



SPHERES

Specialized Philippine Enterprise Reference of Experts and Scientists

Volume 7 No. 1 June 2023

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.

EDITORIAL BOARD AND STAFF:

Richard P. Burgos, Director

Alan C. Taule, Chief, Information Resources and Analysis Division

Khasian Eunice M. Romulo, Science Research Specialist II

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/>



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**DR. ALDRIN Y. CANTILLA***Data Analytics***Sex:** Male**Education:**

Doctor of Philosophy in Biology, The University of Western Australia, 2022

Master of Science in Plant Breeding, University of the Philippines, 2014

Bachelor of Science in Agriculture, Plant Breeding and Genetics, University of Southern Mindanao, 2010

Field of Specialization

Data Analytics

DNA

Plant Breeding

Researches:**Article title:** Mining of Cloned Disease Resistance Gene Homologs (CDRHs) in Brassica Species and Arabidopsis thaliana**Authors:** Aldrin Y. Cantila, Ting X. Neik, Soodeh Tirnaz, William J.W. Thomas, Philipp E. Bayer, David Edwards, Jacqueline Batley**Publication title:** Biology 11(6):821, 2022**Abstract:**

Various diseases severely affect Brassica crops, leading to significant global yield losses and a reduction in crop quality. In this study, we used the complete protein sequences of 49 cloned resistance genes (R genes) that confer resistance to fungal and bacterial diseases known to impact species in the Brassicaceae family. Homology searches were carried out across Brassica napus, B. rapa, B. oleracea, B. nigra, B. juncea, B. carinata and Arabidopsis thaliana genomes. In total, 660 cloned disease R gene homologs (CDRHs) were identified across the seven species, including 431 resistance gene analogs (RGAs) (248 nucleotide binding site-leucine rich repeats (NLRs), 150 receptor-like protein kinases (RLKs) and 33 receptor-like proteins (RLPs)) and 229 non-RGAs. Based on the position and distribution of specific homologs in each of the species, we observed a total of 87 CDRH clusters composed of 36 NLR, 16 RLK and 3 RLP homogeneous clusters and 32 heterogeneous clusters. The CDRHs detected consistently across the seven species are candidates that can be investigated for

broad-spectrum resistance, potentially providing resistance to multiple pathogens. The R genes identified in this study provide a novel resource for the future functional analysis and gene cloning of Brassicaceae R genes towards crop improvement.

Full text link <https://tinyurl.com/ym2f3ck9>

Article title: Advancing designer crops for climate resilience through an integrated genomics approach

Authors: Nur Shuhadah Mohd Saad, Ting Xiang Neik, William J.W. Thomas, Junrey C. Amas, Aldrin Y. Cantila, Ryan J. Craig, David Edwards, Jacqueline Batley

Publication title: Current Opinion in Plant Biology 67, 2022

Abstract:

Climate change and exponential population growth are exposing an immediate need for developing future crops that are highly resilient and adaptable to changing environments to maintain global food security in the next decade. Rigorous selection from long domestication history has rendered cultivated crops genetically disadvantaged, raising concerns in their ability to adapt to these new challenges and limiting their usefulness in breeding programmes. As a result, future crop improvement efforts must rely on integrating various genomic strategies ranging from high-throughput sequencing to machine learning, in order to exploit germplasm diversity and overcome bottlenecks created by domestication, expansive multi-dimensional phenotypes, arduous breeding processes, complex traits and big data.

Full text available upon request to the author/s.

Article title: Predicting Cloned Disease Resistance Gene Homologs (CDRHs) in Radish, Underutilised Oilseeds, and Wild Brassicaceae Species

Authors: Aldrin Y. Cantila, William J.W. Thomas, Philipp E. Bayer, David Edwards, Jacqueline Batley

Publication title: Plants 11(22):3010, 2022

Abstract:

Brassicaceae crops, including Brassica, Camelina and Raphanus species, are among the most economically important crops globally; however, their production is affected by several diseases. To predict cloned disease resistance (R) gene homologs (CDRHs), we used the protein sequences of 49 cloned R genes against fungal and bacterial diseases in Brassicaceae species. In this study, using 20 Brassicaceae genomes (17 wild and 3 domesticated species), 3172 resistance gene analogs (RGAs) (2062 nucleotide binding-site leucine-rich repeats (NLRs), 497 receptor-like protein kinases (RLKs) and 613 receptor-like proteins (RLPs)) were identified. CDRH clusters were also observed in *Arabis alpina*, *Camelina sativa* and *Cardamine hirsuta* with assigned chromosomes, consisting of 62 homogeneous (38 NLR, 17 RLK and 7 RLP clusters) and 10 heterogeneous RGA clusters. This study highlights the prevalence of CDRHs in the wild relatives of the Brassicaceae family, which may lay the foundation for rapid identification of functional genes and genomics-assisted breeding to develop improved disease-resistant Brassicaceae crop cultivars.

Full text link <https://tinyurl.com/57mzktea>

Article title: The Impact of Genomics in Identifying Blackleg Disease Resistance Genes in Canola

Authors: William J.W. Thomas, Junrey C. Amas, Tingting Wu, Aldrin Y. Cantila, Linh B. Ton, Jacqueline Batley

Publication title: Next-generation Sequencing and Agriculture 12(24):24, 2022

Abstract:

Blackleg disease, caused by the fungal pathogen *Leptosphaeria maculans*, poses a serious threat to canola (*Brassica napus*) production worldwide. However, the deployment of resistance (R) genes is a cost-effective, reliable and sustainable measure for managing the disease. This chapter reports the recent advances in sequencing and genomics, and how they have been vital for the rapid identification of R genes responsible for conferring blackleg resistance in canola. Promising new genomic technologies which may accelerate future identification efforts are also discussed.

Full text available upon request to the author/s.

Article title: In silico integration of disease resistance QTL, genes and markers with the *Brassica juncea* physical map

Authors: Fabian Inturrisi, Philipp E. Bayer, Aldrin Y. Cantila, Soodeh Tirnaz, David Edwards, Jacqueline Batley

Publication title: Molecular Breeding 42(7):37, 2022

Abstract:

Brassica juncea (AABB), Indian mustard, is a source of disease resistance genes for a wide range of pathogens. The availability of reference genome sequences for *B. juncea* has made it possible to characterise the genomic structure and distribution of these disease resistance genes. Potentially functional disease resistance genes can be identified by co-localization with genetically mapped disease resistance quantitative trait loci (QTL). Here we identify and characterise disease resistance gene analogs (RGAs), including nucleotide-binding site–leucine-rich repeat (NLR), receptor-like kinase (RLK) and receptor-like protein (RLP) classes, and investigate their association with disease resistance QTL intervals. The molecular genetic marker sequences for four white rust (*Albugo candida*) disease resistance QTL, six blackleg (*Leptosphaeria maculans*) disease resistance QTL and BjCHI1, a gene cloned from *B. juncea* for hypocotyl rot disease, were extracted from previously published studies and used to compare with candidate RGAs. Our results highlight the complications for the identification of functional resistance genes, including the duplicated appearance of genetic markers for several resistance loci, including Ac2(t), AcB1-A4.1, AcB1-A5.1, Rlm6 and PhR2 in both the A and B genomes, due to the presence of homoeologous regions. Furthermore, the white rust loci, Ac2(t) and AcB1-A4.1, mapped to the same position on chromosome A04 and may be different alleles of the same gene. Despite these challenges, a total of nine candidate genomic regions hosting 14 RLPs, 28 NLRs and 115 RLKs were identified. This study facilitates the mapping and cloning of functional resistance genes for applications in crop improvement programs.

Full text available upon request to the author/s.

Article title: Recent Findings Unravel Genes and Genetic Factors Underlying *Leptosphaeria maculans* Resistance in *Brassica napus* and Its Relatives

Authors: Aldrin Y. Cantila, Nur Shuhadah Mohd Saad, Junrey C. Amas, David Edwards, Jacqueline Batley

Publication title: International Journal of Molecular Sciences 22(1):313, 2020

Abstract:

Among the Brassica oilseeds, canola (*Brassica napus*) is the most economically significant globally. However, its production can be limited by blackleg disease, caused by the fungal pathogen *Lepstosphaeria maculans*. The deployment of resistance genes has been implemented as one of the key strategies to manage the disease. Genetic resistance against blackleg comes in two forms: qualitative resistance, controlled by a single, major resistance gene (R gene), and quantitative resistance (QR), controlled by numerous, small effect loci. R-gene-mediated blackleg resistance has been extensively studied, wherein several genomic regions harbouring R genes against *L. maculans* have been identified and three of these genes were cloned. These studies advance our understanding of the mechanism of R gene and pathogen avirulence (Avr) gene interaction. Notably, these studies revealed a more complex interaction than originally thought. Advances in genomics help unravel these complexities, providing insights into the genes and genetic factors towards improving blackleg resistance. Here, we aim to discuss the existing R-gene-mediated resistance, make a summary of candidate R genes against the disease, and emphasise the role of players involved in the pathogenicity and resistance. The comprehensive result will allow breeders to improve resistance to *L. maculans*, thereby increasing yield.

Full text link <https://tinyurl.com/45ytx7ap>

Article title: DNA-based screening of Brassica germplasm for sustainable and enhanced crop production

Authors: Yueqi Zhang, Ting Xiang Neik, Junrey C Amas, Aldrin Y Cantila, Nur Shuhadah Mohd Saad, Tingting Wu, Jacqueline Batley

Publication title: Plant genetic resources, 2021

Abstract:

The Brassica genus contains many agriculturally important oilseed and vegetable crops. Brassica germplasm, including natural accessions and breeding populations, are maintained globally for sustainable management and enhancement of Brassica crop production, which is critical in meeting the demands of population growth and challenges of environmental stresses due to global climate change. DNA-based markers, such as SNPs, are commonly used to screen large numbers of Brassica germplasm for conservation, genetic mapping and association studies. This chapter focuses on the application of SNP genotyping technologies for conservation of Brassica germplasm, uncovering the genetic basis of various biotic and abiotic stresses and screening for yield-related traits and oil quality through marker-trait association studies.

Full text available upon request to the author/s.

Article title: Genotype main effects and genotype× environment interaction (GGE) analysis for grain yield of the hybrid rice varieties under rain-prone environment

Authors: Aldrin Y. Cantila, Isagane V. Boholano

Publication title: Science & Engineering 14(02):298, 2021

Abstract:

The stability of high yielding hybrid rice varieties is very important to meet food security. The grain yield (GY) stability of 13 hybrid rice varieties in multienvironment with type IV climate condition (E1, E2, E3, and E4) was analyzed using genotype main effects and genotype x environment interaction (GGE). Combined analysis of variance showed environment and genotype by environment (GxE) interaction which accounts 45% and 28% of the total variation, respectively, as the main factors influencing the GY significantly ($p < 0.005$). GGE biplots were generated using the two interaction principal components (PC1 and PC2) which accounts a total of 92.4% of the GxE effect for GY. GGE biplot analysis identified best performing genotypes for a specific environment like M1 (Mestizo 1), M60 (PAC 801), and M55 (Mestizo 55) at E1 and E2, M60 and M6 (SL-8H) at E3, and M6 at E4. M1 was ranked as top 1, M60 as top 2, M6 as top 3, and M55 as top 4 in four tested environments with a mean GY of 7.48, 7.40, 6.93, and 6.86 t/ha, respectively. Therefore, M1, M60, M6, and M55 should be recommended to rice farm areas of SOCCSKSARGEN and other places in the Philippines with type IV climate condition such as Davao regions.

Full text link <https://tinyurl.com/4x92v3ad>

Article title: Genetic variation in twenty Philippine traditional rice varieties

Authors: A. Y. Cantila and A. J. R. Quitel

Publication title: Bangladesh Journal of Scientific and Industrial Research 55(1):35-42

Abstract:

The study of genetic variation (GV) in 20 Philippine traditional rice varieties (TRVs) were determined in grain morphology such as length (Gl), width (Gwd), and weight (Gwt), grain yield (Gy), and grain micronutrients such as copper (Cu), iron (Fe), manganese (Mn) and zinc (Zn). Analysis of variance obtained highly significant GV among TRVs in all traits. The mean for Gl, Gwd, Gwt, Gy, Cu, Fe, Mn, and Zn contents was 8.56 mm, 2.8 mm, 20.01 g, 2.13 t/ha, 8.64 ppm, 14.56 ppm, 20.79 ppm, and 30.26 ppm, respectively. The micronutrients in TRVs followed an order as $Zn > Mn > Fe > Cu$. For the correlation in traits, 11 pairs were significantly correlated; however, only Mn and Zn content in grains was positively and strongly correlated. Other significant pairs were either in positive or negative and moderately correlated. Cluster analysis, on the other hand, revealed five clusters and showed distinct TRV in two clusters. In conclusion, the presence of higher grain micronutrient content in TRVs indicates a better opportunity for breeders to determine parental genetic resource in breeding rice with high grain micronutrients

Full text link <https://tinyurl.com/22vjsm94>

Article title: DNA-based screening of Brassica germplasm for sustainable and enhanced crop production

Authors: Yueqi Zhang, Ting Xiang Neik, Junrey C Amas, Aldrin Y Cantila, Nur Shuhadah Mohd Saad, Tingting Wu, Jacqueline Batley

Publication title: Plant genetic resources, 2021

Abstract:

The Brassica genus contains many agriculturally important oilseed and vegetable crops. Brassica germplasm, including natural accessions and breeding populations, are maintained globally for sustainable management and enhancement of Brassica crop production, which is critical in meeting the demands of population growth and challenges of environmental stresses due to global climate change. DNA-based markers, such as SNPs, are commonly used to screen large numbers of Brassica germplasm for conservation, genetic mapping and association studies. This chapter focuses on the application of SNP genotyping technologies for conservation of Brassica germplasm, uncovering the genetic basis of various biotic and abiotic stresses and screening for yield-related traits and oil quality through marker-trait association studies.

Full text available upon request to the author/s.

Article title: Genotype main effects and genotype× environment interaction (GGE) analysis for grain yield of the hybrid rice varieties under rain-prone environment

Authors: Aldrin Y. Cantila, Isagane V. Boholano

Publication title: Science & Engineering 14(02):298, 2021

Abstract:

The stability of high yielding hybrid rice varieties is very important to meet food security. The grain yield (GY) stability of 13 hybrid rice varieties in multienvironment with type IV climate condition (E1, E2, E3, and E4) was analyzed using genotype main effects and genotype x environment interaction (GGE). Combined analysis of variance showed environment and genotype by environment (GxE) interaction which accounts 45% and 28% of the total variation, respectively, as the main factors influencing the GY significantly ($p < 0.005$). GGE biplots were generated using the two interaction principal components (PC1 and PC2) which accounts a total of 92.4% of the GxE effect for GY. GGE biplot analysis identified best performing genotypes for a specific environment like M1 (Mestizo 1), M60 (PAC 801), and M55 (Mestizo 55) at E1 and E2, M60 and M6 (SL-8H) at E3, and M6 at E4. M1 was ranked as top 1, M60 as top 2, M6 as top 3, and M55 as top 4 in four tested environments with a mean GY of 7.48, 7.40, 6.93, and 6.86 t/ha, respectively. Therefore, M1, M60, M6, and M55 should be recommended to rice farm areas of SOCCSKSARGEN and other places in the Philippines with type IV climate condition such as Davao regions.

Full text link <https://tinyurl.com/4x92v3ad>

Article title: Phenotypic variation and correlation of traits in Philippine hybrid rice varieties

Authors: Aldrin Y. Cantila, Aizel Mae L. Fordan, Isagane V. Boholano

Publication title: Journal of the Bangladesh Agricultural University 17(2):179-186, 2019

Abstract:

Understanding the phenotypic variation and correlation in hybrid rice varieties will lead to proper utilization of these genetic resources. Grain yield (GY), the primary trait, and its secondary traits such as days to 50% flowering (DF), days to maturity (DM), grain length (GL), grain weight (GW), number of filled grains panicle-1 (NFGP), one thousand grain weight (OTGW) panicle length (PL), panicle weight (PW), spikelet fertility (SF), and spikelet number panicle-1 (SNP) of 13 hybrid rice in two environments (E1 and E2) were analyzed using combined analysis of variance (ANOVA) and correlation analysis. High significant variation was found among hybrids (G) in all traits except for GW while there was at least significant result among environments (E) in DF, DM, GL, GW, PW, and OTGW, and in GxE in DF, DM, GW, NFGP, PW, and SNP. Therefore, E1 hybrids were early flowering and maturing, had longer, wider, and more grains, had longer panicles, and higher yield while in E2 hybrids were late flowering and maturing, and had heavier grains. However, among the 13 hybrid rice, M1 had the highest GY and GL in each environment with a mean of 9.57 t ha⁻¹ and 9.75 mm, respectively. M1, therefore, can be recommended to farmers for varietal utilization. Correlation analysis, on the other hand, found 15 and 17 significant correlations in E1 and E2, respectively. Of the correlation results, it was found out that among the secondary traits, only NFGP was consistently, significantly and positively correlated with GY in two environments. The result implied that attaining higher yield in hybrid rice cultivation can be possible by giving more attention to the plants during the grain filling stage.

Full text link <https://tinyurl.com/56xwyc3s>

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 link <https://tinyurl.com/5n6u4zet>

Article title: Multiple Statistical Tools for Divergence Analysis of Rice (*Oryza sativa* L.)

Released Varieties

Authors: Aldrin Y. Cantila, Sailila E. Abdula, Haziel Jane C. Candalia and Gina D. Balleras

Publication title: The Philippine Statistician 65(2):121-134, 2016

Abstract:

Rice released varieties are genetic resources bulked with good genes. To define the potentials of these germplasm, genetic divergence analysis must be done. The study used different statistical tools such as descriptive statistics, Kolmogorov-Smirnov test, Shannon-Weaver diversity index (H'), correlation statistics (r), principal component analysis (PCA), Dixon's test and clustering statistics in evaluating 29 NSIC (National Seed Industry Council) released varieties based on 11 morphological traits. Descriptive statistics showed significant differences on the traits used while following a normal distribution. Shannon-Weaver diversity derived a range of 0.55 (number of filled grain per panicle, NFGP) to 0.91 (grain yield, GY and number of tillers, NT) that infer moderate to high diversity traits. Correlation statistics among traits showed a range of $r = -0.55$ to 0.84 which GY was noted to positively correlate to all traits. PCA accounted 39.95% and 26.10% for PC1 and PC2, respectively. Notable component loading for the yield component traits such as panicle weight (PW) showed the highest contributor of positive projections in two PCs that explained 66.05% of the variation. PCA also detected two latent traits such GY and spikelet fertility (SF) as confirmed in Dixon's test where outlier was found in SF and to yield contributing traits. Clustering statistics separated varieties into 5 clusters with a range of 5.88 to 106.22 euclidean distance (ED). Among the clusters, 5th cluster composed of one variety, NSIC Rc240 gave the highest GY (7.07 tha⁻¹), NFGP (152.67), one thousand grain weight (24.77 g), PW (5.08 g) and spikelet number per panicle (185.33). The variety could potentially be adapted and a good source of genes for rice improvement localize at General Santos City.

Full text link <https://tinyurl.com/2fkdsjmx>

Article title: Statistical Analysis of Foreign Rice Phenotypes under Different Seasons of the Philippines

Authors: Aldrin Cantila, Alvin John R. Quitel

Publication title: Journal of Advanced Applied Scientific Research 1(12), 2017

Abstract:

Korean rice is a foreign genetic resources in the Philippines that has to be characterized for its proper germplasm utility. Ten Korean phenotypes were analyzed using correlation, clustering and principal component analyses (PCA) based on the 13 traits viz., culm length (CL), days to 50% flowering (D50F), days to maturity (DM), filled grains per panicle (FGP), flag leaf length (FLL), flag leaf width (FLW), grain length (GL), grain width (GW), grain yield (GY), plant height (PH), productive tillers (PT), spikelet fertility SF) and thousand grain weight (TGW) under different seasons of the Philippines. It was found out that Korean phenotypes had earlier D50F and DM, shorter PH and CL, more PT, FGP and SF, and higher GY under dry than wet season. Each season had three groups based on the clustering analysis with a pattern of group 1 having

phenotypes with heavy TGW, early D50F and DM, short PH and FLL; and more FGP, SF and GY; group 2 having long CL, wide FLW, light TGW; and late D50F and DM; and group 3 having short CL, narrow FLW and low PT. Correlation in FGP, PT and SF to GY was consistently high positive ($r \geq 0.68$) in two seasons. Also, PCA consistently showed that GY, PH and PT were the highest contributor of variation with an average of 21.42% in two seasons. Korean GY therefore was highly variable but attaining higher GY can be possible by utilizing grain-filling (FGP and SF) and productive tillering (PT) traits as selection indices in the breeding program.

Full text link <https://tinyurl.com/mu54a3s5>

Article title: Morphometric analysis of upland rice phenotypes in lowland condition

Authors: Aldrin Y. Cantila, Sailila E. Abdula, Jenalyn L. Balos

Publication title: Journal of Biodiversity and Environmental Sciences 10(4):62-69, 2017

Abstract:

Knowledge about upland characters expressed in an unfavorable environment will direct to appropriate utilization of upland rice varieties (URVs) for breeding and improvement. Morphometric analysis of 55 URVs in lowland condition was done using different statistical parameters such as basic statistics (standard deviation, coefficient of variation and ANOVA), Shannon-Weaver diversity coefficient (H'), principal component analysis (PCA) and clustering analysis based on 14 characters. H' values were ranged from 0.69 (flag leaf width, FLW) to 0.95 (grain yield, GY), indicating a medium to high diversity characters. PCA captured 84.78% variation for six principal components (PC), retained using proportion of variance and eigenvalues >1.0 . Grain length (GL), grain width (GW) and grain size ratio (GSR) formed PC1 and days to 50% flowering (DF), days to maturity (DM) and thousand grain weight (TGW) formed PC2. PCA found that grain attributes (GL, GW, GSR and TGW) followed by DF and DM were highly affected. Clustering analysis grouped varieties into four. The results therefore could be used especially on deciding what URV is to be utilized for any rice breeding program in lowland conditions.

Full text available upon request to the author/s.

Article title: The Study of Quantitative Traits with Different Statistical Parameters in Registered Inbred Rice (*Oryza sativa* L.)

Authors: Aldrin Y. Cantila, Sailila E. Abdula, and Haziel Jane C. Candalia

Publication title: Philippine Journal of Science 146(4):387-393, December 2017

Abstract:

The primary quantitative trait grain yield (GY) and secondary traits viz., days to maturity (DM), number of productive tillers (NPT), plant height (PH), panicle weight (PW), spikelet fertility (SF), spikelet number per panicle (SNP), and thousand seed weight (TSW) of 18 Philippine registered inbred rice were studied using different statistical parameters viz., correlation analysis, genotypic and phenotypic coefficient of variability (GCV and PCV), broad sense heritability (H^2_b), and genetic advance (GA). There was a significant, positive, and strong correlation between DM and PH, PW and SNP, PW and GY, and SNP and GY. GCV showed moderate variability in PW with 11.94% and NPT with 10.55%. PCV also showed moderate variability in

NPT with 17.23%, GY with 14.3%, PW with 13.89% and SNP with 12.67%. All traits except for PW and SNP in GCV and traits except for NPT, GY, PW, and SNP in PCV showed low variability. H2b too had PH with 79.26%, PW with 73.91%, and SNP with 60.39% as high heritability while GA expressed to the mean (GAM) had PW with 21.14% as high genetic gain. The study found out that PW and SNP had positive and strong association to GY, but only PW had consistent and considerable amount of genotypic and phenotypic variations. Furthermore, high H2b along with high GAM was only obtained in PW. Therefore, the different statistical parameters were in congruent with the implication that higher grain yield can be achieved by attaining genotypic selection in PW

Full text link <https://tinyurl.com/4ttb8ty8>

Article title: Transgressive segregants: a potential approach in yield mining

Authors: Abdula, S.E., Balos, J.L., Cantila, A.Y., Ramos, M.R.; et al.

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

Abstract:

Transgressive segregation is the formation of extreme or transgressive phenotypes, observed in segregated hybrid populations compared to phenotypes observed in the parental lines (Nolte et al; 2005 and Rieseberg et al; 1999). This phenomenon is specific to segregating hybrid generations and refers to that fraction of individuals that exceed parental phenotypes values in either a negative or positive fashion (Doyle and Gaut, 2000). Using ten FI hybrid rice varieties, this research aimed to identify and select possible transgressive segregants after several planting of segregating population with yield and phenotype equal to or better than the original FI hybrids. After F6 generation of planting and selection, a total of 366 candidate transgressive lines were selected and evaluated for general yield trial in six different sites. Twenty-two high yielding transgressive lines were identified with yield advantages ranging from 10-30%. Further, AMMI analysis of variance for grain yield tested in these environments showed that mean effects of G and R accounted for 0.96% and 79.19% variations, respectively and GXE interaction effects represent 1.88% of the total variation. Furthermore, the variance due to environments were diverse into large differences on the mean yield between environments causing most of the variation in the grain yield, indicating that there were viable differences in the genotype response across environments. Moreover, the presence of GEI was clearly demonstrated by the AMMI model, when the interaction was partitioned among the five interaction principal component axis (IPCA).

Full text available upon request to the author/s.

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):9-27, 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 link <https://tinyurl.com/23ucvc37>

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 link <https://tinyurl.com/5n6u4zet>

Article title: Multiple Statistical Tools for Divergence Analysis of Rice (*Oryza sativa* L.) Released Varieties

Authors: Aldrin Y. Cantila, Sailila E. Abdula, Haziell Jane C. Candalia and Gina D. Balleras

Publication title: The Philippine Statistician 65(2):121-134, 2016

Abstract:

Rice released varieties are genetic resources bulked with good genes. To define the potentials of these germplasm, genetic divergence analysis must be done. The study used different statistical tools such as descriptive statistics, Kolmogorov-Smirnov test, Shannon-Weaver diversity index (H'), correlation statistics (r), principal component analysis (PCA), Dixon's test and clustering statistics in evaluating 29 NSIC (National Seed Industry Council) released varieties based on 11 morphological traits. Descriptive statistics showed significant differences on the traits used while following a normal distribution. Shannon-Weaver diversity derived a range of 0.55 (number of filled grain per panicle, NFGP) to 0.91 (grain yield, GY and number of tillers, NT) that infer moderate to high diversity traits. Correlation statistics among traits showed a range of $r = -0.55$ to 0.84 which GY was noted to positively correlate to all traits. PCA accounted 39.95% and 26.10% for PC1 and PC2, respectively. Notable component loading for the yield component traits such as panicle weight (PW) showed the highest contributor of positive projections in two PCs that explained 66.05% of the variation. PCA also detected two latent traits such GY and spikelet fertility (SF) as confirmed in Dixon's test where outlier was found in SF and to yield contributing traits. Clustering statistics separated varieties into 5 clusters with a range of 5.88 to 106.22 euclidean distance (ED). Among the clusters, 5th cluster composed of one variety, NSIC Rc240 gave the highest GY (7.07 tha⁻¹), NFGP (152.67), one thousand grain weight (24.77 g), PW (5.08 g) and spikelet number per panicle (185.33). The variety could potentially be adapted and a good source of genes for rice improvement localize at General Santos City.

