doing similar work on fate and transport of the studied system.

Full text available upon request to the author

Article title: Sonication-assisted perfusion decellularization of whole porcine kidney

Authors: Sreypich Say, Nathaniel P. Dugos, Susan A. Roces, John Martin Mondragon
Publication title: International Journal of Biology and Biomedical Engineering 13, 2019

Abstract:

Bioengineering of kidneys is a potential treatment option in addressing common problems such as incompatibility and shortage of donor organs. The first step in the kidney bioengineering process involves perfusion decellularization wherein the use of chemicals is considered the most preferred preparation method to date. However, the use of chemicals alone requires long treatment time and excessive chemical usage hence, in this study perfusion decellularization was enhanced by sonication treatment at varying sonication power (150, 200 and 250 W). Scaffolds produced were evaluated for cell removal and preservation of structural integrity. Results revealed that decellularization with sonication using 150 W, 200 W and 250 W required a treatment time of 24 h, 16 h, and 12 h respectively compared to the 28 h treatment time of decellularization without sonication. Cells were almost and completely removed as indicated by histological analysis. Meanwhile, preservation of renal structures such as glomerulus, tubules, and blood vessels were observed except for the kidney scaffolds produced from decellularization with 250 W sonication where minimal disruption of the glomerular basement membranes and thinning of blood vessels were observed. Overall, decellularization with 200 W of sonication power resulted in an acellular renal ECM scaffold and preserved ECM structure. It can also be concluded that the higher sonication power used, the shorter is the decellularization time needed to prepare a kidney scaffold thus reducing the amount of chemicals used.

Full text available upon request to the author

Article title: Plasma-Enhanced Chemical Vapor Deposition of Indene for Gas Separation Membrane
Authors: Myat Kyaw, Shinsuki Mori, Nathaniel Dugos, Susan Roces, et al.
Publication title: ASEAN Journal of Chemical Engineering 19(1): 47-53, October 2019

Abstract:

Polyindene (PIn) membrane was fabricated onto a zeolite 5A substrate by using plasma-enhanced chemical vapor deposition (PECVD) at low temperature. Membrane characterization was done by taking Scanning Electron Microscopy (SEM) and FT-IR measurements and the new peak was found in the plasma-derived PIn film. Membrane performance was analyzed by checking permeability of pure gases (H2, N2, and CO2) through the membrane. PECVD-derived PIn membrane showed high gas barrier properties and selectivities of 8.2 and 4.0 for H2/CO2 and H2/N2, respectively, at room temperature.

Full text available upon request to the author

Article title: Gas permeation properties and preparation of carbon membrane by PECVD method using indene as precursor

Authors: M. Kyaw, N. Dugos, S. Mori, S. Roces, et al.

Publication title: Journal of Physics Conference Series 1295: 012057, September 2019

Abstract:

This work could demonstrate a new approach to the fabrication of gas separation membrane using indene as polymeric precursor for low pressure PECVD system. Membrane characterization was done by taking Scanning Electron Microscopy (SEM) and FTIR measurements. For membrane performance testing, permeability and selectivity of the membrane were evaluated with pure gases of H2, N2, and CO2 using a differential permeation technique. PECVD-derived polyindene membrane showed selectivities of 8.2 and 4.0 for H2/CO2 and H2/N2, respectively, at room temperature. Polyindene (PIn) membrane was successfully fabricated onto a zeolite 5A substrate via radio frequency plasma-enhanced chemical vapor deposition (RF-PECVD) at room temperature.

Full text available upon request to the author

Article title: Effect of sonication power on perfusion decellularization of cadaveric porcine kidney

Authors: Sraypich Say, Nathaniel Dugos, Susan Roces, John Martin Mondragon

Publication title: MATEC Web Conferences 268: 01009, 2019

Abstract:

Kidney problems rank 7th among the top 10 causes of mortality among Filipinos. One of the potential future treatment options is the use of bioengineered kidney. The preparation of scaffolds is the first step in kidney bioengineering and perfusion decellularization using chemicals is considered the most preferred preparation method to date. However, the use of chemicals alone requires long treatment time hence, in this study perfusion decellularization is to be enhanced by sonication treatment at varying sonication power. Decellularization was carried out by perfusing the kidney with 1% SDS and was subjected to sonication treatment with a 2h sonication and 2h rest cycle. The cycle is repeated until the kidney is clear and transparent. Washing using 1% Triton X-100 and 1x PBS then follows to remove residual SDS. The extent of cell removal was determined by H&E staining. The results showed that decellularization with sonication using 150W, 200W and 250W required a treatment time of 24h, 16h and 12h respectively compared to the 28h treatment time of decellularization without sonication. The result clearly shows that with higher sonication power, the shorter is the decellularization time needed to prepare a good kidney scaffold.

Full text available upon request to the author

Article title: Optimized Ultrasound-Assisted Oxidative Desulfurization Process of Simulated Fuels over Activated Carbon-Supported Phosphotungstic Acid

Authors: Peniel Jean Gildo, Nathaniel Dugos, Susan Roces, Meng-Wei Wan

Publication title: MATEC Web of Conferences 156: 03045, 2018

Abstract:

Recent technological advancements respond to the call to minimize/eliminate emissions to the atmosphere. However, on the average, fuel oils which is one of the major raw materials, is found to increase in sulfur concentration due to a phenomenon called thermal maturation. As such, a deeper desulfurization process is needed to obtain low/ultra-low sulfur fuel oils. In the present study, the ultrasound

assisted oxidative desulfurization (UAOD) processes using the H2O2 and HPW-AC oxidizing system applied to simulated fuel (~2800 ppm sulfur in the form of dibenzothiophene, benzothiophene, and thiophene dissolved in toluene), were optimized. After the pre-saturation of the HPW-AC with the simulated fuel, H2O2 was added just before the reaction was commenced under ultrasonic irradiation. After the application of both 2k-factorial design of experiment for screening and Face-Centered Design of Experiment for optimization, it was found that 25.52 wt% of H2O2 concentration, 983.9 mg of catalyst dose, 9.52 mL aqueous phase per 10 mL of the organic phase and 76.36 minutes of ultrasonication time would render 94.74% oxidation of the sulfur compounds in the simulated fuel. After the application of the optimized parameters to kerosene and employing a 4-cycle extraction using acetonitrile, 99% of the original sulfur content were removed from the kerosene using the UAOD optimized parameters. The desulfurization process resulted in a low-sulfur kerosene which retained its basic fuel properties such as density, viscosity and calorific value.

Full text available upon request to the author

Article title: Adsorption of benzothiophene sulfone over clay mineral adsorbents in the frame of oxidative desulfurization

Authors: Angelo Earvin Sy Choi, Susan Roces, Nathaniel Dugos, Meng-Wei Wan

Publication title: Fuel 205(1): 153-160, October 2017

Abstract:

The adsorption of benzothiophene sulfone (BTO) from model fuel oil was investigated using three different clay mineral adsorbents. The adsorption characteristics of clay mineral adsorbents such as activated clay, bentonite and kaolinite were evaluated using Fourier transform infrared spectroscopy and Brunauer, Emmett and Teller surface area analyzer. A batch process was conducted to determine the adsorption performances at varying contact time, reaction temperature and initial concentration. Increasing adsorption capacities followed the order of kaolinite < bentonite < activated clay. The equilibrium isotherms using Langmuir and Freundlich models yielded a good fit (R2 > 0.98) indicating a

monolayer and heterogeneous adsorption. A second order reaction kinetic model showed high suitability (R2 > 0.97) based on the experimental data. Results showed that adsorption follows a two-step process: (1) fast adsorption rate for the first two hours and (2) markedly slow adsorption rate until equilibrium. The clay minerals have different functional groups present in its surface which determines the essential adsorption characteristics. The thermodynamic parameters for BTO adsorption onto clay mineral adsorbents indicated an endothermic reaction. Activated clay and kaolinite were spontaneous and non-spontaneous, respectively, while bentonite was found to be only non-spontaneous at 25 °C. In comparison with conventional adsorbents, activated clay was found to be superior in the application of sulfone adsorption in fuel oil.

Full text available upon request to the author

Article title: Synthesis and characterization of hybrid composite aerogels from alginic acid and graphene oxide

Authors: C. J. U. Co, A. T. Quitan, J. Q. Borja, N. P. Dugos, et al.

Publication title: IOP Conference Series Materials Science and Engineering 206(1): 012053, June 2015

Abstract:

Aerogels are one class of solid adsorbents that are gaining considerable attention because of their very high porosity, high specific surface area, and extremely low density. However, most aerogels being studied and used recently are synthetic in nature, which are usually mesoporous silica and metal-organic frameworks (MOFs). As research focus is geared towards sustainable engineering, it is desired to utilize biomass to synthesize aerogels. This study thus aims to produce alginic acid-graphene oxide hybrid composite aerogels and compare them with its existing synthetic counterparts. Alginic acid (AA) is an abundant marine biopolymer that easily forms gels, while graphene oxide (GO) is a nanomaterial consisting of many functional groups. Aerogels made up of AA and GO were successfully synthesized using a sol-gel method. The hydrogel was converted into an aerogel by drying with supercritical carbon dioxide. The percentage of graphene oxide was varied from 0 to

20%. The aerogels were characterized by scanning electron microscopy (SEM), Fourier Transform Infrared Spectroscopy (FTIR), X-ray diffraction (XRD), thermogravimetric analysis (TGA) and nitrogen adsorption–desorption measurements. The addition of GO increased the specific surface area of the aerogel up to a certain point, after which it decreased. The 10% GO-AA aerogel showed the most favourable porosity characteristics with a specific surface area of 177.26 m^2/g and average pore diameter of 53.2 nm. There had been no observable difference in the thermal behaviour of the aerogels with a change in the concentration of graphene oxide.

Full text available upon request to the author

Article title: Adsorptive removal of dibenzothiophene sulfone from fuel oil using clay material adsorbents

Authors: Angelo Earvin Sy Choi, Susan Roces, Nathaniel Dugos, Aries Arcega, et al.

Publication title: Journal of Cleaner Production 161(10): 267-276, September 2017

Abstract:

Dibenzothiophene sulfone (DBTO) adsorption utilizing clay material adsorbents such as activated clay, bentonite and kaolinite were investigated in this study. The properties of each adsorbent were characterized using Fourier transform infrared spectroscopy, scanning electron microscope, Brunauer, Emmett and Teller surface area analyzer and zeta potential. The effects of pH (1.0–5.0), contact time (5 min–48 h), temperature (298–328 K) and initial concentration (10–1000 mg/L) were examined in a batch adsorption process to determine the suitability of clay material adsorbents in DBTO removal. Kinetic models of pseudo-first order, pseudo-second order and intraparticle diffusion were used to assess the experimental data. Results showed high correlation to the pseudo-second order kinetic model (R2 > 0.99) that implies chemisorption as the rate-limiting step. Isotherm models of Langmuir, Freundlich, Temkin and Dubnin-Radushkevich were used to evaluate the equilibrium experimental data. DBTO adsorption showed a good fit towards the Freundlich isotherm (R2 > 0.99) which indicates a heterogeneous adsorption onto the adsorbent. Thermodynamic studies indicated that DBTO adsorption onto clay

material adsorbents was endothermic. Utilizing the adsorbent of activated clay was spontaneous while kaolinite was non-spontaneous at 298–328 K. Bentonite was found to be only non-spontaneous at 298 K. Activated clay displayed a good potential in adsorbing sulfones to achieve low sulfur fuel oil in an oxidative desulfurization process.

Full text available upon request to the author

Article title: Process Optimization of Carbon Dioxide Adsorption using Nitrogen-Functionalized Graphene Oxide via Response Surface Methodology Approach

Authors: Fritzie Hannah B. Baldovino, Nathaniel P. Dugos, Susan A. Roces, Armando T. Quitain, et al.

Publication title: ASEAN Journal of Chemical Engineering 17(2): 106-113, January 2017

Abstract:

This paper presents a response surface methodology approach in the optimization of the carbon dioxide temperature-programmed adsorption process using a new material referred as nitrogen-functionalized graphene oxide. This material was synthesized by loading nitrogen groups to graphene oxide using aqueous ammonia in supercritical condition. Later on, it was utilized as a sorbent for carbon dioxide adsorption. This process was optimized by implementing a response surface methodology coupled with a Box-Behnken design for the effects of three factors: adsorption temperature, carbon dioxide flow rate, and the amount of adsorbent. In analyzing the response surface, a model equation was generated based on the experimental data by regression analysis. This model equation was then utilized to predict optimum values of response. Furthermore, response optimizer was also conducted in identifying factor combination settings that jointly optimize the best response.

Full text available upon request to the author

Article title: Oxidation by H2O2 of bezothiophene and dibenzothiophene over different polyoxometalate catalysts in the frame of ultrasound and mixing assisted oxidative desulfurization

Authors: Angelo Earvin Sy Choi, SusanRoces, Nathaniel Dugos, Meng-WeiWan

Publication title: Fuel 180(15): 127-136, September 2016

Abstract:

Desulfurization involves the removal of refractory sulfur compounds in fossil-fuel derived oils. In this study, an ultrasound and mixing assisted oxidative desulfurization of synthetic oil containing sulfur compounds of benzothiophene and dibenzothiophene were carried out using different polyoxometalate catalysts, H2O2 oxidant and a phase transfer agent. The effects of reaction time (2–30 min) and temperature (30–70 °C) were examined in the oxidation of benzothiophene and dibenzothiophene. Results showed high correlation to the pseudo first-order reaction kinetics ($R2 > 0.97$) and Arrhenius equation ($R2 > 0.99$) that draws out the rate constant and activation energy of each catalyst tested in the oxidation process. Oxidation of benzothiophene and dibenzothiophene using different polyoxometalate catalysts showed a catalytic activity trend of Na3PW12O40 > H3PW12O40 > H3PM12O40 > H4SiW12O40. Furthermore, ultrasound and mixing assisted oxidative desulfurization showed comparable results (<5% difference) in oxidation efficiency and better performance in the kinetic reaction rate and activation energy as compared to conventional oxidation step in the oxidative desulfurization technique.

Full text available upon request to the author

Article title: Operating cost study through a Pareto-optimal fuzzy analysis using commercial ferrate (VI) in an ultrasound-assisted oxidative desulfurization of model sulfur compounds

Authors: Angelo Earvin Sy Choi, SusanRoces, Nathaniel Dugos, Meng-WeiWan

Publication title: Clean Technologies and Environmental Policy 18(5), June 2016

Abstract:

There is a need for transportation fuel such as diesel oil to undergo a desulfurization process prior to its usage in order to comply with stringent environmental regulations. Predominant organic sulfur compounds present in fuel oils comprise benzothiophene (BT) and dibenzothiophene (DBT). High sulfur compound reduction is attainable through a desulfurization process but this often leads to risking higher operating cost due to longer reaction time and the use of large amounts of oxidizing agent and phase transfer agent. Fuzzy logic, which is often used in multi-objective decision-making models, is able to meet the desired objective and satisfy the given constraints at the same time. In this study, a pareto-optimal fuzzy analysis is used in order to determine the best conditions in the ultrasound-assisted oxidative desulfurization process and at the same time achieving the lowest possible operating cost for reducing BT and DBT. Process parameters investigated include ultrasonication time (10–30 min), phase transfer agent (100–300 mg), organic to aqueous phase ratio (10:30–30:10), and ferrate concentration (100–300 ppm) for the reduction of model sulfur compounds. Results through fuzzy optimization indicated optimum results of 93.79 % BT conversion with operating cost of US$ 0.830 and 88.36 % DBT conversion with operating cost of US$ 0.769.

Full text available upon request to the author

Article title: Mixing-assisted oxidative desulfurization of model sulfur compounds using polyoxometalate/H2O2 catalytic system

Authors: Angelo Earvin Sy Choi, SusanRoces, Nathaniel Dugos, Meng-WeiWan

Publication title: Sustainable Environment Research 26(4), April 2016

Abstract:

Desulfurization of fossil fuel derived oil is needed in order to comply with environmental regulations. Dibenzothiophene and benzothiophene are among the predominant sulfur compound present in raw diesel oil. In this study, mixing-assisted oxidative desulfurization of dibenzothiophene and benzothiophene were carried out using polyoxometalate/H2O2 systems and a phase transfer agent. The effects of reaction time (2-30 min) and temperature (30-70 °C) were examined in the oxidation of model sulfur compounds mixed in toluene. A pseudo first-order

reaction kinetic model and the Arrhenius equation were utilized in order to evaluate the kinetic rate constant and activation energy of each catalyst tested in the desulfurization process. Results showed the order of catalytic activity and activation energy of the different polyoxometalate catalysts to be H3PW12O40 > H3PM12O40 > H4SiW12O40 for both dibenzothiophene and benzothiophene.

Full text available upon request to the author

Article title: Synthesis and Characterization of Nitrogen-Functionalized Graphene Oxide in High-Temperature and High-Pressure Ammonia

Authors: F. H. Baldovino, A. T. Quitain, Nathaniel P. Dugos, Susan A. Roces, et al.

Publication title: RSC Advances 6(115): 113924-113932, November 2016

Abstract:

A novel and efficient approach to the synthesis of nitrogen-functionalized graphene oxide (GO) using aqueous ammonia, NH3 (aq.), under high-temperature and high-pressure conditions was investigated. Nitrogen groups (N-groups) were incorporated in GO in different ways; by replacing the carbon (C) atoms and reacting with the oxygenated functionalities present in GO. Reaction mechanisms were proposed, showing how N-groups were attached to GO. Functionalization was confirmed using Fourier transform infrared spectroscopy (FTIR), X-ray photoelectron spectroscopy (XPS), nuclear magnetic resonance (NMR) spectroscopy and elemental analysis (EA). Raman spectroscopy, X-ray diffraction spectroscopy (XRD), and scanning electron microscopy (SEM) were employed to further characterize GO modification. Functionalization was carried out to increase GO adaptability to a wide range of applications, including carbon dioxide (CO2) capture and electrochemical oxygen reduction as reported.

Full text available upon request to the author

Article title: A Skeletal Kinetic Model For Biodiesel Fuels Surrogate Blend Under Diesel-Engine Conditions

Authors: Chit Wityi Oo, Masahiro Shioji, Hiroshi Kawanabe, Susan A. Roces, et al.

Publication title: ASEAN Journal of Chemical Engineering 15(1), 2015

Abstract:

The biodiesel surrogate fuels are realistic kinetic tools to study the combustion of actual biodiesel fuels in diesel engines. The knowledge of fuel chemistry aids in the development of combustion modeling. In order to numerically simulate the diesel combustion, it is necessary to construct a compact reaction model for describing the chemical reaction. This study developed a skeletal kinetic model of methyl decanoate (MD) and n-heptane as a biodiesel surrogate blend for the chemical combustion reactions. The skeletal kinetic model is simply composed of 45 chemical species and 74 reactions based on the full kinetic models which have been developed by Lawrance Livermore National Laboratory (LLNL) and Knowledge-basing Utilities for Complex Reaction Systems (KUCRS) under the diesel like engine conditions. The model in this study is generated by using CHEMKIN and then it is used to produce the ignition delay data and the related chemical species. The model predicted good reasonable agreement for the ignition delays and most of the reaction products at various conditions. The chemical species are well reproduced by this skeletal kinetic model while the good temperature dependency is found under constant pressure conditions 2MPa and 4MPa. The ignition delay time of present model is slightly shorter than the full kinetic model near negative temperature coefficient (NTC) regime. This skeletal model can provide the chemical kinetics to apply in the simulation codes for diesel-engine combustion.

Full text available upon request to the author

Article title: Optimization analysis of mixing-assisted oxidative desulfurization of model sulfur compounds using commercial ferrate(VI)

Authors: Angelo Earvin Sy Choi, SusanRoces, Nathaniel Dugos, Cybelle Morales Futalan, et al.

Publication title: Desalination and Water Treatment 57(37), 2016

Abstract:

Mixing-assisted oxidative desulfurization of benzothiophene (BT) and dibenzothiophene (DBT) was investigated using commercial ferrate(VI). The effect of

operating parameters such as temperature (50–70°C), agitation speed (7,600–14,000 rpm), and mixing time (10–30 min) were examined in relation to sulfur reduction. Optimization experiments were carried out using Box–Behnken design under response surface methodology to evaluate the significance of operating variables. Results show that optimum sulfur reduction of 84.35% for BT could be attained at 15.42 min, 12,198 rpm, and 52.22°C. Moreover, a 93.68% sulfur reduction for DBT could be achieved at 14.43 min, 8,704 rpm, and 51.26°C. Using the optimized conditions, diesel oil was oxidized and showed a sulfur reduction of 58.03 and 93.15% for BT and DBT, respectively.

Full text available upon request to the author

Article title: Ignition and combustion characteristics of various biodiesel fuels (BDFs)

Authors: Chit Wityi Oo, Masahiro Shioji, Shinji Nakao, Nguyen Ngoc Dung, et al.

Publication title: Fuel 158(15): 279-287, October 2015

Abstract:

The fundamental data of ignition and combustion characteristics of various biodiesel fuels (BDFs) are exhibited for finding the optimal condition in diesel engines. The experimental research has been conducted in a constant-volume vessel with the pre-burn system under diesel-engine conditions. The ignition delays and heat release rates were investigated under different ambient temperatures and pressures. This study used diesel oil and various BDFs such as jatropha methyl ester (JME), coconut methyl ester (CME), soybean methyl ester (SME) and palm methyl ester (PME). The experimental results on fuel-spray development and combustion characteristics were affected by the properties of biodiesel fuels (BDFs), which may support potentially the optimal design of diesel engine fueled with BDFs. Evaporation and mixing are promoted at the tip of fuel jet with lower distillation temperature and lower viscosity, resulting in a shorter length dense region in the spray. These properties may disturb the mixture formation of BDFs at spray tip although the penetration lengths are almost same. The ambient temperature (*Ti*) and ambient pressure (*pi*) strongly influenced the ignition and combustion processes of BDF and diesel oil.

Though ignition delays of all BDFs are shorter than that of diesel oil in the whole temperature range from 600 K to 1200 K, CME exhibits the significant shortest delay, suggesting a dominant effect of physical properties of mixing process. At the ambient temperature 800 K and 4 MPa, all of BDFs and diesel oil predict the similar histories of heat release rate. The pre-mixture combustion with longer ignition delay dominates the combustion process at 700 K, but its period is almost constant irrespective of BDF. Ignition delay becomes longer than the injection period for high density and viscosity tested fuels, resulting in a very slow combustion.

Full text available upon request to the author

Article title: A skeletal kinetic model for biodiesel fuels surrogate blend under diesel-engine conditions

Authors: Chit Wityi Oo, Masahiro Shioji, Hiroshi Kawanabe, Susan A. Roces, et al.

Publication title: 2014 International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)

Abstract:

The biodiesel surrogate fuels are realistic kinetic tools to study the combustion of actual biodiesel fuels in diesel engines. The knowledge of fuel chemistry aids in the development of combustion modeling. In order to numerically simulate the diesel combustion, it is necessary to construct a compact reaction model for describing the chemical reaction. This study developed a skeletal kinetic model of methyl decanoate (MD) and n-heptane as a biodiesel surrogate blend for the chemical combustion reactions. The skeletal kinetic model is simply composed of 45 chemical species and 74 reactions based on the full kinetic models which have been developed by Lawrance Livermore National Laboratory (LLNL) and Knowledge-basing Utilities for Complex Reaction Systems (KUCRS) under the diesel like engine conditions. The model in this study is generated by using CHEMKIN and then it is used to produce the ignition delay data and the related chemical species. The model predicted good reasonable agreement for the ignition delays and most of the reaction products at various conditions. The chemical species are well reproduced by this

skeletal kinetic model while the good temperature dependency is found under constant pressure conditions 2MPa and 4MPa. The ignition delay time of present model is slightly shorter than the full kinetic model near negative temperature coefficient (NTC) regime. This skeletal model can provide the chemical kinetics to apply in the simulation co des for dieselengine combustion.

Full text available upon request to the author

Article title: Carbon Dioxide Absorption in a Fabricated Wetted-Wall Column Using Varying Concentrations of Aqueous Ammonia

Authors: H.E.E. Ching, L.M.P. Co, S.I.C. Tan, S.A. Roces, et al.

Publication title: ASEAN Journal of Chemical Engineering 13(2), 2013

Abstract:

Due to the continued increasing levels of CO2 emissions that is contributing to climate change, CO2 mitigation technologies, particularly carbon capture and storage, are being developed to address the goal of abating CO2 levels. Carbon capture technologies can be applied at the pre-combustion, oxy-fuel combustion, and post-combustion stages, the latter being the most widely used due to its flexibility. Among the several CO2 separation processes available for carbon capture, absorption is the most widely used where amine solutions are used as absorbents. This paper highlights the use of a wetted wall column fabricated by Siy and Villanueva (2012) and simulated flue gas to determine the performance of CO2 absorption in terms of the percentage of CO2 absorbed, the steady state time, and the overall gas mass transfer coefficient. The concentrations used were 1, 5, 10, and 15% NH3(aq) at a constant temperature range of 12-17°C, solvent flow rate of 100 mL/ min, and simulated flue gas flow rate of 2 L/min. It was found that increasing the solvent concentration resulted in a proportional increase both in the percentage of CO2 absorbed and the overall gas mass transfer coefficient. The average percentage of CO2 absorbed ranged within 52.25% to 95.29% while the overall mass transfer coefficient ranged from 0.1843 to 0.7746 mmol/m2·s·kPa. However, erratic behavior was seen for the time required for the system to reach steady state. Using Design ExpertTM for analysis, the results showed that the effect of varying the

concentration had a significant effect on the percentage of CO2 absorbed and the overall gas mass transfer coefficient. The results proved that the greater the aqueous ammonia concentration, the greater the percentage of CO2 absorbed. The range of 5-10% aqueous ammonia is recommended because the percentage of CO2 absorbed peaks at an average of 92% beyond the range of 5-10%.

Full text available upon request to the author

Article title: Stability and Emission Characteristics of Diesel-Ethanol-Coconut Methyl Ester Blends for the Diesel Engines

Authors: Tanti Ardiyati, Nathaniel P. Dugos, Susan A. Roces, Masaaki Suzuki, et al.

Publication title: ASEAN Journal of Chemical Engineering 14(2), 2014

Abstract:

The stability and emission characteristics of diesel-ethanol-coconut methyl ester (CME) blends were studied to determine the most suitable fuel blends to be applied in diesel engines. This is done in order to assess the potential of the blends as a substitute for commercially available diesel fuel used in diesel engine. The stability results of the blends using 100% and 99.5% ethanol purity showed that the fuel blends containing ethanol up to 10% and CME of 5% and greater exhibited high mutual solubility at any temperature range and were resistant to microbial growths after 3 months storage. Engine operations at low speed especially at idle-no load and using a bigger size engine lead to a minimum ignition delay and result in lower fuel consumption rate. The emission test results with the new- blended fuels showed a reduction in CO_2 and increasing percentage by volume of CO_2 compared to commercially available diesel. The blends could deliver an efficient combustion and could run efficiently since production of the CO2 gases is higher than that of CO. The blends of 80% diesel, 5% ethanol, 10% CME; and 80% diesel, 10% ethanol, 10% CME could reduce the smoke opacity compared to commercially available diesel.