Full text link <https://tinyurl.com/2fkdsjmx>



DR. NORALENE UY
Environmental Sciences

Sex: Female

Education:

Doctor of Philosophy in Global Environmental Studies, Kyoto University, 2013

Master in Global Environmental Studies, Environmental Management, Kyoto University, 2010

Master in Development Economics, Development Economics, University of the Philippines, 2004

Bachelor of Science in Business Administration and Management, University of the Philippines, 1994

Field of Specialization

Climate Change Adaptation

Disaster Management

Sustainable Development

Disaster Preparedness

Disaster Risk Reduction

Disaster Planning

Sustainability

Environmental Management

Sustainability Management

Climate Change Impacts

Researches:

Article title: Island Stories: Mapping the (im)mobility trends of slow onset environmental processes in three island groups of the Philippines

Authors: Sonja Ayeb-Karlsson & Noralene Uy

Publication title: Humanities and Social Sciences Communications 9(1): 60, 2022

Abstract:

There is an immediate lack of people-centered empirical evidence investigating how slow onset events influence human (im)mobility across the globe. This represents an important knowledge

gap that makes it difficult for climate policy to safeguard vulnerable populations (whether on the move or left behind). In this study, 48 qualitative focus group discussions in the Philippines elaborated around people's (im)mobility pathways in the context of slow onset events. The selected collective storytelling approach effectively mapped out the (im)mobility trends of 12 different origin- and destination locations involving the perceptions of 414 women and men across six provinces on Luzon, the Visayas and Mindanao islands. The research findings delicately outlined people's translocality and its interlinkage with their personal (im)mobility experiences. People described how slow onset events such as longer-term soil and water degradation often contributed to reduced livelihood sustainability that influenced their decisions to move or stay. At the very core of people's narratives were the ways that the environmental changes and (im)mobility experiences influenced people's wellbeing. Some people described how temporary migration could increase their social status and boost wellbeing after returning home. Others described adverse impacts on their mental health during their migration experiences due to loss of place, identity, food, and social networks. The research findings show how policy can better support those moving, hosting, or identifying as immobile, as well as where (geographically and socially) more assistance is needed.

Full text link <https://tinyurl.com/3t7v3vpr>

Article title: Ecosystem resilience and community values: Implications to ecosystem-based adaptation

Authors: Noralene Uy and Rajib Shaw

Publication title: Journal of Disaster Research 8(1):201-202, 2013

Abstract:

In recent years, the case for ecosystem approaches in disaster risk reduction and climate change adaptation is strongly argued because losses can be reduced and safer and resilient communities built by ensuring resource sustainability and enhancing ecosystem resilience. Recognizing the interdependencies of ecological, physical, economic, social and institutional actors and that community-level perception can shape adaptation actions, a study is conducted through surveys of village councils and households in Infanta, Quezon, Philippines. Utilizing a questionnaire covering 5 dimensions, 25 parameters and 125 measures selected based on the local context of Infanta, the level of resilience in mountain, riverine, urban, agricultural plain, estuarine and coastal ecosystems is determined. In addition, a survey on community values for ecosystem services as well as autonomous and recommended adaptation actions is done. Results show that overall resilience levels of ecosystems lie between 3.08 (medium resilience) and 3.26 (high resilience) on a scale of 1 to 5. The coastal ecosystem demonstrates the highest resilience while the mountain ecosystem shows the lowest resilience. Moreover, the community gives high value to the floodplain and ocean as natural assets and the forest and coastal ecosystems for their provisioning, regulating and cultural services. Lastly, autonomous adaptation actions are primarily ecological, economic and social in nature. By assessing the resilience of ecosystems and mapping of community values and actions as attempted in this study, entry points for an ecosystem-based adaptation strategy are identified while addressing positive and negative factors as well as gaps and opportunities to enhance the resilience of Infanta's ecosystems.

Full text link <https://tinyurl.com/bd4prmcy>

Article title: Watershed Approach to Ecosystem Management

Authors: Noralene Uy and Rajib Shaw

Publication title: Ecosystem-Based Adaptation (Community, Environment and Disaster Risk Management, 12:107-122, 2012

Abstract:

The watershed approach is recognized as a holistic approach to ecosystem management. The chapter examines the concept of watershed as an ecosystem in relation to ecosystem management, disaster risk reduction, and climate change adaptation. It describes the importance of watersheds in disaster risk reduction and climate change adaptation. It specifically looks at the watershed approach and provides some case studies showing the important role of communities in watershed management. Moreover, it discusses some incentive schemes in managing watersheds.

Full text available upon request to the author/s.

Article title: An Ecosystem-Based Resilience Analysis of Infanta, Philippines

Authors: Noralene Uy, Yukiko Tekeuchi, Rajib Shaw

Publication title: Environmental Hazards 11(4):1-17, 2012

Abstract:

An exploratory study is conducted to assess the resilience of Infanta through an analysis of its ecosystems from ecological, physical, economic, social and institutional perspectives. Recognizing the strong interdependencies of ecological, physical, economic, social and institutional dimensions in ecosystems and that community-level perceptions can shape adaptation actions, a survey is conducted in 36 village councils in Infanta, Quezon, Philippines utilizing a questionnaire covering 5 dimensions, 25 parameters and 125 measures selected based on the local context of Infanta to gain an understanding of the level of resilience in mountain, riverine, urban, agricultural plain, estuarine and coastal ecosystems. Results show that overall resilience levels of ecosystems lie between 3.08 (medium resilience) and 3.26 (high resilience) on a scale of 1–5. However, resilience scores in the five dimensions vary from 2.57 (low resilience) to 3.51 (high resilience). On the whole, overall resilience levels in the 36 villages exhibit high levels in the social dimension and low levels in the economic dimension. By assessing the resilience of ecosystems as attempted in this study, a baseline is determined where entry points for adaptation actions that are responsive to prevailing ecosystem conditions can be identified, positive and negative factors addressed and gaps and opportunities acted upon to enhance the resilience of Infanta's ecosystems.

Full text available upon request to the author/s.

Article title: Local adaptation for livelihood resilience in Albay, Philippines

Authors: Noralene Uy, Yukiko Tekeuchi, Rajib Shaw

Publication title: Environmental Hazards 10(2):139-153, 2011

Abstract:

Local adaptation to climate change is essential for vulnerable coastal communities faced with increasing threats to livelihood and safety. This paper seeks to understand the micro-level enabling conditions for climate change adaptation through a livelihood lens in a study of six coastal villages in Bacacay in the province of Albay, Philippines. Albay is a high-risk province due to hydro-meteorological and geophysical hazards. The analysis of livelihood resilience utilizing the Sustainable Livelihoods Approach shows that a soft adaptation strategy focusing on enhancing human and social capital needs to be undertaken to increase adaptive capacity and build resilience in the study area. Moreover, the micro-level variations in the villages suggest that the understanding of local conditions is indispensable in planning and formulation of appropriate adaptation strategies and actions at local level.

Full text available upon request to the author/s.

Book Chapters

Chapter title: Private Sector and Higher Educational Institution Partnerships to Enhance Resilience in the Philippines: The Experience of the National Resilience Council

Authors: Antoni Yulo Loyzaga, Noralene Uy, Dexter Lo & Emma Porio

Publication title: Safety and Resilience of Higher Educational Institutions, Considerations for a Post-COVID-19 Pandemic Analysis pp.233-253, June 2022

Abstract:

By their concentrated scientific knowledge, technical expertise, organizational infrastructure, and material resources, the private sector and higher education institutions play a pivotal role in disaster risk reduction and resilience, being co-owners of risk as well as co-creators and co-implementers of solutions to resilience challenges. The impact and influence that the private sector and higher education institutions possess inform and catalyze evidence-informed decision-making in risk reduction across sectors, at different levels, and beyond their specific geographic locations. The COVID-19 pandemic provided an opportunity for higher education institutions and the private sector to mobilize resources and initiatives to support the government response. The experience of the National Resilience Council and its academic partners in implementing resilience programs in the Philippines shows that multi-stakeholder participation, trust-building, communication, information sharing, partnership, and social transformation provide the enabling conditions to enhance the resilience of higher education institutions. Post-COVID-19, the private sector and higher education institutions can leverage and strengthen existing partnerships and explore opportunities for future collaborations to build resilient societies. The private sector and higher education institutions continue to play an essential role in facilitating disaster risk reduction and resilience actions that foster transformation toward resilient development pathways.

Full text available upon request to the author/s

Chapter title: Turning Blue, Green and Gray: Opportunities for Blue-Green Infrastructure in the Philippines

Authors: Noralene Uy & Chris Tapnio

Publication title: Ecosystem-Based Disaster and Climate Resilience, pp.161-184, August 2021

Abstract:

Nature-based solutions represent a critical concept that harnesses natural systems to provide essential services for disaster risk reduction and climate change adaptation. As a nature-based solution, blue-green infrastructure takes advantage of nature's innate ability to substitute for or strengthen infrastructure systems by preserving, enhancing, or restoring a natural system's elements to build high quality, resilient and lower-cost infrastructure. The chapter describes how ecosystem-based disaster risk reduction, ecosystem-based adaptation, and blue-green infrastructure are implemented in the Philippines, including the policies that support them, the status of implementation, and through a case study in Polillo, Quezon, Philippines. Findings show that despite policies in place to support and advance the mainstreaming of nature-based solutions in the country, the environment's cross-cutting nature as a sector makes enforcement and implementation of programs, plans, and activities extremely challenging. Implementing nature-based solutions in the Philippines has so far been undertaken as a response to environmental challenges. More than being reactive, a proactive focus on nature-based solutions for prevention, mitigation, and rehabilitation is needed. The science and evidence for blue-green infrastructure would need to be strengthened to inform decision-making better, gain political commitment at all levels, secure funding and private sector engagement, and ultimately advance its implementation.

Full text available upon request to the author/s

Chapter title: Coastal Risks from Typhoons in the Pacific: Politics and Policy for Threatened Seas

Authors: Noralene Uy & Joe-mar Perez

Publication title: Climate Change and Ocean Governance, pp.90-101, February 2019

Book title: PhilCCA Working Group 2: Impacts, Vulnerabilities and Adaptation

Authors: Noraleen Uy, Rex Oafallas Cruz, Rodel D. Lasco, Juan M. Pulhin

Publisher: Oscar M. Lopez Center of Climate Change Adaptation and Disaster Risk Management Foundation, Inc., February 2018

Abstract:

This report is an assessment of the current understanding on climate change impacts, vulnerabilities, and adaptation in the Philippines. It focuses on ecosystems, freshwater resources, coastal systems and low-lying areas, agriculture and fisheries, and human health. The depth and breadth of assessment vary across chapters due to the uneven availability of literature specific to the Philippines. In cases where there are limited literatures specifically pertaining to the Philippines, the assessment of impacts and vulnerabilities to climate change in the country was inferred from published results of related studies in other countries.

Full text available upon request to the author/s

Chapter title: Guinsaugon, Leyte Landslide: Experience and Lessons in Land Use Policy

Authors: Noralene Uy, Benigno Balgos, Rajib Shaw

Publication title: Land Use Management in Disaster Risk Reduction, pp.197-214, December 2017

Abstract:

Land use planning was an important issue revisited after the Guinsaugon, Leyte, landslide in 2006. Without a national land use policy in the Philippines, effective planning and implementation of the comprehensive land use plan of local government units is still sought. This chapter examines the landslide disaster experience of Guinsaugon, Leyte, and its implications for land use policy specifically looking at the need to revisit land use policy and the importance of risk-sensitive land use planning and public participation in land use planning after a disaster. It also describes the land use planning process in the country including policies and relevant government agencies. The lessons of the disaster are expected to strengthen land use decisions in mountain regions in the country.

Full text available upon request to the author/s.

Chapter title: Ecosystem-Based Disaster Risk Reduction: Experiences, Challenges, and Opportunities in the Post-2015 Development Agenda

Authors: Noralene Uy, Rafaela Jane P. Delfino, Rajib Shaw

Publication title: Sustainable Development and Disaster Risk Reduction, pp. 119-142, 2016

Abstract:

Ecosystems, climate change, and disaster risk reduction are among the cross-cutting issues highlighted in the Rio+20 Conference. In view of the post-2015 development agenda, the chapter discusses the important role of ecosystem-based disaster risk reduction in sustaining ecosystems and building disaster-resilient communities. It describes ecosystem management strategies that link ecosystem protection and disaster risk reduction, elucidates the challenges in advancing the use of ecosystem-based disaster risk reduction and linking it to policy, and identifies opportunities for scaling up.

Full text available upon request to the author/s.

Book title: Ecosystem-based Adaptation

Authors: Noraleen Uy and Rajib Shaw

Publisher: Emerald Publishing Group Limited, December 2012

Chapter title: Overview of Ecosystem-Based Adaptation

Authors: Noralene Uy and Rajib Shaw

Publication title: Ecosystem-based Adaptation, pp.pp. 3-17. December 2012

Abstract:

Ecosystem management has emerged as a preferred, and often, mandated approach to managing ecological systems. However, this comes with much debate because of the complexity in its applicability and feasibility due to political, economic, social, cultural, and

ecological factors. This chapter outlines the evolving nature of Ecosystem-based Adaptation (EbA), and provides an insight on the future direction.

Full text available upon request to the author/s

Chapter title: Ecosystem Services, Biodiversity, and the Millennium Development Goals

Authors: Noralene Uy and Rajib Shaw

Publication title: Ecosystem-based Adaptation, pp.pp. 19-39, December 2012

Abstract:

Ecosystem services are essential for human well-being. The chapter explores the linkages between ecosystems and ecosystem services, biodiversity, and the Millennium Development Goals. Specifically, it focuses on the discussions in the Millennium Ecosystem Assessment, the ecosystem approach within the framework of the Convention on Biological Diversity, and ecosystems' role in the achievement of specific targets of the Millennium Development Goals. It highlights the need for ecosystem-based approaches to ecosystem management, biodiversity conservation, and attainment of human well-being.

Full text available upon request to the author/s

Chapter title: Challenges and the Way Ahead in Ecosystem-Based Adaptation

Authors: Noralene Uy and Rajib Shaw

Publication title: Ecosystem-based Adaptation, pp.pp. 257-265, December 2012

Abstract:

The key concept of ecosystem-based adaptation (EbA) is how to think of ecosystem in daily lifestyles (both in urban and rural areas), and how ecosystem-based adaptation can be a tool to adapt daily lives in changing climatic conditions. Sustainably managing, conserving, and restoring ecosystems so that they continue to provide the services that allow people to adapt to climate change is known as ecosystem-based adaptation. Summarizing the key observations provided in the earlier chapters, this chapter provides the ways of action-oriented ecosystem based adaptation.

Full text available upon request to the author/s

Chapter title: The Role of Ecosystems in Climate Change Adaptation and Disaster Risk Reduction

Authors: Noralene Uy and Rajib Shaw

Publication title: Ecosystem-based Adaptation, pp.pp. 41-59, December 2012

Abstract:

In the context of natural disasters and climate change, ecosystems are critical natural capital because of their ability to regulate climate and natural hazards. This chapter examines the important role of ecosystems and their services in disaster risk reduction and climate change adaptation. It discusses the relevance of adopting ecosystem-based approaches in managing risks brought about by a changing climate.

Full text available upon request to the author/s

Chapter title: Benchmarking Ecosystem Conditions

Authors: Noralene Uy and Rajib Shaw

Publication title: Ecosystem-based Adaptation, pp.pp. 177-194, December 2012

Abstract:

Benchmarking ecosystem conditions is a prerequisite to any investigation of ecological systems. It provides a description or better understanding of the system under study. This chapter discusses ecological indicators and the conceptual approaches to ecosystem assessment. It introduces a case study on participatory ecosystem resilience assessment in Infanta, Philippines.

Full text available upon request to the author/s

Chapter title: Governance in Climate Change: An Ecosystem Perspective

Authors: Noralene Uy and Rajib Shaw

Publication title: Ecosystem-based Adaptation, pp.pp. 239-253, December 2012

Abstract:

Climate change poses serious challenges to existing ecosystem governance systems due to the emerging issues that it presents. The chapter discusses two main characteristics of ecosystem governance (i.e., adaptive and collaborative) in the context of a changing climate. It examines the issues to be addressed in the review of governance systems such as ecosystem degradation, adaptation to climate change, and institutionalization of governance structures. It reiterates the importance of considering the consequences of climate change to the ecosystem, economy, and human well-being toward better ecosystem governance.

Full text available upon request to the author/s

Chapter title: Valuing Ecosystem Services

Authors: Noralene Uy and Rajib Shaw

Publication title: Ecosystem-based Adaptation, pp.pp. 223-238

Abstract:

The unsustainable management of ecosystem services often arises as a result of the non-recognition of the multiple benefits or under-valuation of ecosystem services. The chapter looks at economic valuation as an essential tool in ecosystem management decision-making and policy. It discusses the economics of ecosystem services, explains the motivations for economic valuation, describes economic valuation methods, and examines the limitations of economic valuation. It emphasizes that economic valuation can be a powerful and convincing tool for placing ecosystems on the agenda of planners and decision-makers.

Full text available upon request to the author/s

Chapter title: Livelihoods: Linking Livelihoods and Ecosystems for Enhanced Disaster Management

Authors: Noralene Uy and Rajib Shaw

Publication title: Environment Disaster Linkages (Community, Environment and Disaster Risk Management, Vol. 9), January 2012

Abstract:

Human beings are inseparable from the environment because of their dependence on ecosystems and their services (Schroter, 2009). The Millennium Ecosystem Assessment (2005) identifies ecosystem services as vital links between humans and ecosystems because these services are essential for human well-being, especially in terms of security, basic materials for a good life, health, good social relations, and freedom of choice and action. Ecosystem services include flows of materials, energy, and information from natural resources that combined with manufactured and human resources contribute to human well-being (Costanza et al., 1997). These include provisioning services (e.g., food, fresh water, wood and fiber, fuel), regulating services (e.g., climate, flood and disease regulation, water purification), supporting services (e.g., nutrient cycling, soil formation, primary production), and cultural services (e.g., aesthetic, spiritual, educational, and recreational value). The regulating services provided by ecosystems, in particular, are critical for disaster risk reduction and climate change adaptation. Ecosystems primarily affect both the probability and the severity of events and modulate the effects of extreme events. For example, soils store large amounts of water, facilitate transfer of surface water to groundwater, and prevent or reduce flooding, and natural buffers reduce hazards by absorbing runoff peaks and storm surges.

Full text available upon request to the author/s

Chapter title: CBDRM experience of the Philippines

Authors: Noralene Uy, Rajib Shaw, Glenn Fernandez, Yukiko Takeuchi

Publication title: Community based disaster risk reduction, January 2012

Chapter title: Local adaptation to enhance livelihood assets and build resilience in Albay, Philippines

Authors: Noralene Uy, Yukiko Takeuchi, Rajib Shaw

Publication title: Climate Change Adaptation and Disaster Risk Reduction: An Asian Perspective (Community, Environment and Disaster Risk Management, Vol. 5), 2010

Abstract:

Compelling evidence in recent decades confirms that climate change is already happening as demonstrated by increasing mean temperature, changing precipitation patterns, rising sea level, and increasing frequency and growing intensity of extreme weather events in Asia. Regional climate studies have shown and projected that the worse is yet to come. According to the International Strategy for Disaster Reduction (ISDR), Asia registered the highest number of hydrometeorological disasters at 1,532 occurrences in the period 1991–2005 among all regions in the world.

Full text available upon request to the author/s

Chapter title: Climate change adaptation in ASEAN: Actions and challenges

Authors: Noralene Uy, Rajib Shaw

Publication title: Climate Change Adaptation and Disaster Risk Reduction: Issues and Challenges (Community, Environment and Disaster Risk Management, Vol. 4), 2010

Abstract:

The Association of Southeast Asian Nations (ASEAN) comprises 10 countries namely Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam (Fig. 1). The ASEAN region has a total land area of 4.5 million square kilometers (3.3% of the world total) and a coastline of 173,252 km (third longest in the world). It is a region that boasts of a wealth of biodiversity including 20 percent of all known plant, animal, and marine species and one-third or 284,000 km² of all coral reefs. Four biodiversity hotspots identified by Conservation International cut across a wide area of the region that includes Indo-Burma, the Philippines, Sundaland, and Wallacea.

Full text available upon request to the author/s.

Chapter title: Climate change impacts and conservation practices in the coastal communities of Albay, Philippines

Authors: Noralene Uy

Publication title: Communities and coastal zone management, pp.269-281, 2010

Chapter title: Community-based water management practices in Japan

Authors: Yukiko Takeuchi, Noralene Uy, Rajib Shaw

Publication title: Water Communities (Community, Environment and Disaster Risk Management, Vol. 2), 2010

Abstract:

The Japanese culture has many meanings and proverbs associated with the word “water.” “Water” could mean “clear,” “clean,” “beautiful,” and “life.” Water is valuable to people in that it is used for drinking, cooking, washing, and fishing. On the flip side, water is a cause of disaster. Thus, people use water for survival, as well as fight with water during disasters. Because of the many uses of water, people developed a rule for water utilization. This rule cultivated trust in the community. However, infrastructure development (e.g., water supply system, dikes, and road networks), the promotion of washing machines, and social advancement changed the role of the water area from just a flowing stream, which can be simply likened to a sewer, to an important component of infrastructure.

Full text available upon request to the author/s.

Chapter title: Indigenous knowledge of the Ivatans in Batanes Islands, Philippines

Authors: Noralene Uy and Rajib Shaw

Publication title: Indigenous knowledge and disaster risk reduction: From practice to policy, pp.193-207

Book title: Indigenous knowledge disaster risk reduction: Policy note

Authors: Yukiko Takeuchi, Noralene Uy, Rajib Shaw, Anshu Sharma

Publisher: UNISDR Asia Pacific, January 2009

Abstract:

Indigenous Knowledge (IK) has been practiced in communities over time. There is news after major disasters on how IK has been effective in the protection of the lives and properties of people and communities. Some IK has been orally transmitted, and some are documented by local organizations sporadically. People and communities have developed their coping mechanisms over time, which is reflected in the form of IK. While many organizations recognize the importance of IK for Disaster Risk Reduction (DRR), there have been few systematic studies that analyze the principles of IK and its applicability to the modern context. This unique book is one of the first attempts of systematic study of IK in DRR. The key challenge will start after the publication of this book: to make it a useful reference material for decision making, research, implementation, and documentation. The target audience of the book consists of professionals, practitioners, researchers, and graduate students in the related field.

Full text available upon request to the author/s.

Chapter title: Shaped by wind and typhoon: The indigenous knowledge of the Ivatans in the Batanes Islands, Philippines

Authors: Noralene Uy and Rajib Shaw

Publication title: Indigenous knowledge for disaster risk reduction: Good practices and lessons learned from experiences in the Asia-Pacific region, pp.59-63, July 2008

Book title: Indigenous Knowledge for Disaster Risk Reduction: Good Practices and Lessons Learnt from the Asia-Pacific Region

Authors: Noralene Uy, Rajib Shaw, Jennifer Baumwoll

Publisher: UNISDR Asia Pacific, 2008

**DR. NIKKO LORENZ P. LAWSIN***Education***Sex:** Male**Education:**

Doctor of Philosophy in Science Education major in Biology, De La Salle University, 2021

Master of Arts in Science Education, Philippine Normal University, 2017

Bachelor of Secondary Education, General Science, 2015

Field of Specialization:

Biology Education

Action Research

Educational Technology

Environmental Sciences

Researches:

Article title: Exploring Student Mental Models and Student Experiences to Improve the Teaching Practice of Cell and Molecular Biology

Authors: Nikko Lorenz P. Lawsin, Genelita S. Garcia, Cyrus T. Esguerra

Publication title: American Journal of Multidisciplinary Research and Innovation 1(5), 2022

Abstract:

Teaching and Learning Biology requires a lot of memorizations of concepts, principles, and laws which may be one of the reasons why students find this area of knowledge highly conceptual. This action research is conducted to improve the teaching practice of Cell and Molecular Biology by investigating and exploring the mental models of students in learning this course under the program, Bachelor of Secondary Education (BSED) Major in Science. This study utilized an action research design by developing learning modules that contain asynchronous tasks which allowed students to design their own concept maps and other visual organizers to explain highly technical concepts in Cell and Molecular Biology. This targets to improve students' critical thinking and enhance comprehension of difficult concepts which were assessed through summative assessments. Based on the results of this study, the students frequently used concept maps and bubble topical organizers or clusters of objects that show linkages

among the topics that were discussed in the modules. Students relatively agreed that use of concept mapping helped them organize their ideas in the entire course of cell and molecular biology. This study recommends the testing of this intervention to other disciplines in science education such as in genetics & biotechnology and in anatomy and physiology to establish the consistency of results.

Full text link <https://tinyurl.com/mu2adbnx>

Article title: Strategies and Approaches Towards Environmental Biomonitoring of Freshwater Ecosystems in Philippines

Authors: J. S. Berame, M. B. Hojilla, E. Trinidad, N. L. Lawsin, J. A. Orozco, I. J. Arevalo, and Zeba F. Alam

Publication title: Nature Environment and Pollution Technology 20(4), December 2021

Abstract:

The Philippines, like many other Asian countries, is struggling to combat the current widespread aquatic pollution levels caused by anthropogenic activities. Environmental biomonitoring is an efficient tool to detect and monitor the fluctuating toxicity levels in a dynamic ecosystem using bioindicators like algae, macrophytes, zooplankton, insect, bivalve mollusks, gastropod, fish, amphibians, and others to assess the extent and levels of pollution in aquatic ecosystems. The present review deliberates on the biomonitoring techniques such as bioaccumulation, biochemical alterations, population, and community-level approaches to evaluate the current status with respect to the extent and levels of pollution in the aquatic ecosystems in the Philippines which also is one of the biodiversity hotspots. Therefore, the potential applications for biomonitoring are proposed to mainly include evaluation of actual aquatic pollutions, bioremediation, toxicology prediction, and research on toxicological mechanisms. The purpose of such evaluations is to critically analyze and help stakeholders to come up with a strategic action plan with recommendations on a low-cost, sensitive, and effective bioindicator for rapid and efficient environmental biomonitoring.

Full text link <https://tinyurl.com/5cmxxcrj>

Article title: Morphological variations of mangosteen fruits from Luzon and Mindanao Islands, the Philippines

Authors: J. Berame, N. Lawsin, F. Miguel, J. Chavez

Publication title: Biodiversitas Journal of Biological Diversity 21(7):3094-3100, July 2020

Abstract:

Luzon and Mindanao islands in the Philippines are the important mangosteen producing provinces whose growing areas are scattered on these two islands. With this, mangosteen variability was detected based on field fruit collections in summer of 2019. The morphological variations of mangosteen fruits were observed and collected in Quezon Province in Luzon and Davao-Zamboanga Provinces in Mindanao based on the total number of 175 mangosteen trees. The main objectives of the research were to find out the morphological variations of mangosteen fruits and using Tomato Analyzer 4.0 to determine the morphological characters that can be used to differentiate mangosteen accessions in the Philippines. The variables

include fruit shape index (external and internal), curve fruit shape index, asymmetry, internal eccentricity and weight of the ripe fruits. The results show that fruit characters like ellipsoidal, circular, rectangular, lobe shape, size, pericarp area, and pericarp thickness. are highly resemblance particularly in its fruit shape characters, and even sharing a similar taste of ripe fruits. Data revealed that *Garcinia mangostana* shared a similar character with *Garcinia malaccensis* even though they are from different geographical areas. Based on the morphological variations and characters, the two varieties of mangosteen fruits in the Philippines, *G. mangostana* and *G. malaccensis*, are so closely related that they could be combined together as one species as identified in the morphological analysis of this study.

Full text link <https://tinyurl.com/bde39hbz>

Article title: Board Licensure Examination for Professional Teacher (BLEPT) Synthesis Classes: Their effects on Student's Performance and Learning Experience

Authors: Nikko Lorenz P. Lawsin, Ph.D., Fermae L. Tamayao, Ph.D., . Ligaya Panlilio, MA Ed, Edsel R. Umali, Ed.D., Danilo B. Solayao, Ed.D

Publication title: *not stated*

Abstract:

This study aims to determine the effectiveness of the synthesis classes as an intervention to improve student's readiness and performance in the Board Licensure Examination for Professional Teachers (BLEPT) and to enrich student's learning experiences in these review courses. It also aims to document the best practices that the lectures are conducting on their assigned topics. This study will utilize an experimental research design to determine the effectiveness of this intervention based on the above mentioned parameters. Google Forms served as the primary tool in recording and analyzing the student's scores in the formative tests (pretests, posttests), summative tests (midterm and final exam), and their responses in their learning logs per session. The results of the formative tests-pretests and posttests-guided the course instructors in improving their instructions while the results of the summative tests-midterm and final examination-were compared, analyzed, and it served as the basis of students' performance. Student's learning logs were tabulated and thematically analyzed to completely describe its effectiveness on student's performance and learning experience. Based on the results, student's performance improved in terms of the midterm and final examination results and students positively perceived the relevance of this intervention as preparation for their licensure examination. This study recommends the continuous implementation of this program as it helps the student's preparedness for their licensure examination, and encourages other board programs in PLMun and other local colleges to design this kind of departmental intervention for the improvement of their respective programs in terms of student's board exam readiness.

Full text link <https://tinyurl.com/yxn63ejh>

Article title: Development and Validation of Organismal Classification Achievement Test (OCAT): Basis for Implementation and Standardization for Test Construction in Junior Science High School

Authors: Berame J.S., Lawsin N.L.P. , Gacosta H., Yadao M. and Orleans A.V.

Publication title: International Journal of Biotechnology and Recent Advances 1(1): 30-34, July 2018

Abstract:

This study aimed to develop, validate and administer an achievement test in organismal classification for grade 8 junior science high school. In the development stage, the researchers followed the aligned topics in the K to 12 curriculum guide for grade 8 science that focused on taxonomy and systematics and these were the basis for the development of the achievement test. The developed Organismal Classification Achievement Test (OCAT) was validated by content experts in biology. The initial version of the instrument is 60-item test which was administered to grade 8 high school students. Reliability coefficient, (KR20), difficulty index and discrimination index were used to select which items were retained, revised or rejected. Result of pilot-testing retained 40 items in which 19 items were described as average to excellent items ($x > 0.20$) while 21 questions were described as items subject for revision (between 0.10 and 0.20) for discrimination index.

Full text link <https://tinyurl.com/5eccfyxt>

**DR. CLARISSA B. JUANICO***Nutrition***Sex:** Female**Education:**

Doctor of Philosophy in Human Nutrition, University of the Philippines, Los Baños, 2017

Field of Specialization:

Nutrition

Human Nutrition

Nutrition Assessment

Nutritional Education

Dietetics

Malnutrition

Applied Nutrition

Nutritional Science

Child Nutrition

Obesity

Researches:

Article title: Microbial quality, safety, sensory acceptability, and proximate composition of a fermented nixtamalized maize (*Zea mays* L.) beverage

Authors: Patricia Isabel K. Ramos, Arvin Paul P. Tuaño, Clarissa B. Juanico

Publication title: Journal of Cereal Science 107:103521, September 2022

Abstract:

Consumption of maize and maize-based snacks in the Philippines is limited despite the high maize production. This study aimed to develop a fermented nixtamalized maize beverage (FNMB) and evaluate the microbial quality, safety, sensory characteristics, acceptability, and proximate composition of the formulated product. Different ratio of maize milk and cow milk were mixed [0:100 (control), 50:50, 70:30, 80:20]. Ecological nixtamalization (using CaCO_3) was employed to produce the maize milk and fermentation using *L. bulgaricus* and *S. thermophilus* was applied. Results showed that the lactic acid bacteria (LAB) count of the fermented

treatments reached the minimum required level for fermented beverages. The most acceptable formulation was that of 50:50 maize milk:cow milk ratio, and was selected for further studies. The FNMB did not exhibit *E. coli*, *Salmonella*, and *S. aureus*. Nixtamalization increased the moisture and protein contents and decreased the carbohydrate and ash levels of the fermented beverage ($p < 0.05$). Fermentation decreased the amount of moisture and carbohydrate and increased the crude protein and ash contents of the nixtamalized samples ($p < 0.05$). The FNMB exhibited higher protein, carbohydrate, and lower fat than commercial yogurt. The FNMB is a healthy snack alternative which can promote maize consumption and utilization in the Philippines.

Full text available upon request to the author/s.

Article title: Nutrient Composition, Starch Microstructure and Thermal Properties, and In Vitro Availability of Selected Minerals of Nixtamalized Philippine Quality Protein Maize Variety IPB Var 6 and the Production of Healthy Loaf Bread using Nixtamalized Corn-Wheat Flour Blends

Authors: Deborah Christine A. De Leon, Aldrin P. Bonto, Arvin Paul P. Tuaño, Clarissa B. Juanico

Publication title: Journal of Food Processing and Preservation 46(6), April 2022

Abstract:

Corn is one of the most important food crops globally providing at least 30% of the food calories in developing countries. This study aimed to determine the nutritional content and starch properties of nixtamalized Philippine quality protein maize variety (QPM) variety and its potential as a flour substitute in loaf bread production. The nixtamalized Philippine QPM flour had a significant increase in moisture and calcium contents. In vitro availability of calcium, iron and zinc was relatively lower and associated with phytate content. The developed loaf bread utilizing the optimum nixtamalized corn-wheat flour blend had improved nutritional value and had no significant difference in sensory characteristics compared with the control loaf bread made from wheat flour. The use of nixtamalized IPB Var 6 flour as an ingredient in loaf bread-making improved its crude fiber, calcium, and iron levels and can be a nutritious potential substitute ingredient for baked products.

Full text available upon request to the author/s.

Article title: Development and characterization of the nutritional profile and microbial safety of rice-nixtamalized corn grits blends as potential alternative staple for household consumption

Authors: Jessica A. Hernandez, Arvin Paul P. Tuaño, Clarissa B. Juanico

Publication title: Future Foods 5:100127, June 2022

Abstract:

The nutritional composition of corn is relatively insufficient to sustain human growth and development. This study developed and characterized rice-nixtamalized corn blends to enhance the nutritional quality of rice-corn composites geared towards household consumption. Corn kernels of two Philippine corn varieties, IPB Var 6 (VK) and Lagkitan (LK), were nixtamalized using ecological method, processed into corn grits, and blended with locally available rice Sinandomeng. Out of the six rice-nixtamalized corn grits blends developed, three blends (30%

VK, 70% LK, and 50% VK) were considered most acceptable based on sensory evaluation of consumer panelists. The blends required 210–290 mL cooking water and 20–25 minutes of cooking time. Microbial analysis showed that the blends had $<1.0 \times 10^3$ cfu/g yeast and mold count (YMC) after two months of storage in a dry place at ambient conditions, indicating food safety upon common short-term storage in a typical Filipino household. Both the IPB Var 6 and Lagkitan blends exhibited significant increase in calcium (2- to 3-folds), iron (4- to 7-folds), zinc, (1- to 2-folds), and phosphorus (1- to 2-folds) as compared to rice alone. Consuming 100 grams of the developed rice-nixtamalized corn grits blends can achieve an average healthy adult's daily calcium requirement by 4%, iron requirement by 7%, and as high as 35% zinc requirement.

Full text available upon request to the author/s.

Article title: Dietary diversity and nutritional status of 2 to 5 years old children in households with and without home gardens in selected districts in Siem Reap province, Cambodia

Authors: Liny S.E.K., Aimee A. Sheree Barrion, Clarissa B. Juanico, Josefina T. Dizon² & Hurtada A. Wilma

Publication title: Malaysian Journal of Nutrition 27(2), July 2021

Abstract:

There is a high prevalence of malnutrition in Cambodia during the past 10 years. One of the programmes implemented to secure household food security in order to alleviate malnutrition was home gardening. This study aimed to compare the nutritional status of 2 to 5 years old children in households with and without home gardens. Methods: Twenty-five households with home gardens and 60 households without home gardens were sampled. Results: The households sampled had a mixed type of home garden with three to five crop varieties occupying 20 to 200 square meters area. The purpose of the garden was to increase vegetable consumption and produce additional income. Results showed that 72% and 65% of the children resided in households with and without home gardens, respectively. Majority had medium dietary diversity score, i.e. consumed four to five different food groups per day. Except for stunting, higher prevalences of undernutrition (32%) and wasting (8%) were observed among children residing in households with home gardens compared to children in households without home gardens. Conclusion: There were no associations for dietary diversity score and nutritional status of children from households with and without home gardens. Among the sociodemographic and economic factors, age, sex, family size, and vegetable consumption were significantly associated with dietary diversity score and nutritional status of the children.

Full text link <https://tinyurl.com/4mf45eta>

Article title: Acculturation-Related Factors of Dietary Pattern Changes among Indigenous Adolescents in Mt. Arayat, Philippines

Authors: Mark Spencer K. Barcena, Anna Teresa O. Orillo, Clarissa B. Juanico, Arvin Paul P. Tuaño

Publication title: Jurnal Gizi dan Pangan 16(1): 21-30, March 2021

Abstract:

This study aimed to determine the levels of dietary acculturation and factors affecting acculturation-related changes in dietary patterns of 15 adolescents in an indigenous community in Mt. Arayat, Central Luzon, Philippines displaced after the eruption of Mt. Pinatubo in 1991. Mixed-methods sequential explanatory design (using modified scales) was employed to measure dietary acculturation; index analyses to evaluate dietary patterns; and focus group discussion to determine factors leading to dietary acculturation. Majority was found to be bicultural (93.33%) and the mean dietary pattern index score was 69.40 implying a need for dietary improvement. Moderate to high levels of dietary acculturation were observed on the traditional food block, while low to moderate levels were observed towards the dominant food block. Various psychosocial factors driving dietary choices cumulatively affect dietary patterns of adolescents experiencing acculturation in this study, including but not limited to: 1) the neighboring communities' ethnocultural composition facilitates acculturation primarily through language fluency; 2) prevalence of discrimination exerts an external pressure to adopt host culture for social acceptance; 3) economic need for integration to sustain day-to-day activities exists; 4) religious feasts and gatherings centered on foods previously unknown to them have been introduced; 5) food selection behavior shifts due to acquired experiences of food whether sensory or cognitive; and 6) their attitudes towards assimilation majorly characterizes the gradual internalization of host culture.

Full text link <https://tinyurl.com/52c8ktmu>

Article title: Physicochemical and Nutritional Properties of Nixtamalized Quality Protein Maize Flour and its Potential as Substitute in Philippine Salt Bread

Authors: Dianne Jane A. Sunico, Felicito M. Rodriguez, Arvin Paul P. Tuaño, Lotis E. Mopera, Liezl M. Atienza, and Clarissa B. Juanico

Publication title: Chiang Mai University Journal of Natural Sciences 20(2), March 2021

Abstract:

Nixtamalization is an ancient method of processing corn that is said to enhance the nutritional value of maize by improving protein quality, increasing calcium and niacin bioavailability, and reducing phytic acid levels, thus increasing iron digestibility and bioavailability. The main objective of this study was to determine the effect of different nixtamalization processes on the physicochemical and nutritional properties of quality protein maize (QPM) flour and evaluate its potential and acceptability as a flour substitute in Philippine salt bread baking, determined through sensory analysis. Three processes of nixtamalization were employed, namely, traditional, classic, and ecological. Nixtamalized QPM flours, combined with wheat flour in 30:70 ratio, were used in the product development and sensory evaluation of Philippine salt bread. Results revealed that nixtamalization contributed significantly in the pH, color, and particle size of nixtamalized QPM flours. There was a significant increase ($P \leq 0.05$) in the moisture, crude protein, crude fiber, crude ash, calcium, iron, niacin, lysine, tryptophan, total starch, amylose, amylopectin, resistant starch, and soluble fiber contents and a significant decrease in the crude fat, nitrogen-free extract (NFE), phytate, and insoluble fiber contents of QPM flours after nixtamalization. No significant difference was found in the zinc and total dietary fiber contents among the samples. The Philippine salt bread produced using nixtamalized QPM flours had a high overall acceptability based on two-step sensory analysis. QPM is greatly improved by the

ancient technology of nixtamalization and nixtamalized QPM flour showed desirable contributions in terms of the nutritional value and sensory attributes of Philippine salt bread when used as a flour substitute or blend.

Full text link <https://tinyurl.com/486byy9p>

Article title: Nutritional Status of Children and Maternal Knowledge, Attitudes, and Practices of Conditional Cash Transfer (CCT) Beneficiaries and Non-Beneficiaries in Lucena City, Quezon, Philippines

Authors: Ma-Ann Zarsuelo, Wilma Hurtada, Madeline Suva, Clarissa Juanico

Publication title: International Proceedings of Chemical, Biological and Environmental Engineering 86, 2015

Abstract:

The study evaluated the impact of Philippine CCT adopted as Pantawid Pamilyang Pilipino Program (4Ps) on health key outcomes focused on maternal knowledge, attitudes, and practices and maternal and child's (6 mos. to 5 y/o) nutritional status. Data from 91 respondents in each group of 4Ps and non beneficiaries showed that 4Ps had significantly higher maternal education. In knowledge score, non beneficiaries were 3.3% significantly lower than the 4Ps average score of 73.1%. Main source of information was health center lectures. In attitude items, both groups had positive perceptions on health and nutrition. The 4Ps mothers/guardians had better practices on maternal and child care. Nutritional status of non beneficiary children had higher prevalence of underweight (24.2%), stunting (47.3%), wasting (8.8%), and overweight (5.5%). The same applies to non beneficiary mothers/guardians, having higher prevalence of CED (17.6%), overweight (23.1%), and obesity (7.7%). Findings showed that the program is successful in investing in human capital through good health. However, malnutrition prevalence is still considerably high.

Full text link <https://tinyurl.com/aa83v22n>

Article title: Household Characteristics, Housing Profile and Diet Diversity of Pantawid Pamilyang Pilipino Program (4Ps) Beneficiaries and Non-beneficiaries in Lucena City, Quezon, Philippines

Authors: Ma-Ann M. Zarsuelo, Madeline M. Suva, Clarissa B. Juanico, Wilma A. Hurtada

Publication title: Acta Medica Philippina 52(5), February 2020

Abstract:

Background. The Philippines adopted the Conditional Cash Transfer (CCT) program as the Pantawid Pamilyang Pilipino Program (4Ps) that serves as the government's flagship social assistance program for the poor. This provides short-term income support to poor families while investing on health and education to overcome future poverty.

Objective. This study aimed to characterize the beneficiary and non-beneficiary households and evaluate the impact of 4Ps program on housing facilities and diet diversity.

Methods. Quasi-experimental design was used to evaluate survey outcomes between 91 randomly sampled beneficiaries and 91 completely enumerated non-beneficiaries (incoming grantees). FANTA Household Dietary Diversity Score (HDDS) was used as an indicator for dietary diversity while structured questionnaire on housing profile was based on BIDANI and CEM-UPLB tools.

Results. The 4Ps beneficiaries had significantly higher maternal education, household size ($p=0.038$), and improved water source ($p=0.004$) than non-beneficiaries. Cash transfer among 4Ps households provided 11% increase in the average monthly income of P7,324 pre-transfer. Diet diversity using FANTA scoring (0-12) showed that nonbeneficiaries were significantly lower by 0.4 than 4Ps score of 7.9 ($p=0.003$). Maternal education was found to have significant positive correlation with diet diversity. Both groups had high cereals and fats intake (>90%) while low in complex carbohydrates and legumes (<31%).

Conclusion. The 4Ps had positive correlation on housing profile and diet diversity among beneficiaries. Family Development Session should integrate practical methods on improving a variety of foods, specifically, the low consumption food groups. Additionally, a review on the selection criteria based on the provincial poverty threshold vis a vis income of grantees must be implemented to accurately target intended beneficiaries.

Full text link <https://tinyurl.com/2ykwp7ht>

**DR. DAVE ARTHUR R. ROBLEDO***Biology*

Sex: Male

Education:

Doctor of Philosophy in Science Education, De La Salle University, 2019

Master of Science Teaching major in Biology, De La Salle University, October 2018

Bachelor of Secondary Education major in Biology, Batangas State University, 2016

Field of Specialization:

Gel Electrophoresis

PCR

Environmental Microbiology

DNA Extraction

SDS-PAGE

Cell Culture

Western Blot Analysis

General Microbiology

Microbial Culture

Microbial Isolation

Researches:

Article title: An Investigation on the Effects of Varying Temperatures on Gelatin Denaturation in Response to Enzymatic Reactions from Fruit Extracts: A Home-based Experiment

Authors: Megan Mae Chu and Dave Arthur R Robledo

Publication title: Journal of Industrial Biotechnology 3(1), 2022

Abstract:

During holiday celebrations, my family would hold gatherings in our home, and I would always help my mother prepare some traditionally known desserts in the Filipino culture, such as buko pandan (coconut salad with jelly) and fruit salad. I was advised to use canned pineapples instead of fresh ones because the latter contained more active enzymes, which "melted" the gelatin in the salad. When we discussed biomolecules in class, I became particularly interested

with the topic, as it is relatively associated with biological processes in the human body such as digestion and metabolism. Thus, upon learning that gelatin - a major component in fruit salads - was made up of the biomolecule protein, I have decided to investigate the different factors that affected fruit enzymes and how these catalysts subsequently affected the breakdown of proteins. This would be demonstrated through an experiment involving the use of materials that I was already familiar with - fruits and gelatin.

Full text <https://tinyurl.com/mpjzzmbc>.

Article title: Evaluation of the Cytotoxic Properties of Lumichrome-Derived Compounds on Breast Adenocarcinoma, Colorectal Cancer, and Liver Carcinoma

Authors: Dave Arthur R. Robledo and Ghulam Muhammad

Publication title: Central Asian Journal of Global Health 6(6):49-54, November 2021

Abstract:

Ongoing research into cancer cures and therapeutic agents is being carried out by scientists worldwide to alleviate the rising burden of this insurmountable illness. Research on lumichrome, a photoproduct of the vitamin riboflavin, led us to discover that it has anticancer properties against lung cancer. More research is needed to determine how effective it is. An anticancer ability of lumichrome and its synthetic derivatives against liver, breast, and colorectal cancer was shown in this work. Cytotoxic activity against Hep3B (liver carcinoma), SkBr3 (Breast adenocarcinoma), and BRAF (Colorectal cancer) cell lines was evaluated using the MTT assay, which is a cytotoxicity test. These results ranged from 8.9 to 23.9 micrograms per milliliter. The IC50 for lumichrome and its synthetic derivative was 8.9 and 16.6 µg/ml, respectively, for Hep3B cells. Activation of apoptosis and interference with transcription is assumed to be the primary mechanisms of action of these substances. The mechanism of action of these products will need to be studied in the future.

Full text link <https://tinyurl.com/2syfahn7>

Article title: Effectiveness of Simulation-Based Activities vs. Traditional Interventions in Teaching Biology: A Meta-Analysis

Authors: Robledo, Dave Arthur

Publication title: Turkish Online Journal of Qualitative Inquiry 12(10):27-37, October 2021

Abstract:

One of the emerging educational technologies is simulation-based activities. Numerous research has been conducted to compare virtual reality to various techniques of teaching anatomy, including structures, lectures, graphical representations, and mixed training. This meta-analysis was focused on the effectiveness of simulation-based activities in teaching biology vs. the traditional interventions in teaching biology. The scope was limited to interventions involving simulations in biology for High school and Senior High School students in STEM contexts. This systematic review showed that when compared with conventional or digital teaching methods, simulation-based activities can enhance the effectiveness of teaching and learning biology. Of all the 15 studies, five evaluated the satisfaction level as a secondary outcome, which shows that most students were more interested in using simulation-based activities to learn biology.

Thus, simulation-based activities as an intervention could enhance the quality of teaching biology. Due to the lack of qualitative and descriptive data, the risk of bias for most studies was uncertain. On the contrary, the researcher emphasized that the meta-analysis results are not concise due to the lack of standardized procedures and high heterogeneity of the studies and subgroups.

Full text link <https://tinyurl.com/2vdsK4zy>

Article title: The Perceptions of Pre-service Teachers on Bachelor of Education Program in Shaheed Benazir Bhutto University, Pakistan

Authors: Dave Arthur R. Robledo, Ghulam Muhammad, Aftab Ur Rahman

Publication title: Journal of Social Sciences Review 1(1), April-June 2021

Abstract:

The provision of quality teachers by teacher preparation programs determines the quality of education in schools. The study aimed to define pre-service teachers' beliefs about teacher education and include recommendations for improving teacher education, given the importance of teacher education for the quality of education in educational institutions. The study included 45 pre-service teachers from Shaheed Benazir Bhutto University's education department in Dir Upper, Khyber Pakhtunkhwa, Pakistan. A total of 30 people were chosen for inclusion in the analysis using a purposive random sampling method. A questionnaire was developed, validated, and piloted to ensure its accuracy. The information was gathered using self-administered questionnaires and evaluated using mean ratings, standard deviation, and the chi-square significance test. The study found that pre-service teachers in the institute are satisfied with their needs and demands through teacher education, that teacher education curricula are tailored to the needs of pre-service teachers, that subject content courses are appropriate, that the scope of teaching practicum is broad, that training is linked to practical school experiences, and that school management courses are offered. The pedagogy courses help pre-service teachers improve their teaching skills, and they receive adequate training in evaluation methods. There are also quality academic research activities. The study suggested that pre-service teachers attend orientation sessions to learn about their needs and demands, which could be met through teacher preparation. Teacher education curricula are revised to provide more realistic exposure to the school's atmosphere and activities.

Full text link <https://tinyurl.com/ymf5v9a2>

Article title: COVID-19 Vaccine Confidence and Hesitancy Among Schools' Stakeholders: A Philippine Survey

Authors: Dave Arthur Roldan Robledo, Aris Alea Lapada, Frosyl Fabrea Miguel, Zeba Farooqi Alam, PhD

Publication title: Journal of Cardiovascular Disease Research 12(3), 2021

Abstract:

The aim of the study was to determine the perception of schools' stakeholders on the COVID-19 vaccination towards readiness to opening schools after prohibiting the face-to-face classes last March 2020. The campaigns were done online using social media platforms. A total of 2034

participants has participated in the survey. Results revealed that participants were dominated by teachers; most of them came from Luzon; ages ranged from 13-19 years old; and female participants. The highest percentage of the reason for vaccine confidence is —They believed that the vaccine would give them immunity from the virus COVID-19 while the highest percentage of the reason for COVID-19 hesitancy was —The vaccine might have a possible effect on genetic make-up. Furthermore, when participants are grouped according to profile, region, sex, and age, the confidence still a little higher than those who hesitate to get vaccinated by the COVID-19 vaccines. Among the demographics of the participants, only their sex has a significant association with their COVID-19 vaccine confidence and hesitancy ($\chi^2 = 42.43$, $p=0.000$). This study recommends that health services at school should be strengthened and vaccination among school children should be part of the school-based management system hand in hand with the health practitioners.

Full text link <https://tinyurl.com/2uvsvz8p>

Article title: Teaching Beyond Borders: Effectiveness of Heuristic Approach in Teaching Science in Public Secondary Schools in Area IV, Division of Batangas, Philippines

Authors: Dave Arthur R. Robledo, Aimee F. Motin, Eliseo C. Catapang, Erma A. Maalihan

Publication title: International Engineering Journal for Research & Development 6(2), May 2021

Abstract:

The primary purpose of this study was to determine the usefulness of the Heuristic approach in the teaching and learning process among Grade 8 public secondary schools, Area IV, Division of Batangas with the end in view of preparing supplementary materials for maximum utilization of the Heuristic approach. The descriptive type of research was used in this study with the use of questionnaires as an instrument to gather data from 30 science teachers and 356 Grade 8 students from public high schools in Area IV, Division of Batangas. Statistical tools used were independent t-test, ranking, and weighted mean. The findings revealed that the Heuristic approach was found to be useful in teaching science. There are real-life heuristics that people use to solve a problem or to learn something. These are consistency Heuristic, educated guess, absurdity Heuristic, common sense, contagion Heuristic, availability heuristic, working backward, familiarity Heuristic, scarcity Heuristic, rule of thumb, affect heuristic, and authority heuristic. The supplementary material was designed to enhance the performance of Grade 8 students in science classes. There is no significant difference between the assessment of teachers and students in the usefulness of the Heuristic approach in the teaching and learning process. It was defined in areas of concern that the Heuristic approach should establish a lively classroom in the teaching-learning process.