Full text available upon request to the author

Article title: Short communication: Interdependent ranking of sources and sinks in CCS systems using the analytic network process

Authors: M.A.B. Promentilla, J.F.D.Tapia, C.A. Arcilla, N.P. Dugos
Publication title: Environmental Modelling & Software 50: 21-24, December 2013

Abstract:
CO2 capture and storage (CCS) is widely regarded as an important low-carbon technology for reducing greenhouse gas emissions from large industrial point sources. It entails the capture of a relatively pure CO2 from exhaust gases using different techniques, and then storing this captured gas in various geological sinks. Large-scale deployment of CCS requires the comprehensive evaluation of candidate sources and sinks present in a given geographical region. In this study, we propose an analytic network process (ANP) approach to rank simultaneously the potential CO2 sources and sinks in a CCS system. Such ranking can be used to identify sites for CCS demonstration projects. This ANP decision model allows us to incorporate the feedback dependency that exist in the preference ranking of sources and sinks due to the importance of geographic proximity as a decision criterion. A case study is then solved to demonstrate the proposed model.
Full text available upon request to the author

Article title: Effect of MgCI2 and CaCI2 on the Bubble Point of Mixed- Solvents (Toluene-Isopropyl Alcohol-H20 System)
Authors: Nathaniel P. Dugos, Noel P. Cabigon, Yolanda P. Brondial
Publication title: ASEAN Journal of Chemical Engineering 6(2), 2006

Abstract:
This study investigated the effect of CaCl2 and MgCI2,both alkaline earth metal salts on the boiling points of a mixed-solvent system composed of toluene, isopropyl alcohol and water. The effect of the concentration of the salt on the boiling point of this ternary system was also examined. Results showed that mixed- solvents added with CaCl2 boil at higher temperatures than those with MgCl2even though the latter salt is higher in molal concentration. This proves that MgCI2, which has a smaller ionic radius than CaCl2 is more effective in reducing the molecular affinity to polar and associating solvents (water and isopropyl alcohol) than to the non-polar solvent

(toluene). The mixed- solvent system added with MgCl2 registered higher boiling point deviation than those with CaCI2, though both showed positive deviations. Based on the results, either of the two salts can be an effective mass separating agent. However it is shown that MgCl2is better than CaCl2 because the solutions with MgCI2 generally exhibited lower boiling points. Though the difference in temperature deviations of the two salts is statistically not significant, a difference in temperature of one degree is economically significant considering the cost of energy.

Full text available upon request to the author

Claro N. Mingala

Sex: Male

Education:

Postdoctoral Fellowship, Veterinary Biomedical and Clinical Sciences, 2016

Senior Research Fellow, Department of Agriculture, 2011

Doctor of Philosophy in Infectious Diseases – Molecular Immunology and Microbiology, Hokkaido University, Sapporo, Japan, 2009

Master of Veterinary Studies (Preventive Veterinary Medicine), Central Luzon State University, 2002

Bachelor of Science in Animal Husbandry, Central Luzon State University, 1992

Field of Specialization

Veterinary Immunology, Epidemiology, Virology

Infectious Diseases

Molecular Biology and Diagnostics

Vaccine and Drug Development

Researches:

Article title: Prevalence and Characterization of Quinolone-Resistance Determinants in Escherichia coli Isolated from Food-Producing Animals and Animal-Derived Food in the Philippines

Authors: Lawrence Belotindos, Marvin Villanueva, Joel Miguel, Precious Bwalya, et al.

Publication title: Antibiotics 10(4): 413, 2021

Abstract:

Antimicrobial resistance to quinolones, which constitutes a threat to public health, has been increasing worldwide. In this study, we investigated the prevalence of quinolone-resistant determinants in Escherichia coli not susceptible to quinolones and isolated from food-producing animals and food derived from them, in the Philippines. A total of 791 E. coli strains were isolated in 56.4% of 601 beef, chicken, pork, egg, and milk samples, as well as environmental, cloacal, and rectal swab-collected samples from supermarkets, open markets, abattoirs, and poultry, swine, and buffalo farms. Using the disc diffusion method, it was determined that 78.6% and 55.4% of the isolates were resistant to at least one antimicrobial and multiple drugs, respectively. In 141 isolates not susceptible to quinolones, 115 (81.6%) harbored quinolone-resistant determinants and had mutations predominantly in the quinolone-resistance determining regions (QRDRs) of gyrA and parC. Plasmid-mediated, quinolone resistance (PMQR) and Qnr family (qnrA1, qnrB4, and qnrS1) genes were detected in all isolates. Forty-eight sequence types were identified in isolates harboring mutations in QRDR and/or PMQR genes by multilocus sequence typing analysis. Moreover, 26 isolates harboring mutations in QRDR and/or PMQR genes belonged mostly to phylogroup B1 and Enteroaggregative E. coli. In conclusion, a high prevalence of E. coli was found in food-producing animals and products derived from them, which could potentially spread high-risk clones harboring quinolone-resistance determinants.

Full text available upon request to the author

Article title: Methicillin-resistant Staphylococcus aureus (MRSA) associated with mastitis among water buffaloes in the Philippines

Authors: Alona T. Badua, Sukolrat Boonyayatra, Nattakarn Awaiwanont, Paula Blanca V. Gaban, et al.

Publication title: Heliyon 6(12): e05663, December 2020

Abstract:

Methicillin-resistant Staphylococcus aureus (MRSA) from dairy animals could pose a public health concern in the population. The study was designed to determine the prevalence of S. aureus and MRSA associated with mastitis among water buffaloes in

the central part of Luzon island, the Philippines, and to investigate its associated factors. Three hundred and eighty-four water buffaloes were examined for mastitis using California mastitis test (CMT). Composite milk samples (n = 93) were collected from buffaloes showing positive reaction with CMT. S. aureus was identified from milk samples using biochemical tests. Cefoxitin disk diffusion assay and PCR detecting mecA gene were performed to identify MRSA isolates. Disk diffusion assay was used to investigate the antimicrobial resistance against 9 antibiotics. The prevalence of S. aureus was 41.94% (39/93). MRSA isolates resistant to cefoxitin were at 25.81% (24/93) but only 37.5% (9/24) harbored the mecA gene. All 24 MRSA isolates were resistant to penicillin while the majority were susceptible to clindamycin, trimethoprim-sulfamethoxazole, gentamycin, tetracycline, rifampicin, ciprofloxacin and chloramphenicol with intermediate susceptibility to erythromycin. Furthermore, 37.5% of the isolates were found resistant to two or more antibiotics. Animal-level factor associated with MRSA infection was the history of mastitis (OR = 3.18, CI = 1.03-9.79, p = 0.040). Herd-level factors associated with the detection of MRSA in milk included herd size (OR = 4.24, CI = 1.05-17.07, p = 0.042) and the presence of other animals (OR = 0.15, CI = 0.04-0.58, p = 0.006). High prevalence of intramammary infection with S. aureus and MRSA in dairy buffaloes was observed in the region. This finding raises the concern of preventing zoonotic spread of MRSA.

Full text available upon request to the author

Article title: Antibiotic resistance and genotyping of mecA-positive methicillin-resistant Staphylococcus aureus (MRSA) from milk and nasal carriage of dairy water buffaloes (Bubalus bubalis) in the Philippines

Authors: Alona T. Badua, Sukolrat Boonyayatra, Nattakarn Awaiwanont, Paula Blanca V. Gaban, et al.

Publication title: Journal of Advanced Veterinary and Animal Research, 7(3):397-406, June 2020

Abstract:

Objective: Mastitis is considered as an economically important disease of dairy buffaloes in Asia. This study examined the mastitis milk and nasal swab samples for the detection and genotyping of methicillin-resistant Staphylococcus aureus (MRSA) in water buffaloes.

Materials and methods: Staphylococcus aureus was identified based on biochemical tests and Polymerase Chain Reaction (PCR) detection of nuc gene, whereas MRSA on mecA gene. The disc diffusion test was used to determine the antibiotic resistance and staphylococcal cassette chromosome mec (SCCmec), spa, and multilocus sequence typing for the genotyping of isolates.

Results: Staphylococcus aureus was detected on 39/93 milk (41.94%) and 27/384 nasal swab (7.03%) samples. However, only nine isolates (23.08%) harbored the mecA gene from milk samples and three isolates (11.11%) from the nasal carriage. All MRSA isolates exhibited resistance to cefoxitin and penicillin, whereas 50% were found resistant to clindamycin. All these isolates were found susceptible to sulfa-trimethoprim and chloramphenicol, whereas the majority of the isolates were susceptible to gentamicin, ciprofloxacin, tetracycline, and rifampicin. The SCCmec types of the MRSA isolates were type IVc (50.00%), type II (8.33%), type I (8.33%), and non-typeable (33.33%). The spa types and sequence type (ST) identified were t019 (ST30), t701 (ST1649), t311 (ST5), t657 (ST1148), t015 (ST508), t1939 (ST12), t800 (ST9), t091 (ST2454), t138 (ST5991), and t1642 (ST5992).

Conclusion: Milk and nasal swab samples from dairy water buffaloes were found positive for MRSA. The MRSA isolates were still susceptible to most antibiotics tested. Moreover, the genotypes of some MRSA isolates were found similar to some human MRSA strains, suggesting a possible human to animal transmission.

Full text available upon request to the author

Article title: Trypanosoma Evansi and Neospora Caninum among water buffaloes (Bubalus Bubalis) in the Philippines

Authors: Claro N. Mingala, Jaypee A. Abenoja, Christopher V. Rivera, Michelle M. Balbin, et al.

Publication title: Archives of Veterinary Science 25(1): 10-19, 2020

Abstract:

The study determined the positivity rate of Trypanosoma evansi and Neospora caninum antibodies in water buffaloes in the province of Nueva Ecija, Philippines using Polymerase Chain Reaction (PCR) for T. evansi and competitive Enzyme-linked Immunosorbent Assay (cELISA) for N. caninum antibodies. A total of 100 whole blood and 100 serum samples were collected to test for T. evansi and N. caninum, respectively. Rotat 1.2 VSG gene was target using PCR for T. evansi detection. Neospora caninum antibody detection was done from the serum samples using cELISA test kit. Results revealed that the positivity rate of T. evansi in Nueva Ecija was 11% (11/100). The positive animals identified were from the municipalities of Muñoz (4/16; 25%), Sta. Rosa (3/13; 23.08%) and Talugtug (4/16; 25%). The seropositive rate of Nueva Ecija for N. caninum. was 46% (46/100), seropositive animals were identified in Cabanatuan City, 57.14% (4/7); Science City of Muñoz, 43.14% (22/51); Sta. Rosa, 40% (4/10); Sto. Domingo, 50% (6/12); and Talugtug 50% (10/20). The seropositivity rate of N. caninum and the presence of T. evansi in Nueva Ecija may contribute to the cases of abortions in the province and further studies should be employed to confirm the association of these organisms to abortion cases on water buffaloes.

Full text available upon request to the author

Article title: Molecular characterization of MHC II DRB3 gene of swamp- and riverine-type water buffaloes

Authors: Noraine P. Medina, Arren Christian M. De Guia, Virginia M. Venturina, Claro N. Mingala

Publication title: Journal of Advanced Veterinary and Animal Research 6(3): 308-314, July 2019

Abstract:

Objective: Major histocompatibility complex (MHC) is a set of molecular proteins on the surface of antigen presenting cells encoded by a large gene family which are important parts of the immune system. This study was conducted to convey information on the genetic characteristics of the MHC II DRB3 gene in riverine and swamp buffaloes.

Materials and methods: Characterization of MHC II DRB3 gene was carried out using polymerase chain reaction (PCR)-based assay. Thirty-milliliter milk samples were collected from 10 swamp-type and 10 riverine-type buffaloes. RNA from milk samples were extracted using Trizol and then followed by reverse transcription-PCR (RT-PCR).

Results: The phylogenetic analysis with 1,000 bootstrap replications clearly showed complex parsimony in MHC II DRB3 gene between 10 riverine- and 10 swamp-type but also confirmed that the samples are similar to Bubalus bubalis. Aligned sequences of the 20 water buffaloes were compared with three other ruminants (Bos taurus, Ovis aries, and Capra hircus) and non-ruminant (Sus scrofa) that serve as an outgroup. MHC sequences from GenBank show that there was an average of 705 identical pairs, with 22 transitional pairs and 30 transversional pairs with a ratio of 0.7.

Conclusion: Based on the molecular data, the current study conforms to other works of literature that this gene is highly polymorphic which can be due to its function in the immune responsiveness and disease resistance. Further study on the immunological response of MHC II DRB3 to infection may elucidate its underlying function and role in the protection against specific disease of animals.

Full text available upon request to the author

Article title: Screening of the acid meat condition in the rendement napole gene using polymerase chain reaction - restriction fragment length polymorphism

Authors: Jessica G. Manalaysay, Nathaniel D. Antonio, Ralph Lorenz R. Apilado, Joseph F. Bambico, et al.

Publication title: Indonesian Journal of Agricultural Sciences 20(1): 29-34, June 2019

Abstract:

A mutation in the rendement napole (RN) gene causes the acid meat condition which results to poor meat quality due to its reduced water holding capacity, low pH, pale color, reduced processing and cooking yield due to increased drip, and strong metallic taste. This study was conducted to detect the mutation in the RN gene in 535 commercial breeder pigs from the Philippines. Blood collection was done then subjected to DNA extraction and genotyping using polymerase chain reaction - restriction fragment length polymorphism (PCR-RFLP) using the enzyme BsrBI, then validated by DNA sequencing. Results revealed that 97.01% of the breeder pigs did not have the mutation in their RN gene, while 2.69% had at least one copy of the defective allele in their gene. The acid meat condition has only been previously detected in the Hampshire breed whereas this study found the mutations predominantly in Pietrain and Landrace breed they were classified as normal (rn/ rn), heterozygous mutants (RN/rn), and homozygous mutants (RN/RN) which allowed breeding systems to be developed ensuring that all offspring are free of the defect. This genetic screening will help in detecting the presence of the defect in a given swine population and reduce the unwanted effects on meat quality thus increasing its market value.

Full text available upon request to the author

Article title: Phospholipase C zeta 1 mRNA as a marker of Oocyte-Activation and Fertilization Potential of Water Buffalo (Bubalus bubalis) Semen

Authors: E.P. Atabaya, Z.P. Fajardo, R.D.T adeo, E.C. Atabay, E.V. Venturina, et al.

Publication title: Livestock Science 225: 103-108, July 2019

Abstract:

The present study aimed to detect and quantify the expression of buffalo PLCZ1 mRNA (buPLCZ1 mRNA) in buffalo semen and to determine its oocyte-activation and fertilizing ability through IVF. Buffalo semen samples were collected and subjected to standard subjective physical and microscopic evaluation of semen

characteristics. Small amount of fresh semen sample was taken for molecular experiment. The rest of the samples were processed into frozen semen. Both fresh and frozen semen were subjected to Reverse Transcriptase quantitative PCR (RT-qPCR) technique to determine and quantify buPLCZ1 mRNA expression. Subsequently, 40 bulls with known buPLCZ1 mRNA content were evaluated for its oocyte-activation activity through IVF using frozen semen. Correlation analysis was done to determine the relationship between the expression of buPLCZ1 mRNA and percentage of IVF, and other semen variables. PLCZ1 mRNA expression in buffalo semen was observed variable among donor bulls, but was not significantly different ($P > 0.05$) between fresh and frozen semen. The result suggests that the cryopreservation procedure does not affect the expression of buPLCZ1 mRNA in semen. Statistical analysis showed that the expression of buPLCZ1 mRNA in fresh semen was strongly correlated with that of frozen semen ($r=0.992$; $P < 0.001$). Similarly, expression of buPLCZ1 mRNA in frozen semen was positively correlated with percentage of IVF ($r=0.776$; $P < 0.001$), but not with Initial ($r=-0718$; $P > 0.05$) nor with Post-Thaw Motility ($r=-0.0313$; $P > 0.05$). A strong relationship between buPLCZ1 mRNA concentration and IVF rate indicates that buPLCZ1 mRNA concentration can be used to assess oocyte-activation and fertilizing potential of the buffalo semen. The present study essentially demonstrated buPLCZ1 mRNA as biological marker for male fertility and that molecular technique serves as an objective approach of semen quality evaluation to enhance bull selection for genetic improvement in water buffaloes.

Full text available upon request to the author

Article title: Genome-wide Analysis for Variants in Philippine Trypanosoma evansi Isolates with Varying Drug Resistance Profiles

Authors: Jose Enrico H. Lazaro, Neil Andrew D. Bascos, Francis A. Tablizo, Nancy S. Abes, et al.

Publication title: Philippine Journal of Science 148(S1): 219-233, March 2019

Abstract:

Surra, a parasitic disease transmitted by hematophagous flies and caused by Trypanosoma evansi, affects many domesticated animals – including water buffaloes, camels, horses, pigs, dogs, and other carnivores – throughout the world. When left untreated, this disease can cause anemia, significant loss of weight, abortion, and death in affected animals. Among Philippine isolates of T. evansi, variability has been reported in terms of virulence as well as response to drug treatment. In this study, trypanosoma-positive blood was obtained from 15 Philippine water buffalo samples from different sites in the country. The collected T. evansi strains were propagated in mice then subjected to in vivo virulence, in vitro drug sensitivity testing, and whole genome sequencing. One strain (O14) was found to be highly virulent in vivo, and was found to be resistant to three commonly used drugs [i.e., isometamidium chloride (IC), diminazene diaceturate (DD), and melarsamine hydrochloride (CY for Cymelarsan®)] in vitro. This highly resistant sample was compared with two less-virulent strains using genome-wide analysis of single nucleotide polymorphisms (SNPs) and short insertions and deletions (indels) relative to the reference strain STIB 805. Variant analysis between O14 and the less virulent strains (M4 and C117) identified a number of distinctive SNPs, many of which corroborate previous data. Genes with relatively high copy numbers were observed in mutation hotspots. These included genes that code for variant surface glycoproteins (VSGs), expression site-associated genes (ESAGs), retrotransposon hot spot (RHS) proteins, and leucine rich repeat proteins. Notable mutations were also predicted from genes coding for membrane transporters and cysteine peptidases, as well as those involved in RNA degradation. The whole genome sequences acquired from the Philippine isolates (O14, M4, and C117) vary greatly from the reference strain (STIB 805). These WGS data serve as a good resource for the discovery of genetic and phenotypic features that may be translated to effective treatment strategies, relevant to the Philippine setting.

Full text available upon request to the author

Article title: Anthelmintic effect of betel nut (Areca catechu) and neem (Azadirachta indica) extract against liver fluke (Fasciola spp.)

Authors: Elnalyn C. Yamson, Gabriel Alexis S. P. Tubalinal, Victoria V. Viloria, Claro N. Mingala

Publication title: Journal of Advanced Veterinary and Animal Research 6(1): 44-49, January 2019

Abstract:

Objective: This study aimed to measure the anthelmintic effects of betel nut (Areca catechu) and neem (Azadirachta indica) leaf extracts against Fasciola spp. in vitro in comparison with the commercial dewormer, Albendazole, and the negative control, nutrient broth. The study determined the extract concentration that produced the highest efficacy based on the average recorded mean motility time, gross, and microscopic changes of the flukes treated with different concentrations of plant extracts.

Material and methods: The study consisted of eight treatments. Every treatment consisted of 10%, 20%, and 40% concentrations of both betel nut extract (BNE) and neem leaf extracts, positive control treatment (Albendazole-treated) and negative control treatment (25 ml nutrient broth). The motility of the flukes on all treatments was based on the established motility criteria scoring. The flukes subjected to all treatments were processed for histopathological analysis.

Results: The result of the study revealed that after exposure of Fasciola spp. under 10%, 20%, and 40% extract concentrations, betel nut showed higher efficacy having the recorded mean motility time of 0.22, 0.07 min, and no movement upon contact, respectively, than Albendazole which produced mean motility time of 0.38 min. Nevertheless, the flukes treated with 10%, 20%, and 40% neem leaf extracts obtained the average mean motility time of 220, 151, and 98 min, respectively.

Conclusions: The results gathered showed that 40% BNE concentration showed the highest efficacy based on the recorded mean motility time. All treatments of betel nut extract evidently showed marked changes in the gross and microscopic morphology of the flukes. However, the neem extract was ineffective in all concentrations

although changes were observed microscopically. Furthermore, the nutrient broth was proven to be effective as a culture medium since the flukes remained active until 8 h of exposure.

Full text available upon request to the author

Article title: Comparative molecular characterization of Forkhead box protein 3 (FoxP3) gene of swamp-type (Bubalus carabanensis) and riverine-type (Bubalus bubalis) water buffaloes

Authors: Jonifel C. Gamboa, Ryan Bismark C. Padiernos, Mary Rose D, Uy, Elfren F. Celestino Jr, et al.

Publication title: Comparative Immunology, Microbiology and Infectious Diseases 64: 1-6, June 2019

Abstract:

FoxP3 is a forkhead family member that plays an important role in the development and function of a type of CD4 + T cell called T regulatory cells. Molecular characterization of FoxP3 gene in swamp- and riverine-type water buffaloes was conducted to determine its homology and compare it to the FoxP3 gene of other animal species (cattle, goat, sheep, horse, pig, cat, and dog), determine its unique characteristics in water buffaloes, and provide a reference for future studies to analyze its immunological function. FoxP3 nucleotide sequence of swamp- and riverine-type water buffaloes was 99% identical, whereas its protein translation revealed 97% homology. FoxP3 of swamp- and riverine-type water buffaloes were compared to FoxP3 of other animal species and revealed a high degree of homology which suggests that they may have the same biological properties. This study is the first report that describes the genetic characteristic of FoxP3 gene in water buffalo.

Full text available upon request to the author

Article title: A luminescence-based assay for evaluating bactericidal antibody to Borrelia Burgdorferi in vaccinated horses' serum

Authors: J. J. Lee, C. L. Hsieh, J. Widman, C. Mingala, et al

Publication title: Equine VeterinaryJournal 51(5): 669-673, September 2019

Abstract:

Background: Current serological tests cannot discriminate between bactericidal Borrelia burgdorferi antibodies from others that are merely a response to Borrelia antigenic stimulation.

Objective: To develop a sensitive and convenient luminescence-based serum bactericidal assay (L-SBA) to identify serum borreliacidal activity.

Study design: Prospective validation study and method comparison.

Methods: Serum samples were obtained either from archives of the Animal Health Diagnostic Center at Cornell University (N = 7) or from a vaccination trial (N = 238). Endogenous complement-inactivated serum sample was incubated with exogenic complement and B. burgdorferi ML23 pBBE22luc, which is able to process luciferin with luciferase and produce luminescence in viable Borrelia. After incubation, a light signal can be detected by using a luminometer to calculate the borreliacidal antibody titre.

Results: Components of the reaction mixture including spirochetes and complement from various sources and concentrations were tested to identify a reliable recipe for our complement-mediated L-SBA. We also applied this L-SBA on measuring bactericidal antibody activities and calculated the half inhibitory concentration (IC50) of serum samples from clinical collections. Furthermore, we analysed the L-SBA titres and anti-outer surface protein A (OspA) antibody levels from vaccinated horses using the multiplex assays and found that there is a relationship between results generated using these two different assays. The increases of L-SBA titres correlated with increases of anti-OspA antibody titre in sera (r = 0.423).

Main limitations: Immunoreactivity of commercial complement may differ from different batches. Clinical protection of borreliacidal antibody levels has not been determined.

Conclusions: The L-SBA provided a sensitive and easy-operating platform for the evaluation of bactericidal antibody to B. burgdorferi, and we anticipated L-SBA would function well as an evaluation tool of vaccine efficiency in the future.
Full text available upon request to the author

Article title: Screening of Pig (Sus scrofa) Bactericidal Permeability-Increasing Protein (BPI) Gene as Marker for Disease Resistance
Authors: Michelle A. Miguel and Claro N. Mingala
Publication title: Animal Biotechnology 30(2): 146-150, April 2019

Abstract:
Salmonella infection can cause septicemia, acute or chronic enteritis and wasting in weaned pigs, but may occur in other age groups. The bactericidal/permeability-increasing protein (BPI) gene plays an important role in the natural defense of the host and is found to be associated with resistance/susceptibility to Salmonella infection and identified as a candidate gene for disease resistance breeding in pig. This study was conducted to screen the resistance and/or susceptibility of pigs to Salmonella infection, to determine the genotype and evaluate presence of resistant allele of the BPI gene in population of pigs, and to establish genetic data for pig breeders for the improvement of Philippine pig industry. In this study, 389 blood samples from different pig breeds were collected from pig breeder farms in the Philippines. Genomic DNA was extracted from these samples and genotyping was done by PCR-RFLP analysis using AvaII restriction enzyme. Out of 389 pigs, the genotypic frequency showed that 98.4, 1.3, and 0.3% pigs are resistant (GG), heterozygous type (AG), and susceptible (AA), respectively. The application of BPI gene as marker for disease resistance will provide information to the pig industry to implement strategies for the identification of Salmonella infection-resistant pigs.
Full text available upon request to the author

Article title: Characterization of drug resistance-associated TevAT1 gene of Trypanosoma evansi from Philippine water buffaloes (Bubalus bubalis)

Authors: Claro N. Mingala, Alma Corazon P. Pasag, Marvin Bryan S. Salinas, Michelle M. Balbin, et al.

Publication title: Annals of Parasitology 65(4): 381–386, 2019

Abstract:

This study detected and characterized the TevAT1 gene of Trypanosoma evansi isolates from Philippine water buffaloes (Bubalus bubalis). A total of 68 blood samples from Philippine water buffaloes were subjected to DNA extraction and PCR assay was performed using RoTat 1.2 gene to detect T. evansi. Those samples positive for T. evansi subsequently underwent another PCR assay to detect the presence of TevAT1 gene. Trypanosoma evansi was detected in 26.47% (18/68) blood samples in which distributed throughout the main islands of the country (4 from Luzon, 2 from Visayas and 12 from Mindanao). However, only 10 of these samples were positive for TevAT1 gene. Sequence alignment of the TevAT1 gene from local isolates showed no single nucleotide polymorphisms when compared to other strains in various countries. Those T. evansi without the gene of interest could be possibly resistant to some trypanocidal drugs but this needs to be further investigated in-vitro or in-vivo.

Full text available upon request to the author

Article title: Molecular Detection of Tetracycline and Sulfonamide Resistance Genes in Respiratory and Gastrointestinal Bacterial Isolates of Ruminants

Authors: Gemerlyn G. Garcia, Allan Jeffrey E. Francia, Kevin B. Costales, Michelle M. Balbin, et al.

Publication title: International Journal of Veterinary Science 8(1): 1-9, 2019

Abstract:

The resistance of respiratory bacterial isolates (Acinetobater schindleri, Bacillus pumilus, Enterococcus faecalis, Pseudomonas aeruginosa, Staphylococcus sciuri and Staphylococcus sporosarcina) and gastrointestinal isolates (Arthrobacter sp., Bacillus megaterium, Pseudomonas aeruginosa, Escherichia coli and Enterococcus faecalis) from ruminants to tetracycline and sulfonamide was evaluated. Antibiotic sensitivity

test in agar cup well method that applied different concentrations of tetracycline and sulfonamide demonstrated the resistance of the isolates to different concentrations of tetracycline and sulfonamide. Tetracycline and sulfonamide resistance in antibiotic sensitivity test was further validated by PCR amplification of genes that code for tetracycline and sulfonamide resistance. Methods involved the utilization of primers that recognize efflux pumps (tetB), ribosomal protective proteins (tetM) and enzyme inactivation (tetX) in genes that regulate tetracycline resistance in bacteria while testing for sulfonamide resistance involved the application of primers for dihydropteroate synthase (DHPS) genes (sul1 and sul2). DNA sequencing of amplified products revealed tetracycline resistance in one respiratory bacterial isolate (E. faecalis) out of the 6 isolates tested. The amplicon with the putative tetracycline resistance had a molecular weight of 171 bp and explains the involvement of ribosomal protective proteins encrypted in the tetM gene as a mediator of tetracycline resistance in E. faecalis. Sulfonamide resistance gene was exhibited by the GIT bacterial isolate P. aeruginosa. The DNA amplicon with the reputed sulfonamide resistance is linked with the sul2 genes which had a molecular weight of 721 bp. The detection of the sul2 genes explains the inhibition of DHPS to effect resistance of P. aeruginosa to sulfonamides.

Full text available upon request to the author

Article title: Serological and molecular evaluation of Mycobacterium avium subspecies paratuberculosis (Johne's disease) infecting riverine-type water buffaloes (Bubalus bubalis) in the Philippines

Authors: Mary Rose D. Uy, Jeffrey L. Cruz, Michelle A. Miguel, Marvin Bryan S. Salinas, et al.

Publication title: Comparative Immunology, Microbiology and Infectious Diseases 61: 24-29, December 2018

Abstract:

Mycobacterium avium subsp. paratuberculosis (MAP) is the causative agent of Johne's disease and a possible cause of Crohn's disease in humans. A total of 70 blood and fecal samples were collected from water buffaloes in selected

municipalities of Nueva Ecija for ELISA and qPCR assay. Results revealed presence of antibodies of MAP in 3 serum samples for ELISA. The qPCR assay was carried out using standard curve method targeting the MAP specific insertion element IS900. Results revealed that 10 of the samples were positive for MAP DNA in qPCR. ELISA was able to detect antibodies for MAP showing 2.48% infection rate among the 70 buffaloes tested using blood serum samples. On the other hand, qPCR was able to detect MAP using IS900 showed 14.28% infection rate among buffaloes tested using fecal samples. Nucleotide sequence of isolated MAP showed high homology (99–100%) among the reported MAP isolates in the GenBank.

Full text available upon request to the author

Article title: Evaluation of LAMP for detection and/or screening of Leptospira spp. infection among domestic animals in the Philippines Anti-Mullerian hormone as a marker of embryo production in ruminants View project A New Loop-Mediated Isothermal Amplification Method for Rapid, Simple, and Sensitive Detection of Leptospira spp. in Urine View project Claro Mingala Evaluation of LAMP for detection and/or screening of Leptospira spp. infection among domestic animals in the Philippines

Authors: Gabriel Alexis SP. Tubalinal, Michelle M. Balbin, Marvin A. Villanueva, Clarissa Yvonne J. Domingo and Claro N. Mingala

Publication title: Journal of Advanced Veterinary and Animal Research 5(4): 459–465, December 2018

Abstract:

Objective:

This study assessed the applicability of loop-mediated isothermal amplification (LAMP) for the detection of leptospirosis among domesticated animals and sewage rats. Specifically, it evaluated the ability of LAMP to amplify Leptospira spp. targeting the 16s rRNA gene in boiled urine samples.

Materials and methods:

A total of 140 samples from different domestic animals were tested for the presence of the antigen. A nested-polymerase chain reaction (nPCR) protocol was used to compare and determine the sensitivity of LAMP in detecting Leptospira spp. The LAMP was also evaluated by comparing its amplification result using agarose gel electrophoresis and color change using dye.

Results:

Positivity rate of Leptospira spp. antigen was 29.0% (40/140) for LAMP and 9.3% (13/140) for nPCR. Also, LAMP results for gel electrophoresis and dye color change varied in some samples that may be due to the interpretation of the result in dye color change.

Conclusion:

Overall, LAMP is a rapid, sensitive, and cost-effective diagnostic method compared with nPCR. Also, LAMP has a potential application as pen-side screening, surveillance, and clinical diagnostic kits of infectious diseases without requiring advanced equipment and skilled personnel.

Full text available upon request to the author

Article title: Gene expression analysis of swine leukocyte antigen (SLA-1 and SLA-2) involved in porcine pre-weaning and post-weaning diarrhea in Nueva Ecija, Philippines

Authors: Mary Rose D. Uy, Gemerlyn G. Garcia, Jeffrey P. Aquino, Joan F. Sampang, et al.

Publication title: Philippine Journal of Science 147 (3): 473-481, September 2018

Abstract:

The immune responses of two breeds of piglets to diarrhea at pre-weaning and post-weaning were evaluated in terms of the relative quantification of Major Histocompatibility Complex (MHC) glycoproteins represented by the swine leukocyte antigen (SLA) class I. The expression of SLA-1 and SLA-2 genes of diarrheic and non-diarrheic Native and Large White piglets were measured using

real time polymerase chain reaction (qPCR). Blood samples from 20 Native and 20 Large White piglets were used in this study. It is comprised of 5 Native piglets with clinical signs of diarrhea and 5 Native piglets with no diarrhea at pre-weaning. Same number of piglets were used for Native piglets at post-weaning and Large White piglets at pre-and post-weaning periods. The cDNA samples were amplified using primers for SLA-1 and SLA-1 alleles having amplicon sizes of 217 bp and 126 bp, respectively. Factors that were considered in the study include breed and status of piglets. Relative quantification was done using comparative threshold cycle (CT) method. Significantly higher levels of SLA-1 were noted in diarrheic pigs compared to those of non-diarrheic piglets (P=0.040) of the Native and Large White breeds at pre-weaning period. This observation was not analogous with the non-significant differences in SLA-2 expression, deduced as SLA-linked immune responses of piglets from the Native and Large White breeds with and without diarrhea observed at pre-weaning and post-weaning stages. The upregulation of SLA-1 in piglets with diarrhea at pre-weaning in the two breeds of swine examined the potential role of SLA-1 in the host's response to diarrhea. These data associate the significance of the SLA-1 gene as a marker for diarrhea in pre-weaning piglets.

Full text available upon request to the author

Article title: Characterisation of porcine epidemic diarrhea virus isolates during the 2014–2015 outbreak in the Philippines

Authors: Gemerlyn G. Garcia, Mark Arman D. Aquino, Michelle M. Balbin, Lawrence P. Belotindos, et al.

Publication title: VirusDisease 29(3): 342–348, September 2018

Abstract:

The viral agent of the porcine epidemic diarrhea (PED) was investigated during the reported 2014–2015 outbreaks in commercial farms in Central Luzon, Philippines. The study covered detection of PED virus (PEDV) in fecal and intestinal samples through reverse transcription PCR and sequence analysis of the nucleocapsid (N) gene. Results showed that 10 out of 34 fecal and intestinal samples examined were positive for PEDV. The partial nucleotide sequence of the N gene of the field samples

showed 98–99% homologous to PEDV sequences registered in the GenBank. It was also noted that N gene sequences between field samples were 98% homologous. Interestingly, the partial sequences of the N genes of the field samples were genetically similar to the PEDV isolates from USA, China, Mexico, Canada and Japan. The phylogenetic tree analysis revealed that the Philippine samples clustered in group 2–1 of the PEDV, wherein the isolates of this group were responsible for the outbreaks in Asia and the USA. Analysis of the partial nucleotide and amino acid sequences revealed polymorphisms, deletions and insertions in the N-gene of the PEDV. Amino acid sequence alignment also showed deletions and insertion in the PEDV detected in the Philippines.

Full text available upon request to the author

Article title: Molecular detection of ephemeral fever virus among large ruminants in the Philippines

Authors: John Emmanuel E. Lapira, Michelle M. Balbin, Lawrence P. Belotindos, Victoria V. Viloria, et al.

Publication title: VirusDisease 29(3): 400-404, September 2018

Abstract:

In the Philippines, bovine ephemeral fever (BEF) is currently undetected and considered as an exotic disease of both cattle and water buffaloes. The Philippines until now has no official data regarding the occurrence of BEF. There were no existing control programs or vaccine used for the prevention of the disease. However, there are claims of BEF existence in different water buffalo and cattle farms based on the clinical signs but never confirmed using laboratory test yet. Detection of BEF virus in cattle and water buffalo blood samples was conducted using reverse-transcription PCR targeting the glycoprotein (G) gene, a conserved region in the BEF virus genome. The samples were collected from 22 cattle and 50 water buffaloes with clinical signs suggesting of BEF infection. All water buffalo blood samples were negative while four cattle blood samples turned positive for BEF virus. The G gene partial sequence analysis from two BEF virus positive samples showed close relationship to Australian isolates.

Full text available upon request to the author

Article title: Outer membrane proteins: Its role in Brucella virulence and immunogenicity

Authors: Joey Marvin C. Carpio and Claro N. Mingala

Publication title: International Journal of Veterinary Science 7(1): 33-37, 2018

Abstract:

Members of the genus Brucella are facultative intracellular bacterial pathogens that have the ability to survive and multiply in the phagocytes and cause abortion in cattle and undulant fever in humans. Brucella spp. particularly Brucella melitensis, Brucella abortus, and Brucella suis represent a significant public health concern. The ability of Brucella to invade and replicate in host cells which is being linked to its outer membrane properties as well as to structures found within the cell envelope continue to be a major challenge with regards to treatment and control of the disease. The Brucella outer membrane proteins (OMPs) has been proposed to be involved in virulence (i.e., resistance to bactericidal cationic peptides and polycations), permeability to hydrophobic agents, resistance to divalent cation chelators, and poor activation of bactericidal mechanisms by LPS. Studies on a molecular level have now highlighted the mechanisms that are involved surrounding the pathogenesis of Brucella particularly involving OMPs.

Article title: Gold nanoparticle-based probes for the colorimetric detection of Mycobacterium avium subspecies paratuberculosis DNA

Authors: Thenor Aristotile Charles S. Ganareal, Michelle M. Balbin, Juvy J. Monserate, Joel R. Salazar, et al.

Publication title: Biochemical and Biophysical Research Communications 496(3): 988-997, February 2018

Abstract:

Gold nanoparticle (AuNP) is considered to be the most stable metal nanoparticle having the ability to be functionalized with biomolecules. Recently, AuNP-based

DNA detection methods captured the interest of researchers worldwide. Paratuberculosis or Johne's disease, a chronic gastroenteritis in ruminants caused by Mycobacterium avium subsp. paratuberculosis (MAP), was found to have negative effect in the livestock industry. In this study, AuNP-based probes were evaluated for the specific and sensitive detection of MAP DNA. AuNP-based probe was produced by functionalization of AuNPs with thiol-modified oligonucleotide and was confirmed by Fourier-Transform Infrared (FTIR) spectroscopy. UV-Vis spectroscopy and Scanning Electron Microscopy (SEM) were used to characterize AuNPs. DNA detection was done by hybridization of 10 µL of DNA with 5 µL of probe at 63 °C for 10 min and addition of 3 µL salt solution. The method was specific to MAP with detection limit of 103 ng. UV-Vis and SEM showed dispersion and aggregation of the AuNPs for the positive and negative results, respectively, with no observed particle growth. This study therefore reports an AuNP-based probes which can be used for the specific and sensitive detection of MAP DNA.

Full text available upon request to the author

Article title: Molecular identification of Buxtonella sulcata from associated-diarrhea in water buffaloes (Bubalus bubalis) in the Philippines

Authors: Joseph A. Dianso, Gemerlyn G. Garcia, Lawrence P. Belotindos, Claro N. Mingala

Publication title: Annals of Parasitology 64(2): 93-100, 2018

Abstract:

Sixty suspected protozoan oocysts were demonstrated from 260 fecal samples collected from water buffaloes aged one month to seven years old with clinical signs of diarrhea in four provinces in the Philippines after conventional methods of isolation, sporulation, morphological characteristics and Kinyoun Acid Fast Staining techniques. The recovered protozoan oocysts were subjected to molecular analysis. Amplification of DNA extracted from recovered Eimeria oocysts using universal primers for the ITS-1 region of 18S rRNA revealed PCR products with 348 bp size demonstrated by samples collected from Benguet, La Union and Nueva Ecija provinces in the Philippines while DNA extracted from oocysts of suspected

Cryptosporidium spp. samples that applied primers for the SSU of 18S rRNA registered PCR products but no genes were amplified from diarrheic water buffaloes from these provinces. Alignment of the DNA sequences of the suspected Eimeria and Cryptosporidium species revealed sequences for three isolates of Buxtonella sulcata with product lengths that varied from 235 to 252 bp. This is an initial observation on the involvement of B. sulcata in diarrhea condition of water buffaloes in the Philippines. Phylogenetic analysis of the three local isolates of B. sulcata revealed no similarity with other protozoan constructed according to Neighbor-Joining method.

Full text available upon request to the author

Article title: Detection of quinolone resistance through amplification of the gyrA Gene of mycobacterium species from human and animal sources

Authors: Gemerlyn G. Garcia, Ralph Kevin M. Espinosa, Michelle A. Miguel, Mark Lester Bernardino, et al.

Publication title: International Journal of Veterinary Science 7(4): 190-194, 2018

Abstract:

Ten (10) DNA samples of Mycobacterium tuberculosis (Mtb) isolated from sputum of TB-positive humans, DNA samples from Mycobacterium species isolated from lymph nodes and fecal samples of avians and bubaline animals were analysed by PCR targeting primers for gyrase A (gyrA), quinolone resitance A(qnrA) and topoisomerase IV (parC) genes. Results demonstrated that quinolone resistance recognized by gyrA was seen in one out of 10 DNA samples from human Mtb isolates and that no qnrA and parC genes were detected. The gene for quinolone resistance detected by the primer gyrA had a molecular weight of 333 bp. Resistance to quinolone mediated by gyrA, qnrA and parC genes in avian (M. avium avium) and bubaline (M. avium paratuberculosis) isolates of mycobacteria were not detected after PCR. The non-amplification of genes observed in this study explains the non-existence of quinolone resistance arbitrated by gyrA, qnrA and parC genes in the specified avian and bubaline mycobacterial isolates.

Full text available upon request to the author

Article title: Detection of Cryptosporidium parvum DNA in fecal samples of infected cattle (Bos indicus) and water buffaloes (Bubalus bubalis) in the Philippines using loop mediated isothermal amplification method

Authors: Clarissa Yvonne J. Domingo, Hamelyn G. Pascual, Claro N. Mingala

Publication title: Annals of Parasitology 64(4): 331-338, 2018

Abstract:

Fecal DNA samples from 17 cattle and 38 water buffaloes found to be infected with Cryptosporidium oocysts using Kinyoun acid fast stain from a previous study, were subjected to loop-mediated isothermal amplification (LAMP) assay using specific primers for Cryptosporidium parvum (C. parvum) from three municipalities, Maria, Baler and San Luis of the province of Aurora in the Philippines. Results of the fecalysis using Kinyoun acid fast stain and LAMP assay were compared with the PCR results of the examined farmer/owner who raised these animals to determine the possible zoonoses of C. parvum between the farmers and their animals. Using LAMP assay, only 41% (7/17) were positive in cattle and 76% (29/38) in water buffaloes. Out of the seven LAMP positive cases in cattle, 86% (6/7) came from Maria and 14% (1/7) from Baler. Out of 29 LAMP positive cases in water buffaloes, 62% (18/29) came from Maria, 24% (7/29) from Baler and 14% (4/29) from San Luis. Comparing with the earlier results for probable zoonoses of C. parvum between the farmers and their animal was determined. Eight farmers that were positive in PCR and with their water buffaloes, positive in LAMP assay were detected to have C. parvum. Only one farmer with his cattle was detected positive of Cryptosporidium spp. in PCR, however, it was negative in LAMP assay hence, a non-parvum species might infected the farmer and the animal.

Full text available upon request to the author

Article title: Anti-Müllerian hormone as a marker of embryo production in ruminants

Authors: Salvador S. Soquilla and Claro N. Mingala

Publication title: Scientific Annals of Polish Society of Animal Production 13(4): 9-16, 2017

Abstract:

This review describes the role of anti-Müllerian hormone (AMH) in embryo production for assisted reproductive technologies in ruminants. AMH is a marker of healthy follicles and oocytes, a reliable marker of gonadotropin-responsive follicles, and an indicator of longevity and productivity in dairy animals. The best times to measure AMH levels in order to select cows for embryo production is during oestrus and the period after the 12th day of the oestro-us cycle. This allows animals with AMH concentrations below 87 pg/mL at oestrus or less than 74 pg/mL for multiple ovulation embryo transfer to be eliminated. Good oocyte donors, which have higher antral follicle counts, can be identified based on their higher AMH levels. In sheep and goats, the blood AMH level can serve as a marker of the animal's potential to produce high or low numbers of high-quality embryos. A plasma AMH level of 97 pg/mL in sheep has been shown to be the optimum cutoff point to predict fertility and can be useful in selecting replacement ewes.

Full text available upon request to the author

Article title: Development and validation of a loop-mediated isothermal amplification assay for the detection of Mycoplasma bovis in mastitic milk

Authors: Aqeela Ashraf Muhammad Imran, Tahir Yaqub, Muhammad Tayyab, et al.

Publication title: Folia Microbiologica 63(3): 373-380, May 2018

Abstract:

Mycoplasma mastitis is often difficult to control due to a lack of rapid and accurate diagnostic tools. The aim of the current study was to develop a loop-mediated isothermal amplification (LAMP) assay for the detection of Mycoplasma bovis (M. bovis) in mastitic milk. The assay was developed using primers designed for three different target genes: uvrC, 16S rRNA, and gyrB, and validated using mastitic milk samples previously found positive for the target pathogen. Specificity of the developed assay was determined by testing cross-reactivity of LAMP primers against closely related bovine mastitis bacterial pathogens. The sensitivity was found to be higher compared to conventional polymerase chain reaction (PCR). The LAMP

assay was also capable of detecting M. bovis in PCR-negative milk samples of cows with clinical mastitis. The uvrC primers were found to be more sensitive, while gyrB primers were more specific; however, 16S rRNA primers were less specific and sensitive compared to either uvrC or gyrB primers. Cohen's kappa values for uvrC, gyrB, and 16S rRNA primers used in the LAMP assays were 0.940, 0.970, and 0.807, respectively. There was a high level of agreement between the test results and the true-disease status as indicated by the receiver operating characteristic (ROC) curve. Our findings suggest that the newly developed LAMP assays targeting the uvrC and gyrB genes could be a useful tool for rapid and accurate diagnosis of mastitis caused by M. bovis.

Full text available upon request to the author

Article title: Historical review and insights on the livestock tick-borne disease research of a developing country: The Philippine scenario

Authors: Adrian P. Ybañez, Claro N. Mingala, Rochelle Haidee D. Ybañez

Publication title: Parasitology International 67(2): 262-266, April 2018

Abstract:

Tick-borne diseases (TBDs) remain to be a global animal health threat. Developing countries like the Philippines is not exempt to this. Despite the potential impact TBDs can give to these countries, local government initiatives and researches remain to be limited. In the Philippines, most epidemiological studies were confined only to specific areas, and predominantly in the Northern Area. Due to its unique geography and limited studies, the current nationwide status of most TBDs could not be clearly established. This review mainly covered published studies and presented challenges in the conduct of TBD research in the Philippines, which may be similar to other Southeast Asian or developing countries. To date, reported livestock TBD pathogens in the Philippines include Anaplasma, Babesia, Theileria, and Mycoplasma spp. With the ubiquitous presence of the Rhipicephalus microplus ticks in the country, it is highly probable that other pathogens transmitted by these vectors could be present. Despite studies on different TBDs in the livestock sector, the Philippine government has not yet heightened its efforts to implement tick control measures as part of the

routine animal health program for local farmers. Further studies might be needed to determine the nationwide prevalence of TBDs and the presence of other possible tick species and TBD pathogens. The Philippine scenario may present situations that are similar to other developing countries.

Full text available upon request to the author

Article title: Molecular detection and phylogenetic analysis of Ehrlichia canis in a Philippine dog

Authors: Naoya Maekawa, Satoru Konnai, Michelle M. Balbin, Claro N. Mingala

Publication title: Ticks and Tick-borne Diseases 9(2): 266-269, February 2018

Abstract:

Canine monocytic ehrlichiosis (CME), caused by a rickettsial bacterium, Ehrlichia canis, is distributed worldwide, particularly in tropical and subtropical regions. Transmission of E. canis is primarily mediated by the vector tick, Rhipicephalus sanguineus sensu lato and the bacteria then infect and replicate in monocytes and macrophages. Many cases are seen in veterinary hospitals and treated routinely; however, the genetic variation of E. canis strains found in the Philippines has been poorly investigated to date. In this study, the 16S rRNA gene and the gp200 gene of E. canis were detected by polymerase chain reaction from an infected dog in the Philippines, and the deduced amino acid sequence of the gp200 gene was subjected to a phylogenetic analysis. The Philippine genotype formed a cluster with the Taiwan genotype, and was somewhat divergent from the USA and Brazil strains. This suggested that E. canis underwent evolution in East and Southeast Asia, confirming the utility of the gp200 gene for the assessment of genetic relationships among strains.

Full text available upon request to the author

Article title: Molecular Characterization and Comparison of Phospholipase C zeta (PLCZ1) Gene Between Swamp (Bubalus carabanensis) and Riverine (Bubalus bubalis) Buffaloes: Its Implications and Future Perspectives

Authors: Eufrocina P. Atabay, Roseline D. Tadeo, Edwin C. Atabay, Emma V. Venturina, et al.

Publication title: 29(3): 190-198, July 2018

Abstract:

Phospholipase C zeta, a novel sperm-specific protein which is widely known to induce oocyte activation following fertilization, had already been characterized in various mammalian species, but not in water buffaloes thus far. The present study was conducted to initially characterize and compare the sequences of PLCZ1 gene of swamp and riverine buffaloes. Semen samples were collected; total RNA was extracted and reverse-transcribed. PLCZ1 cDNA was then amplified, and submitted for sequencing. Buffalo PLCZ1 gene yielded a sequence of 1905 base pair nucleotides translated into 634 bp amino acids. In general, the buffalo PLCZ1 gene was found to have high sequence identity with cattle and other domestic species. Similarly, significant residues and motifs in PLCZ1 gene sequence are found conserved in water buffaloes. However, there are variations in sequences identified between types of water buffaloes that may play a role in species-specific differences in terms of gene and protein expression, physiological mechanisms, and biological functions. The molecular information on buffalo PLCZ1 gene is highly valuable in subsequent works such as correlation studies on the identified gene variations with semen quality and fertility, and the development of biomarkers for bull fertility.

Full text available upon request to the author

Article title: Gross and Molecular Comparison of Fasciola hepatica and Fasciola gigantica from the Field in the Philippines

Authors: Lara Shinette I. Valino, Virginia M. Venturina, Claro N. Mingala

Publication title: International Journal of Veterinary Science, December 2017

Abstract:

The study established the morphologic and molecular differentiation of Fasciola hepatica and Fasciola gigantica in buffaloes. Specifically, the study described the gross structure and morphometry of F. hepatica and F. gigantica and validated the identification of Fasciola spp. based on gross morphology and PCR results. Sixty (60)

samples were evaluated grossly and morphometrically using body length, body width, cone width, and cone length as parameters to differentiate the two species. Ten representative samples from each species identified based on the parameters were subjected to single step-duplex polymerase chain reaction (PCR) for molecular identification of the species identity.

Full text available upon request to the author

Article title: Prevalence of babesiosis (Babesia bovis and Babesia bigemina) in cattle and water buffalo in Nueva Ecija, Philippines using Nested Polymerase Chain Reaction

Authors: Princess Charmaine T. Herrera, Victoria V. Valoria, Michelle M. Balbin, Claro N. Mingala

Publication title: Annals of Parasitology 63(4): 309-316, 2017

Abstract:

The study was conducted to determine the prevalence of Babesia bovis and Babesia bigemina infection in blood samples of cattle and water buffaloes using nested polymerase chain reaction (nested-PCR). It also aimed to generate a spot map showing areas in Nueva Ecija, the Philippines where B. bovis and B. bigemina were detected. Whole blood samples of cattle (148) and water buffalo (65) were collected for DNA extraction and subsequent nested-PCR to detect B. bovis and B. bigemina. To further confirm and validate the nested-PCR results, three selected positive samples for each B. bovis and B. bigemina were sequenced and examined for homology analysis. The results showed that the prevalence of B. bovis, B. bigemina and mixed infection in cattle were 11.49% (17/148), 10.81% (16/148) and 5.41% (8/148), respectively. Homology analysis of nucleotide sequence of three selected DNA samples for each B. bovis showed two 99% and one 96% (partial sequence analysis) identities with B. bovis Thailand strain, while B. bigemina positive samples showed all 100% identities with B. bigemina Philippine strain. The result did not demonstrate in all water buffalo samples. These findings provide information about the prevalence of B. bovis and B. bigemina in cattle and water buffaloes in Nueva

Ecija, which can be beneficial for strategic planning, disease management, and control and prevention.

Full text available upon request to the author

Article title: Molecular characterization of the lymphocyte activation gene-3 (LAG-3, CD223) of swamp-and riverine-type water buffaloes (Bubalus bubalis)

Authors: Shanemae M. Rivera, Ryan Bismark C. Padiernos, Evaristo A. Abella, Satoru Konnai, et al.

Publication title: Japanese Journal of Veterinary Research 65(2): 65-74, May 2017

Abstract:

The present study was conducted to characterize LAG-3 of swamp- and riverine-type water buffaloes by DNA sequencing, homology and phylogenetic analysis. Bubaline LAG-3 sequence contained an open reading frame of 1551 nucleotide, encoding a polypeptide of 516 amino acids. Nucleotide and amino acid sequence homology of LAG-3 revealed 76-96% and 61-94% identity in water buffalo to that of other mammals, respectively. LAG-3 protein sequence of water buffalo contained four extracellular domains, a transmembrane domain and different conserved regions. There were three N-glycosylation sites, two sequence motifs: 'RGD' and 'WXC' motif and five cysteine residues located at different positions of extracellular region. Likewise, the possible serine phosphorylation site and the 'KTGELE' inhibitory motif were found in the intracellular region of bubaline LAG-3. However, one highly conserved cysteine residue in mammalian LAG-3 was replaced by tyrosine in both swamp- and riverine-type water buffaloes. Phylogenetic analysis generated high bootstrap value between the two types of water buffalo which further confirmed the degree of relationship between bubaline species. This was the first report that describe the genetic characteristic of LAG-3 in swamp- and riverine-type water bufffaloes.

Full text available upon request to the author

Article title: Screening of BCL-2 associated X protein gene polymorphism associated with scrotal hernia in domesticated swine using polymerase chain reaction-restriction fragment length polymorphism

Authors: Jessica G. Manalaysay, Nathaniel D. Antonio, Ralph Lorenz R. Apilado Joseph F. Bambico

Publication title: Asian-Australasian Journal of Animal Sciences 30(2) :262-266, February 2017

Abstract:

Objective: This study was conducted to screen scrotal hernia in domesticated swine from selected breeders in the Philippines. This defect is associated with a cytosine to thymine mutation in the BCL-2 associated X protein (BAX) gene of swine.

Methods: Genetic screening was done by DNA extraction followed by amplification and digestion using polymerase chain reaction-restriction fragment length polymorphism, amplifying the 416 bp region of the BAX gene that was subjected to digestion using the Ear I enzyme. Sequencing was also conducted to validate the results.