Full text link <https://tinyurl.com/yk3h6z4t>

Article title: Out of the Classroom: IB Students' Experiences and Tips on the Use of Home-based Biology Experiments for Internal Assessment

Authors: Megan Mae C. Chu, Eleen Hanna L. Labarez, Lara G. Reños, Jessica Rianne C. Velasco, Dave Arthur R. Robledo

Publication title: Universe International Journal of Interdisciplinary Research 1(11), 2021

Abstract:

Experimentation has been an essential part of teaching and learning biological concepts. Science experiments provide opportunities for students to learn scientific concepts, experience natural phenomena, and explore the world around them. However, this COVID-19 pandemic has disrupted the educational system in the Philippines, particularly science education. School facilities and laboratories are temporarily closed or inaccessible for teachers and students. These events hinder the conventional process of doing experiential learning activities, experiments, and scientific investigations. Because of this major disruption, the International Baccalaureate organization released a memorandum that encourages teachers and students from IB World Schools to utilize other activities other than laboratory experiments such as online simulations, analysis of secondary data, or doing safe and appropriate experiments at home. In response, the biology students of the International Baccalaureate Diploma Programme (IBDP) of Saint Jude Catholic School utilized home-based biology experiments for their internal assessment. Students investigated the effects of different fruit extracts on gelatin denaturation, effects of kinds of milk on the volume and pH of cheese produced, effects of nutrient solutions on the growth of onion, and effects of the different wavelengths of light on the growth of an aquatic plant. Because of these unpredictable changes in the educational system, it is necessary to document these innovations and practices. This paper aimed to present students' experiences on the use of home-based biology experiments. It was shown that household materials and kitchens can be utilized as alternative laboratories in remote learning. Furthermore, it was also revealed that they had trouble finding literature related to their topic. In the paper, they also emphasized the importance of choosing the right topic which fits your interest. In conclusion, home-based biology experiments are timely, relevant, and appropriate alternatives for the actual laboratory experiments.

Full text link <https://tinyurl.com/3wvfc2wz>

Article title: Biology at Home: The Six Attributes of Home-based Biology Experiments (HBEs) for Remote Authentic Learning

Authors: Dave Arthur R. Robledo

Publication title: Psychology (Savannah, Ga.) 28(3):4319-4323, April 2021

Abstract:

Home-based biology experiments are activities that utilize household materials that have been adapted for the remote learning environment and are aligned to standard learning competencies. Recognizing the households and kitchens as extensions of laboratories, HBEs can be used to deliver authentic learning experiences for the students at home. Furthermore, there are several attributes of HBEs that should be considered before the implementation of the activity. These attributes are, it is ethical and safe to perform, it produces tangible products, encourages students to reflect, promotes collaboration, materials are easy-to-find and affordable and lastly, home-based biology experiments are modifiable. Also, HBE encourages students to work independently under the supervision of their parents and teachers. Parents and guardians, as collaborators, should ensure students' safety, monitor their child's progress, provide a safe environment and conducive work area, and should report all cases of accidents and problems to

the subject teacher. In conclusion, home-based biology experiments are one of the emerging teaching tools for remote authentic learning in the new normal. Moreover, HBEs could also be used to address the problem of the lack of hands-on activity in remote learning. Further studies should be conducted on the effectiveness of HBEs in different topics in biology.

Full text link <https://tinyurl.com/3nubjh4y>

Article title: Effects of Halopriming on Seed Germination and Seedling Emergence of *Capsicum frutescens*

Authors: Dave Arthur R. Robledo

Publication title: Journal of Botany Research 3(1):114-118, September 2020

Abstract:

Siling labuyo (*Capsicum frutescens*) is a small, commonly found chili pepper in the Philippines. This pepper is great to add spice, without altering the flavor of the dish because of its distinctive and complex taste. These plants are exposed to different abiotic factors including drought, salinity, high temperature, etc. which have adverse effects on plant growth and productivity. The soil salinity has become a critical problem worldwide among different environmental stresses due to their significant impacts on the physiology and performance of plants. Soil salinity is a significant factor that restricts *Capsicum* f. germination by affecting the establishment of crop plants. Germination is an important stage of planting and thus plays an important role in crop production. In cultivation of *Capsicum* f., low and slow seed germination and seedling emergence result in economic losses. Seed priming has been developed as an important method for producing resistant plants against different stresses. It is a method of pre-germination treatment that increases seed quality and results in faster and more coordinated germination of seed. Halopriming is a simple and cheap seed priming method and is therefore considered suitable for farmers because of better synchronization of emergence and crops under different environmental conditions. In halopriming, the seeds are immersed in various salt solutions (NaCl and KNO₃ was used in this study) that facilitate the germination of seeds and subsequent seedling even under adverse environmental conditions.

Full text link <https://tinyurl.com/y27ynyu6>

Article title: Teachers' Covid-19 Awareness, Distance Learning Education Experiences and Perceptions towards Institutional Readiness and Challenges

Authors: Lapada Aris Alea, Miguel Frosyl Fabrea, Robledo Dave Arthur Roldan, Alam Zeba Farooqi

Publication title: International Journal of Learning, Teaching and Educational Research 19(6): 127-144, June 2020

Abstract:

Amidst the threat of COVID 19 pandemic in the Philippines, the educators, students, and the school are still coping and adjusting to the distance learning education. This study explored teachers' awareness about the COVID-19 pandemic and their opinion on their respective schools' readiness, as well as their response to the challenges of conducting distance learning education in the Philippines. A validated questionnaire was developed to collect the relevant

data for this study. The initial reliability test obtained 8.9 Cronbach's alpha. Data gathering procedure was done through Google forms, which, after validation from the respective DepEd divisions and universities, were subsequently sent to the teachers via email. The results show that the teachers were highly aware of the presence and consequences caused by the COVID-19 pandemic. The correlation between teacher's demographic profiles and awareness to COVID-19 shows no relationship at all. Nevertheless, the length of teaching experience and specialization is very strongly correlated to readiness to distance learning education. Simultaneously, the teachers' geographic location is strongly correlated to readiness to adapt to distance learning education. Furthermore, only the teachers' gender has a significant difference in their awareness of the COVID-19 pandemic. In contrast, teachers' gender, length of teaching experience, and geographic location have significant differences with their readiness to distance learning education. This study can be used as a basis for further research particularly in developing institutional plans to better understand the status of their teachers and educational organizations, and schools' readiness to teach and learn through distance learning approach; hence, preserving and continuing educational mission during the current or future pandemic as well as be prepared for any natural disasters.

Full text link <https://tinyurl.com/38n7err5>

**CRISLINE MAE C. ALHAMBRA***Food Science***Sex:** Female**Education:**

Master of Science in Food Science, University of the Philippines Los Baños, 2016

Bachelor of Science in Food Technology, University of the Philippines Mindanao, 2012

Field of Specialization:

Starch

Food Science

Food Research

Researches:**Article title:** Long glucan chains reduce in vitro starch digestibility of freshly cooked and retrograded milled rice**Authors:** Crisline MaeAlhambra, Maria Krishnade Guzman, Sushil Dhital, Aldrin P. Bonto, Erlinda I.Dizon, Katherine Ann C.Israel, Wilma A. Hurtada, Vito M. Butardo Jr., Nese Sreenivasulu**Publication title:** Journal of Cereal Science 86, February 2019**Abstract:**

Understanding the structural factors related to the starch digestibility of cooked milled rice grains is important in mitigating the impact of diet-related diseases. In this study, changes in starch structure of rice during in vitro digestion and retrogradation is reported for 8 varieties of indica milled rice with apparent amylose ranges from 3 to 34. Results showed that retrogradation is effective in decreasing starch hydrolysis rate (k), while addition of exogenous lipid had no significant effect. Moreover, reduction in digestibility after retrogradation was more effective in high amylose than low amylose or waxy rice. Structurally, strong negative correlations were found between k and starch fractions rich in long glucan chains such as long-chain amylose (LCAM) or intermediate-chain amylose (ICAM). Conversely, strong positive correlation was seen between k and short-chain amylopectin (SCAP). Decreased hydrolysis of LCAM and low levels of SCAP was observed in retrograded rice. This shows that LCAM becomes less susceptible to

digestion which consequently results to increased hydrolysis of SCAP as the preferred substrate in rice.

Full text available upon request to the author/s.

Article title: Investigating glycemic potential of rice by unraveling compositional variations in mature grain and starch mobilization patterns during seed germination

Authors: Maria Krishna de Guzman, Sabiha Parween, Vito M. Butardo, Crisline Mae Alhambra, Roslen Anacleto, Christiane Seiler, Anthony R. Bird, Chung-Ping Chow & Nese Sreenivasulu

Publication title: Scientific Reports 7(1), July 2017

Abstract:

Rice lines with slower starch digestibility provide opportunities in mitigating the global rise in type II diabetes and related non-communicable diseases. However, screening for low glycemic index (GI) in rice breeding programs is not possible due to time and cost constraints. This study evaluated the feasibility of using in vitro cooked grain amylolysis, starch mobilization patterns during seed germination, and variation in starch structure and composition in the mature seed to differentiate patterns of starch digestibility. Mobilization patterns of total starch, resistant starch, amylose and amylopectin chains, and free sugars during seed germination revealed that the process is analogous to digestion in the human gastrointestinal tract. The combination of these biochemical markers can be used as an alternative measure to predict GI. Additionally, transcriptome analysis of stored mRNA transcripts in high and low GI lines detected differences in starch metabolism and confirmed the importance of seed storage pathways in influencing digestibility. Pathway analyses supported by metabolomics data revealed that resistant starch, cell wall non-starch polysaccharides and flavonoids potentially contribute to slower digestibility. These new insights can guide precision breeding programs to produce low GI rice with acceptable cooking quality to help mitigate the burden of diet-associated lifestyle diseases.

Full text link <https://tinyurl.com/pcnzvma5>

Article title: Systems Genetics Identifies a Novel Regulatory Domain of Amylose Synthesis

Authors: Vito M. Butardo Jr., Roslen Anacleto, Sabiha Parween, Irene Samson, Krishna de Guzman, Crisline Mae Alhambra, Gopal Misra, and Nese Sreenivasulu

Publication title: Plant Physiology 173(1):01248.2016, November 2016

Abstract:

A deeper understanding of the regulation of starch biosynthesis in rice endosperm is crucial in tailoring digestibility without sacrificing grain quality. In this study, significant association peaks on chromosomes 6 and 7 were identified through genome-wide association study (GWAS) of debranched starch structure from grains of a 320 indica rice diversity panel using genotyping data from the high-density rice array. A systems genetics approach that interrelates starch structure data from GWAS to functional pathways from a gene regulatory network identified known and novel genes with high correlation to the proportion of amylose and amylopectin. A novel SNP in the promoter region of Granule Bound Starch Synthase I (GBSS I) was identified along with seven other SNPs to form haplotypes that discriminate samples into different

phenotypic ranges of amylose. A novel GWAS peak on chromosome 7 between LOC_Os07g11020 and LOC_Os07g11520 indexed by a non-synonymous SNP mutation on exon 5 of a bHLH transcription factor was found to elevate the proportion of amylose at the expense of reduced short-chain amylopectin. Linking starch structure with starch digestibility by determining the kinetics of cooked grain amylolysis of selected haplotypes revealed strong association of starch structure with estimated digestibility kinetics. Combining all results from grain quality genomics, systems genetics, and digestibility phenotyping, we propose novel target haplotypes for fine-tuning starch structure in rice through marker-assisted breeding that can be used to alter the digestibility of rice grain, thus offering rice consumers a new diet-based intervention to mitigate the impact of nutrition-related non-communicable diseases.

Full text link <https://tinyurl.com/mvay73f3>

Chapter title: Quantifying Grain Digestibility of Starch Fractions in Milled Rice: Methods and Protocols

Authors: Crisline Mae Alhambra, Sushil Dhital, Nese Sreenivasulu & Vito M. Butardo Jr.

Publication title: Methods in Molecular Biology, January 2019

Abstract:

Rice is one of the staple foods which serves as the major source of carbohydrate in the human diet. A typical milled rice grain is mainly composed of starch of up to 80–90%, with an average of 6–8% proteins and some trace amounts of dietary fiber. Although cooked white rice can elicit variable glycemic response, a portion of rice starch may evade digestion in the human small intestine. The digested portion of rice can be estimated and characterized in vitro based on starch digestion extent and rate (kinetics). The indigestible portion of starch can also be quantified. This chapter will present micro-scale methods to quantify rice starch digestion rate and extent based on the sugar fractions released after treating the samples with digestive enzymes.

Full text available upon request to the author/s.

Article title: Development and Validation of Amylolysis Method to Assess Digestibility of Rice Grains

Authors: Vito M. Butardo Jr., Krishna de Guzman, Crisline Mae Alhambra, Asgar Faranahky, Laura, Pallas, Christopher Blanchard and Nese Sreenivasulu

Conference title: 2017 AIFST Food Science Summer SchoolAt: Western Sydney University Hawkesbury Campus

Abstract:

Rice is an important energy source for more than half of the world's population. Understanding the digestibility of rice grains is crucial in mitigating the impact of hunger and overnutrition. In this paper, we summarise more than one decade of research efforts on rice digestibility to address the global prevalence of malnutrition. In the past, we screened for grain digestibility using amylose content as proxy measure. Digestibility was then verified using an in vitro starch hydrolysis method. This strategy proved to be effective in identifying starch mutants with extremely reduced digestibility. However, this was accomplished at the expense of reduced

grain quality and consumer acceptance. Consequently, recent phenotypic screening focused on characterising rice grains from diversity panels with subtle allelic variations. Using this diversity screening approach, we identified some rice accessions that can be used as parental sources to tailor the digestibility of rice grains by marker-assisted breeding. After initial screening, selected rice lines representing glutinous to very high amylose varieties were subjected to cooked grain amylolysis to determine in vitro digestibility kinetics. The role of endogenous and exogenous factors that can alter digestibility kinetics were also determined. Lastly, we present our recent efforts in developing an accurate and robust phenotyping method to quantify rice grain digestibility focusing on Australian commercially-released rice varieties. A quick and low-cost phenotyping method to characterize rice digestibility is important in screening thousands of samples within the Australian rice breeding program each year. We believe that this current strategy is better in improving the nutritional quality of rice grains without sacrificing other grain quality traits essential in maintaining consumer acceptance.

Full text link <https://tinyurl.com/4swdhke3>

**RYAN V. LABANA***Infectious Diseases*

Sex: Male

Education:

Master of Science in Biology, Centro Escolar University, 2018

Bachelor of Education, Northwest Samar State University, 2007

Field of Specialization:

Emerging Infectious Diseases

Tropical diseases

Public health

Researches:

Article title: Prevalence and intensity of soil-transmitted helminth infections among school-age children in the Cagayan Valley, the Philippines

Authors: Ryan V. Labana, Vimar A. Romero, Analette M. Guinto, Alvin N. Caril, Kimberly D. Untalan, Alejandro Jose C. Reboa, Khristine L. Sandoval, Kristel Joy S. Cada, Gary Antonio C. Lirio, Iris Rowena A. Bernardo, Lanieleen Jerah Mae Arocha, Julieta Z. Dungca

Publication title: Asian Pacific Journal of Tropical Medicine 14(3):113-121, February 2021

Abstract:

Objective: To identify the prevalence of soil-transmitted helminthiasis (STH) among school-age children in the Cagayan Valley, the Philippines, assess their level of awareness on the disease, and determine predisposing factors of the disease.

Methods: A total of 478 Grades III-V school-age children in Pamplona and Sanchez-Mira School Districts in the Cagayan Valley answered the questionnaire assessing their knowledge, attitude, and practices on STH, subjected to anthropometric measurements, and provided faecal samples for parasitologic assessment (direct smear, Kato-Katz, and formol-ether concentration techniques).

Results: The participants of the study, with 55.86% females, were 8 to 14 years old. Their nutritional status was assessed 'normal' (84.31%), 'severely wasted' (6.49%), 'wasted' (5.23%), 'overweight' (2.72%), and 'obese' (1.26%). The prevalence of infection with at least 1 STH species was 25.99% in Pamplona and 19.40% in Sanchez- Mira. Overall, the prevalence of heavy intensity was 7.11% for *Ascaris lumbricoides* and 1.67% for *Trichuris trichiura*. All hookworm infections had light intensities. The majority of the school-age children had a low score in the KAP test. In knowledge of STH, 'stunted growth as a symptom of infection' was associated with a lower risk of *Ascaris lumbricoides* infection (OR 0.448; 95% CI 0.212, 0.945; P=0.035) while 'playing with soil as a mode of transmission' was associated with an increased risk of *Ascaris lumbricoides* infection (OR 2.067; 95% CI 1.014, 4.212; P=0.046). In attitude towards STH, 'I think I have intestinal worm now' was associated with a higher risk of *Ascaris lumbricoides* infection (OR 1.681; 95% CI 1.061, 2.662; P=0.027).

Conclusions: The prevalence rate of *Ascaris lumbricoides* among the school-age children in the Cagayan Valley shows the need to further intensify intervention in the area to meet the threshold set by the World Health Organization. The identified predictors of infection, which concerns the school-age children's knowledge and attitude toward STH, can be used in augmenting intervention programs in the future.

Full text link <https://tinyurl.com/yc5c2auh>

Article title: Online Game Addiction and the Level of Depression Among Adolescents in Manila, Philippines

Authors: Ryan V. Labana, Jehan L. Hadjisaid, Adrian R. Imperial, Kyeth Elmeron Jumawid, Marc Jayson M. Lupague, Daniel C. Malicdem

Publication title: Central Asian Journal of Global Health 9(1), December 2020

Abstract:

Introduction: World Health Organization recognizes online game addiction as a mental health condition. The rise of excessive online gaming is emerging in the Philippines, with 29.9 million gamers recorded in the country. The incidence of depression is also increasing in the country. The current correlational analysis evaluated the association between online game addiction and depression in Filipino adolescents.

Methods: A paper-and-pencil self-administered questionnaire assessing depression and online game addiction was distributed from August to November, 2018. The questionnaire included socio-demographic profiles of the respondents, and the 14-item Video Game Addiction Test (VAT) (Cronbach's $\alpha=0.91$) and the Patient Health Questionnaire-9 (Cronbach's $\alpha=0.88$) to determine levels of online game addiction and depression, respectively. Multiple regression analyses were used to test the association between depression and online game addiction.

Results: Three hundred adolescents (59% males, 41% females) participated in the study. Fifty-three out of 300 respondents (12.0% males, 5.7% females) had high level of online game addiction as reflected in their high VAT scores. In this study, 37 respondents (6.7% males, 5.7% females) had moderately severe depression and 6 (2.0%) females had severe depression.

Online game addiction was positively correlated with depression in this study ($r=0.31$; $p<0.001$). When multiple regression analysis was computed, depression was found to be a predictor of online game addiction (Coefficient=0.0121; 95% CI-8.1924 - 0.0242; $p=0.05$).

Conclusion: Depression, as associated with online game addiction, is a serious threat that needs to be addressed. High level of online game addiction, as positively correlated to the rate of depression among adolescents in Manila, could potentially be attributed to the booming internet industry and lack of sufficient mental health interventions in the country. Recommended interventions include strengthening depression management among adolescents and improving mental health services for this vulnerable population groups in schools and within the communities.

Full text link <https://tinyurl.com/44uzuyzn>

Article title: A Cross-sectional Analysis of Facebook Comments to Study Public Perception of the Mass Drug Administration Program in the Philippines

Authors: Ryan V. Labana, Veeranoot Nissapatorn, Kristel Joy S. Cada, Khristine L. Sandoval

Publication title: International Journal of Health Policy and Management (IJHPM) 10(5), April 2020

Abstract:

Mass Drug Administration (MDA) of albendazole is being implemented in the Philippines to eliminate soil-transmitted helminthiasis (STH) among school-age children (SAC). The first round of MDA for the school year 2019-2020 was suspended in the province of Surigao del Norte due to a reported death of a student after deworming. It was broadcasted on a national television and the story was then posted on Facebook. We used structured and simple nature of social media research to study public perception of the MDA program after the controversial issue in the Philippines. The news story was assessed, and the Facebook comments were analyzed. A large portion of the Facebook comments expressed a declining trust of the Filipinos toward MDA. The negative impact could be attributed to the public-initiated discussion and sharing of comments with no solid evidence in Facebook. This study showed a possible threat to the successful implementation of the program if not properly managed. The Department of Health (DOH) should be able to cope with the developing landscape of public perception during the era of social media.

Full text link <https://tinyurl.com/mv3964e6>

Article title: Gaps and barriers in interventions for the control of soil-transmitted helminthiasis among school-age children in an endemic area of the Philippines: a school-based point-of-view

Authors: Ryan V. Labana, Vimar A. Romero, Analette M. Guinto, Alvin N. Caril, Kimberly D. Untalan, Alejandro Jose C. Reboa, Khristine L. Sandoval, Kristel Joy S. Cada, Gary Antonio C. Lirio, Iris Rowena A. Bernardo, Lanieleen Jerah Mae G. Arocha & Julieta Z. Dungca

Publication title: Journal of Public Health Policy 40(9):478–497, December 2019

Abstract:

We used a qualitative cross-sectional study in 20 elementary schools in an area of Cagayan Valley, Philippines where soil-transmitted helminthiasis (STH) is endemic, to analyze the strengths, weaknesses, opportunities, and threats for three intervention components for STH control: mass drug administration (MDA), health education, and sanitation. School teachers and staff generally perceived MDA to be a well-delivered program, but opportunities exist to strengthen other control strategies: health education and school rules on hygiene and sanitation at school. Complete and consistent monitoring of program impact and the availability of up-to-date reports on prevalence of the infection can guide teachers' efforts to promote interventions for STH elimination.

Full text link <https://tinyurl.com/khk86ykz>

Article title: Cryptosporidium in the Philippines

Authors: Ryan V. Labana

Publication title: International Annals of Science 6(1):18-27, January 2019

Abstract:

This short review provides an overview regarding the research findings on the occurrence of Cryptosporidium in the Philippines. It seeks to set conjecture about its possible role on the increasing waterborne disease incidences in the country. Intensive search of journal articles was done among major databases, online. The first report of Cryptosporidium infection in the country was in 1985. Past more than 30 years, Cryptosporidium is not yet well-understood in the Philippines, but an increasing research interest has been observed among Filipinos in the past few years. Recently, waterborne transmission of the infection appeared in the studies to be more potent than zoonotic and person-to-person transmissions. An improvement on the detection methods was also observed, giving an improved knowledge on the molecular diversity of Cryptosporidium in the country. Despite these improvements, the paucity of the data regarding the impact of Cryptosporidium to the public health in the Philippines is still apparent. One Health approach is recommended to fully understand the interconnections between human, animal, and environment as reservoirs of the infective stage of the parasite. Dedication of the researchers in understanding their geographical distribution, molecular diversity, and environmental and climatic behaviour will eventually uncover the public health implications of Cryptosporidium in the country.

Full text link <https://tinyurl.com/2yjaye3y>

Article title: Presence of Cryptosporidium and Giardia in the water sources of indigenous peoples in Boliwong, Philippines

Authors: R. V. Labana, J. Z. Dungca , V. Nissapatorn

Publication title: Asian Pac. J. Health Sci.,5(3):163-166, 2018

Abstract:

The study investigated the presence of Cryptosporidium and Giardia in the water system from an untapped indigenous community inhabited by the Tawali ethno-linguistic group of the Philippines. These protozoa parasites were detected from river, creek and water pumps using direct fluorescence antibody (DFA) test and immunomagnetic separation (IMS) technique. In

situ measurement of physico-chemical parameters such as pH, temperature, and total dissolved solids of the water samples were done. From the 24 samples collected during the month of April 2017, seven samples were positive for *Cryptosporidium* (29%) and one sample was positive for *Giardia* (4.2%). The concentration of parasites were typically one to two (oo)cysts per 10 liters of water. The quality of water was generally acceptable for primary contact recreation, irrigation and livestock watering based on the standards set by the Department of Environment and Natural Resources of the Philippines. The occurrence of *Cryptosporidium* and *Giardia* in the community is an important indicator of the occurring zoonosis in the community. This calls for a wider scale of the detection for waterborne protozoan parasites within the region before a possible outbreak could happen.

Full text link <https://tinyurl.com/3s6uabn5>

Article title: Survey of Intestinal Parasites Including Associated Risk Factors Among Food Vendors and Slaughterhouse Workers in Metro Manila, Philippines

Authors: G. A. C. Lirio, R. V. Labana, I. R. A. Bernardo, R. P. Bernarte, J. Z. Dungca, V. Nissapatorn

Conference title: 4th International Conference on Higher Education At: Bali Indonesia, June 2018

Abstract:

Infections by intestinal parasites are considered as one of the major health concerns in developing countries afflicting different groups of people including food handlers and food vendors and are linked to poor personal hygiene and sanitation. This raises public health issues as food vendors and handlers may potentially become agents for the fecal-oral transmission of intestinal parasitic infections to consumers. This study focused on determining the prevalence of intestinal parasites among slaughter house workers and food vendors and examined their personal and food hygiene practices. A small-scale survey was conducted and selected a total of 91 slaughter house workers and food vendors from different areas in Metro Manila. Microscopic examination of the fecal samples collected was done following standard procedures by the World Health Organization (WHO) thru direct smear, formalin-ethyl acetate sedimentation and staining methods. Participants were also interviewed on their food and personal hygiene practices using a questionnaire. The overall prevalence of parasitic infection was 90% with helminthic predominating protozoan infections. Eight (8) different intestinal parasites were identified: *Entamoeba histolytica/Entamoeba dispar* (15.6%), *Balantidium coli* (8.4%), *Giardia lamblia* (4.2%), *Ascaris lumbricoides* (30%), *Trichuris trichiura* (14.9%), *Ancylostoma duodenale/ Necator americanus* (2.3%), *Taenia* spp. (2.4%), and *Enterobius vermicularis* (2.9%). Other amoeba-like protozoans (19.2%) were also observed suggestive of exposure to fecal materials. Based on the results obtained, there is high levels of parasitic infections among slaughter house workers and food vendors. Raising awareness on proper food handling, improved personal hygiene and sanitation is needed to prevent further transmission of parasites to the public.

Full text available upon request to the author/s.

Article title: Community-based surveillance of *Cryptosporidium* in the indigenous community of Boliwong, Philippines: from April to December 2017

Authors: Ryan V. Labana, Julieta Z. Dungca, Veeranoot Nissapatorn

Publication title: Epidemiology and Health, September 2018

Abstract:

Objectives

For the first time, Boliwong, an indigenous community in the Philippines, was surveyed for the prevalence of *Cryptosporidium* from April to December 2017.

Methods

Cryptosporidium oocysts were detected in samples from the river, creek, and water pumps via immunomagnetic separation techniques, and from human and animal concentrated faecal samples using the modified Ziehl-Neelsen technique.