Results: Results revealed that out of 538 samples tested, 411 (76.4%) of the samples were found to be normal whereas the remaining were carriers of the mutation in which 80 (14.9%) were heterozygous mutants and 47 (8.7%) were homozygous mutants. Pietrain breed was found to have the highest incidence.

Conclusion: Having a scrotal hernia eliminates the chances of using the boar as a breeder stock because the following generations arising from it would most likely exhibit herniation. It is therefore advised to establish a genetic screening method for Scrotal Hernia in the Philippines to eliminate the negative gene from the herd.

Article title: Green synthesis of gold nanoparticles reduced and stabilized by sodium glutamate and sodium dodecyl sulfate

Authors: Gil Felicisimo S. Cabrera, Michelle M. Balbinb, Paul John G. Eugenio, Charleo S. Zapanta, et al.

Publication title: Biochemical and Biophysical Research Communications 484(4): 774-780, March 2017

Abstract:

The Turkevich method has been used for many years in the synthesis of gold nanoparticles. Lately, the use of plant extracts and amino acids has been reported, which is valuable in the field of biotechnology and biomedicine. The AuNPs was synthesized from the reduction of HAuCl4 3H2O by sodium glutamate and stabilized with sodium dodecyl sulfate. The optimum concentrations for sodium glutamate and sodium dodecyl sulfate in the synthesis process were determined. The characteristics of the synthesized AuNPs was analysed through UV–Vis Spectroscopy and SEM. The AuNPs have spherical shape with a mean diameter of approximately 21.62 ± 4.39 nm and is well dispersed. FTIR analysis of the AuNPs reflected that the sulfate head group of sodium dodecyl sulfate is adsorbed at the surface of the AuNPs. Thus, we report herein the synthesis of AuNPs using sodium glutamate and sodium dodecyl sulfate.

Full text available upon request to the author

Article title: Colorimetric detection of caprine arthritis encephalitis virus (CAEV) through loop-mediated isothermal amplification (LAMP) with gold nanoprobes

Authors: Michelle M. Balbina, Benchaporn Lertanantawong, Werasak Suraruengchai, Claro N. Mingala

Publication title: Small Ruminant Research 147: 48-55, February 2017

Abstract:

Infectious diseases in goats, CAE in particular have widely affected the productivity of this animal and greatly affected the farmers and the small ruminant industry. Molecular technique such as LAMP has been applied to detect the CAEV proviral DNA specifically and sensitively but this technique has its own drawback. Gold is the most widely used nanoparticle (NP) which has excellent properties such as high

surface area and compatibility with biomolecules. In this study, gold nanoparticle (AuNP) conjugated with modified oligonucleotides or gold nanoprobe (AuPr) was used to detect CAEV proviral DNA in LAMP product. The hybridization of AuPr to a complementary sequence on the LAMP product made the gold resistant to high salt concentration. This resistance or non-resistance of the AuNP is observed as color change in the mixture. This study, reported a simple method of visual detection of CAEV proviral DNA in LAMP product using AuPr.

Full text available upon request to the author

Article title: Genetic Factors Affecting Pork Quality: Halothane and Rendement Napole Genes

Authors: Ramon Cesar D. Salas and Claro N. Mingala

Publication title: Animal Biotechnology 28(2): 148-155, April 2017

Abstract:

The most common pork quality problems are pale, soft, and exudative (PSE) and acid pork (AP). PSE is associated with the expression of recessive halothane (Hal) allele Haln. Recessive Hal pigs (Halnn) have defective Ca2+ release channels (CRC) or Ryanodine Receptors (RYR1) within the sarcoplasmic reticulum that allow uncontrolled release of Ca2+ in response to stress. Abnormal lactic acid metabolism caused by stress prior to slaughter leads to the sudden drop in postmortem muscle pH producing the PSE pork. Conversely, AP is caused by the dominant RN- allele of the Rendement Napole gene. RN- pigs have high glycolytic potential that causes the lower ultimate pHu due to excessive lactic acid production postmortem. Poor water holding capacity of muscle cells in PSE and AP causes excessive drip loss leading to low cooking and processing yields. The conventional methods to evaluate Hal and RN genotypes are less effective compared to the more accurate gene marker tests. Selection against the Haln and RN- alleles by genomic selection can potentially reduce the frequencies of the defective genes with high accuracy in less time. As more quantitative trait loci (QTL) are identified, pig breeders are able to select traits more effectively to increase efficiency of pig production and enhance pork quality.

Full text available upon request to the author

Article title: Molecular epidemiology of pathogenic Leptospira spp. among large ruminants in the Philippines

Authors: Marvin A. Villanueva, Claro N. Mingala, Michelle M. Balbin, Chie Nakajima

Publication title: The Journal of Veterinary Medical Science 78(11): 1649-1655, December 2016

Abstract:

The extent of Leptospira infection in large ruminants resulting to economic problems in livestock industry in a leptospirosis-endemic country like the Philippines has not been extensively explored. Therefore, we determined the prevalence and carrier status of leptospirosis in large ruminants using molecular techniques and assessed the risk factors of acquiring leptospirosis in these animals. Water buffalo and cattle urine samples (n=831) collected from 21 farms during 2013-2015 were subjected to flaB-nested PCR to detect pathogenic Leptospira spp. Leptospiral flaB was detected in both species with a detection rate of 16.1%. Leptospiral DNA was detected only in samples from animals managed in communal farms. Sequence analysis of Leptospira flaB in large ruminants revealed the formation of three major clusters with L. borgpetersenii or L. kirschneri. One farm contained Leptospira flaB sequences from all clusters identified in this study, suggesting this farm was the main source of leptospires for other farms. This study suggested that these large ruminants are infected with various pathogenic Leptospira species causing possible major economic loss in the livestock industry as well as potential Leptospira reservoirs that can transmit infection to humans and other animals in the Philippines.

Full text available upon request to the author

Article title: Larvicidal activity of nematophagous fungi Dudingtonia flagrans against common strongyle roundworms of buffaloes (Bubalus bubalis)

Authors: Toni Rose M. Barroga, Therese Marie A. Collantes, Claro N. Mingala

Publication title: Philippine Journal of Veterinary and Animal Sciences 42(1), 2016

Abstract:

Infestation of gastrointestinal nematodes is a major problem in grazing animals. Control is achieved through administration of anthelmintics; however, because of indiscriminate use, there have been increased reports of resistance to chemical anthelmintics which led to the failure of parasite control. This study determined the efficacy of the chlamydospore of Duddingtonia flagrans as biological control against common strongyle roundworms of buffaloes. Using corn meal agar assay, strongyle infective larvae were treated with and without D. flagrans. The chlamydospore/ gram (CG) assay tested a dose-dependent concentration wherein feces with 2,100 eggs/ gram (EPG) strongyles were treated with D. flagrans at an increasing doses of CG (100,000, 250,000 and 500,000). Results showed an 84.39% larval reduction after treatment with 500,000 CG. The chlamydspore/ egg assay evaluated increasing ratios of egg to chlamydospore dose (1:0, 1:100, 1:500, 1:1000) using the 2,100 EPG feces. The ratio 1:500 achieved the highest percent larval reduction (78.88%). D. flagrans was directly fed to buffaloes at varying concentrations (50,000, 150,000, 250,000 chlamydospores/kg BW). A 78.77% larval reduction was observed at 50,000 chlamydospore/kg BW oral administration for 5 days. This study showed the efficacy of D. flagrans as a potential alternative for anthelmintics in buffaloes.

Full text available upon request to the author

Article title: The corollary effect of heavy metal accumulation in freshwater ponds on the hematological profile of Nile Tilapia (Oreochromis niloticus)

Authors: Gemerlyn G. Garcia, Elaine Jean L. Miguel, Mark Anthony L. Gabriel, Claro N. Mingala

Publication title: Environmental and Experimental Biology 14: 69–73, 2016

Abstract:

The status of heavy metal buildup in commercial and non-commercial ponds of Nile tilapia (Oreochromis niloticus) and its effect on fish health was evaluated. Pond water and tilapia meat were examined for Pb, As, cadmium Cd and Cu using flame atomic absorption spectrometry; and Hg through manual cold-vapor atomic absorption spectrometry. Standard methods in hematology were applied to estimate

red and white blood cell function of fish in relation to heavy metal accumulation. The results revealed significantly higher Cu content in pond water of a commercial farm compared to the Cu content of water from a non-commercial farm, while similar levels of Hg and Pb were recorded. Tilapia meat from commercial ponds had significantly higher Pb and lower levels of Cu compared to meat from a non-commercial farm. Similar levels of Hg were observed in tilapia meat obtained from farms while tilapia meat from non-commercial ponds had significantly higher Cu. Neither As nor Cd were detected in the farms. Hematological evaluation revealed comparable counts of total red blood cell. Red blood cell indices such as hematocrit and mean corpuscular volume were significantly higher in tilapia from the commercial ponds. The amount of hemoglobin per red blood cell was smilar in tilapia from the farms while mean corpuscular hemoglobin concentration was significantly higher in tilapia from the non-commercial farm. Total white blood cell and eosinophil counts of tilapia were similar in the farms. Tilapia from the commercial ponds had significantly high neutrophil and monocyte counts while tilapia from the non-commercial ponds had significantly high lymphocyte counts. The hematological evaluation indicate relationship of cellular components of fish blood and heavy metal accretion from the aquatic environment by Nile tilapia.

Full text available upon request to the author

Article title: Molecular comparison of Slc11a1 and Slc11a2 genes of swamp- and riverine-type water buffaloes

Authors: R. B. C. Padiernos and C. N. Mingala

Publication title: International Journal of Immunogenetics 43(3): 171-9, June 2016

Abstract:

Solute-linked carrier 11a and 11a2 (Slc) have been associated with disease resistance and/or susceptibility across animal species. These genes have an important mechanism in the regulation against intracellular infection. This study analysed the genetic characteristic of Slc 11a and 11a2 in swamp-type and riverine-type water buffaloes to understand their immunological distinction. Characterization of Slc11a1 and Slc11a2 genes from swamp- and riverine-type water buffaloes was carried out

by molecular cloning, sequencing and phylogenetic analysis. The cloned cDNA of Slc11a1 and Slc11a2 contained an open reading frame of 1647 and 1723 nucleotides, encoding 549 and 574 amino acids, respectively. Nucleotide sequence homology of both Slc11a1 and Slc11a2 had 99% in swamp and riverine type, which gives almost identical polypeptide. However, Slc11a1 and Slc11a2 have substitutions of 5 and 1 amino acid residues, correspondingly. These substitutions suggest as a potential gene markers for resistance and/or susceptibility to intracellular infection. Furthermore, phylogenetic analysis confirmed the degree of relationship between the bubaline species and justifies the distinctness of each breed by the bootstrap value generated.

Full text available upon request to the author

Article title: Transporter protein and drug resistance of Trypanosoma
Authors: Noraine P. Medina and Claro N. Mingala
Publication title: Annals of Parasitology 62(1): 11-5, 2016

Abstract:

Trypanosoma infection is one of the most important infections in livestock and humans. One of the main problems of its therapeutic control and treatment is the resurgence of drug resistance. One of the most studied causes of such resistance is the function of its adenosine transporter gene. A trypanosomal gene TbAT1 from Trypanosoma brucei has been cloned in yeast to demonstrate its function in the transport of adenosine and trypanocidal agents. Drug resistant trypanosomes showed a defective TbAT1 variant; furthermore, deletion of the gene and set point mutations in the transporter gene has been demonstrated from isolates from relapse patients. The molecular understanding of the mechanism of action trypanocidal agents and function of transporter gene can lead to control of drug resistance of Trypanosomes.

Full text available upon request to the author

Article title: Evidence of Fasciola spp. resistance to albendazole, triclabendazole and bromofenofos in water buffaloes (Bubalus bubalis)

Authors: Virginia M. Venturina, Ma Antonette F. Alejandro, Cyril P. Baltazar, Nancy S. Abes, et al.

Publication title: Annals of Parasitology 61(4): 283-9, 2015

Abstract:

Fasciolosis caused by Fasciola spp. is considered the most important helminth infection of ruminants in tropical countries. Anthelmintic resistance has become a global concern. This study compared the efficacy of the commonly used anthelmintics, determined the toxicity level and any indication of resistance. Thirty two water buffaloes naturally-infected with Fasciola spp. were used to determine the efficacy of triclabendazole (TBZ), albendazole (ABZ), and bromofenofos (BRO) using Fecal Egg Count Reduction Test (FECRT). To test the toxicity of the drugs given, serum glutamic-pyruvic transaminase (SGPT) was evaluated before and within one week after treatment. One dose administration of ABZ registered an efficacy of 79.17%, 73.33% for TBZ and 70.83% for BRO. Efficacy in two dose- treatment group was 83.33% for both BRO and ABZ, and 90.00% for TBZ. Two dose-treatment was effective for TBZ (90%), ineffective for BRO and ABZ. SGPT levels were not significantly different between pre-treatment and post- treatment across all treatments. Giving one or two doses of anthelmintics, at one month interval, does not increase the efficacy of the three drugs tested. The study also implies that anthelmintic resistance may have developed in the animals.

Full text available upon request to the author

Article title: Molecular Evaluation of Pork, Beef and Poultry Meat Sold in Nueva Ecija, Philippines for the Presence of Horse (Equus caballus) and Rat (Rattus rattus) DNA Using Polymerase Chain Reaction Assay

Authors: Sonny C. Ramos, Claro N. Mingala, Erol Jay Y. Balagan, Leslie M. Domingo, et al.

Publication title: The Philippine Journal of Veterinary Medicine 53(1): 44-41, January 2016

Abstract:

The study aimed to detect traces of horse and rat DNA from meat samples declared as pork, beef and poultry meat being sold in the markets of Nueva Ecija, Philippines. Thirty locally-produced and imported canned and processed meat products were bought from various markets. DNAs were extracted using tissue extraction protocol. The quality and quantity of the extracted DNAs were preliminary evaluated by targeting beta-actin gene through PCR and by nanospectrophotometer, respectively. PCR detection of horse and rat DNA was evaluated using specific primers targeting cyt b gene with an expected amplicon size of 439 and 603 bp, respectively. Results showed no band in 100% of the samples after gel electrophoresis which means that all meat products were tested negative for both horse and rat DNA. This suggests that horse and rat meat were absent in the meat products tested.

Full text available upon request to the author

Article title: Serological investigation of Leptospira infection and its circulation in one intensive-type water buffalo farm in the Philippines

Authors: Marvin A. Villanueva, Claro N. Mingala, Nina G. Gloriani, Yasutake Yanagihara, et al.

Publication title: The Japanese Journal of Veterinary Research 64(1): 15-24, February 2016

Abstract:

Water buffalo is an indispensable livestock in the Philippines. Leptospirosis is a serious zoonosis that can be fatal to humans and cause reproductive problems in livestock. Leptospirosis has been reported in some countries where water buffaloes are commercially raised, highlighting the Leptospira prevalence in this farming system, but information on leptospirosis in water buffalo farms in the Philippines is limited. In this study, we collected blood samples from rats (n = 21), and water buffaloes (n = 170) from different groups and locations in one intensive-type buffalo farm in the Philippines. Serum was analyzed by microscopic agglutination test (MAT). Anti-Leptospira antibodies reacting with serogroups Canicola, Icterohaemorrhagiae and Pomona were found in sera of 30% tested rats, and 48% of water buffalo sera tested positive for at least one Leptospira strain, in which

serogroups Mini, Hebdomadis, Tarassovi and Pyrogenes were predominantly agglutinated. The number of seropositive young water buffaloes (< 1 year-old) was lower than that of older seropositive ones. Furthermore, sera from younger water buffaloes were reactive with single serotypes with low MAT titers, but older animals were reactive with multiple Leptospira strains with variable MAT titers. In addition, antibodies against serogroups Icterohaemorrhagiae and Pomona were detected in both animals. Finally, Leptospira infection was found associated with age and animal grouping, highlighting the impact of management in the persistence of leptospirosis at intensive-type buffalo farm settings in the Philippines. Further investigation and appropriate control strategies are required to prevent leptospirosis from causing risks to public health and economic losses to the water buffalo farming industry.

Full text available upon request to the author

Article title: A field trial of recombinant Schistosoma japonicum paramyosin as a potential vaccine in naturally-infected water buffaloes

Authors: Mario Antonio L. Jiz II, Claro N. Mingala, Ivy Fe M. Lopez, Mike Chua, et al.

Publication title: Annals of Parasitology 62(4): 295-299, 2016

Abstract:

The overall aims of this project are to assess the safety and immunogenicity of the Schistosoma japonicum vaccine paramyosin among water buffaloes residing in endemic areas. The study was conducted in four villages in Leyte, the Philippines, an area highly endemic for schistosomiasis japonica. One hundred and fifteen (N=115) animals provided baseline stool samples for coprologic examination, with preliminary results using FLOTAC showing a 10% prevalence of schistosomiasis. Forty-nine (N=49) animals consented to treatment with 25 mg/kg Praziquantel, and 40, 36 and 32 animals consented to the first, second and third dose of the paramyosin vaccine, respectively. The safety trial involved the first 20 animals and included skin testing, vaccination, anaphylaxis monitoring, as well as hematology and serum chemistry analysis. Skin tests revealed that only three out of 20 animals exhibited

redness at the injection site, with none greater than 1 cm. None of the animals exhibited anaphylaxis, and all hematology and serum chemistry markers were within normal range or were similar to pre-vaccination levels. None of the 40 animals administered with the first dose exhibited anaphylaxis, nor any of the subsequent vaccine doses. Immunogenicity assessment of sera collected prior to every vaccination and one month after the last dose showed that the paramyosin vaccine induced robust antibody responses to all animals, as assessed by ELISA. The cytokine levels of whole blood culture supernatants will be further assessed. Our findings demonstrate that the S. japonicum paramyosin vaccine is a safe, well-tolerated and immunogenic treatment among water buffalos residing in endemic areas.

Full text available upon request to the author

Article title: Molecular characterization of T-cell immunoglobulin mucin domain-3 and Galectin-9 genes of swamp- and riverine-type water buffaloes

Authors: P. L. H. Duran, R. B. C. Padiernos, E. A. Abella, S. Konna, C. N. Mingala

Publication title: International Journal of Immunogenetics 42(6): 469-78, December 2015

Abstract:

Molecular characterization of T-cell immunoglobulin mucin domain-3 (TIM-3) and Galectin-9 (GAL-9) genes of swamp- and riverine-type water buffaloes was conducted to compare these genes with other species; determine the unique characteristic specific in water buffalo; and provide baseline information for the assessment of disease progression in buffalo species. TIM-3 and GAL-9 genes were amplified, purified, sequenced and characterized. The sequence result of TIM-3 in both types of water buffaloes contained 843 nucleotides encoding to 280 amino acids while GAL-9 of swamp-type and riverine-type water buffaloes contained 1023 and 972 nucleotides encoding to 340 and 323 amino acids, respectively. Meanwhile, the nucleotide and amino sequence of TIM-3 in water buffalo were 83-98% and 94-97% identical with other artiodactyl species, respectively. On the other hand, GAL-9 nucleotide and amino acid sequence in water buffalo were 85-98% and 76-96%

identical with other artiodactyl species. The tyrosine-kinase phosphorylation motif and potential glycosylation sites were conserved within the tribe Bovinae. It is imperative to have further studies in the assessment of the role of these genes in disease progression in water buffalo during chronic infection. The study is the first report that describes the genetic characteristic of TIM-3 and GAL-9 genes in water buffalo.

Full text available upon request to the author

Article title: Molecular epidemiological survey and genetic analysis of vector-borne infections of cattle in Luzon Island, the Philippines

Authors: Nyamsuren Ochirkhuu, Satoru Konnai, Claro N. Mingala, Tomohiro Okagawa, et al.

Publication title: Veterinary Parasitology 212(3-4): 161-7, September 2015

Abstract:

In the Philippines, vector-borne disease is one of the important problems in the livestock industry. To elucidate the epidemiology of vector-borne diseases in cattle on Luzon Island, the Philippines, the prevalence of five protozoan agents was assessed by polymerase chain reaction. Out of the 339 samples, 324 (95.5%), 154 (45.4%), 209 (61.6%), 140 (41.3%), and 2 (0.6%) were positive for Anaplasma marginale, Babesia bigemina, Babesia bovis, Theileria spp., and Trypanosoma evansi infections, respectively. Mixed infections were detected in 290 (85.5%) samples, of which 115 (33.9%) had two pathogens, 144 (42.5%) had three pathogens, and 31 (9.1%) had four kinds of pathogens. 16S rRNA gene was 100% identical in A. marginale compared with the same lineage across the world. B. bovis RAP-1 and B. bigemina AMA-1 genes were identical with 92.27%-100% and 97.07%-100% sequences, respectively, in the database (Asian isolates). MPSP genes of Theileria spp. were 83.51%-100% identical with the one another. Phylogenetic analysis showed that they belong to the groups of T. sergenti and T. buffeli. Positive rates of the tick-borne pathogens were extremely high in this area. These findings provide vital information that can be used for the planning and execution of effective control measures for vector-borne diseases in the Philippine cattle industry.

Full text available upon request to the author

Article title: Evaluation of treatment alternatives against respiratory bacterial pathogens of small and large ruminants

Authors: Claro N. Mingala

Publication title: Advances in Environmental Biology 9(8), May 2015

Abstract:

The sensitivity of five bacterial isolates from small and large ruminants with respiratory infections to synthetic and herbal-based anti-infectives was evaluated in vitro. Synthetic drugs such as Rifampicin, Erythromycin, Benzylpenicillin, Chloramphenicol and Tetracycline and herbal-based drugs such as Ascof® Lagundi (Vitex negundo) and Lagundi (Vitex negundo) leaf extract were applied at different concentrations adapting the Agar cup plate method to test responses of isolated pathogens. Evaluation of treatment was based on the lowest concentration of each anti-infective that can inhibit the test pathogens and compared with existing antibiotic susceptibility testing standards. Measurements of the zones of inhibition on pathogens in response to the applied anti-infectives revealed that S. sciuri, B. pumilus and P. aeruginosa are susceptible to benzyl penicillin at a minimum concentration of 1 IU/ml. B. pumilus was receptive to Erythromycin at a minimum concentration of 10µg/ml. A. schindleri was sensitive to Chloramphenicol at a minimum concentration of 25 µg/ml while P. aeruginosa was susceptible to 50 µg/ml Chloramphenicol. A. schindleri was responsive to anti-bacterial effect of 10 µg/ml Tetracycline while P. aeruginosa was receptive to 25 µg/ml tetracycline. S. sciuri and B. pumilus were both susceptible to Ascof commercial Lagundi at 10% minimum concentration while B. pumilus alone is sensitive to Lagundi leaf extract at a minimum concentration of 10%.

Full text available upon request to the author

Article title: Expression of regulatory dendritic cell-related cytokines in cattle experimentally infected with Trypanosoma evansi

Authors: Hirohisa Mekata, Shiro Murata, Claro N. Mingala, Kazuhiko Ohashi, et al.

Publication title: The Journal of Veterinary Medical Science 77(8): 1017-9, August 2015

Abstract:

Trypanosoma evansi causes wasting disease in many livestock. T. evansi infection gives rise to inflammatory immune responses, which contribute to the development of inflammation-associated tissue injury. We previously reported that regulatory dendritic cells (DCs), which act as potential regulators of inflammation, were activated in infected mice and transfer of regulatory DCs to infected mice prolonged their survival. However, the kinetics of regulatory DCs in cattle, which are natural hosts of T. evansi, remained unclear. In this study, we report that the expressions of CCL8 and IL-10, which promote the development of regulatory DCs, were up-regulated in cattle experimentally infected with T. evansi. This finding is potentially useful for studying the control strategy of T. evansi infection in cattle.

Full text available upon request to the author

Article title: Molecular characterization of the gag gene of caprine arthritis encephalitis virus from goats in the Philippines

Authors: Ryan Bismark C. Padiernos, Michelle M. Balbin, Arman M. Parayao, Claro N. Mingala

Publication title: Archives of Virology 160(4): 969-78, April 2015

Abstract:

Caprine arthritis encephalitis virus (CAEV) causes caprine arthritis encephalitis syndrome, which is an emerging disease of goats in the Philippines. DNA sequence analysis showed homology of 86-93 % between Philippine CAEV and available CAEV sequences in GenBank. CAEV was detected using nested polymerase chain reaction (PCR), and new sets of primers were designed in order to amplify the gag gene, which is a highly conserved region of the viral genome. In addition, the Philippine CAEV isolate clustered in group B with the prototype caprine lentivirus. Based on amino acid sequence alignments, it is possible that the Philippine CAEV isolate is a new strain of CAEV, but it is also possible that it was already present in

the country even before the start of goat importation. Molecular characterization of the CAEV gag gene is important for the development of a detection kit specific for the local strain of CAEV and the establishment of small ruminant lentivirus eradication programs in the Philippines. This study is the first report to describe the molecular characteristics of CAEV circulating in the Philippines.

Full text available upon request to the author

Article title: Conservation of exotic and endangered animals through biotechnology
Authors: Sanny C. Babera and Claro Mingala
Publication title: Global Journal of Bio-Science and Biotechnology 4(2): 220-223, 2015

Abstract:

Maintaining the biodiversity of animals in the ecosystem could lessen the effect of environmental imbalance. Conservation and preservation of endangered animals using different methods in biotechnology could save important genetic materials for future reconstruction of extinct species or even the most endangered one. DNA fingerprinting is important in identifying traits vital to understand breeding peculiarities of wild animals specially birds. Genetic resource bank could facilitate the longer storage of diverse endangered and exotic genetic material.

Full text available upon request to the author

Article title: Evaluation of treatment alternatives against respiratory bacterial pathogens of small and large ruminants
Authors: Gemarlyn Garcia, Lawrence Belotindos, Claro Mingala
Publication title: Advances in Environmental Biology 9(8): 149-155, January 2015

Abstract:

The sensitivity of five bacterial isolates from small and large ruminants with respiratory infections to synthetic and herbal-based anti-infectives was evaluated in vitro. Synthetic drugs such as Rifampicin, Erythromycin, Benzylpenicillin, Chloramphenicol and Tetracycline and herbal-based drugs such as Ascof® Lagundi (Vitex negundo) and Lagundi (Vitex negundo) leaf extract were applied at different concentrations adapting the Agar cup plate method to test responses of isolated

pathogens. Evaluation of treatment was based on the lowest concentration of each anti-infective that can inhibit the test pathogens and compared with existing antibiotic susceptibility testing standards. Measurements of the zones of inhibition on pathogens in response to the applied anti-infectives revealed that S. sciuri, B. pumilus and P. aeruginosa are susceptible to benzyl penicillin at a minimum concentration of 1 IU/ml. B. pumilus was receptive to Erythromycin at a minimum concentration of 10µg/ml. A. schindleri was sensitive to Chloramphenicol at a minimum concentration of 25 µg/ml while P. aeruginosa was susceptible to 50 µg/ml Chloramphenicol. A. schindleri was responsive to anti-bacterial effect of 10 µg/ml Tetracycline while P. aeruginosa was receptive to 25 µg/ml tetracycline. S. sciuri and B. pumilus were both susceptible to Ascof commercial Lagundi at 10% minimum concentration while B. pumilus alone is sensitive to Lagundi leaf extract at a minimum concentration of 10%.

Full text available upon request to the author

Article title: The great diversity of major histocompatibility complex class II genes in Philippine native cattle

Authors: S.N. Takeshima, T. Miyasaka, M. Polata, M. Kikuya, et al.

Publication title: Meta Gene 2: 176-190, December 2014

Abstract:

Bovine leukocyte antigens (BoLA) are extensively used as markers for bovine disease and immunological traits. However, none of the BoLA genes in Southeast Asian breeds have been characterized by polymerase chain reaction (PCR)-sequence-based typing (SBT). Therefore, we sequenced exon 2 of the BoLA class II DRB3 gene from 1120 individual cows belonging to the Holstein, Sahiwal, Simbrah, Jersey, Brahman, and Philippine native breeds using PCR-SBT. Several cross-breeds were also examined. BoLA-DRB3 PCR-SBT identified 78 previously reported alleles and five novel alleles. The number of BoLA-DRB3 alleles identified in each breed from the Philippines was higher (71 in Philippine native cattle, 58 in Brahman, 46 in Holstein × Sahiwal, and 57 in Philippine native × Brahman) than that identified in breeds from other countries (e.g., 23 alleles in Japanese Black and 35 in Bolivian Yacumeño

cattle). A phylogenetic tree based on the DA distance calculated from the BoLA-DRB3 allele frequency showed that Philippine native cattle from different Philippine islands are closely related, and all of them are closely similar to Philippine Brahman cattle but not to native Japanese and Latin American breeds. Furthermore, the BoLA-DRB3 allele frequency in Philippine native cattle from Luzon Island, located in the Northern Philippines was different from that in cattle from Iloilo, Bohol, and Leyte Islands, which are located in the Southern Philippines. Therefore, we conclude that Philippine native cattle can be divided into two populations, North and South areas. Moreover, a neutrality test revealed that Philippine native cattle from Leyte showed significantly greater genetic diversity, which may be maintained by balancing selection. This study shows that Asian breeds have high levels of BoLA-DRB3 polymorphism. This finding, especially the identification of five novel BoLA-DRB3 alleles, will be helpful for future SBT studies of BoLA-DRB3 alleles in East Asian cattle.

Full text available upon request to the author

Article title: Assessment of Swine (Sus scrofa domesticus) Alveolar Macrophage Viability Associated with Heavy Metal Air Pollutants

Authors: Gemerlyn G. Garcia, Eduardo H. Grivialde, Lerma C. Ocampo, Claro N. Mingala

Publication title: The Thai Veterinary Medicine 44(4): 461-468, December 2014

Abstract:

The impact of air pollution on airway cellular defense of pigs raised under backyard, semi-commercial and commercial conditions was investigated. Flame atomic absorption spectrometry was used to analyze Cadmium (Cd) and Lead (Pb) while manual cold vapor atomic absorption spectrometry was applied to evaluate Mercury (Hg) contents of dust particles from farms. Tests for viable counts of swine alveolar macrophages (SAM) that simulate animal responses to air pollutants, microbiological techniques for the recovery of bacterial cells and evaluation for cellular function were undertaken. Results showed that air pollution was accompanied by significant high levels of Pb and Cd. Exposure of SAM to air

pollutants induced significant reduction in cell viability and the reduction was substantially contributed by the duration of exposure and the farm source of SAM and air pollutants. Significant differences in colony counts of P. multocida were recorded as effects attributed by SAM exposure, the duration of exposure to air pollutants and the farm origin of the tested SAM and air pollutants. Data that revealed high recovery counts of P. multocida were taken as a measure for altered microbicidal action of SAM against the bacterium. In vitro interaction of backyard-obtained SAM and air pollutants for 6 h does not modify the killing or microbicidal action of SAM on P. multocida but prolonging the SAM and air pollutant interface beyond 6 h may eventually weaken the microbicidal action of the cells which allows incessant yielding of high bacterial recovery counts and failure of SAM to counteract this process.

Full text available upon request to the author

Article title: Evaluation of a Portable Somatic Cell Counter in the Diagnosis of Bubaline Subclinical Mastitis

Authors: R.T. Salvador, R.L. Soliven, E.J.Y. Balagan, N.S. Abes

Publication title: Thai Journal of Agricultural Science 47(4): 205-209, 2014

Abstract:

The study aimed to evaluate the performance of portable somatic cell counter (PortaSCC) relative to that of the laboratory-based somatic cell counter (Fossomatic) in the diagnosis of bubaline subclinical mastitis. It determined the sensitivity and specificity of PortaSCC with Fossomatic as the reference. The agreement between the results of the two test equipments was also measured using kappa statistics. Eighty milk samples were collected from different farms. Samples were immediately processed for somatic cell count using the PortaSCC. Same samples were brought to the laboratory for the somatic cell counts. All samples were processed in triplicates. The PortaSCC has 94.12% and 87.30% sensitivity and specificity, respectively. A substantial agreement (k=0.70) between the results of the two tests was also observed. These test properties of the PortaSCC and its capability to rapidity to provide results rationalize its utilization as an alternative for the laboratory-based

cell counter in evaluating milk samples from herds in remote areas under Philippine field conditions.

Full text available upon request to the author

Article title: Detection and molecular characterization of bovine leukemia virus in Philippine cattle

Authors: Meripet Polat, Ayumu Ohno, Shin-Nosuke Takeshima, Jiyun Kim

Publication title: Archives of Virology 160(1): 285-96, November 2014

Abstract:

Bovine leukemia virus (BLV) is the etiological agent of enzootic bovine leukosis, which is the most common neoplastic disease of cattle. BLV infects cattle worldwide, imposing a severe economic impact on the dairy cattle industry. However, there are no comprehensive studies on the distribution of BLV in the Philippines, and the genetic characteristics of Philippine BLV strains are unknown. Therefore, the aim of this study was to detect BLV infections in the Philippines and determined their genetic variability. Blood samples were obtained from 1116 cattle from different farms on five Philippine islands, and BLV provirus was detected by BLV-CoCoMo-qPCR-2 and nested PCR targeting BLV long terminal repeats. Out of 1116 samples, 108 (9.7 %) and 54 (4.8 %) were positive for BLV provirus, as determined by BLV-CoCoMo-qPCR-2 and nested PCR, respectively. Of the five islands, Luzon Island showed the highest prevalence of BLV infection (23.1 %). Partial env gp51 genes from 43 samples, which were positive for BLV provirus by both methods, were sequenced for phylogenetic analysis. Phylogenetic analysis based on a 423-bp fragment of the env gene revealed that Philippine BLV strains clustered into either genotype 1 or genotype 6. Substitutions were mainly found in antigenic determinants, such as the CD4(+) T-cell epitope, the CD8(+) T-cell epitope, the second neutralizing domain, B and E epitopes, and these substitutions varied according to genotype. This study provides comprehensive information regarding BLV infection levels in the Philippines and documents the presence of two BLV genotypes, genotypes 1 and 6, in this population.

Full text available upon request to the author

Article title: Increased expression of the regulatory T cell-associated marker CTLA-4 in bovine leukemia virus infection

Authors: Saori Suzuki, Satoru Konnai, Tomohiro Okagawa, Ryoyo Ikebuchi, et al.

Publication title: Veterinary Immunology and Immunopathology 163(3-4): 115-24, October 2014

Abstract:

Regulatory T cells (Tregs) play a critical role in the maintenance of the host's immune system. Tregs, particularly CD4(+)CD25(+)Foxp3(+) T cells, have been reported to be involved in the immune evasion mechanism of tumors and several pathogens that cause chronic infections. Recent studies showed that a Treg-associated marker, cytotoxic T-lymphocyte antigen 4 (CTLA-4), is closely associated with the progression of several diseases. We recently reported that the proportion of Foxp3(+)CD4(+) cells was positively correlated with the number of lymphocytes, virus titer, and virus load but inversely correlated with IFN-γ expression in cattle infected with bovine leukemia virus (BLV), which causes chronic infection and lymphoma in its host. Here the kinetics of CTLA-4(+) cells were analyzed in BLV-infected cattle. CTLA-4 mRNA was predominantly expressed in CD4(+) T cells in BLV-infected cattle, and the expression was positively correlated with Foxp3 mRNA expression. To test for differences in the protein expression level of CTLA-4, we measured the proportion of CTLA-4-expressing cells by flow cytometry. In cattle with persistent lymphocytosis (PL), mean fluorescence intensities (MFIs) of CTLA-4 on CD4(+) and CD25(+) T cells were significantly increased compared with that in control and aleukemic (AL) cattle. The percentage of CTLA-4(+) cells in the CD4(+) T cell subpopulation was positively correlated with TGF-β mRNA expression, suggesting that CD4(+)CTLA-4(+) T cells have a potentially immunosuppressive function in BLV infection. In the limited number of cattle that were tested, the anti-CTLA-4 antibody enhanced the expression of CD69, IL-2, and IFN-γ mRNA in anti-programmed death ligand 1 (PD-L1) antibody-treated peripheral blood mononuclear cells from BLV-infected cattle. Together with previous findings, the present results

indicate that Tregs may be involved in the inhibition of T cell function during BLV infection.

Full text available upon request to the author

Article title: Molecular detection and characterization of Theileria species in the Philippines

Authors: Lawrence P. Belotindos, Jonathan V. Lazaro, Marvin A. Villanueva, Claro N. Mingala

Publication title: Acta Parasitologica 59(3): 448-53, September 2014

Abstract:

Theileriosis is a tick-borne disease of domestic and wild animals that cause devastating economic loss in livestock in tropical and subtropical regions. Theileriosis is not yet documented in the Philippines as compared to babesiosis and anaplasmosis which are considered major tick-borne diseases that infect livestock in the country and contribute major losses to the livestock industry. The study was aimed to detect Theileria sp. at genus level in blood samples of cattle using polymerase chain reaction (PCR) assay. Specifically, it determined the phylogenetic relationship of Theileria species affecting cattle in the Philippines to other Theileria sp. registered in the GenBank. A total of 292 blood samples of cattle that were collected from various provinces were used. Theileria sp. was detected in 43/292 from the cattle blood samples using PCR assay targeting the major piroplasm surface protein (MPSP) gene. DNA sequence showed high similarity (90-99%) among the reported Theileria sp. isolates in the GenBank and the Philippine isolates of Theileria. Phylogenetic tree construction using nucleotide sequence classified the Philippine isolates of Theileria as benign. However, nucleotide polymorphism was observed in the new isolate based on nucleotide sequence alignment. It revealed that the new isolate can be a new species of Theileria.

Full text available upon request to the author

Article title: A comparison of FLOTAC and CFF techniques in detecting gastrointestinal parasites in water buffaloes (Bubalus bubalis)

Authors: Roderick T. Salvador, Rogelyn P. Abalos, Angeline M. Ruba, Claro N. Mingala

Publication title: Annals of Parasitology 60(2): 119-25, 2014

Abstract:

The objective of the study was to compare the usefulness of FLOTAC and centrifugal fecal flotation (CFF) techniques. More specifically, the taxonomic classes (Nematoda and Cestoda) of endoparasites present in fecal samples of buffaloes are identified, the sensitivity and specificity of FLOTAC relative to CFF are calculated, and the agreement of both techniques is evaluated using Kappa statistics. Fresh fecal samples from 220 buffaloes in 10 municipalities were collected. Sheather's sugar was used as a flotation solution for both the FLOTAC and CFF techniques. Of the 220 animals, 109 samples were nematode positive and 111 samples were nematode negative according to the FLOTAC technique, while 74 were found to be positive and 146 negative according to the CFF technique. No cestodes were detected by either technique. The calculated sensitivity for FLOTAC is 89.19% and its specificity is 70.55%. Kappa statistics revealed moderate agreement (k = 0.535) between the two techniques in detecting nematodes. The prevalence observed based on FLOTAC and CFF test were 49.54% (109/220; 95% CI: 47.75-56.34) and 33.64% (72/220; 95% CI: 27.42-40.3), respectively.

Full text available upon request to the author

Article title: Genetic Testing for Porcine Stress Syndrome Using Mutagenically Separated-Polymerase Chain Reaction

Authors: Jessica G. Manalaysay, Claro N. Mingala, Domina Flor L. Gamboa, Rubigilda Paraguison-alili, et al.

Publication title: Philippine Journal of Veterinary Medicine 51(2), 2014

Abstract:

Porcine Stress Syndrome (PSS) is a defect in the Halothane (Hal) gene that produces pale, soft and exudative meat of inferior quality that results to significant losses in the meat industry. This study was conducted to detect PSS in pigs from seven farms

in Luzon, Philippines which are used for breeding purposes. They were classified as normal (NN), stress carrier (Nn) and mutant (nn). This classification will help to form a new breeding system to be developed ensuring that all offspring are free of the stress gene. Characterization of the Hal gene was done by collecting blood samples subjected to DNA extraction and genotyping using mutagenically separated-polymerase chairn reaction (MS-PCR) which is an optimized one step process of PSS detection. Out of 427 samples, 22 were found to be mutant, 34 were carrier, and 371 were normal. Results for genotypic frequency showed that 87% pigs are normal (NN); 8% are heterozygotes (Nn) and only 5% are stress-positive (nn). Results were validated through DNA sequencing which showed the same results with MS-PCR. A genetic screening using this developed method for the Philippine setting is recommended to be able to minimize the effect of PSS.

Full text available upon request to the author

Article title: Biological activity of the Tiger mushroom (Lentinus tigrinus) with notes on its assessment for therapeutic consideration

Authors: Gemerlyn G. Garcia, Allen M. Veloso, Renato G. Reyes, Sofronio P. Kalaw, et al.

Publication title: Advances in Environmental Biology 8(10): 399-403, June 2014

Abstract:

This study has been initiated to explore the therapeutic potential of L. tigrinus. Evaluation of lethal effects and responses of mice to Lentinus tigrinus were undertaken. Intravenous lethal dose 50 (LD50), safe intravenous dose and other safety indices were also determined to validate its prospective therapeutic value. The experiment used 30 male BALB/c mice randomly distributed into 6 treatments. Each mouse received 200 µl of each dose of L. tigrinus extract (LTE) (3 mg/mouse, 7.50 mg/mouse, 15 mg/mouse, 22.50 mg/mouse, 30 mg/mouse). Observation for mortality, perceptible responses such as piloerection, eye secretions, weakness and anorexia were carried out at 30 min, 1 h, 3 h, 6 h, 12 h, 24 h, 36 h and 48 h post-treatment with LTE wherein median lethal dose, safe IV dose, safety indices and dose-related responses were based from. Results showed that treatment with higher

LTE concentrations (15 - 30 mg/mouse) elicited perceptible responses earlier preceding death of significantly higher number of mice compared to delayed onset of perceptible responses with no associated mortality in treatments with lower doses. Data also identified the threshold dose at 3 mg/mouse which triggered observable responses of mice while concentrations below the threshold dose have neither effect on perceptible responses nor on death in mice and linked estimated safe IV dose at 7.50 mg/mouse with zero mortality. Identification of the LD50 at 28.47 mg/mouse demonstrated its potent lethal effect in mice. Computed safety indices showing low therapeutic index (1.99), therapeutic ratio (0.67) and a safety factor (0.02) for LTE confirms its low margin of safety when used for therapeutic purposes.

Full text available upon request to the author

Article title: Caprine arthritis encephalitis virus detection in blood by loop-mediated isothermal amplification (LAMP) assay targeting the proviral gag region

Authors: Michelle M. Balbin, Lawrence P. Belotindos, Nancy S. Abes, Claro N. Mingala

Publication title: Diagnostic Microbiology and Infectious Disease 79(1): 37-42, May 2014

Abstract:

Caprine arthritis encephalitis virus (CAEV), of the genus Lentivirus of the Retroviridae family, causes persistent disease, which is characterized by polyarthritis and mastitis in adult goats and progressive paresis (leukoencephalomyelitis) in kids. A loop-mediated isothermal amplification (LAMP) assay was developed for the detection of CAEV in blood samples. Species-specific primers amplifying the gag gene region in the provirus were used for the detection of CAEV. The LAMP assay result was obtained 30 min after incubation on a constant temperature at 63 °C in a heat block. Resulting amplicons were visualized by addition of SYBR green dye after the reaction and checked by agarose gel electrophoresis. The sensitivity of LAMP assay was evaluated by comparing the result with the nested polymerase chain reaction. Based on the experiments, the result of the assay indicated a rapid and sensitive test for the detection of CAEV.

Full text available upon request to the author

Article title: Identification and characterization of bovine programmed death-ligand 2
Authors: Asami Nishimori, Satoru Konnai, Ryoyo Ikebuchi, Tomohiro Okagawa, et al.
Publication title: Microbiology and Immunology 58(7): 388-97, July 2014

Abstract:
Previous reports from this group have indicated that the immunoinhibitory programmed death (PD)-1 receptor and its ligand, PD-L1, are involved in the mechanism of immune evasion of bovine chronic infection. However, no functional analysis of bovine PD-L2 in cattle has been reported. Thus, in this study, the molecular function of bovine PD-L2 was analyzed in vitro. Recombinant PD-L2 (PD-L2-Ig), which comprises an extracellular domain of bovine PD-L2 fused to the Fc portion of rabbit IgG1, was prepared based on the cloned cDNA sequence for bovine PD-L2. Bovine PD-L2-Ig bound to bovine PD-1-expressing cells and addition of soluble bovine PD-1-Ig clearly inhibited the binding of PD-L2-Ig to membrane PD-1 in a dose-dependent manner. Cell proliferation and IFN-γ production were significantly enhanced in the presence of PD-L2-Ig in peripheral blood mononuclear cells (PBMCs) from cattle. Moreover, PD-L2-Ig significantly enhanced IFN-γ production from virus envelope peptides-stimulated PBMCs derived from bovine leukemia virus-infected cattle. Interestingly, PD-L2-Ig-induced IFN-γ production was further enhanced by treatment with anti-bovine PD-1 antibody. These data suggest potential applications of bovine PD-L2-Ig as a therapy for bovine diseases.
Full text available upon request to the author

Article title: The prevalence of Ehrlichia canis, Anaplasma platys and Babesia spp. in dogs in Nueva Ecij., Philippines based on multiplex polymerase chain reaction (mPCR) assay
Authors: Joyce Marielle I. Corales, Victoria V. Viloria, Virginia M. Venturina, Claro N. Mingala
Publication title: Annals of Parasitology 60(4): 267-72, 2014

Abstract:

The aim of the study was to determine the prevalence of Ehrlichia canis, Anaplasma platys and Babesia spp. in dogs. It describes the practice of veterinarians in detecting tick-borne diseases in Nueva Ecija, Philippines. Seventy blood samples were collected and were subjected to multiplex PCR for the detection of E. canis, Babesia spp. and A. platys. The prevalence of babesiosis is the highest in Cabanatuan City (2/10), while a 10% prevalence (1/10) was observed in Science City of Muñoz, Talavera and Sta. Rosa. E. canis were only detected in Cabanatuan City. However, no anaplasmosis was detected in any area. The prevalence of babesiosis and ehrlichiosis in Nueva Ecija is 7.14% (5/70) and 2.85% (2/70) respectively. In addition, 70% (7/10) of the Nueva Ecija veterinary practitioners encountered cases of suspected ehrlichiosis in their practice. The diagnosis of ehrlichiosis is based primarily on presented clinical signs and complete blood counts, which include a platelet count. Of the 10 respondents, half utilized test kits while 90% interpreted blood samples. Meanwhile, only 60% of the respondents used an ELISA test kit for ehrlichiosis. For some practitioners, the main reason for not utilizing a kit is the high cost. None of the respondents had previously attended cases of suspected anaplasmosis. Only one respondent diagnosed a case of babesiosis by blood smear microscopy.

Full text available upon request to the author

Article title: Evaluation of a Portable Somatic Cell Counter in the Diagnosis of Bubaline Subclinical Mastitis

Authors: R.T. Salvador, R.L. Soliven, E.J.Y. Balagan, N.S. Abes, et al.

Publication title: Thai Journal of Agricultural Science 47(4): 205-209, 2014

Abstract:

The study aimed to evaluate the performance of portable somatic cell counter (PortaSCC) relative to that of the laboratory-based somatic cell counter (Fossomatic) in the diagnosis of bubaline subclinical mastitis. It determined the sensitivity and specificity of PortaSCC with Fossomatic as the reference. The agreement between the results of the two test equipments was also measured using kappa statistics. Eighty

milk samples were collected from different farms. Samples were immediately processed for somatic cell count using the PortaSCC. Same samples were brought to the laboratory for the somatic cell counts. All samples were processed in triplicates. The PortaSCC has 94.12% and 87.30% sensitivity and specificity, respectively. A substantial agreement (k=0.70) between the results of the two tests was also observed. These test properties of the PortaSCC and its capability to rapidity to provide results rationalize its utilization as an alternative for the laboratory-based cell counter in evaluating milk samples from herds in remote areas under Philippine field conditions.

Full text available upon request to the author

Article title: Molecular Characterization of Respiratory Bacterial Pathogens in Large and Small Ruminants

Authors: Gemerlyn Gonzales Garcia, Lawrence Pascual Belotindos, Claro Niegos Mingala

Publication title: The Thai Veterinary Medicine 43(4): 483-489, December 2013

Abstract:

Bacterial isolates from different cases of respiratory infections in small and large ruminants were evaluated using bacterial culture and semi-nested PCR and identification was confirmed by DNA sequencing. Universal primers targeting the bacterial 16S rRNA for bacteria were used. Other sets of primers that were specific for Gram-positive bacteria and combinations of primers specific for Gram-negative organisms were used in the second PCR. The amplified PCR products were subjected to DNA sequence analysis. The DNA sequences of the isolated bacteria were aligned with the DNA sequences of bacteria in the GenBank through BLAST. Results confirmed isolation of three Gram-positive and two Gram-negative organisms. Gene sequence studies demonstrated identification of the Gram-positive microorganisms as Staphylococcus sciuri, Staphylococcus sporosarcinae and Bacillus pumilus while the identified Gram-negative organisms were Acinetobacter schindleri and Pseudomonas aeruginosa from ruminants manifesting clinical signs of respiratory infection.

Full text available upon request to the author

Article title: Concordance of competitive enzyme linked immunosorbent assay and nested-polymerase chain reaction in the detection of caprine arthritis-encephalitis virus

Authors: Justin Christian V. Gonzales, Clarissa Yvonne J. Domingo, Nancy S. Abes, Charito A. Gutierrez, et al.

Publication title: Small Ruminant Research 115(1-3): 134-139, October 2013

Abstract:

The study detected the presence of caprine arthritis-encephalitis virus (CAEV) in blood samples from 262 goats and compared the results using competitive enzyme linked immunosorbent assay (cELISA) and nested-polymerase chain reaction (nested-PCR) assay. Moreover, it determined the agreement using kappa (ϰ) statistic, analyze the genetic sequence of CAEV and describe the histopathologic features using carpal joint, brain, lung and mammary gland samples of CAEV positive animals. CAEV antibodies were detected in 15/262 (5.73%) of goat serum samples using cELISA, based on the use of monoclonal antibody binding to CAEV gp135 or SU glycoprotein. In nested-PCR assay targeting the CAE proviral gag region, 9/262 (3.44%) goats were positive which increased the number of positive animals detected to 19 (7.25%). Kappa statistic showed fair agreement between cELISA and nested PCR (ϰ = 0.39). DNA sequence of PCR product showed 91–98% homology among the reported CAEV genome in the GenBank. Histopathological findings were characterized by varying degrees of mononuclear cell infiltrations that conformed to the typical features of lentivirus infection.

Full text available upon request to the author

Article title: Expression analysis of Foxp3 in T cells from bovine leukemia virus infected cattle

Authors: Saori Suzuki, Satoru Konnai, Tomohiro Okagawa, Ryoyo Ikebuchi, et al.

Publication title: Microbiology and Immunology 57(8): 600-4, August 2013

Abstract:

In the present study, we monitored Foxp3(+) T cells in bovine leukemia virus (BLV)-infected cattle. By flow cytometric analysis, the proportion of Foxp3(+) CD4(+) cells from persistent lymphocytotic cattle was significantly increased compared to control and AL cattle. Interestingly, the proportion of Foxp3(+) CD4(+) cells correlated positively with the increased number of lymphocytes, virus titer and virus load, whereas it inversely correlated with IFN-γ mRNA expression, suggesting that Foxp3(+) CD4(+) T cells in cattle have a potentially immunosuppressive function. Further studies are necessary to elucidate the detailed mechanism behind the increased Treg during BLV infection.

Full text available upon request to the author

Article title: Intramammary teat sealant rather induced sub-clinical mastitis in water buffaloes (Bubalus bubalis)

Authors: M. Villamor, N. P. Medina, N. S. Abes, C. Mingala

Publication title: Large Animal Review 19: 195-198, 2013

Abstract:

Introduction - Teat sealing is one preventive tools for mastitis control to prevent the access of the bacteria into the mammary gland. Intramammary teat sealants (ITS) have a high potential as preventive management among animal which do not have history of mastitis. Aim - The general aim of the study was to evaluate the intramammary teat sealant (ITS) for the prevention of subclinical mastitis (SCM). It also aimed to compare the Somatic Cell Count (SCC) and California Mastitis Test (CMT) values of buffaloes infused with ITS device to those buffaloes without ITS, response of primiparous and multiparous buffaloes and determine the adverse reaction based on the changes on teat size and behavior of the treated animals. Materials and methods - Eleven purebreed and healthy female buffaloes were enrolled in the study. Buffaloes were infused with ITS one month before the expected calving date. Milk collection was done every week for one month. Result and discussion - Result showed that there was significant increase on the SCC of buffaloes infused with ITS in comparison to buffaloes without ITS based on SCC and

CMT. Higher percentage occurrence of SCM was observed among buffaloes sealed with ITS in comparison to unseal. No significant difference was observed between treated multiparous and primiparous buffaloes. It showed that there was no significant difference on the size of the teat after 4-6 hours and 24 hours post infusion. Changes of behavior upon infusion of ITS were observed. Conclusion - The use of ITS as preventive management in the occurrence of SCM should be carefully employed in lactating buffaloes. Since this product is already available in the market, adjunct use of antiseptic and proper infusion should be observed. The concept of reducing bacterial contaminants thru the teat via teat sealing is a rational one but based on the study it is not an absolute protection to the lactating animals particularly on water buffaloes maybe due to anatomical difference compare to cattle where this ITS is patterned. Employment of proper management such as regular cleaning and disinfection of the pens is still the best way of controlling mastitis in water buffaloes.

Full text available upon request to the author

Article title: Correlation of California mastitis test and somatic cell count on milk of water buffalo cows in the Philippines

Authors: Roderick T. Salvador, DVSM, MPH, Agnes Alexandria A. Garcia, DVM, Nancy S. Abes, DVM, MS and Claro N. Mingala

Publication title: Tropical Agriculture 90(3), July 2013

Abstract:

The objective of the study was to determine the correlation of California Mastitis Test (CMT) and somatic cells count (SCC) on milk of Murrah buffalo cows. It aimed to calculate the prevalence of subclinical mastitis (SCM), sensitivity and specificity of CMT using SCC as the basis, determine the predictive values of CMT, calculate the true prevalence of subclinical mastitis based on sensitivity and specificity established, and determine the variations on the correlation of SCC and CMT against several factors: age of animal, parity number and length of lactation. Pearson's correlation analysis and Kappa statistics were used for statistical analysis. Results showed that Correlation and Kappa statistics had a 23.37% ($p < .0001$) and 20.20% (p

<.0001) respective agreement between the results of SCC and CMT. SCM prevalence were 30.29% and 23.46% based on CMT and SCC, respectively. The CMT has 54.43% sensitivity and 77.10% specificity. The positive predictive value of CMT was 42.11% while the negative predictive value was 84.67%. The calculated true prevalence of the test was 23.33%. Test agreement may change from slight to fair depending on the factors considered such as the age of the animal, parity number and length of lactation.