Results

Seven of the 24 water samples (29.2%) were positive for *Cryptosporidium*, with the highest concentration (0.8 oocyst/L) detected in the creek. Of 35 fecal samples from different animal groups, 8 (21.6%) were positive for *Cryptosporidium* oocysts. The highest intensity of oocyst shedding was detected in dogs ($\chi^2 = 8.00$). Of the 137 human fecal samples, 39 (28.5%) were infected with *Cryptosporidium*. In this study, 3 risk factors were found to be associated with infection: (1) location (crude odds ratio [cOR], 16.39; 95% confidence interval [CI], 2.11 to 127.41; $p=0.008$), (2) drinking water from the natural spring (cOR, 0.29; 95% CI, 0.11 to 0.82; $p<0.05$), and (3) using an open pit as a sanitary toilet facility (cOR, 2.44; 95% CI, 1.14 to 5.20; $p<0.05$). When the cOR was adjusted, using an open pit as a sanitary toilet facility remained a significant risk factor of infection (adjusted OR, 0.41; 95% CI, 0.19 to 0.90; $p<0.05$).

Conclusions

There is a potentially emerging *Cryptosporidium* zoonosis in Boliwong, Lagawe, Philippines. It is recommended that the toilet facilities and the water system in the community be rehabilitated to avoid any possible disease outbreak. Health education is also needed in the community to maintain proper hygiene and sanitation practices.

Full text link <https://tinyurl.com/yfvms99p>

Article title: Presence of *Cryptosporidium* and *Giardia* in the water sources of indigenous peoples in Boliwong, Philippines

Authors: R .V. Labana, J. Z. Dungca , V. Nissapatorn

Publication title: Asian Pac. J. Health Sci.,5(3):163-166, 2018

Abstract:

The study investigated the presence of *Cryptosporidium* and *Giardia* in the water system from an untapped indigenous community inhabited by the Tawali ethno-linguistic group of the Philippines. These protozoa parasites were detected from river, creek and water pumps using direct fluorescence antibody (DFA) test and immunomagnetic separation (IMS) technique. In

situ measurement of physico-chemical parameters such as pH, temperature, and total dissolved solids of the water samples were done. From the 24 samples collected during the month of April 2017, seven samples were positive for *Cryptosporidium* (29%) and one sample was positive for *Giardia* (4.2%). The concentration of parasites were typically one to two (oo)cysts per 10 liters of water. The quality of water was generally acceptable for primary contact recreation, irrigation and livestock watering based on the standards set by the Department of Environment and Natural Resources of the Philippines. The occurrence of *Cryptosporidium* and *Giardia* in the community is an important indicator of the occurring zoonosis in the community. This calls for a wider scale of the detection for waterborne protozoan parasites within the region before a possible outbreak could happen.

Full text link <https://tinyurl.com/3s6uabn5>

Article title: Physico-chemical analysis of fish pond water in Candaba, Pampanga, Philippines

Authors: Khristine L. Sandoval, Kristel Joy S. Cada, Ryan V. Labana and Julieta Z. Dungca

Publication title: Philippine Journal of Systematic Biology 11(1), January 2017

Abstract:

The study of Physico-chemical parameters in fish ponds in Candaba, Pampanga was conducted to determine the quality of water for fish pond from July to August, 2014. Water samples were tested in-situ using probe meter: Thermo Orion Model A920. The results showed variation in the observed parameters at the different sampling stations and two sampling dates. Temperature ranged from 29 ± 16.74 to $35.23 \pm 1.01^\circ\text{C}$. pH values were 8.70 ± 5.02 to 9.57 ± 1.11 . Dissolved oxygen values were 5.20 ± 3 to $7.57 \pm 0.77\text{mg/l}$. Electrical conductivity ranged from 220 ± 0.01 to $489 \pm 0.57\mu\text{S/cm}$. The values for temperature and DO were higher than accepted values for fish culture while those of other parameters favored for good fish production. The observations in this study suggest that fish production in some fish ponds of Candaba, Pampanga could be practiced without adverse effects posed by the quality of water.

Full text link <https://tinyurl.com/2d26exkz>

Papers Presented:

Article title: Survey of Intestinal Parasites Including Associated Risk Factors Among Food Vendors and Slaughterhouse Workers in Metro Manila, Philippines

Authors: G. A. C. Lirio, R. V. Labana, I. R. A. Bernardo, R. P. Bernarte, J. Z. Dungca, V. Nissapatorn

Conference title: 4th International Conference on Higher Education At: Bali Indonesia, June 2018

Abstract:

Infections by intestinal parasites are considered as one of the major health concerns in developing countries afflicting different groups of people including food handlers and food vendors and are linked to poor personal hygiene and sanitation. This raises public health issues as food vendors and handlers may potentially become agents for the fecal-oral transmission of intestinal parasitic infections to consumers. This study focused on determining the prevalence of intestinal parasites among slaughter house workers and food vendors and examined their

personal and food hygiene practices. A small-scale survey was conducted and selected a total of 91 slaughter house workers and food vendors from different areas in Metro Manila. Microscopic examination of the fecal samples collected was done following standard procedures by the World Health Organization (WHO) thru direct smear, formalin-ethyl acetate sedimentation and staining methods. Participants were also interviewed on their food and personal hygiene practices using a questionnaire. The overall prevalence of parasitic infection was 90% with helminthic predominating protozoan infections. Eight (8) different intestinal parasites were identified: *Entamoeba histolytica/Entamoeba dispar* (15.6%), *Balantidium coli* (8.4%), *Giardia lamblia* (4.2%), *Ascaris lumbricoides* (30%), *Trichuris trichiura* (14.9%), *Ancylostoma duodenale/ Necator americanus* (2.3%), *Taenia* spp. (2.4%), and *Enterobius vermicularis* (2.9%). Other amoeba-like protozoans (19.2%) were also observed suggestive of exposure to fecal materials. Based on the results obtained, there is high levels of parasitic infections among slaughter house workers and food vendors. Raising awareness on proper food handling, improved personal hygiene and sanitation is needed to prevent further transmission of parasites to the public.

Full text available upon request to the author/s.

Article title: Effects of rising temperature on the antibiotic susceptibility pattern of bacterial isolates from Pasig River tributaries, Philippines

Authors: Ryan V. Labana, Gary Antonio C Lirio, Julieta Z Dungca, et. al.

Conference title: 6th Clinical Microbiology Conference At: Rome, Italy, October 2016

Abstract:

While there has been a number of literatures suggesting the direct positive effects of increasing temperature on bacterial density, there has been scarcity of data, however, describing how temperature may impact the efficacy of antibiotics. In this study, the effect of rising temperatures brought about by global warming on the antibiotic susceptibility pattern of bacteria isolated from the surface water of Pasig River, Philippines was investigated. Nine bacterial isolates belonging to three families namely: Aeromonadaceae (*Aeromonas sobria* (3), *Aeromonas veronii* (1) and *Aeromonas caviae* (1)); Enterococcaceae (*Enterococcus gallinarum* (1)); and Enterobacteriaceae (*Klebsiella oxytoca* (2) and *Citobacter sedlakii* (1)) were tested for their activities against six antibiotics namely: Gentamicin (10 µg), Chloramphenicol (30 µg), Tetracycline (30 µg), Erythromycin (15 µg), Vancomycin (30 µg) and Bacitracin (10 units) using Kirby Bauer disk diffusion method at varying incubation temperature (37oC, 39oC, 42oC and 45oC). Bacterial density at the time of sampling was also determined. The mean heterotrophic plate count was estimated at 3.7029×10^4 CFU/ml. All the nine bacterial isolates were found to be multiple drug resistant (MDR) (55.6% being triresistant while 44.4% being tetraresistant). It is surprising to note that all the nine isolates were able to tolerate high temperature exposure and that all of them exhibited resistance to erythromycin, vancomycin and bacitracin. Out of the nine isolates, eight (88.9%) and seven (77.8%) were sensitive to gentamicin and chloramphenicol, respectively, suggesting that these were still effective in killing these bacteria. A very high positive correlation ($r=0.868$, $p=0.001$) between antibiotics and zones of inhibition across varying temperatures was noted. These data may suggest possible beneficial effect of increasing temperature on the activity of some antibiotics against bacteria. Further, it implies

that thermotolerant MDR bacterial strains have gone through the river water system which may pose potential threat to the public.

Full text available upon request to the author/s.

Article title: Surveillance of intestinal protozoans and multi-drug resistant bacteria from various water samples from the Philippines

Authors: Julieta Z. Dungca, Onichandran, T. Kumar, C. Salibay, H. Tabo, N. Tabo, T.C. Tan, Y. Lim, N. Sawangjaroen, S. Phiriyasamith, H. Andiappan, I. Ithoi, Y-L Lau, V. Nissapatorn, Z. Los Banos, A. Yu, J. Adrano, R. Labana, G. Lirio, A. Fabella, G. Tapar, A. Ayacocho, P. Fua, C. Coats, Arellano, R., Cueto, C, Asuncion, D. J. and Delmo

Conference title: International conference and Expo on Water Microbiology & Novel Technologies At: Chicago, USA, July 2016

Abstract:

As water pollution is one of the key health issues in the Philippines, parasitological and bacteriological surveys were made on various water systems in the Philippines with the hope of assisting policy makers in coming up with environmental health programs for the region. A total of thirty three water samples were examined for the presence of *Cryptosporidium* spp. and *Giardia* spp. using an immunomagnetic separation method and fluorescence microscopy. Likewise, *Acanthamoeba* and *Naegleria* were tested through microscopy examination and polymerase chain reaction (PCR). Results of the parasitological analysis revealed that twelve samples were positive for *Cryptosporidium* spp. (36.4%); 17 (45.5%) for *Giardia* spp., 13 (33.3%) for *Acanthamoeba* and 5 (18.2%) for *Naegleria* spp. The occurrence of *Giardia* in the water samples was positively correlated with nitrite ($r=0.736$, $p<0.01$) as well as nitrate concentration ($r=0.502$, $p<0.01$). These findings may serve as baseline surveillance data for parasitic contamination in various water systems in the Philippines. Likewise, the occurrence of multidrug resistant bacteria (defined as resistance to at least three antibiotics) in selected river systems was also investigated. The resistance profile of the 27 bacterial isolates from Pampanga River, 8 isolates from Estero de San Miguel and 9 isolates from Pasig River were determined against five to ten antibiotics using the Kirby Bauer disk diffusion method. Results showed that all the 37 out of 44 isolates (20 from Pampanga; all 8 from Estero de San Miguel and all 9 from Pasig River) were resistant to at least three antibiotics. In this study, 9 thermotolerant multiple drug resistant (MDR) bacterial isolates were identified. Further investigation has to be made as to how these MDR had been introduced into these bodies of water which may place the public at great risk.

Full text link <https://tinyurl.com/yhsy48uf>

**DR. MYLENE ANWAR***Food Science***Sex:** Female**Education:**

Doctor of Philosophy in Food Science, University of Otago, New Zealand, 2020

Master of Science in Food Science Technology, Visayas State University, 2013

Bachelor of Science in Food Science Technology, Visayas State University, 2008

Field of Specialization:

Food Science

Food Technology

Researches:

Article title: Effects of Taro (*Colocasia esculenta*) Water-Soluble Non-Starch Polysaccharide, *Lactobacillus acidophilus*, *Bifidobacterium breve*, *Bifidobacterium infantis*, and Their Synbiotic Mixtures on Pro-Inflammatory Cytokine Interleukin-8 Production

Authors: Mylene Anwar, Sonya Mros, Michelle McConnell and Alaa El-Din A. Bekhit

Publication title: *Nutrients* 14(10):2128, May 2022

Abstract:

In the past decades, the regulation of pro-inflammatory cytokine production, including interleukin-8 (IL-8), has been the goal of many targeted therapeutic interventions for Necrotising enterocolitis (NEC), a gastrointestinal disease commonly associated with a very low birth weight in preterm infants. In this study, the ability to regulate the production of IL-8 of the water-soluble non-starch polysaccharide (WS-NSP) from taro corm (Tc-WS-NSP) extracted using a conventional (CE) or improved conventional (ICE) extraction method, of the probiotics *Lactobacillus acidophilus*, *Bifidobacterium breve*, and *Bifidobacterium infantis*, and their synbiotic mixtures were evaluated. The TNF- α stimulated HT-29 cells were incubated with undigested or digested Tc-WS-NSPs (CE or ICE), probiotics, and their synbiotic mixtures with *Klebsiella oxytoca*, an NEC-positive-associated pathogen. Overall, the synbiotic mixtures of digested Tc-WS-NSP-ICE and high bacterial concentrations of *L. acidophilus* (5.57×10^9), *B. breve* (2.7×10^8 CFU/mL), and *B. infantis* (1.53×10^8) demonstrated higher (42.0%, 45.0%, 43.1%, respectively) ability to downregulate IL-8 compared to the sole use of Tc-WS-NSPs

(24.5%), or the probiotics *L. acidophilus* (32.3%), *B. breve* (37.8%), or *B. infantis* (33.1%). The ability demonstrated by the Tc-WS-NSPs, the probiotics, and their synbiotics mixtures to downregulate IL-8 production in the presence of an NEC-positive-associated pathogen may be useful in the development of novel prophylactic agents against NEC.

Full text link <https://tinyurl.com/mr4aft6y>

Article title: Fruit pomace-lignin as a sustainable biopolymer for biomedical applications

Authors: Oseweuba Valentine Okoro, Andrew Amenaghawon, Daria Podstawczyk, Houman Alimoradi, Mohammad Reza Khalili, Mylene Anwar, Peiman Brouki Milan, Lei Niel Amin Shavandi

Publication title: Journal of Cleaner Production 328(1):129498, December 2021

Abstract:

Previous studies have explored the potential of pomace valorization, with an emphasis on the transformation of polysaccharide biopolymers of pomace-cellulose and hemicellulose to produce high-value bioproducts such as microcrystalline cellulose. Notably, opportunities for the exploration of the biopolymer of pomace-lignin for its employment in biomedical applications such as tissue engineering have not been comprehensively explored. There is, therefore, a need for an intervention to highlight the potential of utilizing pomace-lignin as a high-value biomass resource. This review explores potential biomedical applications of pomace-lignin and highlights some of the factors that hinder the industrial utilization of pomace-lignin. In addition, the present review covers lignin chemistry, extraction methods, depolymerization approaches, and prospects of lignin utilization in biomedical applications. It is anticipated that this review will aid future decisions regarding the preferred approaches for the valorization of pomace-lignin.

Full text available upon request to the author/s.

Article title: Effects of extraction methods on the digestibility, cytotoxicity, prebiotic potential and immunomodulatory activity of taro (*Colocasia esculenta*) water-soluble non-starch polysaccharide

Authors: Mylene Anwar, Sonya Mros, Michelle McConnell, Alaa El-Din A. Bekhit

Publication title: Food Hydrocolloids 121(1):107068, July 2021

Abstract:

In this study, water-soluble non-starch polysaccharide (WS-NSP) from taro corm (Tc-WS-NSP) extracted using conventional extraction (Tc-WS-NSP-CE) and improved conventional extraction (Tc-WS-NSP-ICE) methods was used to compare the effects of these in vitro on the digestibility, cytotoxicity in HT-29 cells, prebiotic action on probiotic strains *Lactobacillus acidophilus*, *Bifidobacterium breve*, and *Bifidobacterium infantis*, and immunomodulatory activity measured by the ability to regulate the production of the pro-inflammatory chemokine IL-8 following TNF- α stimulation of HT-29 cells. Tc-WS-NSP-ICE was more resistant to digestion with lower digestibility (4.1%) compared to Tc-WS-NSP-CE (11.5%). Digested Tc-WS-NSP-ICE had higher carbohydrate (98.4 ± 0.9 g/100g) and lower protein (2.1 ± 0.3 g/100g) contents than the carbohydrate (96.4 ± 0.2 g/100g) and protein (5.4 ± 0.3 g/100g) contents of Tc-WS-NSP-CE. Digested Tc-WS-NSP-CE and Tc-WS-NSP-ICE contained the monosaccharides arabinose,

galactose, glucose and mannose, the functional groups –OH, C=O, –COOH, –CH₃, nitro and amino groups in their FTIR spectra, and were highly amorphous. The extraction methods did not significantly affect the cytotoxicity to HT-29 cells and the ability to enhance the growth of the probiotics *L. acidophilus*, *B. breve*, and *B. infantis* of the undigested and digested Tc-WS-NSP-CE and Tc-WS-NSP-ICE samples. The use of the ICE method resulted in a Tc-WS-NSP exhibiting better immunomodulatory activity than the CE where undigested (20.7%) and digested (25.0%) Tc-WS-NSP-ICEs demonstrated higher IL-8 down-regulation capacities than undigested (18.3%) and digested (22.2%) Tc-WS-NSP-CEs. Overall, the study demonstrated that extraction method can affect, and specifically enhance some property (i.e., digestibility) and biological activity (i.e., immunomodulatory activity) of the extracted biomaterial.

Full text available upon request to the author/s.

Article title: Utilization of ultrasound and pulse electric field for the extraction of water-soluble non-starch polysaccharide from taro (*Colocasia esculenta*) peel

Authors: Mylene Anwar, Greeshma Babu, Alaa El-Din Bekhit

Publication title: Innovative Food Science & Emerging Technologies 70(2015):102691, April 2021

Abstract:

This study investigated the effects of different extraction methods (i.e. conventional (CE), ultrasound-assisted (UAE), and pulse electric field-assisted (PEFAE)) on the yield and physico-chemical properties of the water-soluble non-starch polysaccharide (WS-NSP) from taro peel (Tp). The use of UAE resulted in a significantly ($p \leq 0.05$) higher yield (3.65 g/100 g) than PEFAE (2.25 g/100 g) and CE (2.10 g/100 g). Tp-WS-NSP-UAE and Tp-WS-NSP-PEFAE had fewer impurities indicated by the lower amount of ash (UAE: 0.41; PEFAE: 0.20 g/100 g) and protein (UAE: 0.55; PEFAE: 0.42 g/100 g), had lighter color (UAE: L = 39.13; PEFAE: L = 34.72), and higher degradation temperatures (UAE: 252.68; PEFAE: 251.75 °C) than Tp-WS-NSP-CE (ash: 0.47; protein: 1.23 g/100 g; L = 34.18; < 250 °C). All Tp-WS-NSP samples contained the sugars arabinose, galactose, glucose, and mannose, had comparable functional groups in their FTIR spectra, were amorphous, and exhibited shear-thinning behavior ($n < 1$).

Full text available upon request to the author/s.

Article title: New freeze-thaw method for improved extraction of water-soluble non-starch polysaccharide from taro (*Colocasia esculenta*): Optimization and comprehensive characterization of physico-chemical and structural properties

Authors: Mylene Anwar, Michelle McConnell, Alaa El-Din Bekhit

Publication title: Food Chemistry 349(2015):129210, February 2021

Abstract:

This study investigated the effects of an improved extraction method that utilized freeze-thaw, termed improved conventional extraction (ICE), on the yield and properties of the water-soluble non-starch polysaccharide of taro (Tc-WS-NSP) and compared this method to the conventional extraction (CE) method. The freeze-thaw condition was optimized using response surface

methodology (RSM) based on yield. The use of the ICE method resulted in a 227.8% increase in yield of Tc-WS-NSP compared to the CE method. The Tc-WS-NSP-ICE had higher purity, lighter color, larger particle size, and higher ζ -potential than Tc-WS-NSP-CE. Both of the samples contain the sugar arabinose, galactose, glucose, and mannose and exhibited comparative FTIR, ^1H , and ^{13}C NMR spectra. The Tc-WS-NSP-ICE had a semi-crystalline structure resulting in higher thermal stability and had a higher consistency index than Tc-WS-NSP-CE. Overall, the use of the ICE method provided a simple, efficient, and green alternative to CE for the extraction of Tc-WS-NSP.

Full text available upon request to the author/s.

Article title: Water-soluble non-starch polysaccharides of root and tuber crops: extraction, characteristics, properties, bioactivities, and applications

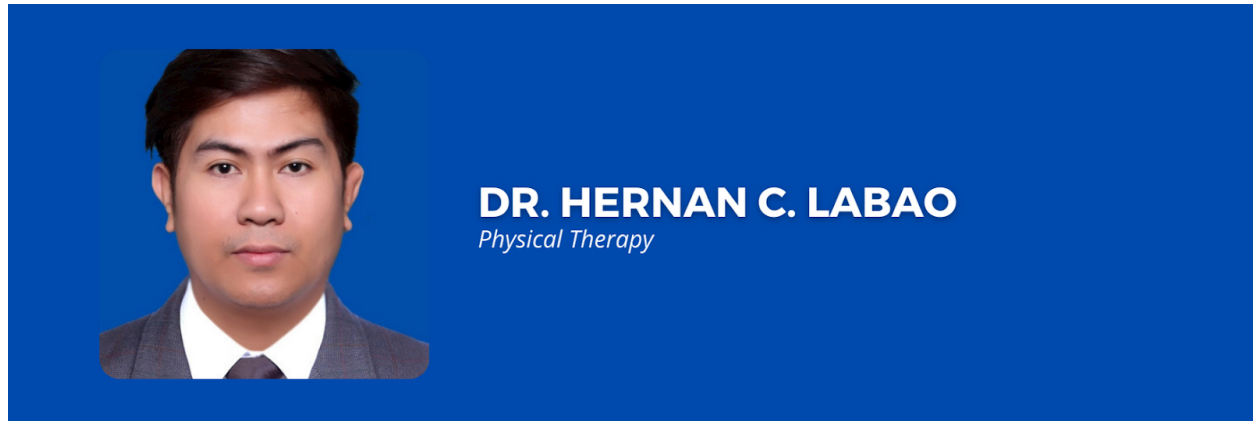
Authors: Mylene Anwar, Edward John Birch, Yu Ding, Alaa El-Din Bekhit

Publication title: Critical Reviews in Food Science and Nutrition 62(2), December 2020

Abstract:

This review critically evaluates and discusses groundwork and recent studies on the extraction, characteristics, properties, bioactivities, and applications of the water-soluble non-starch polysaccharides (WS-NSPs) of root and tuber crops. Early studies have focused on the use of conventional extraction methods for the extraction of the WS-NSPs and there are limited information on the characteristics and properties of the extracted materials. In recent years, novel extraction techniques such as microwave, ultrasound, and enzyme-assisted extractions have been utilized to improve the yield and functionality of the WS-NSPs. However, low yield and co-extraction of other biological compounds remain a challenging obstacle for commercial uses. A better understanding of the characteristics and properties was recently afforded by employing advanced analytical techniques to investigate the chemical composition and molecular structures of the WS-NSPs. Recent bioactivities of the WS-NSPs that demonstrated their potential in the prevention and management of metabolic diseases like diabetes, obesity, cancer, and in improving gut health and immunity had received considerable attention. Also, many studies have confirmed the potential use of the WS-NSPs of root and tuber crops in a wide range of food and pharmaceutical applications. These bioactivities of WS-NSPs warrant further investigations on this interesting biomaterial.

Full text available upon request to the author/s.



Sex: Male

Education:

Master of Science in Physical Therapy, Neurologic Rehabilitation, Our Lady of Fatima University, 2014

Field of Specialization:

Neurologic Physiotherapy
Stroke Rehabilitation
Health-Related Quality of Life
Neurorehabilitation
Postural Balance
Movement Analysis

Researches:

Article title: Correlates of low back pain among Filipino caregivers of children with disability: A preliminary study

Authors: Maybelle Anne L.Zamora, Hernan C.Labao

Publication title: Enfermería Clínica 30:120-123, February 2020

Abstract:

The caregiver's role in rearing a child with disability requires huge physical demands which may lead to development of musculoskeletal disorders such as low back pain (LBP). This study aims to determine the factors associated with low back pain among caregivers of children with disability. A quantitative, correlational research design was used. Data were gathered among caregivers of children with disabilities enrolled in a specialized educational and pediatric rehabilitation unit in Valenzuela City. A personal information sheet was used to gather relevant demographic data while Oswestry Disability Index (ODI) was used to measure low back pain and disability. Pearson's correlation and Chi-square were used to determine the relationship and association among demographic factors and low back pain and disability. Majority of the respondents are mothers (59.09%) caring for children with autism spectrum disorder (31.82%),

married (68.18%), and living in an extended family (36.36%). Chi-squared revealed a statistically significant association between caregivers' gender ($p = 0.003$), relationship to child ($p = 0.000$), and marital status ($p = 0.000$) to low back pain and disability. Results imply that married mothers who are the primary caregivers to children with disability are prone to develop low back pain and disability. Preventive and restorative physical interventions, such as caring rotation, is recommended. Future studies should focus on other factors such as psychosocial, physical, and emotional aspects of low back pain and disability among caregivers of children with disability.

Full text available upon request to the author/s.

Article title: Awareness and Perception of the Roles and Services of Physiotherapy among Private Healthcare Practitioners in Kota Kinabalu, Sabah

Authors: Lydia Wong, Hernan Cortez Labao, Yughdtheswari Muniandy, Jim Brown Clements

Publication title: Inti Journal, 2020

Abstract:

Background: Physiotherapy helps restore movement and function when a person is affected by injury, illness, or disability. Due to its non-invasive and cost-effective techniques, Physiotherapy is rapidly gaining popularity among the people however the awareness of Physiotherapy among various health care practitioners is questionable. This study aims to study the current level of awareness and perception of Physiotherapy roles and services among health care practitioners in the private sector working at Kota Kinabalu. Methods: A quantitative, cross-sectional study was adopted with a total of 120 participants with an age range between 20 to 60 years old who were recruited using predefined inclusion and exclusion criteria. A self-developed questionnaire on awareness and perception of the roles of Physiotherapy was distributed to the participants. Results: The data collected revealed all 120 participants have a moderate level of awareness although 64.2 % of participants did not receive any Physiotherapy treatment before. Musculoskeletal Physiotherapy (86.70%), Sports Physiotherapy (86.70%), rehabilitation, and pain management (70%) were the ones that have received the highest awareness. Not only that, but 78.13% of participants also reported having no negative perception of Physiotherapy. Conclusions: There is moderate awareness regarding the level of awareness and positive perception towards the roles and services of Physiotherapy among health care practitioners in the private sector at Kota Kinabalu, Sabah. These indicated that health care practitioners are open to Physiotherapy practices and they are very likely to refer patients to a Physiotherapist when necessary.

Full text link <https://tinyurl.com/28phr7j8>

Article title: Correlates of coping among Filipino migrant workers in Malaysia with musculoskeletal pain

Authors: Hernan C. Labao

Publication title: European Journal of Physiotherapy 23(6):1-6, October 2019

Abstract:

Objective

Coping with musculoskeletal pain is associated with severe pain behavior. This study aims to determine the factors associated with coping among Filipino migrant workers in Malaysia with musculoskeletal pain.

Methods

Ninety Filipino migrant workers were purposively selected from a training school based in Kuala Lumpur, Malaysia. Participants were asked to answer the Nordic Musculoskeletal Questionnaire (NMQ) to identify body regions with musculoskeletal pain. Coping Strategies Questionnaire (CSQ) - 24 was used to determine coping strategies and control over pain.