Full text available upon request to the author

Article title: In-vivo assessment of the effects of trypanocidal drugs against Trypanosoma evansi isolates from Philippine water buffaloes (Bubalus bubalis)

Authors: Bryan B. Macaraeg, Jonathan V. Lazaro, Nancy S. Abes, and Claro N. Mingala

Publication title: Veterinarski Arhiv 83(4): 381-392, July 2013

Abstract:

The effects of the trypanocidal drugs against Trypanosoma evansi isolated from Philippine water buffaloes from the three island groups were comparatively evaluated. Specifically, the study determined the duration of efficacy, relapse and death per drug dosage using laboratory mice. A total of 270 inbred Balb/c mice were divided into three groups corresponding to the three trypanosome isolates (Luzon, Visayas, and Mindanao). Each group had three sets corresponding to the three trypanocidal drugs used with five treatment levels and one control group each. Each experimental group was composed of five mice. Each mouse was inoculated with 0.2 ml of T. evansi intraperitoneally and blood was examined under the microscope. Parasitemia level was determined using "Rapid Matching Method". Effective and curative doses were noted and evaluated through t-test and bio-assay graphical analyses. Results showed that Luzon isolate was sensitive to > 5 mg/kg of diminazene diaceturate and > 10 mg/kg of both isometamidium chloride and quinapyramine sulphate + chloride. The Visayas isolate was sensitive to > 5 mg/kg, > 10 mg/kg, and > 3 mg/kg of diminazene diaceturate, isometamidium chloride and quinapyramine sulphate + chloride, respectively. The Mindanao isolate was sensitive

to > 3 mg/kg of diminazene diaceturate and quinapyramine sulphate + chloride and 20 mg/kg of isometamidium chloride. The study suggested diminazene as recommended drug against Luzon isolates, quinapyramine against Visayas isolates and either diminazene or quinapyramine against Mindanao isolates.

Full text available upon request to the author

Article title: Molecular characterization of Trypanosoma evansi isolates from water buffaloes (Bubalus bubalis) in the Philippines

Authors: Marjo V. Villareal, Claro N. Mingala, Windell L. Rivera

Publication title: Acta Parasitologica 58(1): 6-12, March 2013

Abstract:

Trypanosoma evansi infection in the Philippines is frequently reported to affect the country's livestock, particularly, the buffaloes. To assess the prevalence and intraspecific diversity of T. evansi in the country, blood samples from water buffaloes in different geographical regions were collected during an outbreak. T. evansi was detected in all 79 animals tested using PCR targeting the RoTat 1.2 VSG gene. Sequencing of the rDNA complete internal transcribed spacer (ITS) region including the 5.8S subunit showed high similarity (99-100%) between Philippine isolates and known T. evansi isolates in Genbank. Tree construction based on the same region confirmed the close relationship between Philippine and reported Thai isolates as compared to Egyptian isolates separated by relatively small genetic distances, 47 polymorphisms, despite the clustering in four branches. Overall, the results of this study prove genetic diversity within T. evansi species despite previous reports on limited heterogeneity among isolates worldwide.

Full text available upon request to the author

Article title: Isolation, cloning, and pathologic analysis of Trypanosoma evansi field isolates

Authors: Hirohisa Mekata, Satoru Konnai, Claro N. Mingala, Nancy S. Abes, et al.

Publication title: Parasitology Research 112(4): 1513–1521, 2013

Abstract:

In recent years, the emergence of highly pathogenic Trypanosoma evansi strains in the Philippines has resulted in substantial losses in livestock production. In this study, we isolated T. evansi from infected-water buffaloes in the Philippines and analyzed their virulence using mice and cattle. A total of 10 strains of T. evansi were isolated. Evaluation of the virulence of each strain using mice depicted significant differences among the strains in the prepatent period, the level of parasitemia, and the survival time of the infected animals. In mice infected with the highly pathogenic T. evansi, signs of excessive inflammation such as marked splenomegaly and increase more than 6-fold in the number of leukocytes were observed at 8 days post-infection. To study the virulence of the parasite strains in cattle (which are the common T. evansi hosts in Philippines), cattle were infected with the T. evansi isolates that showed high and low virulence in mice. The rate of parasite growth and the length of the prepatent periods were found to be similar to those observed in mice for the respective strains. The cattle infected with the highly pathogenic strain developed anemia and a marked decrease in leukocyte counts. To determine the cause of the pathological changes, we analyzed the expression levels of inflammatory cytokines and observed up-regulation of tumor necrosis factor-α in anemic infected cattle. Our findings suggest that the epidemic of T. evansi in the Philippines is characterized by T. evansi strains with varying virulences from low to very high pathogenicity in cattle.

Full text available upon request to the author

Article title: Genotyping and Molecular Characterization of NRAMP1/-2 Genes as Location of Markers for Resistance and/or Susceptibility to Mycobacterium bovis in Swamp and Riverine Type Water Buffaloes

Authors: C. N. Mingala, Lawrence P. Belotindos, N. S. Abes, L. Cruz

Publication title: Buffalo Bulletin 32: 730-733, January 2013

Abstract:

Natural resistance-associated macrophage proteins (NRAMPs) have been associated to disease resistance across animal species. It has critical role in innate immunity and

influence in adaptive immunity. This study investigated the contribution of NRAMP1 and NRAMP2 gene to the resistance or susceptibility of swamp and riverine buffalo to Mycobacterium bovis infection. Animals were tested for TB by single intradermal tuberculin test (SITT) using Bovine antigen. Reactors to SITT were subjected to comparative intradermal tuberculin test (CITT). Blood samples were collected from the reactors then subjected to DNA extraction to isolate the NRAMP1 and NRAMP2 genes. Isolated NRAMP genes were then examined by single strand conformational polymorphism (SSCP) assay. The 3'UTR were sequenced and then aligned. The SSCP result showed that among the reactor animals to intradermal tuberculin test, four conformational patterns were observed in the 3'UTR of the NRAMP1 gene while two were observed in the 3'UTR of the NRAMP2 gene. SSCP showed that the frequency of four-band pattern were mostly from the reactor animals (66.41%). Sequence alignment clearly established the nucleotide polymorphisms between the conformational patterns. These polymorphisms suggested as a potential markers for resistance or susceptibility to Mycobacterium infection. Allelic patterns will be very useful in future breeding plan for the selection of resistant animals.

Full text available upon request to the author

Article title: Enhanced expression of LAG-3 on lymphocyte subpopulations from persistently lymphocytotic cattle infected with bovine leukemia virus

Authors: Satoru Konnaia, Saori Suzukia, Tatsuya Shiraia, Ryoyo Ikebuchi, et al.

Publication title: Comparative Immunology, Microbiology and Infectious Diseases 36(1): 63-69, January 2013

Abstract:

An immunoinhibitory receptor, lymphocyte activation gene-3 (LAG-3), which is mainly expressed in T-cells, is involved in the immune evasion of several pathogens causing chronic infections and tumors. However, unlike human or mouse LAG-3, no functional analysis of LAG-3 has been reported in domestic animals. Thus, in this study, bovine LAG-3 expression was analyzed in bovine leukemia virus (BLV)-infected cattle. In persistent lymphocytotic (PL) cattle, the numbers of LAG-3+CD4+

cells and LAG-3+CD8+ cells were conserved whilst the number of MHC class II+ cells was remarkably higher than in the control animals. In contrast, the mean fluorescence intensity (MFI) for LAG-3 on PBMCs from PL cattle was significantly increased compared to control and asymptomatic (AL) cattle. Specifically, the LAG-3 expression level was significantly increased in both CD4+ and CD8+ T cells from PL cattle. LAG-3 expression correlated positively with increased numbers of lymphocytes and MHC class II+ cells in infected animals. Preliminary results from PD-L1 and LAG-3 blockade assay revealed that IFN-γ and IL-2 expressions were significantly up-regulated by addition of anti- PD-L1 and LAG-3 antibodies in PBMCs from PL cattle. These findings suggest that LAG-3 might be involved in the inhibition of T-cell function through its binding and signaling on MHC class II molecule during BLV infection.

Full text available upon request to the author

Article title: Detection of Enzootic Bovine Leukosis in Cattle usingNested Polymerase Chain Reaction Assay

Authors: Jomelson Alfaro Uera, Jonathan Ventura Lazaro, Claro Niegos Mingala

Publication title: The Thai Veterinary Medicine 42(3): 319-324, September 2012

Abstract:

Enzootic bovine leukosis (EBL) is caused by bovine leukemia virus (BLV) infection. BLV was detected in cattle using nested polymerase chain reaction (PCR) assay and were identified BLV infected cattle farms in five selected provinces in the Philippines. A total of 300 cattle blood samples were used. BLV Proviral DNA was extracted and amplified using nested PCR assay targeting the BLV long terminal repeat (LTR). Results showed that 11 samples (3.67%) of the 300 cattle blood samples used were positive for BLV infection. This study is considered first report of cattle EBL in the Philippines.

Full text available upon request to the author

Article title: A new loop-mediated isothermal amplification method for rapid, simple, and sensitive detection of Leptospira spp. in urine

Authors: Nobuo Koizumi, Chie Nakajima, Tsunehito Harunari, Tsutomu Tanikawa, et al.

Publication title: Journal of Clinical Microbiology 50(6): 2072–2074, June 2012

Abstract:

We developed a new loop-mediated isothermal amplification (LAMP) method to detect rrs, a 16S rRNA gene of pathogenic Leptospira spp. in urine. The method enables detection of two leptospiral cells per reaction mixture following boiling of urine specimens. The sensitivity of this method is higher than that of culture or of flaB nested PCR.

Full text available upon request to the author

Article title: Kinetics of regulatory dendritic cells in inflammatory responses during Trypanosoma evansi infection

Authors: H. Mekata, S. Konnai, C. N. Mingala, N. S. Abes, et al.

Publication title: Parasite Immunology 34(6): 318-29, June 2012

Abstract:

Trypanosoma evansi (T. evansi) causes a wasting disease in almost all mammals. Trypanosoma evansi infection gives rise to the inflammatory responses that contribute to the development of inflammation-associated tissue injury. To determine what kinds of inflammatory molecules play roles in the pathogenicity of T. evansi infection, polymerase chain reaction array analysis was performed on samples from the infected and uninfected mice. The inflammatory cytokine and chemokine storm, caused mainly by macrophages, was observed. On the other hand, the expression levels of Ccl8 and Il10 in splenocytes were also markedly increased. These results suggested an augmentation in the number and activity of regulatory dendritic cells (DCs). Therefore, the kinetics of regulatory DCs in T. evansi-infected mice were investigated. During T. evansi infection, the regulatory DCs became prevalent, with reducing the amount of inflammatory DCs. Interestingly, when the regulatory DCs were implanted into T. evansi-infected mice, the survival was prolonged, and the expression levels of inflammatory molecules were suppressed. Taken together, these

results showed that a subset of regulatory DCs acted as a potential regulator of the inflammatory responses.

Full text available upon request to the author

Article title: Short communication: Prevalence and risk factors of subclinical mastitis as determined by the California Mastitis Test in water buffaloes (Bubalis bubalis) in Nueva Ecija, Philippines

Authors: R.T. Salvador, J.M.C. Beltran, N.S. Abes, C.A. Gutierrez, et al.

Publication title: Journal of Dairy Science 95(3): 1363-1366, March 2012

Abstract:

A retrospective analysis using records of lactating Bulgarian Murrah buffaloes subjected to the California Mastitis Test in a herd in Nueva Ecija, Philippines was done to determine the prevalence of subclinical mastitis (SCM) and to identify risk factors that may influence its occurrence and recurrence. Results showed that SCM prevalence was 42.76%, whereas its recurrence was 75.03%. Age and lactation length influenced the occurrence of SCM. In contrast to the conclusions for dairy cows, younger buffalo cows were more susceptible compared with those at least 6 yr old. Dams younger than 3 yr have a 76% probability, whereas those age 3 yr have an 82% probability of having SCM.

Full text available upon request to the author

Article title: Retrospective study on the treatment of subclinical mastitis in water buffaloes

Authors: N.M. Villanada, N.P. Medina, N.S. Abes, C.N. Mingala

Publication title: Large Animal Review 18: 201-205, 2012

Abstract:

Introduction: Mastitis is one of the most common problems of dairy animals. Subclinical mastitis (SCM) is the most prevalent form of mastitis. It cannot be detected visually but cause great economic loss due to degrading of milk quality and price caused by high bacterial or somatic cell count, costs of drugs, veterinary

services and increased labor costs, increased risk of subsequent mastitis, herd replacement, and problems related to antibiotic residues in milk and its products Aim: The present study was conducted to evaluate the response of the dairy buffalo on SCM treatment. Specifically, to determined the prevalence rate, recurrence rate and possible risk factors of SCM in dairy water buffaloes and to assess the efficacy of treatment. Materials and methods: A total of 67 treated animals were subjected for the analysis. The prevalence rate of SCM in a 19-month period, including cure rate, recurrence rate and identification of risk factors that can affect the probability of cure was determined. All information that was obtained was cleaned in a prepared collection sheet. Univariate analysis on the possible association between the reoccurrence of SCM and independent variables (risk factors) was examined using Logistic regression. Odds ratios (OR) were computed to determine the strength of association of different factors to treatment of SCM. Results and discussion: The over-all cure of treatment was 65.67% and the recurrence of cured animals was 76.92%. Cloxacillin benzathine achieved the highest efficacy with 47.56% followed by cephapirin benzathine with 16.42% and procaine pen G in combination with dihydrostreptomycin with 1.49%. Among the risk factors only the number of affected quarters was found with significant association (P= 0.008). It showed that as the number of affected quarters increases the probability of cure decreases (CR= -1.13). The over-all prevalence of subclinical mastitis in a 19 month period was 37%. Conclusion: Aside from good management and other control measures, the treatment intervention contributed to the decrease in prevalence of infection. However, treatment alone cannot guarantee that the animal will be cured because of the complexity of the disease condition. Many factors can hinder the success of treatment such as the treatment options, pathogen involved like staphylococcus which is difficult to treat and the animal itself. To further decrease the prevalence of mastitis, other methods of prevention or control should be done such as the use of teat sealant during the dry period. Recurrence was high and should be investigated to identify the causes. Significant factors for the recurrence of the condition should also be explored. Although various factors have been recorded as risk factors for cure of SCM, only the number of affected quarters of lactating mammary gland was

significantly associated with the probability of cure and this must be considered in treatment decision for cost effectiveness consideration.

Full text available upon request to the author

Article title: Comparative virulence of three Trypanosoma evansi isolates from water buffaloes in the Philippines

Authors: John Christian M. Verdillo, Jonathan V. Lazaro, Nancy S. Abes, Claro N. Mingala

Publication title: Experimental Parasitology 130(2): 130-4, February 2012

Abstract:

The virulence of three Trypanosoma evansi isolates in Luzon, Visayas and Mindanao water buffaloes was compared determining the mortality rate, parasitemia level, clinical signs, and lesions on mice. A total of 51 inbred Balb/c mice (5-6 weeks old) were used and divided into two sets. Set A had three groups corresponding to three trypanosomes isolates (Luzon, Visayas, and Mindanao) with seven mice each whose parasitemia level, clinical signs, and lesions were noted at necropsy. Set B had three groups corresponding to the three isolates with ten mice each whose mortality was monitored. Each infected mouse was inoculated with 0.2 ml of T. evansi intraperitoneally and blood was examined under high power magnification. Their parasitemia level was determined using "Rapid Matching Method". Dead mice were subjected to necropsy and the lungs, liver, spleen, brain and heart were subjected to histopathological processing. Results showed that the mortality rate was highest at Day 3 for the Visayas isolates (70%), while at Day 5 for Luzon (90%) and Mindanao (70%) isolates. The parasitemia level of Visayas isolates (1×10(8.7)) reached the earliest peak at Day 4 while Luzon isolates (1×10(9)) at Day 6 and Mindanao isolates (1×10(8.7)) at Day 8. Statistical analysis using Least significant difference (LSD) revealed significant difference among treatment means at Days 2 and 4. All of the affected mice showed rough hair coat, decreased body weight, and decreased packed cell volume. The most obvious gross lesions observed were pale liver with petechiations and pale muscles. Histopathological examination revealed depletion of the red pulp and extramedullary hematopoiesis in the spleen. Congestion,

intralesional trypanosomes in blood vessel and extramedullary hematopoiesis were observed in the liver. In the lungs non-specific lesions observed were pulmonary edema, congestion and hemosiderosis.

Full text available upon request to the author

Article title: Genetic analysis and development of species-specific PCR assays based on ITS-1 region of rRNA in bovine Eimeria parasites

Authors: Fumiya Kawahara, Guohong Zhang, Claro N. Mingala, Yu Tamura, et al.

Publication title: Veterinary Parasitology 174(1-2): 49-57, November 2010

Abstract:

At present, morphological characteristics of oocyst is the only achievable method for the identification of bovine coccidia to the species level. In this study, the internal transcribed spacer 1 (ITS-1) region of ribosomal RNA genes of six bovine Eimeria species; E. alabamensis, E. auburnensis, E. bovis, E. cylindrica, E. ellipsoidalis and E. zuernii, were sequenced and analyzed the phylogenetic relationship among them. In pair-wise alignment, the sequences among the same species had high homology of over 90%. E. bovis and E. zuernii were closely related within the same cluster. This cluster and E. alabamensis were distant from major cluster of bovine coccidia that included E. auburnensis, E. cylindrica and E. ellipsoidalis. Species-specific PCR assays based on the amplification of the ITS-1 region were also developed to identify the 6 pathogens. The ITS-1 region of each Eimeria species had sufficient inter-specific sequence variation enough to design the primer sets that differentially amplified each target species. This PCR assay for the detection and differentiation of Eimeria parasite showed higher sensitivity when compared to the conventional oocyst-morphological examination. This is the first attempt for the identification of 6 bovine Eimeria parasites in the genomic level and may provide as useful methods for diagnosis and epidemiology of bovine coccidial infection.

Full text available upon request to the author

Phillip Alviola

Sex: Male

Education:

Master of Science in Wildlife Studies, University of the Philippines Los Banos

Bachelor of Science in Biology, University of the Philippines Los Banos

Field of Specialization

Mammals

Biodiversity Monitoring

Wildlife Conservation

Wildlife Ecology

Researches:

Article title: Integrative taxonomy and biogeography of Asian yellow house bats (Vespertilionidae: Scotophilus) in the Indomalayan Region

Authors: Vuong Tan Tu, Tamás Görföl, Gábor Csorba, Satoru Arai, et al.

Publication title: Journal of Zoological Systematics and Evolutionary Research 59(3): 772-795, January 2021

Abstract:

Yellow house bats (Scotophilus) have been known for centuries as a widespread genus of vesper bats in the Indomalayan Region. Despite this, their taxonomic status and phylogeographical patterns remain unclear due to differing criteria employed by early taxonomists and inconsistencies between morphological and molecular assessments. To address these issues, we undertook a comparative phylogeographic

analysis of Asian Scotophilus spp. using integrated genetic and morphological analyses of samples collected across the region. These demonstrate that yellow house bats in Asia can be classified into just two widespread species, namely the smaller S. kuhlii (e.g., FA ≤ 53.1 mm, GLS ≤ 20.18 mm) and the larger S. heathii (e.g., FA ≥ 53.4 mm, GLS ≥ 20.85 mm), which occur in sympatry in different parts of the Indomalayan Region. Although these two sympatric species share similar eco−ethological preferences, they differ considerably in their geographic distributions and intraspecific variation in mtDNA sequences and morphological traits. These disparities were likely misinterpreted as indicating potential cryptic diversity in previous studies, whereas we suggest they are related to interspecific differences in sex−biased gene flow and phenotypic plasticity to adapt to varying environments. Our study highlights the importance of using multiple datasets to resolve taxonomic uncertainties and reconstruct demographic and phylogeographic histories of sympatric species.

Full text available upon request to the author

Article title: Comparative histological studies on properties of polysaccharides secreted by vomeronasal glands of eight Laurasiatheria species

Authors: Daisuke Kondoh, Jumpei Tomiyasu, Raito Itakura, Mizuho Sugahara, et al.

Publication title: Acta Histochemica 122(3): 151515, February 2020

Abstract:

Most mammalian species have a vomeronasal organ that detects specific chemical substances, such as pheromones. Mucous fluid covering the vomeronasal sensory epithelium is secreted by vomeronasal glands, and the properties of these fluids have been suggested to be involved in chemical detection. Histological studies using periodic acid-Schiff (PAS) and Alcian blue pH 2.5 (AB) stains, which respectively detect natural and acidic polysaccharides, have suggested variations in the nature of the vomeronasal glands among species. Here, we investigated the responsivity of the vomeronasal glands to PAS and AB stains in eight Laurasiatheria species. All species studied herein possessed vomeronasal glands that stained positive for PAS, like other many reported species. The vomeronasal glands of dogs and minks - like

rodents, were AB-negative, whereas those of cows, goats, sika deer, musk shrews and two bat species were positive. Considering the present findings and previous reports, the vomeronasal glands in most of Laurasiatheria species appear to be fundamentally abundant in acidic polysaccharides, whereas those in carnivores essentially contains neutral polysaccharides.

Full text available upon request to the author

Article title: Local-Scale Bat Guild Activity Differs with Rice Growth Stage at Ground Level in the Philippines

Authors: Jodi L. Sedlock, Alexander M. Stuart, Finbarr G. Horgan, Buyung Hadi, et al.

Publication title: Diversity 11(9): 148, August 2019

Abstract:

High-flying insectivorous bats, as wide-ranging generalist insectivores, are valuable consumers of high-altitude migrating pests of rice in Southeast Asia. Here, we documented the behavior of relatively low-flying bats over irrigated rice to elucidate their potential role as predators of rice-associated pest insects in the Philippines. Specifically, we tested the local-scale effects of rice stage, particularly seedling and late vegetative stages, and time of night on acoustic activity of bats foraging near ground level within three functional guilds (based on foraging distance from background clutter). We also monitored bat activity from two 50 m-high towers to assess the vertical extent of relatively low-flying guilds, as well as document high-flying bat guild presence and temporal behavior. At ground level, the most active guild biased their activity and feeding over early growth stage fields, but also foraged at tower level. Activity of the bat guild adept at foraging closest to vegetation did not vary with time of night or rice stage and was absent from tower recordings. High-flying bats were predictably rare at rice level, but exhibited high foraging intensity at 50 m. Given the well-documented, sequential arrival of insect guilds with growth stage, these data suggest that at ground level edge-space bats may be important consumers of detritivores (e.g., mosquitoes). Moreover, our data suggest that just as habitat heterogeneity enhances the services of arthropod

predators, these management practices also enhance bat activity and, presumably, their contribution to pest suppression.

Full text available upon request to the author

Article title: Seasonal emergence counts from a multispecies horseshoe bat (Chiroptera: Rhinolophidae) roost in the Philippines

Authors: Frex D. Dimaculangan, Angela Como Jacobson, Phillip Alviola, James Alvarez, et al.

Publication title: Journal of Bat Research and Conservation 12(1), 2019

Abstract:

The seasonal roost use of Philippine horseshoe bats (Family: Rhinolophidae) is poorly known. Here, we monitored an undisturbed rock crevice roost comprised of four Rhinolophus species on Mount Makiling, Philippines, to document seasonal changes in colony size and species composition. Evening emergences were videotaped using an IR spotlight and an IR-sensitive camera and were acoustically recorded using an ultrasonic detector. Emergence counts ranged from an average of 7,965 bats in the wet season to 177 bats in the dry season. Higher emergence counts in the wet season, and the presence of post-lactating females and juveniles, together indicated that Rhinolophus arcuatus and Rhinolophus inops used the rock crevice as a maternity roost. Rhinolophus macrotis and Rhinolophus virgo were detected during all survey months but comprised a smaller proportion of the wet-season emergence than R. arcuatus and R. inops. These data, while limited in scope, provide the first evidence of seasonal cave use by Philippine horseshoe bats and highlight the potential conservation value of this particular roost as a maternity site for horseshoe bats within the Makiling Forest Reserve.

Full text available upon request to the author

Article title: Two new species of shrew-rats (Rhynchomys: Muridae: Rodentia) from Luzon Island, Philippines

Authors: Eric A. Rickart, Danilo S. Balete, Robert M. Timm, Phillip A. Alviola,

Publication title: Journal of Mammalogy 100(4): 1112-1129, July 2019

Abstract:

The murine genus Rhynchomys includes the large-bodied Philippine "shrew-rats," highly specialized members of the vermivorous clade of Philippine murids. Four species are recognized, all of which are endemic to Luzon Island: R. soricoides from mountains within the Central Cordillera, R. isarogensis from Mt. Isarog on the Bicol Peninsula, R. banahao from Mt. Banahaw in south-central Luzon, and R. tapulao from Mt. Tapulao in the Zambales Mountains. Field surveys in 2006 and 2008 revealed two additional populations of Rhynchomys, one from Mt. Labo (1,544 m), a dormant stratovolcano at the base of the Bicol Peninsula, the other from Mt. Mingan (1,901 m), the highest peak in the central Sierra Madre of east-central Luzon. Assessment of external and craniodental features of available specimens from throughout Luzon support our description of the populations on Mt. Labo and Mt. Mingan as new species. All species of Rhynchomys are restricted to high-elevation, montane, and mossy forest habitats, separated by intervening lowlands. These discoveries highlight the importance of isolated highland areas in the historical diversification of Southeast Asian murines, and as current centers of endemism.

Full text available upon request to the author

Article title: Diversity and threats to cave-dwelling bats in a small island in Southern Philippines

Authors: Ma. Niña Regina M. Quiboda, Phillip A. Alviola, Anna Pauline O. de Guia, Virginia C. Cuevas, et al.

Publication title: Journal of Asia-Pacific Biodiversity 12(4): 481-487, December 2019

Abstract:

More than 2,000 caves have been documented in the Philippines, yet cave research is very limited. This study was conducted to provide benchmark information on the diversity and ecology of cave-dwelling bats from Samal Island, a small island in the southern Philippines. Bats were surveyed from thirty caves of varying physical features and disturbances. Fifteen species of bats were identified in the island; 14 of which are new records for the island, increasing the island distribution of the

identified bats in the country. The abundance of cave-dwelling bats varied from low to high density, with some caves estimated to harbor more than 10,000 individuals. Abundance and richness of cave-dwelling bats positively increased with longer cave length, higher ceilings, bigger and multiple entrances, and presence of water. The Bat Cave Vulnerability Index (BCVI) revealed three high priority caves, 12 medium priority caves and 15 low priority caves, indicating the importance of standardized method in assessing cave disturbance. Traces of tourism and hunting were the most common disturbance factors. The results of this study highlight the need for fundamental data on the distribution, diversity, and ecology of cave-dweling bats in the Philippines. Keywords: BCVI, Cave assessment, Cave disturbances, Mindanao, Samal island

Full text available upon request to the author

Article title: Hipposideros obscurus, Philippine Forest Leaf-nosed Bat
Authors: Alviola, P.A., Sedlock, J., Alvarez, J., Fidelino, J., Pedregosa, M., et al.
Publication title: The IUCN Red List of Threatened Species 2019

Abstract:
No available
Full text available upon request to the author

Article title: Cheiromeles parvidens, Lesser Naked Bat
Authors: Alviola, P.A., Duya, M.R., Alvarez, J., Fidelino, J., Gatan-Balbas, et al.
Publication title: The IUCN Red List of Threatened Species 2019

Abstract:
No available
Full text available upon request to the author

Article title: Hipposideros pygmaeus, Philippine Pygmy Leaf-nosed Bat
Authors: Sedlock, J., Alviola, P.A., Alvarez, J., Fidelino, J., et al.
Publication title: The IUCN Red List of Threatened Species 2019

Abstract:

No available

Full text available upon request to the author

Article title: Checklist of ectoparasitic arthropods among cave-dwelling bats from Marinduque Island, Philippines

Authors: Ace Kevin S. Amarga, Phillip A. Alviola, Ireneo L. Lit, Jr., Sheryl A. Yap

Publication title: Check List 13(1): 2029, January 2017

Abstract:

This paper constitutes the first ectoparasite faunal survey of bats for Marinduque Island, Philippines. From 1–12 June 2010, 150 bats belonging to 11 species were captured in 11 caves on the island. Each bat was sampled for ectoparasitic arthropods, and a total of 587 individuals representing 21 species, belonging to five families (Acari: Argasidae and Spinturnicidae; Diptera: Nycteribiidae and Streblidae; and Siphonaptera: Ischnopsyllidae) were collected. New host records (new host record) in the Philippines for Brachytarsina cucullata Jobling 1934, B. proxima Jobling 1951, B. werneri Jobling 1951, Raymondia pseudopagodarum Jobling 1951, Eucampsipoda philippinensis Ferris 1924, Nycteribia allotopa Speiser 1901, Nycteribia allotopoides Theodor 1963, Nycteribia parvuloides Theodor 1963, Ancystropus taprobanius (Turk 1950), and Carios batuensis Hirst 1929 were documented. A checklist of the ectoparasitic species known from the Philippines, their distribution, and bat host species is provided.

Full text available upon request to the author

Article title: A contribution to the ectoparasite fauna of bats (Mammalia: Chiroptera) in Mindoro Island, Philippines: I. Blood sucking Diptera (Nycteribiidae, Streblidae) and Siphonaptera (Ischnopsyllidae)

Authors: James D. V. Alvarez, Ireneo L. Lit Jr., Phillip A. Alviola, Edison A Cosico, et al.

Publication title: International Journal of Tropical Insect Science 36(4):1-7, September 2016

Abstract:

New data on bat ectoparasites from Mindoro Island, Philippines are reported. Eighty-three individuals of ectoparasitic insects representing seven species of Nycteribiidae and fve species of Streblidae (both Diptera), and one species of Ischnopsyllidae (Siphonaptera) were recorded from 11 bat species captured in Naujan Lake National Park, Mindoro Oriental Province, Philippines. Raymondia pagodarum is a new record for the country. Eight species are also newly recorded for Mindoro Island, including Cyclopodia garrula, Leptocyclopodia ferrarii mabuhai, Megastrebla parvior, Brachytarsina amboinensis, B. werneri, R. pagodarum, R. pseudopagodarum and Thaumapsylla longiforceps. Five species are newly documented on various hosts: C. horsfieldi on Pteropus pumilus, M. parvior on Macroglossus minimus, B. amboinensis on Hipposideros diadema, B. werneri on Rhinolophus arcuatus and R. pagodarum on Hipposideros bicolor.

Full text available upon request to the author

Article title: Molecular phylogeny of a genetically divergent hantavirus harbored by the Geoffroy's rousette (Rousettus amplexicaudatus), a frugivorous bat species in the Philippines

Authors: Satoru Arai Satoshi Taniguchi, Keita Aoki, Yasuhiro Yoshikawa, et al.

Publication title: Infection, Genetics and Evolution : Journal of Molecular Epidemiology and Evolutionary Genetics in Infectious Diseases 45:26-32, November 2016

Abstract:

The recent discovery of genetically distinct hantaviruses in multiple species of shrews and moles (order Eulipotyphla, families Soricidae and Talpidae) prompted a further exploration of their host diversification and geographic distribution by analyzing lung tissues from 376 fruit bats representing six genera (order Chiroptera, suborder Yinpterochiroptera, family Pteropodidae), collected in the Republic of the Philippines during 2008 to 2013. Hantavirus RNA was detected by RT-PCR in one of 15 Geoffroy's rousettes (Rousettus amplexicaudatus), captured in Quezon Memorial

National Park on Luzon Island in 2009. Phylogenetic analyses of the S, M and L segments, using maximum-likelihood and Bayesian methods, showed that the newfound hantavirus, designated Quezon virus (QZNV), shared a common ancestry with hantaviruses hosted by insectivorous bats, in keeping with their evolutionary relationships and suggests that ancestral bats may have served as the early or original mammalian hosts of primordial hantaviruses. As the first hantavirus detected in a megabat or flying fox species, QZNV extends our knowledge about the reservoir host range.

Full text available upon request to the author

Article title: Detection and molecular characterization of Cryptosporidium and Eimeria specie

Authors: Fumi Murakoshi, Frances C. Recuenco, Tsutomu Omatsu, Kaori Sano, et al.

Publication title: Parasitology Research 115(5):1863-9, May 2016

Abstract:

The genus Cryptosporidium, which is an obligate intracellular parasite, infects various vertebrates and causes a diarrheal disease known as cryptosporidiosis. Bats are naturally infected with zoonotic pathogens; thus, they are potential reservoirs of parasites. We investigated the species and genotype distribution as well as prevalence of Cryptosporidium and Eimeria in Philippine bats. We captured and examined 45 bats; four were positive for Cryptosporidium spp. and seven were positive for Eimeria spp. We detected Cryptosporidium bat genotype II from Ptenochirus jagori. Three other Cryptosporidium sequences, detected from Rhinolophus inops, Cynopterus brachyotis, and Eonycteris spelaea, could not be classified as any known species or genotype; we therefore propose the novel genotype Cryptosporidium bat genotypes V, VI, and VII. Bat genotype V is associated with human cryptosporidiosis clade, and therefore, this genotype may be transmissible to humans. Among the Eimeria sequences, BE3 detected from Scotophilus kuhlii was classified with known bat and rodent clades; however, other sequences detected from C. brachyotis, E. spelaea, Rousettus amplexicaudatus, and R. inops could not be classified with known Eimeria species. These isolates might

represent a new genotype. Our findings demonstrate that the bats of the Philippines represent a reservoir of multiple Cryptosporidium and Eimeria spp.

Full text available upon request to the author

Article title: The mammals of Mt. Amuyao: A richly endemic fauna in the Central Cordillera of northern Luzon Island, Philippines

Authors: Eric A. Rickart, Danilo S. Balete, Phillip A. Alviola, Maria J. Veluz, et al.

Publication title: Mammalia 80(6), January 2016

Abstract:

Faunas of old oceanic islands often have extremely high levels of endemism and are considered highly susceptible to anthropogenic disruption. We surveyed the richly endemic small mammal fauna on Mt. Amuyao in the Central Cordillera of northern Luzon Island, Philippines. We tested hypotheses regarding elevational patterns of species richness and community composition, community response to habitat disturbance, and interactions of native and non-native mammals. Our study revealed greater species richness and faunal heterogeneity within the Central Cordillera than previously suspected. We documented 15 native species (14 rodents and 1 insectivore), and two species of non-native rodents. All of the native species are endemic to the Philippines, eight being restricted to the Cordillera. Twelve of the 14 native rodents belong to two ancient endemic clades, indicating that most of the regional diversity is the product of

Full text available upon request to the author

Article title: Bat flies (Diptera: Nycteribiidae) from Mount Makiling, Luzon Island: New host and distribution records, with a checklist of species found in the Philippines

Authors: James D. V. Alvarez, Ireneo L. Lit, Jr., Phillip A. Alviola

Publication title: Check List 11(1):1509, January 2015

Abstract:

Our survey in Mount Makiling Forest Reserve, Luzon Island, Philippines from April to May 2011 revealed new host records of bat fly species (Diptera: Nycteribiidae), including: Eucampsipoda philippinensis Ferris, Cyclopodia garrula Maa, C. horsfieldi de Mejeire, Phthiridium brachyacantha (Theodor) and Penicillidia acuminata Theodor. We also report C. garrula as a new record for Luzon Island. A checklist of the species known from the Philippines with the known distribution and bat host species was also provided.

Full text available upon request to the author

Article title: A Multicountry Assessment of Tropical Resource Monitoring by Local Communities

Authors: Finn Danielsen, Per M. Jensen, Neil D. Burgess, Ronald Altamirano, et al.

Publication title: BioScience 64(3):236-251, March 2014

Abstract:

The rapid global growth of conservation schemes designed to incentivize local communities to conserve natural resources has placed new importance on biological monitoring to assess whether agreements and targets linked to payments are being met. To evaluate competence in natural resource monitoring, we compared data on status and trends collected independently by local-community members and trained scientists for 63 taxa and five types of resource use in 34 tropical forest sites across four countries over 2.5 years. We hypothesized that the results would vary according to differences in the education and value systems of the monitors. We found that, despite considerable differences in countries, cultures, and the types of natural resources monitored, the community members and the scientists produced similar results for the status of and trends in species and natural resources. Our findings highlight the potential value of locally based natural resource monitoring for conservation decisionmaking across developing countries.

Full text available upon request to the author

Article title: Phylogeography of the Robsonius Ground-Warblers (Passeriformes: Locustellidae) Reveals an Undescribed Species from Northeastern Luzon,

Philippines (La Filogeografía de Robsonius (Passeriformes: Locustellidae) Revela una Especie No Descripta del Noreste de Luzón, Filipinas)

Authors: Peter A. Hosner, Nikki C. Boggess, Phillip Alviola, Luis A. Sánchez-González, et al.

Publication title: The Condor 115(3): 630-639, August 2013

Abstract:

The Robsonius ground-warblers are forest birds endemic to the Luzon Island complex in the Philippine archipelago. Their systematic relationships have long remained ambiguous; until recently they were included in the timaliid genus Napothera. Two Robsonius species are currently recognized on the basis of plumage differences: R. rabori from northern Luzon in the Cordillera Central and the northern Sierra Madre, and R. sorsogonensis from southern Luzon and Catanduanes Island. Recent specimen collections, including the first adult specimen from the Cordillera Central, establish plumage differences between populations of R. rabori in the Cordillera Central and Sierra Madre and reveal a third diagnosable population within Luzon. These differences have gone unnoticed because R. rabori (sensu stricto) had been known only from the juvenile holotype. Molecular phylogenetic data further support the hypothesis that three highly divergent taxa occur across the Luzon Island complex: Robsonius rabori is known only from the northern Cordillera Central in Ilocos Norte; an undescribed taxon (formerly included in R. rabori) occurs in the northern Sierra Madre in Cagayan, Isabela, Aurora, and Nueva Vizcaya provinces; and R. sorsogonensis occurs in southern Luzon (Bulacan and Laguna provinces), the Bicol Peninsula, and on Catanduanes Island. The existence of three putatively allopatric species within the Luzon island complex highlights the role of in situ diversification in island systems, and brings attention to the need for forest conservation to protect geographically restricted populations throughout the Luzon Island complex.

Full text available upon request to the author

Article title: Diversity and Distribution of Small Mammals in the Bicol Volcanic Belt of Southern Luzon Island, Philippines diversity and distribution of Small Mammals in the Bicol Volcanic Belt of Southern Luzon Island, Philippines

Authors: Danilo S. Balete, Lawrence R. Heaney, Philip A. Alviola, Eric A. Rickart

Publication title: National Museum of the Philippines: Journal of Natural History, January 2013

Abstract:

We conducted a survey of non-volant small mammals in 2006-2008 in four areas of the Bicol Peninsula: Mt. Labo (peak 1544 m), Mt. Malinao (peak 1548 m), Saddle Peak (peak 1003 m), and Caramoan National Park (475 m). In 11,227 trap-nights we documented nine species, of which six were native and three were introduced. The native species consisted of one shrew and five rodents; the exotic species included one shrew and two rodents. Species diversity was comparatively low overall, with each mountain supporting from three to four species. None of the four species previously documented on Mt. Isarog (Archboldomys luzon-ensis, Batomys sp., Chrotomys gonzalesi, and Rhynchomys isarogensis) were present in these newly surveyed areas; the Chrotomys from Saddle Peak and Rhynchomys from Mt. Labo are of uncertain identity. We did not record any species of large Apomys (subgenus Megapomys), which are abundant in central and northern Luzon, indicating that these forest mice are absent on the Bicol Peninsula. We captured the exotic rodents only in heavily disturbed forest and subsistence farms in the lowlands; we found the introduced Asian house shrew, Suncus murinus, only in montane forest on Mt. Labo, ca. 1335-1413 m. Relative abundance of the native species was low overall, ranging from 0.32 to 3.31 individuals/100 trap-nights. The presence of the two possibly new species of Chrotomys and Rhynchomys, in addition to the four species endemic to Mt. Isarog, highlight the uniqueness of the Bicol mammal fauna. We recommend that Saddle Peak be designated and managed as a protected area similar to the other areas we surveyed for its importance as a watershed for the municipalities of Camarines Sur surrounding it and as habitat of endemic mammals.

Full text available upon request to the author

Article title: The small mammals of Mt. Anacuao, Northeastern Luzon Island, Philippines: a test of predictions of Luzon mammals biodiversity patterns

Authors: Danilo S. Balete, Lawrence R. Heaney, Philip A. Alviola, Eric A. Rickart, et al.

Publication title: National Museum of the Philippines: Journal of Natural History, January 2013

Abstract:

Our survey of the mammals of Mt. Anacuao, Aurora Province (peak at ca. 1850 m), from 1 April to 6 May 2010, from 940 m to near the peak, documented the presence of eight species of small mammals. One of these appears to be a previously unknown species of vine-mouse (Musseromys sp.), one (Soricomys musseri) is endemic to the Northern Sierra Madre (previously known only from Mt. Cetaceo), and four others are endemic to Luzon Island. Three species were documented only near the peak; two of these (Soricomys musseri and Musseromys sp.) are endemic to the northern Sierra Madre range, and the other (Chrotomys whiteheadi) represents the first record of this species in the entire Sierra Madre. Species richness was highest near the peak, and overall abundance (assessed as number per 100 trap-nights) increased with increasing elevation; this correlation was associated with increasing utilization of earthworms (and probably other invertebrates) as a food source. We captured no exotic pest rodents at our sampling areas, all of which were forested. The number of species on ten mountains that we have surveyed intensively is significantly correlated with the peak elevation of the mountain. Mt. Anacuao is an important watershed headwater for several provinces; coupled with the presence of several local endemic species , it thus deserves designation and management as a protected area. IntroductIon The Philippine Islands have been known for over acentury as a center of remarkable mammalian endemism, with especially high levels of species richness and endemism

Full text available upon request to the author

Article title: The mammals of Mt. Natib, Bataan Province, Luzon, Philippines

Authors: Eric A. Rickart, , Lawrence R. Heaney, Philip A. Alviola, Danilo S. Balete, et al.

Publication title: National Museum of the Philippines: Journal of Natural History, January 2013

Abstract:

Field surveys of the mammal fauna of Mt. Natib, Bataan Province, conducted in 1996 and 2005 documented a total of 20 species including nine bats, five native non-volant small mammals, two non-native small mammals, and four native large mammals. Several additional species of bats and two additional large mammals that are known to occur elsewhere in southwestern Luzon also probably occur on Mt. Natib. One native species, Apomys zambalensis, is endemic to Mt. Natib and the nearby Zambales Mountains and was the most abundant small mammal present. Survey results for non-volant mammals were consistent with predicted diversity of native species for a mountain of relatively low elevation, and strengthened a general pattern of a positive correlation between local species richness and elevation on Luzon. The occurrence of non-native species was strongly associated with highly disturbed habitats. Native species occurred across a broad range of disturbance conditions and were numerically dominant over non-natives even in the most disturbed situations. Results suggest that the Natib mammal fauna is highly tolerant of anthropogenic disturbance, perhaps reflecting a legacy of coping with periods of severe volcanic disturbance. IntroductIon The Bataan Peninsula of west-central Luzon is best known for its historical prominence as the seat of dramatic events that marked the opening of World War II in the Pacific, notably the three-month-long Battle of Bataan and the subsequent Death March (Morton, 1953). The natural history

Full text available upon request to the author

Article title: Nyctalus plancyi and Falsistrellus petersi (Chiroptera: Vespertilionidae) from Northern Luzon, Philippines: Ecology, Phylogeny, and Biogeographic Implications

Authors: Lawrence R. Heaney, Danilo S. Balete, Phillip Alviola, Eric A. Rickart, et al.

Publication title: Acta Chiropterologica 14(2): 265-278, December 2012

Abstract:

We report the first records of Nyctalus plancyi from the Philippines, on the basis of three specimens taken in high-elevation mossy forest in the Central Cordillera of northern Luzon. We also report three new specimens of Falsistrellus petersi in the same areas, previously a poorly known species within the Philippines, and provide the first genetic data on the phylogenetic position of the genus. Analysis of sequence data from the mitochondrial gene cytochrome b shows ca. 4% divergence of the Philippine N. plancyi from a sample from China. Combined sequence data from cytochrome b and the nuclear gene RAG2 confirm that N. plancyi is related to Pipistrellus. They further show that F. petersi is related to Hypsugo and Vespertilio, and Philetor brachypterus is related to Tylonycteris, with all of these taxa being members of the Vespertilionini, not the Pipistrellini. Nyctalus plancyi is the first mammal species documented to have colonized the main, oceanic body of the Philippines from the north (i.e., Taiwan or mainland China),rather than from the south (Borneo, Sulawesi, or New Guinea).

Full text available upon request to the author

Article title: Archboldomys (Muridae: Murinae) Reconsidered: A New Genus and Three New Species of Shrew Mice from Luzon Island, Philippines

Authors: Danilo S. Balete, Eric A. Rickart, Lawrence R. Heaney, Phillip A. Alviola, et al.

Publication title: Bulletin of the American Museum of Natural History 3754(3754):1-60, September 2012

Abstract:

Shrew mice of the genus Archboldomys are poorly known members of an endemic clade of vermivorous/insectivorous murid rodents confined to Luzon Island, Philippines. Three species of these small, ground-living, diurnal mice were previously known, all from a handful of specimens from a few localities. The pattern of morphological and genetic differentiation among additional specimens of shrew mice from our recent field surveys in the Central Cordillera and Sierra Madre

mountains of Luzon document the presence of two distinct species groups within Archboldomys as previously defined, as well as three new species. Gene-sequence data from the mitochondrial cytochrome b and nuclear IRBP genes confirm the existence of six distinct species, but also show that Archboldomys, as previously defined, is composed of two clades that are not sister taxa. Reevaluation of the presumed morphological synapomorphies among these shrew mice, together with analyses of karyological and gene-sequence data, support the following: (1) erection of Soricomys, new genus; (2) transfer of A. kalinga and A. musseri to Soricomys; and (3) recognition of Archboldomys maximus, n. sp., Soricomys leonardocoi, n. sp., and Soricomys montanus, n. sp. The new genus and species are described, and their phylogenetic relationships, biogeography, and conservation are discussed.

Full text available upon request to the author

Article title: Genomic and serological detection of bat coronavirus from bats in the Philippines

Authors: Shumpei Tsuda, Shumpei Watanabe, Joseph S Masangkay, Tetsuya Mizutani, et al.

Publication title: Archives of Virology 157(12): 2349-55, December 2012

Abstract:

Bat coronavirus (BtCoV) is assumed to be a progenitor of severe acute respiratory syndrome (SARS)-related coronaviruses. To explore the distribution of BtCoVs in the Philippines, we collected 179 bats and detected viral RNA from intestinal or fecal samples by RT-PCR. The overall prevalence of BtCoVs among bats was 29.6 %. Phylogenetic analysis of the partial RNA-dependent RNA polymerase gene suggested that one of the detected BtCoVs was a novel alphacoronavirus, while the others belonged to the genus Betacoronavirus. Western blotting revealed that 66.5 % of bat sera had antibodies to BtCoV. These surveys suggested the endemic presence of BtCoVs in the Philippines.

Full text available upon request to the author

Article title: Reston Ebolavirus Antibodies in Bats, the Philippines

Authors: Satoshi Taniguchi, Shumpei Watanabe, Joseph S. Masangkay, Tsutomu Omatsu, et al.
Publication title: Emerging Infectious Diseases 17(8): 1559-60, August 2011

Abstract:
Filoviruses cause highly lethal hemorrhagic fever in humans and nonhuman primates, except for Reston Ebolavirus (REBOV), which causes severe hemorrhagic fever in macaques (1,2). REBOV epizootics among cynomolgus macaques occurred in 1989, 1990, 1992, and 1996 (2) and among swine in 2008 (3). African fruit bats have been suggested to be natural reservoirs for Zaire Ebolavirus and Marburg virus (4–6). However, the natural reservoir of REBOV in the Philippines is unknown. Thus, we determined the prevalence of REBOV antibody–positive bats in the Philippines.

Permission for this study was obtained from the Department of Environment and Natural Resources, the Philippines, before collecting bat specimens. Serum specimens from 141 wild-caught bats were collected at several locations during 2008–2009. The bat species tested are summarized in the Table. Captured bats were humanely killed and various tissues were obtained. Carcasses were then provided to the Department of Environment and Natural Resources for issuance of a transport permit.
Full text available upon request to the author

Article title: Bat Coronaviruses and Experimental Infection of Bats, the Philippines
Authors: Shumpei Watanabe, Joseph S. Masangkay, Noriyo Nagata, Shigeru Morikawa, et al.
Publication title: Emerging Infectious Diseases 16(8): 1217-23, August 2010

Abstract:
Fifty-two bats captured during July 2008 in the Philippines were tested by reverse transcription-PCR to detect bat coronavirus (CoV) RNA. The overall prevalence of virus RNA was 55.8%. We found 2 groups of sequences that belonged to group 1 (genus Alphacoronavirus) and group 2 (genus Betacoronavirus) CoVs. Phylogenetic

analysis of the RNA-dependent RNA polymerase gene showed that groups 1 and 2 CoVs were similar to Bat-CoV/China/A515/2005 (95% nt sequence identity) and Bat-CoV/HKU9-1/China/2007 (83% identity), respectively. To propagate group 2 CoVs obtained from a lesser dog-faced fruit bat (Cynopterus brachyotis), we administered intestine samples orally to Leschenault rousette bats (Rousettus leschenaulti) maintained in our laboratory. After virus replication in the bats was confirmed, an additional passage of the virus was made in Leschenault rousette bats, and bat pathogenesis was investigated. Fruit bats infected with virus did not show clinical signs of infection.

Full text available upon request to the author

Article title: Detection of a new bat gammaherpesvirus in the Philippines

Authors: Shumpei Watanabe, Naoya Ueda, Koichiro Iha, Joseph S. Masangkay, et al.

Publication title: Virus Genes 39(1): 90-3, June 2009

Abstract:

A new bat herpesvirus was detected in the spleen of an insectivorous bat (Hipposideros diadema, family Hipposideridae) collected on Panay Island, the Philippines. PCR analyses were performed using COnsensus-DEgenerate Hybrid Oligonucleotide Primers (CODEHOPs) targeting the herpesvirus DNA polymerase (DPOL) gene. Although we obtained PCR products with CODEHOPs, direct sequencing using the primers was not possible because of high degree of degeneracy. Direct sequencing technology developed in our rapid determination system of viral RNA sequences (RDV) was applied in this study, and a partial DPOL nucleotide sequence was determined. In addition, a partial gB gene nucleotide sequence was also determined using the same strategy. We connected the partial gB and DPOL sequences with long-distance PCR, and a 3741-bp nucleotide fragment, including the 3' part of the gB gene and the 5' part of the DPOL gene, was finally determined. Phylogenetic analysis showed that the sequence was novel and most similar to those of the subfamily Gammaherpesvirinae.

Full text available upon request to the author

Article title: Local Participation in Natural Resource Monitoring: a Characterization of Approaches

Authors: Finn Danielsen, Neil D. Burgess, Andrew Balmford, Paul F. Donald, et al.

Publication title: Conservation Biology : The Journal of the Society for Conservation Biology 2008

Abstract:

The monitoring of trends in the status of species or habitats is routine in developed countries, where it is funded by the state or large nongovernmental organizations and often involves large numbers of skilled amateur volunteers. Far less monitoring of natural resources takes place in developing countries, where state agencies have small budgets, there are fewer skilled professionals or amateurs, and socioeconomic conditions prevent development of a culture of volunteerism. The resulting lack of knowledge about trends in species and habitats presents a serious challenge for detecting, understanding, and reversing declines in natural resource values. International environmental agreements require signatories undertake systematic monitoring of their natural resources, but no system exists to guide the development and expansion of monitoring schemes. To help develop such a protocol, we suggest a typology of monitoring categories, defined by their degree of local participation, ranging from no local involvement with monitoring undertaken by professional researchers to an entirely local effort with monitoring undertaken by local people. We assessed the strengths and weaknesses of each monitoring category and the potential of each to be sustainable in developed or developing countries. Locally based monitoring is particularly relevant in developing countries, where it can lead to rapid decisions to solve the key threats affecting natural resources, can empower local communities to better manage their resources, and can refine sustainable-use strategies to improve local livelihoods. Nevertheless, we recognize that the accuracy and precision of the monitoring undertaken by local communities in different situations needs further study and field protocols need to be further developed to get the best from the unrealized potential of this approach. A challenge to conservation biologists is to identify and establish the monitoring system most relevant to a particular situation and to develop methods to integrate outputs from

across the spectrum of monitoring schemes to produce wider indices of natural resources that capture the strengths of each.

Full text available upon request to the author

Article title: Increasing Conservation Management Action by Involving Local People in Natural Resource Monitoring

Authors: Finn Danielsen, Marlynn M. Mendoza, Anson Tagtag, Phillip A. Alviola, et al.

Publication title: AMBIO A Journal of the Human Environment 36(7):566-70, December 2007

Abstract:

There is a need for a better understanding of the status of the environment. At the same time, concerns have been raised regarding alienation of the local populace from environmental decisions. One proposed solution is participatory environmental monitoring. When evaluating the usefulness of environmental monitoring, the focus may be on accuracy, as is usually done by scientists, or on efficiency in terms of conservation impact. To test whether investment in participatory biodiversity monitoring makes economic sense for obtaining data for management decisions, we compared the cost efficiency of participatory and conventional biodiversity monitoring methods in Philippine parks. We found that, from a government perspective, investment in monitoring that combines scientific with participatory methods is strikingly more effective than a similar level of investment in conventional scientific methods alone in generating conservation management interventions. Moreover, the local populace seemed to benefit from more secure de facto user rights over land and other resources. Participatory biodiversity monitoring not only represents a cost-effective alternative when conventional monitoring is impossible, but it is also an unexpectedly powerful complementary approach, capable of generating a much higher level of conservation management intervention, where conventional monitoring already takes place.

Full text available upon request to the author

Article title: Report on a Survey of Mammals of the Sierra Madre Range, Luzon Island, Philippines

Authors: Mariano Roy M. Duya, Phillip A. Alviola, Melizar V. Duya, Danilo S. Balete, et al.