Results

Pain in shoulders (63.3%) and low back (55.6%) were common in the last 12 months. Participants use diversion (18.4 ± 9.8), cognitive coping (18.1 ± 10.1), and reinterpreting (13.7 ± 8.4) as their coping strategies, with a median control over pain of 3 (some control of pain). A statistically significant association is noted between cognitive coping, diversion, and reinterpreting coping strategies to control over pain (p value <0.05).

Conclusions

Participants who utilized diversion and cognitive coping strategies have better control over pain. Catastrophizing is significantly associated with complaints of pain on the elbow, wrist/hand, low back, and hips/ thigh in the past 12 months. Diversion is associated with pain on neck, shoulder, elbow, upper back, hips/thigh, and ankle/feet while catastrophizing is associated for pain in the elbow, wrist/hand, and low back that is present in the last 7 days. Education about positive coping such as cognitive coping, diversion, and reinterpreting as well as recognition about musculoskeletal disorders is recommended.

Full text link <https://tinyurl.com/2zv62jjn>

Article title: Elderly on the Move: Level, Barriers, and Motivation to Physical Activity

Authors: Hernan C. Labao

Publication title: Indian Journal of Physiotherapy and Occupational Therapy - An International Journal 13(4):180, January 2019

Abstract:

Background of Study: Physical inactivity is associated with many chronic diseases, impaired cognitive health and increased mortality rate. Therefore, understanding the level of physical activity, the underlying motivations, and barriers to physical activity among older adults is important. Materials and Method: This quantitative, descriptive survey involved 34 older adults aged 65 and above from Johor Bahru, Malaysia. Respondents were asked to complete questionnaires about levels of physical activity over the last seven days, barriers, and motivations to physical activity. Results: Results imply that majority of elderly adults (50%) have a moderate level of physical activity. Lack of skills (90.58 ± 12.04), fear of injury (90.29 ± 9.36), and lack of energy (89.70 ± 11.41) were the major barriers in participating to physical activity. In addition, intrinsic motivation (18.42 ± 9.53) and identified regulation (18.35 ± 9.48) represents the main types of motivation that encourage older adults to engage in physical activity. Conclusion: The findings of this research provide an insight when developing interventions that promote higher level of participation and minimize barriers of physical activity among older adults.

Full text link <https://tinyurl.com/2nppnxke>

Article title: 'Aches and Pains' of Filipino Migrant Workers in Malaysia: A Profile of Work-Related Musculoskeletal Disorders

Authors: Hernan C. Labao, Erwin M. Faller, and May Florence D. Bacayo

Publication title: Annals of Global Health 84(3):474, August 2018

Abstract:

Background and Purpose: Musculoskeletal disorders (MSDs) are alarmingly high among migrant workers in Malaysia. MSDs are the most prevalent occupational-related conditions in most parts of the world affecting function, productivity and overall health-related quality of life. Therefore, this study aims to determine the profile of Filipino migrant workers in Malaysia and their various musculoskeletal complaints.

Method: This study utilized a quantitative, nonexperimental, cross-sectional research design. A total of 60 subjects were randomly selected after passing the study's sampling criteria. The Nordic Musculoskeletal Questionnaire (NMQ) was used to determine common MSDs affecting the various regions in the body. The Demographic Profile Sheet was provided to gather a subject's demographic characteristics.

Results: Filipino migrant workers mostly complain of pain in the low back area (60%) and shoulder pain (60%), followed by pain in the upper back (48.3%) and neck pain (45%) in the last 12 months. Household workers accounting for 73.3% of the subjects commonly complain of pain in the hips/thighs (78.9%), while workers in the service industry commonly complain of knee pain (39.1%).

Conclusions: Results imply that Filipino migrant workers have a higher prevalence of shoulder and lower back pain in the last 12 months. Household workers are more susceptible to hip/thigh pain. Interventions focusing on ergonomics policy implementation, education on posture and lifting techniques and physical function is recommended. Further studies should consider the psychological and psychosocial aspects of migrant employment, which are known risk factors for MSDs.

Full text link <https://tinyurl.com/2p9mwf7h>

Article title: The Effects of Balance Training on Risk of Falling and Health-Related Quality of Life (HRQoL) among Filipino Stroke Survivors

Authors: Hernan Cortez Labao and O. Justo

Publication title: Cerebrovascular Diseases 40:24-24, October 2015

Abstract:

Not available

Full text available upon request to the author/s.

**DR. ELLANE BARCELON***Neuroscience***Sex:** Female**Education:**

Doctor of Philosophy in Neuroscience, Seoul National University, 2023

Bachelor of Science in Human Biology, De La Salle University Dasmariñas, 2015

Field of Specialization:

Rodent Stereotaxic Surgery

Behavioral Testing

Neuropharmacology

Behavioral Analysis

Cellular Neuroscience

Immunohistochemistry

Neurotransmission

Molecular Neuroscience

Neurobiology and Brain Physiology

Behavioral Neuroscience

Researches:**Article title:** SARS-CoV-2 spike protein induces cognitive deficit and anxiety-like behavior in mouse via non-cell autonomous hippocampal neuronal death**Authors:** Junyoung Oh, Woo-Hyun Cho, Ellane Barcelon, Kwang Hwan Kim, Jinpyo Hong & Sung Joong Lee**Publication title:** Scientific Reports 12(1), December 2022**Abstract:**

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection is accompanied by chronic neurological sequelae such as cognitive decline and mood disorder, but the underlying mechanisms have not yet been elucidated. We explored the possibility that the brain-infiltrating SARS-CoV-2 spike protein contributes to the development of neurological symptoms observed in COVID-19 patients in this study. Our behavioral study showed that administration of SARS-CoV-2 spike protein S1 subunit (S1 protein) to mouse hippocampus induced cognitive

deficit and anxiety-like behavior in vivo. These neurological symptoms were accompanied by neuronal cell death in the dorsal and ventral hippocampus as well as glial cell activation. Interestingly, the S1 protein did not directly induce hippocampal cell death in vitro. Rather, it exerted neurotoxicity via glial cell activation, partially through interleukin-1 β induction. In conclusion, our data suggest a novel pathogenic mechanism for the COVID-19-associated neurological symptoms that involves glia activation and non-cell autonomous hippocampal neuronal death by the brain-infiltrating S1 protein.

Full text link <https://tinyurl.com/264ru32n>

Article title: Hippocampal astrocytes modulate anxiety-like behavior

Springer Nature

Authors: Woo-Hyun Cho, Kyungchul Noh, Byung Hun Lee, Ellane Barcelon, Sang Beom Jun, Hye Yoon Park & Sung Joong Lee

Publication title: Nature Communications 13(1), November 2022

Abstract:

Astrocytes can affect animal behavior by regulating tripartite synaptic transmission, yet their influence on affective behavior remains largely unclear. Here we showed that hippocampal astrocyte calcium activity reflects mouse affective state during virtual elevated plus maze test using two-photon calcium imaging in vivo. Furthermore, optogenetic hippocampal astrocyte activation elevating intracellular calcium induced anxiolytic behaviors in astrocyte-specific channelrhodopsin 2 (ChR2) transgenic mice (hGFAP-ChR2 mice). As underlying mechanisms, we found ATP released from the activated hippocampal astrocytes increased excitatory synaptic transmission in dentate gyrus (DG) granule cells, which exerted anxiolytic effects. Our data uncover a role of hippocampal astrocytes in modulating mice anxiety-like behaviors by regulating ATP-mediated synaptic homeostasis in hippocampal DG granule cells. Thus, manipulating hippocampal astrocytes activity can be a therapeutic strategy to treat anxiety.

Full text link <https://tinyurl.com/5n7xmzse>

Article title: Development of novel, biocompatible, polyester amines for microglia-targeting gene delivery

Authors:

Publication title: RSC Advances 11(58):36792-36800, November 2021

Abstract:

Recent progress in personalized medicine and gene delivery has created exciting opportunities in therapeutics for central nervous system (CNS) disorders. Despite the interest in gene-based therapies, successful delivery of nucleic acids for treatment of CNS disorders faces major challenges. Here we report the facile synthesis of a novel, biodegradable, microglia-targeting polyester amine (PEA) carrier based on hydrophilic triethylene glycol dimethacrylate (TG) and low-molecular weight polyethylenimine (LMW-PEI). This nanocarrier, TG-branched PEI (TGP), successfully condensed double-stranded DNA into a size smaller than 200 nm. TGP nanoplexes were nontoxic in primary mixed glial cells and showed elevated transfection efficiency compared with PEI-25K and lipofector-EZ. After intrathecal and intracranial

administration, PEA nanoplexes delivered genes specifically to microglia in the spinal cord and brain, respectively, proposing TGP as a novel microglia-specific gene delivery nanocarrier. The microglia-specific targeting of the TGP nanocarrier offers a new therapeutic strategy to modulate CNS disorders involving aberrant microglia activation while minimizing off-target side effects.

Full text link <https://tinyurl.com/s379fwfy>

Article title: Effects of optogenetic astrocyte activation in hippocampus on mouse behavior

Authors: Woo-HyunCho, Kyungchul Noh, Ellane Barcelon, Sung Joong Lee

Publication title: IBRO Reports 6:S379, September 2019

Abstract:

Emerging data from recent investigations show that communication between neurons and astrocytes plays a critical role in brain functions and animal behaviors. For instance, astrocyte in brain stem and hypothalamus regulate respiration and mouse feeding behavior, respectively. However, the in vivo effects of astrocyte activation in hippocampus, a critical brain sub-region for cognitive and affective brain functions, on animal behaviors have not been addressed. To investigate the astrocyte function on animal behaviors in vivo, we generated hGFAPcreER/+;R26ChR2(H134R)EYFP/+ transgenic mice in which ChR2 is specifically expressed in astrocytes in the brain. Upon elevating astrocyte calcium activity by optogenetic stimulation, we demonstrate that hippocampal astrocyte controls fear memory and innate anxiety behaviors by regulating granule cells activity. Our findings show that alteration of hippocampal astrocyte activity has a profound impact on hippocampal neural activity and thereby cognitive or affective behaviors.

Full text link <https://tinyurl.com/mu5x63xf>

Article title: Brain microglial activation in chronic pain-associated affective disorder

Authors: Ellane Barcelon, Woo-Hyun Cho, Sang Beom Jun, Sung Joong Lee

Publication title: IBRO Reports 6:S381, September 2019

Abstract:

A growing body of evidence from both clinical and animal studies indicates that chronic neuropathic pain is associated with comorbid affective disorders. Spinal cord microglial activation is involved in nerve injury-induced pain hypersensitivity characterizing neuropathic pain. However, there is a lack of thorough assessments of microglial activation in the brain after nerve injury. In the present study, we characterized microglial activation in brain sub-regions of CX3CR1GFP/+ mice after chronic constriction injury (CCI) of the sciatic nerve, including observations at delayed time points when affective brain dysfunctions such as depressive-like behaviors typically develop. Mice manifested chronic mechanical hypersensitivity immediately after CCI and developed depressive-like behaviors 8 weeks post-injury. Concurrently, significant increases of soma size and microglial cell number were observed in the medial prefrontal cortex (mPFC), hippocampus, and amygdala 8 weeks post-injury. Transcripts of CD11b, and TNF- α , genes associated with microglial activation or depressive-like behaviors, are correspondingly upregulated in these brain areas. Our results demonstrate that microglia are activated in specific

brain sub-regions after CCI at delayed time points and imply that brain microglial activation plays a role in chronic pain-associated affective disorders.

Full text link <https://tinyurl.com/yck8kvmn>

Article title: Optogenetic Glia Manipulation: Possibilities and Future Prospects

Authors: Woo-Hyun Cho, Ellane Barcelon, and Sung Joong Lee

Publication title: Experimental Neurobiology 25(5):197-204, October 2016

Abstract:

Our brains are composed of two distinct cell types: neurons and glia. Emerging data from recent investigations show that glial cells, especially astrocytes and microglia, are able to regulate synaptic transmission and thus brain information processing. This suggests that, not only neuronal activity, but communication between neurons and glia also plays a key role in brain function. Thus, it is currently well known that the physiology and pathophysiology of brain function can only be completely understood by considering the interplay between neurons and glia. However, it has not yet been possible to dissect glial cell type-specific roles in higher brain functions in vivo. Meanwhile, the recent development of optogenetics techniques has allowed investigators to manipulate neural activity with unprecedented temporal and spatial precision. Recently, a series of studies suggested the possibility of applying this cutting-edge technique to manipulate glial cell activity. This review briefly discusses the feasibility of optogenetic glia manipulation, which may provide a technical innovation in elucidating the in vivo role of glial cells in complex higher brain functions.

Full text link <https://tinyurl.com/nhcadp3t>



DR. RAINIER MORENO-LACALLE.
Nursing

Sex: Male

Education:

Doctor of Philosophy in Nursing, Saint Louis University

Field of Specialization:

Postmodernism

Concept Formation

Evidence Based Nursing Practice

Emancipatory Nursing

Mental Health Promotion

Researches:

Article title: Nurses' Perceived Readiness in Evidence-Based Practice: An Organizational Assessment

Authors: Rainier Moreno-Lacalle, Mark Job G. Bascos, Cheryll M. Bandaay, Marian Tibalao Barrientos, et al.

Publication title: Journal of Nursing Practice Applications & Review of Research

Abstract:

Background: Globally, nursing service departments of various hospitals encounter challenges in implementing Evidence-based Practice (EBP). Critical to the improvement of nursing outcomes is the practice of EBP. That is why EBP is considered a state of the art in the hospital organization. Organizational assessment, therefore, is needed to determine the hospital nursing service readiness in EBP.

Objective: The aims of the study are two-fold: (1) to identify the sources of nurses' knowledge and to determine the extent of knowledge-practice gap, skills, and attitude; and (2) to describe middle- and top-level managers of a hospital on evidence-based practice.

Method: Descriptive, concurrent mixed-methods design was employed. The Promoting Action on Research Implementation in Health Services (PARIHS) model served as the theoretical framework where Context, Evidence, and Facilitation are considered important elements to the successful adoption of EBP. A survey questionnaire on EBP perceived knowledge, attitude, and

practices by Malik et al. (2015) was responded to by 240 eligible staff nurses from a tertiary level, national government-funded hospital in the Philippines. The qualitative component of the study involved review of records, focus group discussions of seven middle-managers, and structured interviews of four top-level managers.

Results: The results revealed that the nursing service institution scored low to moderate readiness on evidence and facilitation elements of the framework, while moderate to high on contextual readiness on EBP. Three themes emerged in the qualitative data, namely: willingness to learn, research and EBP were difficult, and unmotivated to do EBP.

Conclusion: Nursing services of the institution point to the need to strengthen readiness on EBP. Of the three elements of the PARIHS framework, Context element scored favorable on EBP. The Evidence and Facilitation elements of the institution may need to be strengthened through the partnership between the academe and hospital.

Full text link <https://tinyurl.com/5h2fxrrz>

Article title: Frailty as part of the disablement process: calling for health economic interventions

Authors: Rainier Moreno- Lacalle

Publication title: Evidence-Based Nursing 25(2), May 2021

Abstract:

No available

Full text link <https://tinyurl.com/46v3efbz>

Article title: Nurses' Concepts and Experiences in Shared Decision-Making

Authors: Rainier Moreno-Lacalle and Mary Grace C. Lacanaria

Publication title: Journal of Nursing Practice Applications & Review of Research 10(2), 2020

Abstract:

Background: Shared decision-making with nurses is proven to be effective in improving patient outcomes. However, the concept is understood and interpreted in different ways. Nurses' concepts and experiences can bring light to different understanding and interpretations.

Objective: The objective of this study is to explore nurses' concepts and experiences in shared decision-making.

Methods: The study employed qualitative descriptive design, using focus group discussions. Eight hospitals located in Baguio City Tprovinces in the Philippines. There were 38 nurse participants in this study. Twenty-two (22) were staff nurses (or line managers), and 16 were nurse supervisors/head nurses (or middle managers).

Results: -The experiences of nurses in shared decision-making involve family inclusion, courtesy and respect, listening to both sides, and organizational considerations.

Conclusion: Shared decision-making is a dynamic concept involving the active role of pa-and social factors

Full text link <https://tinyurl.com/4p3jv9hz>

Article title: Intuition in Evidence-Based Practice: A Scoping Review

Authors: Rainier Moreno-Lacalle, Racquel Estrada, Jefferson Galanza

Publication title: Philippine Journal of Nursing Education 29, 2019

Abstract:

Purpose: The purpose of this paper is to conduct a scoping review to identify and map the literature along intuition in evidence-based practice.

Background: Intuition is an increasing concept affecting nurses' evidence-based practice and decision-making. However, the extent of studies and attitude regarding the role of intuition in evidence-based practice has not been fully explicated.

Methods: Scoping review by Arksey & O'Malley in 2005 was used as a research design. We searched five electronic databases (CINAHL, EBSCOHost, Google Scholar, Proquest, Research gate, and Science Direct) for published and unpublished literature along intuition in evidence-based practice. The first stage was done by the second author by culling and scoring the relevance of each title. Then each abstract was reviewed and followed up by the first and third authors using Modified Criteria for Optimal Grading. Finally, studies had undergone appraisal using the General Appraisal Tool (GAT) to ensure quality inclusion in this review. After selection, we charted, collated, summarized, and reported the results of the reviewed studies.

Results: After searching 17, 593 articles and three stages of appraisal, we downsized the reviewed studies to 23. We found out that studies exploring explicitly intuition in evidence-based practice (EBP) used a variety of research designs wherein the majority of these are qualitative, literature reviews, and discussion papers. Seven studies used Patricia Benner's Model of Proficiency as their framework while 17 are favorable to the use of intuition in EBP in decision-making.

Conclusions/ Recommendations: There is a sufficiently high number of studies that warrant the conduct of integrative review but not more-focused systematic reviews. Further primary research on intuition in evidence-based practice can be done, in particular, there is a need to substantiate the role of intuition in evidence-based practice.

Full text link <https://tinyurl.com/4vdx4vfj>

Article title: Comparative Analysis Between Nursing Competency Standards of Australia and the Philippines

Authors: Rainier C. Moreno-Lacalle

Publication title: Belitung Nursing Journal 5(5), September 2019

Abstract:

The Philippines as one of the top producers of nurses worldwide must benchmark its national nursing standards to the rest of the world. Therefore, the standards must be compared and contrasted with other countries like Australia. The main purpose of this study is to compare and contrast nurse's competency and performance indicators between the Philippines and Australia nursing competency systems. This is a review article guided by Donnelly and Weichula's Qualitative-Comparative Analysis (QCA). The process includes identification of the condition of interest, dichotomization and development of truth tables. Two official documents namely the Philippines' National Nursing Core Competency Standards and Australia's National Competency Standards for the Registered Nurse were selected as the condition of interest. Findings show that Australia adopted a one pronged-generalist, non-linear approach, and policy-based nursing

education system while the Philippines emphasized on three-pronged specialization, work-based, and linear approach nursing competency standards. The Australia and Philippine nursing competency trails a different path in adopting standards for the nursing education system. The strengths and weaknesses of each national nursing competency standard were discussed.

Full text link <https://tinyurl.com/2p9nudda>

Article title: Emancipation through nursing within the context of health disparities

Authors: Rainier Moreno-Lacalle and Rozzano Locsin

Publication title: Belitung Nursing Journal 5(2):65-74, April 2019

Abstract:

Background: Health disparity can be observed using the lens of emancipation through nursing.

Objective: This paper aims to describe the concept of emancipation through nursing, situate its position within the theory of 'Emancipation through Nursing,' and illuminate the implications of caring within the context of health disparity.

Methods: The sequential process of Rodgers' Evolutionary Concept Analysis and Chinn and Kramer's Process of Theory Construction were applied. Review of the literature utilizing six major databases was conducted using the keywords 'emancipation' or 'empowerment' and 'health disparity' and 'nursing' and with year restrictions from 2000-2017.

Results: Findings revealed that the attributes of the concept of 'emancipation through nursing' are conscientization or critical consciousness, correct and adequate health information, co-construction of a creative process for health service, and collective action. These attributes were preceded by the following antecedents: marginalization, hegemony, the oppressed and the emancipator, centering, and liberation. The resulting features of enlightenment, enervation, empowerment, and evolution served as constructs that collectively structured the theory of Emancipation through Nursing in the Context of Health Disparities.

Conclusion: Nurses worldwide will benefit from descriptions and illuminations of the concepts of emancipation and nursing within the theory of Emancipation through Nursing in the Context of Health Disparities.

Full text link <https://tinyurl.com/2wkrv426>

Article title: Workplace Incivility and Its Influence on Professional Quality of Life amongst Nurses from Multicultural Background: A Cross-sectional Study

Authors: Abdualrahman Saeed Alshehry, Nahed Alquwez, Joseph Almazan, Ibrahim Mohammed Namis, Rainier C. Moreno-Lacalle, Jonas Preposi Cruz

Publication title: Journal of Clinical Nursing 28(1), February 2019

Abstract:

Aims and Objectives

To investigate the workplace incivility of nurses working in two Saudi hospitals and analyse its influence on the nurses' professional quality of life (ProQOL).

Background

The prevalence and economic impact of workplace incivility cannot be overstated and disregarded. To the current authors' knowledge, no extensive study on this topic has been conducted in Saudi Arabia. The influence of workplace incivility to ProQOL of nurses from different cultural backgrounds has never been thoroughly investigated.

Design

Descriptive, cross-sectional design.

Methods

A sample of 378 nurses working in two government hospitals in Saudi Arabia were surveyed using the Nursing Incivility Scale and the ProQOL Scale version 5 from February to May 2018. A multivariate multiple regression analysis was conducted to analyse the multivariate effect of workplace incivility on the nurses' ProQOL. The study adhered to the STROBE guideline (See Supporting Information File 1).

Results

The nurses perceived a moderate level of workplace incivility from the different sources of uncivil acts measured in this study. Among the five sources of incivility explored in this study, the nurses reported the majority of workplace incivility experienced from patients/visitors ($M = 2.44$, $SD = 0.80$), while the lowest was from supervisors ($M = 1.90$, $SD = 0.66$). The mean scores of the respondents in the compassion satisfaction, burnout and secondary traumatic stress subscales were 36.50 ($SD = 6.30$), 26.43 ($SD = 4.81$) and 26.47 ($SD = 6.06$), respectively. General incivility, supervisor incivility, physician incivility and patient/visitor incivility showed a significant multivariate effect on the three ProQOL subscales.

Conclusions

Nurses' experience of workplace civility and its sources were associated with ProQOL. Relevance to clinical practice. The findings of this study can be used as guide in establishing human resource policies towards achieving nurses' needs, reducing workplace incivility and improving ProQOL.

Full text link <https://tinyurl.com/2p942atf>

Article title: Nurses' perceived spiritual climate of a hospital in Saudi Arabia

Authors: J.P. Cruz RN, PhD, N. Alquwez RN, PhD, H.M. Albaqawi RN, PhD, S.M. Alharbi RN, BSN, R.C. Moreno-Lacalle RN, MSN

Publication title: International Nursing Review 65(1), September 2018

Abstract:

Aim

This study investigated the spiritual climate of a hospital in Saudi Arabia as perceived by nurses.

Background

A spiritually conducive environment improves patient, nurse and organizational outcomes. Despite being important, no studies have investigated this area in the Muslim-dominated Middle Eastern countries.

Introduction

A snapshot on the degree of spiritual climate perception may provide insight into the aspects that may need improvement and may become basis for the creation of health and nursing policies directed towards creating a spiritually-accepting and respecting clinical workplace.

Method

A sample of 219 nurses employed in a 500-bed capacity hospital in Saudi Arabia was included in this cross-sectional study utilizing the spiritual climate scale.

Results

The nurses perceived their hospital's spiritual climate to be fair. The item 'I am encouraged to express spirituality in this clinical area' received the lowest mean, whereas the item 'My spiritual views are respected in this clinical area' received the highest mean. Being Saudi, having less total experience as a nurse, and having greater total experience as a nurse in Saudi Arabia and in the present hospital positively influenced the perception of the spiritual climate among nurses.

Conclusion

The findings stress the need to improve the spiritual climate in the hospital.

Implications for nursing and nursing policy

Hospitals are recommended to create policies to implement interventions geared towards creating a spiritually-friendly environment. Hospitals are encouraged to create a safe place where nurses can freely express their spirituality regardless of preference or religious denomination. Spiritual education may be provided by hospitals as part of continuing education. Managers may also focus on the existential spirituality of nurses, especially for spiritually-sensitive environments such as Saudi Arabia.

Full text available upon request to the author/s.

Article title: The Future of Nursing Science: Consilience in Evidence-Based Practice

Authors: Rainier C. Moreno-Lacalle, PhD, RN

Publication title: The Philippine journal of nursing 88(1):33-40, January 2018

Abstract:

Nursing science needs to adopt a paradigm that can be used to apply its knowledge. Notably, how nursing science is applied in nursing practice or education remains confusing. This article aims to discuss the pros and cons of the two ways to implement nursing science, that is, evidence-based practice (including translational research and research utilization) and intuitive nursing. Also, I differentiated evidence-based practice (EBP), translational research (TR), and research utilization (RU). I argued that EBP as the paradigm of choice will be the optimal strategy for the future of nursing science. Adopting EBP improves patient, organizational, and staffing outcomes. While basing clinical decisions on intuition alone may imperil patient's safety due to multiple cognitive biases inherent in our intellectual devices. Combining EBP, TR, RU, and intuitive nursing resulted in a model Consilience in Evidence-based Practice. Implications of the model for nursing practice, education, and research were also discussed.

Full text link <https://tinyurl.com/3xv9ss3j>

Article title: The Effect of Psychoeducation for Depression: A Meta

Authors: Rainier Moreno-Lacalle

Publication title: The Philippine journal of nursing 86(2): 36-43, December 2016

Abstract:

Background/Objective: Depression is a global mental health problem. Therefore, mental health professionals need to develop interventions that are evidence-based and cost-effective. One of the psychosocial interventions is psychoeducation. However, a recent Google search on the effect of psychoeducation for depression suggests conflicting results calling for an analysis of studies to establish psychoeducation effectiveness. The goal of the meta-analysis is to examine randomized controlled trials (RCTs) overall effectiveness of psychoeducation for depression.

Methods: EBSCOhost, PsychINFO, and Science Direct databases were searched using the keywords 'psychoeducation,' 'group psychoeducation,' 'mental health education,' 'depression,' 'depressive disorder,' and 'dysthymia' with year restriction of 2010-2016. In this meta-analysis, the effect size (using Hedges' g value), Q statistics, and I² were calculated under the random effects model aided by CMA v.3. To test for publication bias, trim-and-fill analysis and fail-safe N were computed too.