Publication title: Archives 4(1), 2007

Abstract:

An inventory of mammals was undertaken at 11 localities along the Sierra Madre range in 2002 to 2005, in areas where few or no data were available previously. The inventory included lowland and montane forest habitats, at elevations from 300 to 1500 m. Thirty-eight species of mammals were recorded, including nine new records for the mountain range. One species, Kerivoula cf. papillosa, had not been recorded previously from the Philippines, and one, Coelops hirsutus, was known previously only from Mindanao and Mindoro Islands. Two species, in the genera Apomys and Chrotomys, may represent previously unknown species. We captured Archboldomys musseri only on Mt. Cetaceo, supporting previous evidence that it is endemic only to that mountain.

A modified mist-netting technique (V-net) for insectivorous bats was effectively used to capture these species. The new records clearly demonstrate that the mammalian fauna of the Sierra Madre is poorly known. Surveys of many additional areas are needed in all known habitat types along the Sierra Madre, especially karst, ultrabasic, and mossy forest, to fully document its diversity.

Full text available upon request to the author

Article title: Does Monitoring Matter? A Quantitative Assessment of Management Decisions from Locally-based Monitoring of Protected Areas

Authors: Finn Danielsen, Arne E. Jensen, Phillip A. Alviola, Danilo S. Balete, et al.

Publication title: Biodiversity and Conservation 14: 2633–2652, 2005

Abstract:

Biodiversity monitoring is criticized for being insufficiently relevant to the needs of managers and ineffective in integrating information into decision-making. We examined conservation management interventions resulting from 2½years of monitoring by 97 rangers and 350 community volunteers over 1million hectares of Philippine protected areas. Before this monitoring scheme was established, there was little collaboration between local people and park authorities, and park monitoring was restricted to assessments of the quantity of extracted timber. As a result of the scheme, 156 interventions were undertaken in terrestrial, marine and freshwater ecosystems. In total 98% of these interventions were meaningful and justified, 47% targeted the three most serious threats to biodiversity at the site, and 90% were implemented without external support, suggesting that the interventions were relevant and could be sustained over time at the local level. The mean time from sampling to decision-making was only 97days, probably because 82% of the interventions were initiated by the same people and institutions that had compiled the underlying data, bypassing potential government bureaucracy. Many of the interventions were jointly undertaken by community members and the management authorities or consisted of local bylaws in support of park management. As a result of the monitoring, indigenous resource use regulation schemes were re-established with government recognition in several parks. The monitoring led to more diversified and realistic management responses on the part of the authorities, including a more socially acceptable and effective approach to enforcement. Of the four field monitoring techniques used, the most participatory one generated more interventions aimed at ensuring a continued resource supply for local communities ($\chi 23 = 69.1$, $p<0.01$). Although this suggests that the interest of community members is associated with their possibilities to influence the flow of ecosystem goods and services, the 156 interventions targeted, directly or indirectly, all known globally threatened species of mammals, birds and butterflies in the parks.

Full text available upon request to the author

Article title: Biodiversity monitoring in developing countries: What are we trying to achieve?

Authors: Finn Danielsen, Marlynn M. Mendoza, Phillip Alviola, Danny S. Balete, et al.
Publication title: Oryx 37(04):407 - 409, October 2003

Abstract:
No available
Full text available upon request to the author

Article title: On participatory biodiversity monitoring and its applicability–a reply to Yoccoz et al. and Rodríguez
Authors: Finn Danielsen, Marlynn M. Mendoza, Anson Tagtag, Phillip Alviola
Publication title: Oryx 37(04):412, October 2003

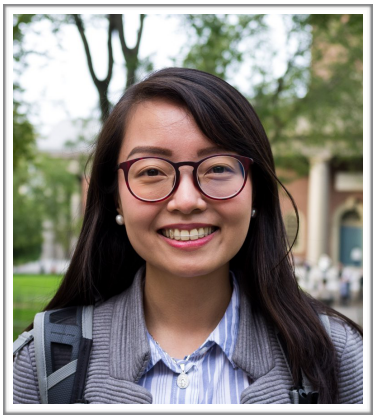
Abstract:
No abstract
Full text available upon request to the author

Article title: Herpetofauna of Puerto Galera, Mindoro Island, Philippines
Authors: Alviola, P.A.; Gonzales, J.C.T.; Dans, A.T.L.; Afuang, L.E.; et al.
Publication title: Technical Journal of Philippine Ecosystems and Natural Resources, January 1998

Abstract:
A total of 32 species of herpetofauna, including 15 endemic species, were recorded in different habitat types on Mount Malasimbo, Puerto Galera, Oriental Mindoro. Standard transect methods were used in conducting the survey. The amphibians accounted for 11 species representing five families, while the 21 species of reptiles from nine families included 13 lizards and eight snake species. Total species count and endemicity were highest at the primary forest area (15 endemics of the 22 species), followed by the secondary forest (seven endemic out of 13 species). The agroforestry area had the lowest number of recorded species (a total of 11 species), which were mostly commensal species and no endemics. Notable species include

two probable new species of Mindoro endemic, a pelobatid (Leptobrachium sp.) and an anglehead (Gonocephalus sp.)

Full text available upon request to the author



Kamela Charmaine S. Ng

Sex: Female

Education:

Research Fellow, Harvard Medical School

Doctor of Philosophy in Transdisciplinary Global Health Solutions, University of Amsterdam & University of Barcelona, Netherlands, Spain, Belgium

Master of Science in Microbiology, University of the Philippines Diliman

Bachelor of Science in Biology, University of the Philippines Diliman

Field of Specialization

Antimicrobial Susceptibility Testing

Antimicrobial Resistance

Microbial Molecular Biology

Diagnostic Microbiology

Molecular Bacteriology

Infectious Diseases Epidemiology

Researches:

Article title: One hundred thirty-three observed COVID-19 deaths in 10 months: unpacking lower than predicted mortality in Rwanda

Authors: Clarisse Musanabaganwa, Vincent Cubaka, Etienne Mpabuka, Muhammed Semakula, et al.

Publication title: BMJ Global Health 6(2):e004547, February 2021

Abstract:

The African region was predicted to have worse COVID-19 infection and death rates due to challenging health systems and social determinants of health. However, in the 10 months after its first case, Rwanda recorded 10316 cases and 133 COVID-19-related deaths translating to a case fatality rate (CFR) of 1.3%, which raised the question: why does Rwanda have a low COVID-19 CFR? Here we analysed COVID-19 data and explored possible explanations to better understand the disease burden in the context of Rwanda's infection control strategies.We investigated whether the age distribution plays a role in the observed low CFR in Rwanda by comparing the expected number of deaths for 10-year age bands based on the CFR reported in other countries with the observed number of deaths for each age group. We found that the age-specific CFRs in Rwanda are similar to or, in some older age groups, slightly higher than those in other countries, suggesting that the lower population level CFR reflects the younger age structure in Rwanda, rather than a lower risk of death conditional on age. We also accounted for Rwanda's comprehensive SARS-CoV-2 testing strategies and reliable documentation of COVID-19-related deaths and deduced that these measures may have allowed them to likely identify more asymptomatic or mild cases than other countries and reduced their reported CFR.Overall, the observed low COVID-19 deaths in Rwanda is likely influenced by the combination of effective infection control strategies, reliable identification of cases and reporting of deaths, and the population's young age structure.

Full text available upon request to the author

Article title: False Rifampicin Resistance in Xpert Ultra Applied to Lymph Node Aspirate: A Case Report

Authors: Kamela C.S. Ng, Leen Rigouts, Bouke C. deJong, and Lutgarde Lynen

Publication title: Open Forum Infectious Diseases 7(6), June 2020

Abstract:

A 36-year-old male patient was diagnosed with tuberculosis in Antwerp, Belgium in May 2018. His lymph node aspirate initially tested rifampicin resistant in Xpert

MTB/RIF Ultra, but tested susceptible in all other tests including targeted deep sequencing, due to a rare matrix effect in the Xpert MTB/RIF Ultra reaction tube.
Full text available upon request to the author

Article title: How well do routine molecular diagnostics detect rifampicin heteroresistance in Mycobacterium tuberculosis?
Authors: Kamela C. S. Ng, Philip Supply, Frank G. J. Cobelens, Cyril Gaudin, et al.
Publication title: Journal of Clinical Microbiology 57(11):e00717-19, October 2019

Abstract:
Rifampin heteroresistance-where rifampin-resistant and -susceptible tuberculosis (TB) bacilli coexist-may result in failed standard TB treatment and potential spread of rifampin-resistant strains. The detection of rifampin heteroresistance in routine rapid diagnostic tests (RDTs) allows for patients to receive prompt and effective multidrug-resistant-TB treatment and may improve rifampin-resistant TB control. The limit of detection (LOD) of rifampin heteroresistance for phenotypic drug susceptibility testing by the proportion method is 1% and, yet, is insufficiently documented for RDTs. We, therefore, aimed to determine, for the four RDTs (XpertMTB/RIF, XpertMTB/RIF Ultra, GenoTypeMTBDRplusv2.0, and GenoscholarNTM+MDRTBII), the LOD per probe and mutation, validated by CFU counting and targeted deep sequencing (Deeplex-MycTB). We selected one rifampin-susceptible and four rifampin-resistant strains, with mutations D435V, H445D, H445Y, and S450L, respectively, mixed them in various proportions in triplicate, tested them with each RDT, and determined the LODs per mutation type. Deeplex-MycTB revealed concordant proportions of the minority resistant variants in the mixtures. The Deeplex-MycTB-validated LODs ranged from 20% to 80% for XpertMTB/RIF, 20% to 70% for Xpert Ultra, 5% to 10% for GenoTypeMTBDRplusv2.0, and 1% to 10% for GenoscholarNTM+MDRTBII for the different mutations. Deeplex-MycTB, GenoTypeMTBDRplusv2.0, and GenoscholarNTM+MDRTBII provide explicit information on rifampin heteroresistance for the most frequently detected mutations. Classic Xpert and Ultra report rifampin heteroresistance as rifampin resistance, while Ultra may denote

rifampin heteroresistance through "mixed patterns" of wild-type and mutant melt probe, melt peak temperatures. Overall, our findings inform end users that the threshold for reporting resistance in the case of rifampin heteroresistance is the highest for Classic Xpert and Ultra to resolve phenotypic and genotypic discordant rifampin-resistant TB results.

Full text available upon request to the author

Article title: How Well Do Routine Molecular Diagnostics Detect Rifampin Heteroresistance in Mycobacterium tuberculosis?

Authors: Kamela C. S. Ng, Philip Supply, Frank G. J. Cobelens, Cyril Gaudin, Julian Gonzalez-Martin, et al.

Publication title: Journal of Clinical Microbiology 57(11), August 2019

Abstract:

Rifampicin heteroresistance – where rifampicin-resistant and -susceptible tuberculosis (TB) bacilli co-exist – may result in failed standard TB treatment and potential spread of rifampicin-resistant strains. Detection of rifampicin heteroresistance in routine rapid diagnostic tests (RDTs) allows for patients to receive prompt and effective multidrug-resistant-TB treatment, and may improve rifampicin-resistant TB control. The limit of detection (LOD) of rifampicin heteroresistance for phenotypic drug susceptibility testing by the proportion method is 1%, yet is insufficiently documented for RDTs. We therefore aimed to determine, for the four RDTs (XpertMTB/RIF, XpertMTB/RIF Ultra, GenoTypeMTBDR plus v2.0, and GenoscholarNTM+MDRTBII), the LOD per probe and mutation, validated by colony-forming-unit-counting and targeted deep sequencing (Deeplex-MycTB). We selected one rifampicin-susceptible and four rifampicin-resistant strains, with mutation D435V, H445D, H445Y, and S450L respectively, mixed them in various proportions in triplicate, tested them with each RDT, and determined the LODs per mutation type. Deeplex-MycTB revealed concordant proportions of the minority resistant variants in the mixtures. The Deeplex-MycTB-validated-LODs ranged from 20-80% for XpertMTB/RIF, 20-70% for Xpert Ultra, 5-10% for GenoTypeMTBDR plus v2.0, and 1-10% for GenoscholarNTM+MTBII for the different mutations. Deeplex-

MycTB, GenoTypeMTBDR plus v2.0, and GenoscholarNTM+MDRTBII, provide explicit information on rifampicin heteroresistance for the most frequently detected mutations. Classic Xpert and Ultra report rifampicin heteroresistance as rifampicin resistance, while Ultra may denote rifampicin heteroresistance through 'mixed patterns' of wild-type and mutant melt probe melt peak temperatures. Overall, our findings inform end-users that the threshold for reporting resistance in case of rifampicin heteroresistance is the highest for Classic Xpert and Ultra, to resolve phenotypic and genotypic discordant rifampicin-resistant TB results.

Full text available upon request to the author

Article title: Bridging the TB data gap: in silico extraction of rifampicin-resistant tuberculosis diagnostic test results from whole genome sequence data

Authors: Kamela C. S. Ng, Jean Claude S. Ngabonziza, Pauline Lempens, Bouke C. de Jong, et al.

Publication title: PeerJ 7(1):e7564, August 2019

Abstract:

Background Mycobacterium tuberculosis rapid diagnostic tests (RDTs) are widely employed in routine laboratories and national surveys for detection of rifampicin-resistant (RR)-TB. However, as next-generation sequencing technologies have become more commonplace in research and surveillance programs, RDTs are being increasingly complemented by whole genome sequencing (WGS). While comparison between RDTs is difficult, all RDT results can be derived from WGS data. This can facilitate continuous analysis of RR-TB burden regardless of the data generation technology employed. By converting WGS to RDT results, we enable comparison of data with different formats and sources particularly for low- and middle-income high TB-burden countries that employ different diagnostic algorithms for drug resistance surveys. This allows national TB control programs (NTPs) and epidemiologists to utilize all available data in the setting for improved RR-TB surveillance. Methods We developed the Python-based MycTB Genome to Test (MTBGT) tool that transforms WGS-derived data into laboratory-validated results of the primary RDTs—Xpert MTB/RIF, XpertMTB/RIF Ultra, GenoType MDRTB plus

v2.0, and GenoscholarNTM+MDRTB II. The tool was validated through RDT results of RR-TB strains with diverse resistance patterns and geographic origins and applied on routine-derived WGS data. Results The MTBGT tool correctly transformed the single nucleotide polymorphism (SNP) data into the RDT results and generated tabulated frequencies of the RDT probes as well as rifampicin-susceptible cases. The tool supplemented the RDT probe reactions output with the RR-conferring mutation based on identified SNPs. The MTBGT tool facilitated continuous analysis of RR-TB and Xpert probe reactions from different platforms and collection periods in Rwanda. Conclusion Overall, the MTBGT tool allows low- and middle-income countries to make sense of the increasingly generated WGS in light of the readily available RDT results, and assess whether currently implemented RDTs adequately detect RR-TB in their setting. With its feature to transform WGS to RDT results and facilitate continuous RR-TB data analysis, the MTBGT tool may bridge the gap between and among data from periodic surveys, continuous surveillance, research, and routine tests, and may be integrated within the national information system for use by the NTP and epidemiologists to improve setting-specific RR-TB control. The MTBGT source code and accompanying documentation are available at https://github.com/KamelaNg/MTBGT .

Full text available upon request to the author

Article title: Variable ability of rapid tests to detect Mycobacterium tuberculosis rpoB mutations conferring phenotypically occult rifampicin resistance

Authors: Gabriela Torrea, Kamela C. S. Ng, Armand Van Deun, Emmanuel André, et al.

Publication title: Scientific Reports 9(1), August 2019

Abstract:

We compared the ability of commercial and non-commercial, phenotypic and genotypic rapid drug susceptibility tests (DSTs) to detect rifampicin resistance (RR)-conferring 'disputed' mutations frequently missed by Mycobacterium Growth Indicator Tube (MGIT), namely L430P, D435Y, L452P, and I491F. Strains with mutation S450L served as positive control while wild-types were used as negative

control. Of the 38 mutant strains, 5.7% were classified as RR by MGIT, 16.2% by Trek Sensititre MYCOTB MIC plate, 19.4% by resazurin microtiter plate assay (REMA), 50.0% by nitrate reductase assay (NRA), and 62.2% by microscopic observation direct susceptibility testing (MODS). Reducing MGIT rifampicin concentration to 0.5 µg/ml, and/or increasing incubation time, enhanced detection of disputed mutations from 5.7% to at least 65.7%, particularly for mutation I491F (from 0.0 to 75.0%). Compared with MGIT at standard pre-set time with 0.25 µg/ml ECOFF as breakpoint, we found a statistically significant increase in the ability of MGIT to resolve disputed mutants and WT strains at extended incubation period of 15 and 21 days, with 0.5 µg/ml and 1 µg/ml ECOFF respectively. MODS detected 75.0% of the I491F strains and NRA 62.5%, while it was predictably missed by all molecular assays. Xpert MTB/RIF, Xpert Ultra, and GenoscholarTB-NTM + MDRTB detected all mutations within the 81 bp RR determining region. Only GenoType MTBDRplus version 2 missed mutation L430P in 2 of 11 strains. Phenotypic and genotypic DSTs varied greatly in detecting occult rifampicin resistance. None of these methods detected all disputed mutations without misclassifying wild-type strains.

Full text available upon request to the author

Article title: Bridging the TB data gap: in silico extraction of rifampicin-resistant tuberculosis diagnostic test results from whole genome sequence data

Authors: Kamela C. S. Ng, Jean Claude S. Ngabonziza, Pauline Lempens, Bouke C. de Jong, et al.

Publication title: PeerJ 7:e7564, August 2019

Abstract:

Background: Mycobacterium tuberculosis rapid diagnostic tests (RDTs) are widely employed in routine laboratories and national surveys for detection of rifampicin-resistant (RR)-TB. However, as next-generation sequencing technologies have become more commonplace in research and surveillance programs, RDTs are being increasingly complemented by whole genome sequencing (WGS). While comparison between RDTs is difficult, all RDT results can be derived from WGS data. This can facilitate continuous analysis of RR-TB burden regardless of the data generation

technology employed. By converting WGS to RDT results, we enable comparison of data with different formats and sources particularly for low- and middle-income high TB-burden countries that employ different diagnostic algorithms for drug resistance surveys. This allows national TB control programs (NTPs) and epidemiologists to utilize all available data in the setting for improved RR-TB surveillance.

Methods: We developed the Python-based MycTB Genome to Test (MTBGT) tool that transforms WGS-derived data into laboratory-validated results of the primary RDTs-Xpert MTB/RIF, XpertMTB/RIF Ultra, GenoType MDRTBplus v2.0, and GenoscholarNTM+MDRTB II. The tool was validated through RDT results of RR-TB strains with diverse resistance patterns and geographic origins and applied on routine-derived WGS data.

Results: The MTBGT tool correctly transformed the single nucleotide polymorphism (SNP) data into the RDT results and generated tabulated frequencies of the RDT probes as well as rifampicin-susceptible cases. The tool supplemented the RDT probe reactions output with the RR-conferring mutation based on identified SNPs. The MTBGT tool facilitated continuous analysis of RR-TB and Xpert probe reactions from different platforms and collection periods in Rwanda.

Conclusion: Overall, the MTBGT tool allows low- and middle-income countries to make sense of the increasingly generated WGS in light of the readily available RDT results, and assess whether currently implemented RDTs adequately detect RR-TB in their setting. With its feature to transform WGS to RDT results and facilitate continuous RR-TB data analysis, the MTBGT tool may bridge the gap between and among data from periodic surveys, continuous surveillance, research, and routine tests, and may be integrated within the national information system for use by the NTP and epidemiologists to improve setting-specific RR-TB control. The MTBGT source code and accompanying documentation are available at https://github.com/KamelaNg/MTBGT.

Full text available upon request to the author

Article title: Whole genome sequencing and single nucleotide polymorphisms in multi-drug resistant clinical isolates of Mycobacterium tuberculosis from the Philippines

Authors: Marylette B. Roa, Francis A. Tablizo, El King D. Morado, Lovette F. Cunanan, et al.

Publication title: Journal of Global Antimicrobial Resistance 15:239-245, December 2018

Abstract:

Objectives: Thousands of cases of multidrug-resistant tuberculosis (TB) have been observed in the Philippines, but studies on the Mycobacterium tuberculosis (MTB) genotypes that underlie the observed drug resistance profiles are lacking. This study aimed to analyse the whole genomes of clinical MTB isolates representing various resistance profiles to identify single nucleotide polymorphisms (SNPs) in resistance-associated genes.

Methods: The genomes of ten MTB isolates cultured from banked sputum sources were sequenced. Bioinformatics analysis consisted of assembly, annotation and SNP identification in genes reported to be associated with resistance to isoniazid (INH), rifampicin (RIF), ethambutol (ETH), streptomycin, pyrazinamide (PZA) and fluoroquinolones (FQs).

Results: The draft assemblies covered an average of 97.08% of the expected genome size. Seven of the ten isolates belonged to the Indo-Oceanic lineage/EA12-Manila clade. Two isolates were classified into the Euro-American lineage, whilst the pre-XDR (pre-extensively drug-resistant) isolate was classified under the East Asian/ Beijing clade. The SNPs katG Ser315Thr, rpoB Ser450Leu and embB Met306Val were found in INH- (4/7), RIF- (3/6) and ETH-resistant (2/6) isolates, respectively, but not in susceptible isolates. Mutations in the inhA promoter and in the pncA and gyrA genes known to be involved in resistance to INH, PZA and FQs, respectively, were also identified.

Conclusions: This study represents the first effort to investigate the whole genomes of Philippine clinical strains of MTB exhibiting various multidrug resistance profiles. Whole-genome data can provide valuable insights to the mechanistic and epidemiological qualities of TB in a high-burden setting such as the Philippines.
Full text available upon request to the author

Article title: Xpert Ultra Can Unambiguously Identify Specific Rifampin Resistance-Conferring Mutations
Authors: Kamela C. S. Ng, Armand van Deun, Conor J. Meehan, Gabriela Torrea, et al.
Publication title: Journal of Clinical Microbiology 56(9):e00686-18, August 2018

Abstract:
No available
Full text available upon request to the author

Article title: Potential Application of Digitally Linked Tuberculosis Diagnostics for Real-Time Surveillance of Drug-Resistant Tuberculosis Transmission: Validation and Analysis of Test Results
Authors: Kamela Charmaine Ng, Conor Joseph Meehan, Gabriela Torrea, Léonie Goeminne, et al.
Publication title: JMIR Medical Informatics 6(1):e12, February 2018

Abstract:
Tuberculosis (TB) is the highest-mortality infectious disease in the world and the main cause of death related to antimicrobial resistance, yet its surveillance is still paper-based. Rifampicin-resistant TB (RR-TB) is an urgent public health crisis. The World Health Organization has, since 2010, endorsed a series of rapid diagnostic tests (RDTs) that enable rapid detection of drug-resistant strains and produce large volumes of data. In parallel, most high-burden countries have adopted connectivity solutions that allow linking of diagnostics, real-time capture, and shared repository of these test results. However, these connected diagnostics and readily available test

results are not used to their full capacity, as we have yet to capitalize on fully understanding the relationship between test results and specific rpoB mutations to elucidate its potential application to real-time surveillance.

Full text available upon request to the author

Article title: Bioactivity of crude ethanolic and hexane extracts from Sargassum siliquosum JG agardh against fish pathogens

Authors: Ourlad Alzeus G. Tantengco, Adrienne Cornelia Marie Therese A. Mathay, Kamela Charmaine S. Ng

Publication title: International Journal of Biosciences 6(9): 55-61, 2015

Abstract:

Microorganisms pathogenic to fish lead to morbidity-linked economic losses and pose threat to human and animal health. Organisms that have potent antimicrobial properties against fish pathogens include brown seaweeds. This study determined the antimicrobial activity of the crude extracts of Sargassum siliquosum through Disc Diffusion Assay. The ethanol extract of S. siliquosum was found to exhibit antibacterial activity against P. aeruginosa, P. vulgaris and A. hydrophila with zones of inhibition of 13.17 ± 0.42 mm and 16.08 ± 1.81 mm and 12.52 ± 2.17 mm, respectively. The hexane extract had a 16.0 ± 0 mm zone of inhibition against P. vulgaris. This investigation reveals that S. siliquosum is a potential source of bioactive compounds against disease-causing fish pathogens.

Full text available upon request to the author

Article title: Multiplex PCR–Based Serogrouping and Serotyping of Salmonella enterica from Tonsil and Jejunum with Jejunal Lymph Nodes of Slaughtered Swine in Metro Manila, Philippines

Authors: Kamela Charmaine S. Ng and Windell L. Rivera

Publication title: Journal of Food Protection 78(5):873-80, May 2015

Abstract:

Food poisoning outbreaks and livestock mortalities caused by Salmonella enterica are widespread in the Philippines, with hogs being the most commonly recognized

carriers of the pathogen. To prevent and control the occurrence of S. enterica infection in the country, methods were used in this study to isolate and rapidly detect, differentiate, and characterize S. enterica in tonsils and jejuna with jejunal lymph nodes of swine slaughtered in four locally registered meat establishments (LRMEs) and four meat establishments accredited by the National Meat Inspection Services in Metro Manila. A total of 480 samples were collected from 240 animals (120 pigs from each type of meat establishment). A significantly higher proportion of pigs were positive for S. enterica in LRMEs (60 of 120) compared with meat establishments accredited by the National Meat Inspection Services (38 of 120). More S. enterica–positive samples were found in tonsils compared with jejuna with jejunal lymph nodes in LRMEs, but this difference was not significant. A PCR assay targeting the invA gene had sensitivity that was statistically similar to that of the culture method, detecting 93 of 98 culture-confirmed samples. Multiplex PCR–based O-serogrouping and H/Sdf I typing revealed four S. enterica serogroups (B, C1, D, and E) and six serotypes (Agona, Choleraesuis, Enteritidis, Heidelberg, Typhimurium, and Weltevreden), respectively, which was confirmed by DNA sequencing of the PCR products. This study was the first to report detection of S. enterica serotype Agona in the country.

Full text available upon request to the author

Article title: Antimicrobial Resistance of Salmonella enterica Isolates from Tonsil and Jejunum with Lymph Node Tissues of Slaughtered Swine in Metro Manila, Philippines

Authors: Kamela Charmaine S. Ng and Windell L. Rivera

Publication title: ISRN Microbiology 2014(4):364265, March 2014

Abstract:

Due to frequent antibiotic exposure, swine is now recognized as potential risk in disseminating drug-resistant Salmonella enterica strains. This study thus subjected 20 randomly selected S. enterica isolates from tonsil and jejunum with lymph node (JLN) tissues of swine slaughtered in Metro Manila, Philippines, to VITEK 2 antimicrobial susceptibility testing (AST). The test revealed all 20 isolates had resistance to at least one antimicrobial agent, in which highest occurrence of resistance was to amikacin (100%), cefazolin (100%), cefuroxime (100%), cefuroxime axetil (100%), cefoxitin (100%), and gentamicin (100%), followed by ampicillin (50%),

and then by sulfamethoxazole trimethoprim (30%). Three multidrug-resistant (MDR) isolates were detected. The sole S. enterica serotype Enteritidis isolate showed resistance to 12 different antibiotics including ceftazidime, ceftriaxone, amikacin, gentamicin, and tigecycline. This study is the first to report worldwide on the novel resistance to tigecycline of MDR S. enterica serotype Enteritidis isolated from swine tonsil tissues. This finding poses huge therapeutic challenges since MDR S. enterica infections are associated with increased rate of hospitalization or death. Thus, continual regulation of antimicrobial use in food animals and prediction of resistant serotypes are crucial to limit the spread of MDR S. enterica isolates among hogs and humans.

Full text available upon request to the author