Results: A total of 1,560 patients from 11 studies were included in this analysis. Post-intervention results had Hedges' g-value of -0.293 (95% CI= -0.552—0.035) of psychoeducation for depression meaning low effect. Although notably, the overall effect size leans towards psychoeducation. The p-value is significant at .05 level, favoring psychoeducation (p=0.026). The studies were also found to be highly heterogeneous (Q (10) = 55.467, p<.05, I² =81.971) under the random effects model, suggesting high inconsistency on the studies included in this meta-analysis. In testing for publication bias, the imputed effect size using trim-and-fill approach was -0.38558 (95% CI= -0.64926- -0.12189) while the result of fail-safe N suggested that 48 nil or null results would be needed to increase the p-value associated with the average effect above an alpha level of 0.05.

Conclusions: This meta-analysis may suggest that psychoeducation has low effect on depression. Longer and more interactive approach can be done to ensure its long-term and maximal effectiveness. Publication bias is unlikely in this meta-analysis. The findings provide valuable information for future psychoeducation to improve content, design, quality, and process that will benefit patients with depression. Keywords: Psychoeducation, Mental Health Promotion, Depression, Depressive disorders

Full text link <https://tinyurl.com/fdew7r8f>

Article title: Nurturing the Seeds of Evidence-Based Practice: Early Ambulation among Cardiac Surgery Patients

Authors: Rainier Moreno-Lacalle

Publication title: International Journal of Evidence-Based Healthcare 14(Supplement 1): S19, December 2016

Abstract:**Background:**

Management of cardiovascular diseases is an essential and a timely global health issue. Extensive research on early ambulation for cardiac surgery patients has been conducted, but no

evidence-based paper has evaluated the overarching effects in improving patient care outcomes.

Objectives:

To evaluate the effects of early ambulation on cardiac surgery patients on improving patient care outcomes.

Methods:

A systematic review was conducted. Six electronic database were searched: Health source: Nursing/ Academic Edition, CINAHL, Cochrane Library, MEDLINE, The National Guidelines Clearinghouse, and The Joanna Briggs Institute from 2000–2015. Each study was appraised using different quality tools: for observational cohort and cross sectional studies, randomized controlled trial, and systematic review/ meta-analysis is used National Heart, Lung, and Blood Institute Quality Assessment Tool, and for the clinical guideline, the AGREE (Appraisal of Guidelines, Research and Evaluation) collaboration tool.

Results:

The evidence-based review involved five-thousand fifty-one ($n = 5051$) participants, with study sizes ranging between 31–4091 patients. Early ambulation time ranges from 2–4 hours after the patient has been stabilized while the late ambulation ranges from 12–24 hours. As to the patient outcomes, three studies utilized vascular complications as an outcome: hematoma, bleeding, false aneurysm, and arteriovenous fistula. Secondary end points were also considered, such as patient comfort, lesser hospital costs (where early ambulatory patients have lesser charge of US\$105), vasovagal collapse, back pain ($OR = 0.19$, 95% CI: 0.08–0.45, $p < 0.001$), urinary problems ($OR = 0.35$, 95% CI: 0.14–0.90, $p = 0.03$), mixed venous oxygen saturation using ejection fraction, and lastly general well-being and satisfaction level ($p = 0.0005$ for vitality scale and $p = 0.014$ for the total general well-being).

Conclusion:

Evidence from the review indicates that early ambulation may improve patient care outcomes. Caution may be in stated since there are idiosyncratic effects that can pose problems toward the patients such as arrhythmia or bleeding. Overall, healthcare providers may render cost-effective and scientifically-grounded interventions.

Full text available upon request to the author/s.

Article title: Integrative Review of Outcomes-Based Education in Nursing

Authors: Rainier Moreno-Lacalle

Publication title: Philippine Journal of Nursing Education 26, October 2016

Abstract:

The need for initial evaluation of Outcomes-based Education (OBE) in nursing is needed, not only to identify its weakness in order to counteract the pitfalls more so to gain insights and lessons for the cause of improving nursing education. The aim of this study is to evaluate OBE in nursing. An integrative review was employed using the databases: CINAHL, ERIC, Google scholar, and MEDLINE, searching from the year of inception to 2015. The final assessment includes six research articles relevant to the study. The overall evaluation of OBE in nursing is equivocal. That is, there are conflicting evaluations to countries that have pioneered the OBE implementation in nursing. Chief among the attributions of the result are methodological weakness of available studies, poor understanding, conflicting interpretation, sloppy

implementation, teacher-related factors, and contextual differences in the application of OBE in nursing. On a positive note, OBE in nursing is generally perceived as student-centered, well-balanced, collaborative, life-long learning, and systemic alignment in nursing education. Therefore, it is recommended that future studies could use randomized controlled trials or meta-analysis as to the effectiveness of OBE in nursing. There might also be a need to revisit the implementation of OBE from institutional outcomes to course learning outcomes implementation.

Full text available upon request to the author/s.

Article title: The effect of psychoeducation for depression: A meta-analysis 2010-2016

Authors: Rainier Moreno-Lacalle

Publication title: The Philippine journal of nursing 86(2):36-43, July 2016

Abstract:

Background/Objective: Depression is a global mental health problem. Therefore, mental health professionals need to develop interventions that are evidence-based and cost-effective. One of the psychosocial interventions is psychoeducation. However, a recent Google search on the effect of psychoeducation for depression suggests conflicting results calling for an analysis of studies to establish psychoeducation effectiveness. The goal of the meta-analysis is to examine randomized controlled trials (RCTs) overall effectiveness of psychoeducation for depression.

Methods: EBSCOhost, PsychINFO, and Science Direct databases were searched using the keywords 'psychoeducation,' 'group psychoeducation,' 'mental health education,' 'depression,' 'depressive disorder,' and 'dysthymia' with year restriction of 2010-2016. In this meta-analysis, the effect size (using Hedges' g value), Q statistics, and I^2 were calculated under the random effects model aided by CMA v.3. To test for publication bias, trim-and-fill analysis, and fail-safe N were computed too.

Results: A total of 1,560 patients from 11 studies were included in this analysis. Post-intervention results had Hedges' g-value of -0.293 (95% CI= -0.552-0.035) of psychoeducation for depression meaning low effect. Although notably, the overall effect size leans towards psychoeducation. The p-value is significant at .05 level, favoring psychoeducation ($p=0.026$). The studies were also found to be highly heterogeneous ($Q = 55.467$, $p<.05$, $I^2 = 81.971$) under the random effects model, (10) suggesting high inconsistency on the studies included in this meta-analysis. In testing for publication bias, the imputed effect size using trim-and-fill approach was - 0.38558 (95% CI= -0.64926- -0.12189) while the result of fail-safe N suggested that 48 nil or null results would be needed to increase the p-value associated with the average effect above an alpha level of 0.05.

Conclusions: This meta-analysis may suggest that psychoeducation has low effect on depression. Longer and more interactive approach can be done to ensure its long-term and maximal effectiveness. Publication bias is unlikely in this meta-analysis. The findings provide valuable information for future psychoeducation to improve content, design, quality, and process that will benefit patients with depression.

Full text link <https://tinyurl.com/3bpcpy3r>

Article title: Wellness Within Illness: An Evolutionary Concept Analysis

Authors: Rainier Moreno-Lacalle

Publication title: The Philippine Journal of Nursing 85(2): 45-49, July 2015

Abstract:

The concept of wellness has no single, universal acceptable definition. The situation gives room to developing and refining wellness both as a concept and an experience. This paper aimed to substantiate the concepts surrounding wellness within an illness experience. Beth Rodger's evolutionary method of concept analysis provided the organizing framework for this paper. The data source was a search of literature published from 2010-2016 on CINAHL, Medline, EBSCO, and Google scholar database. Trailing process is organized with particular focus on antecedents, attributes, and consequences. The analysis found four attributes of wellness within illness namely: normalizing, independence, empowerment, and finding meaning strengthened by antecedents such as strong social support, motivation, constructive coping strategies, and cognitive reframing. Subsequently these may lead to adaptation to illness, being well, and living to illness. Looking at wellness and illness in dichotomy may lead to rote deftness thus expansion of the panorama of wellness within an illness experience may lead to more depth on the scientific understanding and varied application. Increased conceptual understanding and knowledge development on wellness will enable nurses in facilitating patient's adaptation during illness.

Full text link <https://tinyurl.com/272vd2b2>

Paper Presentations:

Article title: Nurturing the seeds of evidence-based practice: Early ambulation among cardiac surgery patients

Authors: Rainier Moreno-Lacalle

Conference title: Optimizing Health care, Chiang Mai, Thailand, June 2016

Article title: Deconstruction and Reconstruction of Florence Nightingale Leadership Theory

Authors: Rainier Moreno-Lacalle

Conference title: Caring Beyond Borders, January 2016

**DR. DAVE BUENAVISTA.***Conservation Biology***Sex:** Male**Education:**

Doctor in Philosophy in Conservation Biology, Bangor University United Kingdom, 2021

Master of Science in Biology major in Taxonomy, Central Mindanao University, 2014

Bachelor of Science in Biology, Central Mindanao University, 2008

Field of Specialization:

Biocultural conservation

Indigenous food system

Researches:

Article title: Any alternatives to rice? Ethnobotanical insights into the dietary use of edible plants by the Higaonon tribe in Bukidnon Province, the Philippines

Authors: Dave Paladin Buenavistaa, Eefke Maria Molleeb, Morag McDonald

Publication title: Regional Sustainability 3: 5-109, 2022

Abstract:

Though considered an agricultural country, the Philippines is the world's largest importer of rice. The persistent problem of insufficient rice supply, however, has been exacerbated by economic crises and natural calamities. Yet, for the Higaonon tribe in Bukidnon Province, the Philippines, the rich agrobiodiversity and wild edible plants are vital for food security and resilience since the mountainous terrain in this province presents a challenge for rice cultivation. To gain insight from the indigenous edible plant knowledge of the Higaonon tribe, we conducted an ethnobotanical research to document the diversity, utilization, and biocultural refugia of both cultivated and wild edible plants. A total of 76 edible plant species belonging to 62 genera and 36 botanical families were documented. The most represented botanical families included the Fabaceae, Solanaceae, and Zingiberaceae. In terms of dietary usage, 3 species were categorized as cereals; 8 species were white roots, tubers, and plantains; 3 species were vitamin A-rich vegetables and tubers; 16 species were green leafy vegetables; 12 species were categorized as other vegetables; 2 species were vitamin A-rich fruits; 27 species were classified as other fruits; 7 species were legumes, nuts, and seeds; and 8 species were used as spices,

condiments, and beverages. Using the statistical software R with ethnobotanyR package, we further calculated the ethnobotanical indices (use-report (UR), use-value (UV), number of use (NU), and fidelity level (FL)) from 1254 URs in all 9 food use-categories. The species with the highest UV and UR were from a variety of nutrient-rich edible plants such as *Ipomoea batatas* (L.) Lam., *Musa* species, *Colocasia esculenta* (L.) Schott, *Zea mays* L., and *Manihot esculenta* Crantz. The extensive utilization of root and tuber crops along with corn and plantain that contain a higher amount of energy and protein, carbohydrates, minerals, and vitamins were shown to be an important nutrient-rich alternatives to rice. Whilst males appeared to be more knowledgeable of edible plant species collected from the forests and communal areas, there were no significant differences between males and females in terms of knowledge of edible plants collected from homegardens, riverbanks, and farms. The various food collection sites of the Higaonon tribe may be considered as food biocultural refugia given their socio-ecological function in food security, biodiversity conservation, and preservation of indigenous knowledge.

Full text link <https://tinyurl.com/3ewkbtee>

Article title: From poison to food: On the molecular identity and indigenous peoples' utilisation of poisonous "Lab-o" (Wild Yam, Dioscoreaceae) in Bukidnon, Philippines

Authors: Dave P. Buenavista , Nikko Manuel A. Dinopol , Eefke Mollee & Morag McDonald

Publication title: Cogent Food And Agriculture 7(1870306): 1-13, 2021

Abstract:

Like any other country in the tropical and subtropical regions, wild yams are considered an important food by many indigenous peoples in the Philippines and other parts of Southeast Asia. Yet, cases of intoxication and even death have been reported due to wild yam consumption. Unfortunately, some locals cannot differentiate the edible from the poisonous species that require further processing whilst ethnobotanical information remains scarce. In this study, we determined the identity of a poisonous wild yam locally known as "Lab-o" to the Higaonon tribe of Bukidnon province in the Mindanao island, Philippines. Due to highly diverse morphological variations within species and varieties of yams, "Lab-o" was identified through DNA barcoding. Based on the BLASTn analysis, the wild yam in question was identified as *Dioscorea hispida* Dennst. which further confirms the reported toxicity of the yam. To bridge scientific knowledge and indigenous knowledge system, we also explored the traditional processing methods of wild yam detoxification practiced by various indigenous cultures. The DNA barcoding protocol described in this study may serve as a reference to accurately identify the plant in the wild. The poisonous yams may be labelled with appropriate warnings and preparation guides as preventive information measures to avoid the incidences of poisoning and death. The indigenous knowledge and practices associated with the utilisation of *Dioscorea hispida* Dennst. and other neglected and underutilised plant resources could be likewise considered in addressing food safety and food insecurity in the Asian region.

Full text link <https://tinyurl.com/2xk7zbp4>

Article title: *Begonia bangsamoro* (Begoniaceae, section *Petermannia*), a new species from Mindanao Island, the Philippines

Authors: Dave Buenavista, Yu Pin Ang, Mc Andrew Pranada, Daryl S. Salas, Eefke Mollee, M.A McDonald

Publication title: Phytotaxa 497(1): 39–48, 2021

Abstract:

Begonia bangsamoro, a new Philippine *Begonia* species from the section *Petermannia* is described and illustrated. The new species was discovered in the fragmented riparian forest of Lanao del Sur, along the Ginapukan river in Wao, Mindanao island, Philippines. The previous collections also revealed that it occurs in the nearby province of Bukidnon. *Begonia bangsamoro* is distinguished from other Philippine *Begonia* by its lacerate leaf margins, terminal inflorescences, 4-tepaled staminate flowers, and sparsely hirsute ovaries. The new species is compared with the phenetically similar *B. quercifolia*. Based on IUCN Red List criteria, *B. bangsamoro* is designated as Endangered (EN).

Full text link <https://tinyurl.com/mrxrrzz8>

Article title: Asian Indigeneity, Indigenous Knowledge Systems, and Challenges of the 2030 Agenda

Authors: Dave P. Buenavista, Sophie Wynne-Jones, Morag McDonald

Publication title: East Asian Community Review 1: 221-240, 2018

Abstract:

Adopted by the UN General Assembly in 2015, the 2030 Agenda pledges to leave no one behind through the 17 Sustainable Development Goals (SDGs) and 169 targets were ratified by the international community to address the global challenges of our time. This framework and universal action plan articulate the inclusion of the indigenous peoples in the social, economic, and environmental dimensions of sustainable development. Nonetheless, the world's largest populations of indigenous peoples are in Asia. However, despite the affirmation of the United Nations Declaration on the Rights of Indigenous Peoples, the concept of indigeneity is still controversial, politically contested, and considered immaterial by many states in the Asian region. With limited rights and inadequate access to social services, indigenous knowledge systems and practices have evolved through time to provide solutions to local problems that marginalized many communities. This article revisits the sociopolitical notion of indigeneity in the region and its implications for the indigenous community. It also explores the diversity of indigenous knowledge systems and traditional practices and its relevance to the SDGs, particularly on food security, community livelihoods, human well-being, natural resources management, and biodiversity conservation. The conclusion reflects the need for legitimate recognition and political enablement of indigenous peoples in the implementation of the 2030 Agenda by forging collaborations between academic researchers, policy-makers, and indigenous organizations in the Asian community

Full text link <https://tinyurl.com/2xc9p2nv>

Article title: Comparative morpho-anatomical studies of *Hoya incrassata* and *Hoya soligamiana* (Apocynaceae) from Mount Hamiguitan, Philippines

Authors: D.S. Salas, E.B. Sinamban and D.P. Buenavista

Publication title: Ruhuna Journal of Science 9(1), 2018

Abstract:

This study compared the morpho-anatomical characters of two horticulturally important hoyas endemic to the Philippines viz., *Hoya incrassata* and *Hoya soligamiana*. Fresh cuttings were used for morphological and anatomical measurements. Free hand sections were taken from leaves, shoots and roots for determination of structural differences. Leaf pigments were cleared to observe the venation and stomatal arrangement. The results showed that hoyas differ in their leaf shape and texture, flower colour, and the inflorescence shape and position. *H. soligamiana* has glabrous lanceolate leaves, whitish to creamy petals, purplish to pink inner and outer coronal lobes, and whitish to pink fused sepals. *H. incrassata* has coriaceous lance-ovate leaves, whitish to yellowish fused petals, yellow inner coronal lobes, reddish to orange outer coronal lobes, and fused sepals. The measured anatomical traits in the cross sections of roots and stems of the two *Hoya* species did not differ with the exception of stomatal types and arrangement in the leaves. The pigment clearing of the leaves showed that *H. incrassata* has sunken cyclocytic stomata while *H. soligamiana* has actinocytic stomata. Morpho-anatomical information provides taxonomic value for identifying and classifying the two *Hoya* species.

Full text link <https://tinyurl.com/56hr5ck4>

Article title: New Distributional Records of *Utricularia striatula* Smith (Lentibulariaceae) in Mindanao, Philippines

Authors: Mark Arcebal Kling Naive, Dave Buenavista, Noe Mendez

Publication title: Philippine Journal of Systematic Biology 11(2), 2018

Abstract:

Utricularia striatula (Lentibulariaceae) is reported for the first time in the Southern Philippines and represents a new record for Mindanao Island. Full descriptions of the species, its habitat ecology, along with photographs are provided.

Full text link <https://tinyurl.com/4m6vjkd5>

Article title: Elevational Pattern of Orchid Rarity and Endemism in Mt. Kalatungan, Mindanao Island, Philippines

Authors: Jessa Marie Garsuta Betanio and Dave Paladin Buenavista

Publication title: Journal of Tropical Life Science 8(2):108-115, 2018

Abstract:

Despite being the Philippines most threatened group of plants, ecological studies on the orchid flora remains to be scanty and poorly studied which become an impediment to their conservation. This study aimed to identify the forest zones and species of conservation priority with an emphasis on the rare and endemic orchid species. A field investigation was carried out using a line transect and plot-sampling methods established along the elevational zones of Mt. Kalatungan Range National Park. Results showed the presence of 44 orchid species belonging to 28 genera, 39 (91%) species of orchids are Philippine endemic with eight new records. The elevational pattern of species followed a double humped-shaped pattern at 1,320-1,395 m and

1,886-1,965 m above sea levels (masl). Based on rarity index, 35 (83%) species are very rare, three (7%) are sparse, three (7%) common and one (3%) is common. The density of endemism was recorded to increase as elevation increases which peaked at 1,886-1,965 masl but declines at 2,000 masl. Findings of the study suggest that the elevational pattern of orchid species follows a humped-shaped pattern wherein species richness is highest in the middle of the elevation gradient.

Full text link <https://tinyurl.com/5883w6f9>

Article title: Histochemical Screening and Medicinal Potentials of *Garuga floribunda* in Mindanao Island, Philippines

Authors: Dave Buenavista and Marilag Mateo

Publication title: Annals of West University of Timișoara, ser. Biology 2: 147-152, 2017

Abstract:

This study was conducted to determine the bioactive components of *Garuga floribunda* (Burseraceae) used by the villagers of Bukidnon, Mindanao Island, Philippines, used in various ethno-veterinary practices as well in traditional medicine in other Asian region. Histochemical analyses of the stem of *Garuga floribunda* showed presence of alkaloids, saponins, tannins, oxalic acid, formic acid, tartaric acid, fats and oils localized in various tissues. This includes sclerenchymatous periderm, collenchyma cells in the cortex, phloem, xylem and vascular cambium and parenchymatous pith tissue of the stem. This study confirms the presence of alkaloids, arbutin, fats and oils, saponins, tannins as well as organic acids such as oxalic, formic and tartaric acid. The presence of bioactive compounds such as tannins suggests the potential antihelmintic properties of the plant as reported in traditional medicine.

Full text link <https://tinyurl.com/p3rh63wk>

Article title: Contributions to the orchid flora of Mindanao Long-Term Ecological Research Sites, Philippines

Authors: Dave P. Buenavista

Publication title: Biologica Nyssana 8(1):31-38, 2017

Abstract:

This contribution is based on the field studies on wild orchids conducted from September 2012 to November 2013 in one-hectare plots in five Long-Term Ecological Research Sites in Mindanao Island, Philippines. The family Orchidaceae is the most threatened group of plants in the Philippines however, it remains to be poorly known and understudied. This is the first preliminary report on the species richness and distribution of wild orchids in the identified research sites. A list of 79 orchid species belonging to 34 genera which represents approximately 7% of the known orchid species in the Philippines. A total of 40 endemics and 3 threatened species were recorded in the sites. This list can be use as basis for future biodiversity assessment and conservation initiatives to identify and prioritize areas for immediate conservation of threatened and endemic orchid species as well as the vulnerable mountain ecosystems.

Full text link <https://tinyurl.com/5crv5d99>

Article title: Amphibian and reptile diversity in Mt. Kalatungan Range Natural Park, Philippines

Authors: Angela Grace Toledo-Bruno, Daryl G. Macas, Dave P. Buenavista, Michael Arie P. Medina, Ronald Regan C. Forten

Publication title: Environmental and Experimental Biology 15(2):127-135, 2017

Abstract:

Herpetofauna inventory was conducted in the montane forest of Mt. Kalatungan Range Natural Park. Sampling plots were established in the lower montane at 1200 to 1400 m above sea level and upper montane at 1400 to 1600 m above sea level. Using a combination of pitfall trap and visual encounter methods, a total of 202 individuals were recorded belonging to 15 species, nine families and 12 genera, six of which are Mindanao endemic species. Five species belong to the IUCN Red List, which includes *Limnonectes magnus*, *Ansonia muelleri*, *Ansonia mcgregori*, *Philautus acutirostris* and *Rhacophorus bimaculatus*. Richness and diversity indices were consistently higher in the upper montane than in the lower montane. Similarity index of the two sites was only 26%, which implies that herpetofauna have specific habitat and food requirements for their survival. Threats in the area include habitat disturbance due to forest fire and conversion of forest to agriculture. These threats should be the focus of conservation efforts of local government units and the community to protect the habitat of these wildlife.

Full text link <https://tinyurl.com/yc8zmr5x>

Article title: A New *Cylindrolobus* (Orchidaceae) species from Bukidnon, Philippines

Authors: Mark Arcebal Kling Naive, Miguel David De Leon, Dave Buenavista

Publication title: Orchideen Journal 4(5), 2016

Abstract:

A new *Cylindrolobus* species from northern Mindanao was found in the ancestral domain of the Talaandig tribe of Bukidnon, on Mindanao. A search of the relevant literature for the Philippines and its neighboring countries was conducted and no matching species could be found. We take this opportunity to name this species as *Cylindrolobus datuguinai* Naive, M.D. De Leon & Buenavista

Full text link <https://tinyurl.com/5emnr8xf>

**DR. ARMIN CORONADO***Botany***Sex:** Male**Education:**

Doctor of Philosophy in Botany major in Phycology, University of the Philippines Los Baños, 2017

Master of Science in Biology, Ateneo de Manila University, 2009

Bachelor of Science in Biology major in Zoology, Central Luzon State University

Field of Specialization

Algal Biotechnology

Algae Culture

Aquatic Science

Algal Diversity

Biodiversity

Zooplankton

Phycology

Biotechnology

Ecology

Researches:

Article title: Cubozoan envenomation: Mechanisms, models and management

Authors: Angel Anne Yanagihara, Noel Saguil, Christie Wilcox, Armin Santos Coronado, Noel Stephen F. Saguil, Raechel Kadler

Publication title: Toxicon 177 Suppl 1:S9, April 2020

Abstract:

Cubozoan envenomations are the leading cause of severe and lethal human sting injuries from marine life. The total amount of venom discharged into sting-site tissues, “venom load”, correlates with tentacle contact length and sequelae severity. Optimal first aid measures prevent additional venom discharge into skin and reduce the activity of venom already discharged. Since 1% of tentacle cnidae discharge upon initial contact, rapid inactivation and effective removal of

adherent tentacles is critical. We evaluated whether common rinse solutions or scraping increased venom load as measured in a direct functional assay of venom activity (hemolysis). Scraping significantly increased hemolysis. For *Alatina alata*, increases did not occur if the tentacles were first doused with vinegar or if heat (45°C for 45 min) was immediately applied. However, in *Chironex fleckeri* and other life threatening chirodropid species, vinegar dousing and heat treatment were somewhat less effective; the best outcomes occurred with the use of copper gluconate containing spray and cream formulations. Pretreatment with a newly identified venom inhibitor, 2 hydroxypropyl- β -cyclodextrin (HP β CD), of blood agar plates before live tentacle application or of red blood cell solutions in hemolytic assays before addition of venom, markedly reduced venom-induced hemolysis, whereas post treatment with HP β CD showed no effect in solution based hemolytic assays and worsened outcomes in live tentacle blood agar assays. Surprisingly, seawater rinsing, considered a “no-harm” alternative to vinegar, significantly increased venom load. The application of ice severely exacerbated *A. alata* stings, but had a less pronounced effect on *C. fleckeri* stings, while heat application markedly reduced hemolysis for both species. Our results do not support scraping or seawater rinsing to remove adherent tentacles but support the use of vinegar dousing followed by application of skin safe heat as well as the utility of novel chemical inhibitors.

Full text available upon request to the author/s.

Article title: Effect of nitrogen from different sources on the growth and biomass production of spirulina platensis (Gomont) Geitler

Authors: Armin Santos Coronado, Florabelle B. Cabbarubias, Mae G. Arocha

Publication title: PUP Journal of Science and Technology, 2019

Abstract:

Spirulina platensis is a filamentous cyanobacterium known for its promising nutritional value used in several industries. The biomass produced after 24-days cultivation treated with sodium nitrate is significantly higher ($0.001 < \alpha 0.05$) than the cultures treated with urea. Cultures given with nitrogen concentration of 1.648 g/L of sodium nitrate had the highest optical density (5.895 ± 1.095) and dried biomass (2.265 ± 0.390 mg/mL) but not significantly higher with other sodium nitrate treatments (OD: $0.395 > \alpha 0.05$, DBM: $0.629 > \alpha 0.05$). The findings suggest that urea is not recommended as an alternative nitrogen source for *Spirulina*. Results also showed that lower nitrogen concentrations (0.103 g/L) of sodium nitrate can be used to cultivate *Spirulina* without compromising the biomass production. Moreover, this study showed that the peak of growth rate happens during the 16th day of cultivation.

Full text link <https://tinyurl.com/mvfmfpme>

Article title: Timing of Early Developmental Stages in Embryos of *Tripneustes gratilla* (Linnaeus, 1758) (Echinodermata: Echinoidea)

Authors: Armin Santos Coronado, Maribel Dionisio-Sese, Ma. Vivian Camacho, Mark Louie D. Lopez

Publication title: PUP Journal of Science and Technology, 2018

Abstract:

Sea urchin is one of the most important subjects in developmental biology studies due to its rapid and simple development. Timing for its development is a key component for most experiments. However, available data often vary due to the effect of temperature and other external factors. With this, standardization on the timing of the early developmental stages in embryos of *Tripneustes gratilla* was conducted in this study. Induced spawning and in-vitro fertilization were done on the collected sea urchins. Morphology of the embryo and timing for each developmental stage including early cleavage stages, morula, and blastula were studied. Sea urchin embryos started its development at 2 minutes after fertilization and reached blastula stage after 6 hours. Developmental stages of *T. gratilla* embryos exhibited embryological distinction from one another and tend to develop rapidly after fertilization making it an appropriate model organism for biological researches.

Full text link <https://tinyurl.com/2s3su46d>

Article title: Automated cell counter for *Dunaliella* SP. Under Laboratory Condition

Authors: Mary Jane Magno Tan, Jonas Gerard, C. Rigor. Jose R. San Juan Jr., Armin S. Coronado

Publication title: PUP Journal of Science and Technology, 2018

Abstract:

In order to maximize the potential of *Dunaliella* sp. as feedstock for biodiesel production, the laboratory culture conditions must be fully understood to obtain high yield and good quality lipids. However, optimizing culture conditions need rigorous daily monitoring of algal growth that entails time-consuming protocol like manual counting of cells under the microscope. This research developed a cost-effective system that utilizes Haar Cascade Algorithm as classifier, to automatically count *Dunaliella* sp. cells in order to calculate the culture cell density and generate data through graphs. The Automated Cell Counter has a percentage accuracy of 87.75% and percentage performance of 87.75% using F-measure (F1-score). Moreover, the precision (exactness) of the system and recall (sensitivity of the classifier) has values of 72.76% and 71.3%, respectively. Analysis of Variance (ANOVA) revealed that the calculated cell density between automated cell counter and manual counting done by domain experts of *Dunaliella* sp. is not significantly different ($\alpha 0.05 < 0.609$). Therefore, the Haar Cascade Algorithm can be used as classifier to count *Dunaliella* sp. cells.

Full text link <https://tinyurl.com/2p8w2e82>

Article title: Web-based Decision Support System for broodstock management of *Siganus guttatus* (bloch, 1787) in open fish cage

Authors: Mary Jane Magno-Tan, Axl C. Alejandrino, Conrad G. Dela Cruz, Arnold C. Inoc, and Armin S. Coronado

Publication title: International Journal of Machine Learning and Computing 7(6), 2017

Abstract:

This paper presents a Decision Support System (DSS) for broodstock management of *Siganus guttatus* - a high valued herbivorous fish species cultured in the Philippines which has a promising commercial potential. The DSS helps aquaculture experts and farmers in monitoring

water quality of the fish cages of the breeders known as broodstock. The system predicts future water quality values based on the past and current values; models present and future water quality parameters through graphs; recommends tasks on broodstock management based on the current water quality and provides an early warning for possible fish kill occurrence based on predicted water quality. The algorithm used for the forecasting module of the DSS is Artificial Neural Network (ANN); forecast error was computed by comparing actual and predicted values, to measure the forecast accuracy; and Test-Retest method was used to assess the reliability of the system. The accuracy rate of the system in predicting future water temperature, salinity, and dissolved oxygen are 91.05%, 92.67% and 72.58% respectively. The forecast accuracy for dissolved oxygen is significantly lower than the forecast accuracy for temperature and salinity because of insufficient training data for dissolved oxygen. The overall accuracy of the system in prediction is 85.44%. The test-retest reliability of the water quality shows consistency between values for each water parameter, hence the system prediction is considered reliable.

Full text link <https://tinyurl.com/45pjprmj>

Article title: Preliminary assessment of water quality of Donata Falls in Polillo, Quezon, Philippines Using Macrobenthos

Authors: Armin Santos Coronado and Mc Javis Soltura Villaruel

Publication title: PUP Journal of Science and Technology 8(11-24), 2015

Abstract:

The macrobenthos distribution and productivity are directly influenced by physico-chemical parameters of freshwater systems which make them a good bioindicator. This study presented a preliminary assessment of Donata Falls to provide baseline information regarding its aquatic health status. No significant differences were observed among parameters measured, which include dissolved oxygen, conductivity, pH and temperature. Based on the mean values of total nitrogen (14.09 ppm) and phosphorus (0.11 ppm), falls can be classified as oligotrophic. Macrobenthos were collected using bucket method. The macrobenthos community represents 1 species under Class Gastropoda, 2 species under Order Coleoptera, 3 species under Order Odonata and 1 species under Order Oligochaeta, Ephemeroptera and Tricoptera. *Nerita* sp. under Class Gastropoda obtained the highest abundance (37.03%) followed by Family Coenagrionidae under Order Odonata with 24.07% abundance. Abundance of these organisms would suggest that the falls has a good water condition. Family biotic index (FBI), biological monitoring working party (BMWP) and average score per taxon (ASPT) were also calculated. The average FBI value was 1.50 suggesting that there is no apparent organic pollution in the area. Moreover, BMWP score (65.6) and ASPT score (6.56) indicate that the falls has moderate to clean water condition.

Full text link <https://tinyurl.com/r3feykt5>

Article title: Antimicrobial property of crude ethanolic extract from *Sargassum crassifolium*

Authors: Armin Santos Coronado and Maribel Dionisio-Sese

Publication title: Asian Journal of Microbiology, Biotechnology and Environmental Sciences 16(4):383-386, 2014

Abstract:

Marine bioactive compounds have become popular due to their biomedical importance. This study focuses on exploring the antimicrobial property of the crude ethanolic extract from the brown seaweed *Sargassum crassifolium* J.G. Agardh collected from the coastal waters of Polillo Island, Quezon Province, Philippines. Crude ethanolic extract from fresh (F) and dried (D) samples of *S. crassifolium* produced two (2) fractions (F1= liquid fraction; F2 = solid lyophilized fraction). Phytochemical screening of the four (4) fractions revealed the presence of alkaloid, glycoside, polyphenol, saponin and volatile oil. Anthraquinone, flavonoid and tannin were not detected in the crude ethanolic extract. Antimicrobial susceptibility testing by disk-diffusion assay showed that only the Gram-positive bacterium *Staphylococcus aureus* was susceptible to the crude extract. The Gram-negative bacterium *Escherichia coli* as well as the non-filamentous and filamentous fungi *Candida albicans* and *Aspergillus niger*, respectively, were found to be resistant. The highest antimicrobial activity against *S. aureus* was observed in FF1 (%RIZ = 39.40 ± 1.13) while the lowest was observed in DF2 (%RIZ = 29.51 ± 4.47).

Full text link <https://tinyurl.com/utds5zp>

Article title: A Web-based Water Quality Prediction and Decision Support System for the Early Developmental Stage of *Holothuria scabra* (Jaeger, 1833) Utilizing Bayesian Networks

Authors: Mike Lemuel B. Bacayo, James Labnao, O Vincent, Jerico M Tana, Mary Jane Magno Tan, Armin Santos Coronado

Publication title: Not indicated

Abstract:

Holothuria scabra is a high valued marine species in the Philippines. During its early developmental stage, the larvae depends on the water quality of the larval tank in order to survive. But with the unpredictable changes of the water quality of the larval tank only 2% of the larvae survives into a juvenile. This research aims to develop a decision support system (DSS) using Bayesian Networks, that predicts the water quality of the larval tank during the early developmental stage of *H. scabra* and provide suggestion on the amount of water to be added to the larval tanks to maintain an optimum water quality. Using Mean Absolute Percentage Error to compute the forecast accuracy (FA), it showed the result of 84.37%, 88.44% and 88.44% in forecasting the salinity level, dissolved oxygen level and temperature respectively and an overall FA of 87.08%. The FA in predicting the salinity level is significantly lower than the FA in predicting the dissolved oxygen level and temperature because of lack of variation on the training data. One-way ANOVA showed that there is no significant difference between the advice of the DSS and human experts in the amount of water needed to be added to the larval tank.

Full text link <https://tinyurl.com/yckp9mea>

Article title: Influence of yeast, chicken manure and daily feeding of *Chlorella ellipsoidea* in the population growth of *Moina micrura*

Authors: Armin Santos Coronado and Marian Vivian Camacho

Publication title: PUP Journal of Science and Technology, 2014

Abstract:

The total number of broods produced, daily fecundity and the size-class distributions of *Moina micrura* were determined in a four-day culture experiment to evaluate the effectiveness of rearing *M. micrura* in six culture methods. This study shows that addition of yeast, chicken manure and daily feeding of *Chlorella ellipsoidea* are the effective protocols in culturing *M. micrura*, which produced a significantly higher number of individuals (708 ± 66 individuals) compared with no yeast, no chicken manure and non-daily feeding of *C. ellipsoidea*. Higher production of *M. micrura* in chicken manure could be attributed to bacteria proliferation, which serves as additional food for the zooplankters, as well as to the products synthesized by bacteria to enhance growth. Daily feeding of *C. ellipsoidea* also contributed to high brood production of *M. micrura*, which may be attributed to the presence of certain nutrients necessary for growth and development of cladocerans. The proportion of neonates, juveniles and adults did not differ significantly among treatments but the lengths of developmental stages were significantly different among the treatments. Knowing the size-class distribution of *M. micrura* is important since this would allow determination of appropriate feed for fish with various gape sizes.

Full text link <https://tinyurl.com/36vn4cee>

Article title: Toxicity of sulfated polysaccharide extracted from brown algae *Sargassum crassifolium* J.G. Agardh using *Moina Macrocopa* (Strauss, 1820)

Authors: Armin Santos Coronado and Mc. Jervis S. Villaruel

Publication title: PUP Journal of Science and Technology 6, 2013

Abstract:

Sargassum crassifolium is a common brown algae found along the coastal area of Polillo Island, Quezon Province, Philippines. This macroalgae is known to contain sulfated polysaccharide, a bioactive compound localized in their cell wall matrix, which is popularly known for having wide range of bioactivities and therapeutic uses. Information regarding its toxicity must be fully understood thus, this study elucidated the use of *Moina macrocopa* as test organism for toxicity assay. Two (2) aqueous fractions of crude sulfated polysaccharide were extracted from fresh and dried *S. crassifolium*. Four (4) concentrations (0 µg/mL, 100 µg/mL, 200 µg/mL and 300 µg/mL) of the lyophilized extract were used to ascertain its toxicity. Twenty (20) mature *M. macrocopa* adults were used and the survivorship after 96 hours was determined. Analysis of Variance (ANOVA) revealed that the survivorship of *M. macrocopa* with various concentrations are significantly different ($FF1=0.05>0.0001$; $FF2=0.05>0.043$; $DF1=0.05>0.005$; $DF2=0.05>0.0001$) from each fraction. The differences were due to the high survivorship of *M. macrocopa* as the concentration increases. This indicated that sulfated polysaccharide is non-toxic up to 300 µg/mL, which manifested by the reproduction of *M. macrocopa* among treatments. On the other hand, no significant differences ($0.05<0.257$) were observed in the fecundity of each individual among four (4) fractions thus, all the extracted sulfated polysaccharide fractions exhibited no toxicity to *M. macrocopa*.

Full text link <https://tinyurl.com/2nrssx4d>

Article title: Community Structure of Zooplankton at Sampaloc Lake, San Pablo City, Laguna, Philippines

Authors: Armin Santos Coronado, John Genricsson S. Mallari, Sarah Jane M. Balana

Publication title: PUP Journal of Science and Technology 4, 2011

Abstract:

The zooplankton distribution and productivity are directly affected by the physical and chemical conditions of freshwater systems. This study assessed the composition of zooplankton community in Sampaloc Lake, San Pablo City, Laguna in an attempt to determine the trophic status of the lake. Among the environmental parameters measured, only the dissolved oxygen gave significant differences ($\alpha 0.05 > 0.04$) among five stations, which can be explained by the varying levels of organic compounds that each station is receiving. The zooplankton community of the lake consists of three major groups namely Rotifera, Cladocera and Copepoda. Although rotifers gave the highest species richness (42 taxa), copepods were the most abundant (53.60%). Zooplankters within the lake showed high diversity ($H' = 2.034$; $1-D = 0.7581$) but no taxa drastically dominated ($D = 0.2419$) the community. During the sampling period, the average measurements of the various physico-chemical parameters ($pH = 7.91 \pm 0.09$; transparency = $32,40 \pm 4.57$ in; $DO = 7.50 \pm 0.40$ mg/L) indicated mesotrophic condition of the lake. Moreover, the presence of Brachionus, Filinia, Bosmina and Ceriodaphnia supported the

Full text link <https://tinyurl.com/38dhz6f6>

Article title: Patterns of Leaf Shape Variations in Ceriops tagal (Perr.) C.B. Robb.

Authors: Armin Santos Coronado, Mark Anthony Jariol Torres, Cesar De Mayo, Vivian S. Tolentino, Catherine B. Lagunzad, Vivian Panes

Publication title: PUP Journal of Science and Technology 2(1), 2008

Abstract:

Geometric morphometry was used to assess the variations in the shapes of the leaves in Ceriops tagal (Perr.) C.B. Rob. The technique enabled to understand the shapes of the leaves through Elliptic Fourier Descriptors (EFD). The outline-based morphologies of the leaves from the third order branch located at the crown. Lateral inflorescence and base in each tree stand from three sites were determined by assigning chain-codes to the binary images of the leaves. The leaf outline was reconstructed using a total of 80 elliptic Fourier coefficients. The leaf shape variations, symmetrical (intrinsic) and asymmetrical (extrinsic), were summarized by performing Principal Component Analysis using the variance-covariance matrix of the coefficients. Results showed that the first four principal components obtained explain 90.45% of the total symmetric variations, indicating that differences in the leaf-width ratio exist among the tree positions from different populations. The asymmetrical components were summarized by a total of five principal components. Moreover, this study elucidated the use of Elliptic Fourier Analysis (EFA) to facilitate taxonomic descriptions of the species and possible applications in systematics and evolutionary studies of mangroves.

Full text link <https://tinyurl.com/yznw6s32>

Papers Presented

Article title: Antioxidant Activity of Crude Sulfated Polysaccharide Extracted from *Sargassum crassifolium* J . G . Agardh

Authors: Armin Santos Coronado and Maribel Dionisio-Sese

Conference title: 6th National Symposium and Scientific Meeting on "Enhancing Regional Capability for Algal Research and Commercialization" of Philippine Phycological Society, Inc., June 2015

Abstract:

Crude sulfated polysaccharide (CSP) was extracted from the fresh (F) and dried (D) thalli of brown macroalga *Sargassum crassifolium* J. G. Agardh, which resulted into two fraction extracts (F1 and F2) each. The four fractions were tested for antioxidant activity using three antioxidant assays, namely, nitric oxide radical scavenging activity (NORSA), 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging activity and total antioxidant capacity (TAC). In NORSA, FF2 revealed the highest NO⁻ inhibition than all fraction extracts and standard ascorbic acid (AA). On the basis of the calculated IC₅₀ of all the fraction extracts, FF2 (188.90 µg ml⁻¹), may be considered as a promising antioxidant against NO⁻. All the fraction extracts, however, showed lower DPPH- inhibition (<3.83 µg ml⁻¹) than AA (85.03 µg ml⁻¹). Moreover, CSP exhibited lower TAC (<22.50 µg ml⁻¹) based on its calculated ascorbic acid equivalent.

Full text link <https://tinyurl.com/48exe8kv>

Article title: Anti-proliferative Activity of Crude Sulfated Polysaccharide Extracted from *Hormophysa cuneiformis* (J.F. Gmelin) P.C. Silva Using In-vitro Fertilized Sea Urchin Embryos

Authors: Armin Santos Coronado, Dan Jethro Magcuha Masacupan, Maribel Dionisio-Sese, Jake Ivan Perez Baquiran

Conference title: 6th National Symposium and Scientific Meeting on "Enhancing Regional Capability for Algal Research and Commercialization" of Philippine Phycological Society, Inc., June 2015

Abstract:

Aqueous extraction of the dried thalli of *Hormophysa cuneiformis* (J.F. Gmelin) P.C. Silva produced two lyophilized fraction extracts (F1 and F2) of crude sulfated polysaccharide (CSP). The capability of F1 and F2 to inhibit proliferation of cells in the early embryogenesis (2-cell stage to blastula stage) of fertilized sea urchin (*Tripneustes gratilla* L.) eggs were tested and compared using colchicine and doxorubicin as positive controls. Results showed that the highest relative development inhibition (RDI) was observed in F1 at 92.65%, which significantly differ from colchicine (>0.007) and doxorubicin (>0.0001). Moreover, F1 obtained the lowest calculated half maximal inhibitory concentration (IC₅₀) of 0.46 ± 0.08 µg/mL, which is comparable to colchicine (<0.363) at 0.60 ± 0.02 µg/mL. Thus, the CSP from *H. cuneiformis* can inhibit sea urchin embryo development suggesting high potential for anti-cancer therapy.

Full text link <https://tinyurl.com/335bppmf>

Article title: Preliminary studies to improve outcomes of box jellyfish sting injuries in the Indo-Pacific

Authors: Angel Anne Yanagihara, Noel Saguil, Bryan Joseph Estojero Matillano, Armin Santos Coronado

Conference title: 6TH INTERNATIONAL JELLYFISH BLOOMS SYMPOSIUM, November 2019

Abstract:

Throughout the Indo-Pacific, multiple species of box jellyfish present life threatening hazards. While deaths due to box jellyfish stings occur in coastal Australia, Thailand, Indonesia and Malaysia, evidence suggests that the greatest sting-related loss of life occurs in the Philippines where while sting incidence and prevalence have never been systematically assessed, case reports demonstrate that childhood deaths and injuries due to chirodroid box jellyfish stings represent a critical and currently unmet health challenge. Underlying this challenge is the fact that box jellyfish sting incidents and fatalities, are considered “environmental accidents” and not documented in regional and provincial health records. Preliminary pilot study efforts in 2016–2019 in the Philippines demonstrated that the burden of these stings represents an area of serious concern to coastal communities with highest impacts on children and fisher folk in already marginalized areas (estimated at over 100 deaths/year). This is likely the result of the abundance of these lethal stingers and the maritime nature of this island nation, as well as challenges in remote coastal community access to emergent care. Study results will be presented related to the three main aims of this pilot study: 1) public health outreach; 2) field ecology surveys; and 3) bioactivity assays.

Full text link <https://tinyurl.com/y5umtz6f>

Article title: Population growth and size class distribution of *Moina Macrocopa* (Strauss) reared in Different Culture Conditions

Authors: Mary Jane Magno Tan, Armin Santos Coronado, Rustom R. Garcia, May D. Maulani

Conference title: BFAR-NFRDI 6th Scientific Conference, October 2014

Abstract:

Live organisms provide and transfer the nutritive elements to its predator (New, 1998). The growth and development of fish larvae is dependent on the nutrients delivered by the live feeds, which should be acceptable to the larval fish in terms of size, shape and palatability. The use of live feeds has been recognized in larviculture (Olurin and Oluwo, 2010). The amount and quality of live feeds should be amenable to supply the needs of rearing fish larvae. Thus, the stability and reliability of live feed culture are indispensable. In aquaculture, cladocerans have been utilized successfully as food for larval fish (Qin and Culver, 1996) and preferred to be eaten by most fish larvae as they become visible through its jerky movement (Mayer and Wahl, 1997). *Moina* is a cladoceran that has been used as replacement live feed for *Artemia* (Alam et al., 1993) but their availability is seasonal. It is therefore necessary to develop culture technology for *Moina* in order to ensure their availability at all times. Moreover, if the amount of food present in the medium is adequate as well as favorable environmental conditions, the adult females undergo parthenogenesis (Innes, 1997), which increases the rate of reproduction and makes *Moina* suitable for mass culture production. In this study, contribution of daily feeding of *Chlorella sorokiniana* to the total number of broods produced, daily fecundity

and the class--size distribu3on of *Moina macrocopa* during seven--day culture period were explored .

Full text link <https://tinyurl.com/2p9xmtm8>

Article title: Taxonomic Survey of Brown Algae (Division Phaeophyta) in Polillo Island, Quezon Province, Philippines

Authors: Armin Santos Coronado, John Kenneth, A Manaloto, Tiffany M Reyes

Conference title: 5th National Phycological Symposium and Scientific Meeting on "Exploring Algae Diversity for Health, Environment and Industry, 2013

Abstract:

A survey of brown algae present along the littoral zone of selected barangays in Polillo Island, Quezon Province, Philippines was conducted. Collection sites include five (5) barangays namely Anawan, Canicanian, Languyin, Pamatdan and Sabang. Fourteen (14) species of brown algae were present that belongs to five (5) genera and four (4) families. Sargassaceae had the highest species distribution of 71.43% (n=10) while only 7.14% (n=1) represents Scytoseiraceae and Cytoseiraceae, respectively. *Padina minor* was the only brown algae observed in all collection sites. Moreover, the study revealed that Polillo Island had seven (7) new record of brown algae distribution namely *Hormophysa cuneiformis*, *Turbinaria decurrens*, *Sargassum ilicifolium*, *S. kushimotoense*, *S. paniculatum*, *S. feldmannii* and *S. yoshidae*. The presence of these species can be contributed by the open coast area of the island with strong water current, which detached algae from other places may possibly be transported by strong waves.

Full text link <https://tinyurl.com/tu4yvv3m>

Article title: Antimicrobial Property of Crude Ethanolic Extract from *Sargassum crassifolium* J.G. Agardh

Authors: Armin Santos Coronado and Maribel Dionisio-Sese

Conference title: 5th National Phycological Symposium and Scientific Meeting on "Exploring Algae Diversity for Health, Environment and Industry, April 2013

Abstract:

Marine bioactive compounds have become popular due to their biomedical importance. This study focuses on exploring the antimicrobial property of the crude ethanolic extract from the brown seaweed *Sargassum crassifolium* J. G. Agardh collected from the coastal waters of Polillo Island, Quezon Province, Philippines. Crude ethanolic extract from fresh (F) and dried (D) samples of *S. crassifolium* produced two (2) fractions (F1= liquid fraction; F2=solid lyophilized fraction). Phytochemical screening of the four (4) fractions revealed the presence of alkaloid, glycoside, polyphenol, saponin and volatile oil. Anthraquinone, flavonoid and tannin were not detected in the crude ethanolic extract. Antimicrobial susceptibility testing by disk-diffusion assay showed that only the Gram-positive bacterium *Staphylococcus aureus* was susceptible to the crude extract. The Gram-negative bacterium *Escherichia coli* as well as the non-filamentous and filamentous fungi *Candida albicans* and *Aspergillus niger*, respectively, were found to be

resistant. The highest antimicrobial activity against *S. aureus* was observed in FF1 (%RIZ= 39.40 ± 1.13) while the lowest was observed in DF2 (%RIZ= 29.51 ± 4.47).

Full text link <https://tinyurl.com/znpyn52r>

Article title: Leaf Shape Variation between *Halophila ovalis* (R. Br.) Hook F. and *Halophila minor* (Zoll.) den Hartog (Family Hydrocharitaceae)

Authors: Armin Santos Coronado, Christian Joy O. Regala, Michelle O. Casayuran

Conference title: Association of Systematic Biologist of the Philippines (ASBP) Annual Conference

Abstract:

Full text link <https://tinyurl.com/bdzyyuar>



Sex: Female

Education:

Master of Science in Public Health, Medical Microbiology (Virology Specialization), University of the Philippines

Bachelor of Science in Biology major in Microbiology, University of the Philippines

Field of Specialization

Sequencing

PCR

Cell Culture

RNA Extraction

Western Blot Analysis

Gel Electrophoresis

DNA Extraction

Electrophoresis

Molecular Genetics

DNA Sequencing

Researches:

Article title: Genotyping of respiratory syncytial virus among influenza-like illness and severe acute respiratory infection cases of children in the Philippines from 2006 to 2016

Authors: Jonjee Calaor-Morin, Vina Lea Arguelles, Janiza Lianne Foronda, Alvin Tan, Evelina Lagamayo, Clyde Dapat, Socorro Lupisan

Publication title: Influenza and other respiratory viruses 16(5):942-951, 2022

Abstract:

Objective: Respiratory syncytial virus (RSV) is a leading cause of severe lower respiratory infection, and therefore, a major threat to global health. This study determined the epidemiological and molecular characteristics of RSV among cases of influenza-like illness (ILI) and severe acute respiratory infection (SARI) among children in the Philippines.

Method: The study included archived nasopharyngeal swab and oropharyngeal swab samples collected from patients under the age of five who are presented with ILI or SARI for the period of 2006-2016. Swabs were examined for RSV subgroup by multiplex real-time qRT-PCR. Partial genome sequencing and phylogenetic analyses of the second hypervariable region (HVR) of the G gene were used to determine the genotype of RSV isolates.

Results: A total of 1036 representative samples from all sites were selected and tested. Of these samples, 122 were RSV-positive at 11.8% prevalence rate, and 58.2% (71/122) were classified as RSV-A. Six genotypes were identified, which include NA1 (27/122, 22.1%), ON1 (5/122, 4.1%), GA2 (1/122, 0.8%), and GA5 (1/122, 0.8%) for RSV-A; and BA2 (13/122, 10.7%) and BA9 (1/122, 0.8%) for RSV-B. Most RSV-related cases were significantly associated with clinical characteristics such as runny nose (88.1% RSV vs. 11.9% non-RSV; p value = 0.021), pneumonia (80.6% RSV vs. 19.4% non-RSV; p value = 0.015), and bronchitis (71.7% RSV vs. 28.3% non-RSV; p value < 0.001). Increased RSV-related cases were observed among children below 24 months old.

Full text available upon request to the author/s.

Article title: Serotype Identification of Human Adenoviruses Associated with Influenza-Like Illnesses in the Philippines from 2006 to 2012 by Microneutralization and Molecular Techniques

Authors: Catherine Calzado-Dacasin, Janiza Lianne Foronda, Vina Lea Arguelles, Chona Mae Daga, Marie Therese Quimpo, Socorro Lupisan, Clyde Dapat, Mariko Saito, Michiko Okamoto, Pia Marie Albano, Hitoshi Oshitani

Publication title: International Journal of Infectious Diseases 117:326-333, April 2022

Abstract:

Objectives

Human adenoviruses (HAdV) are known to cause a wide range of diseases including acute respiratory infections, conjunctivitis, and acute gastroenteritis. In this study, we aimed to determine the serotypes of HAdV in patients with influenza-like illness (ILI) in the Philippines from 2006-2012 and to describe the demographic and epidemiological characteristics of patients who tested positive for HAdV.

Methods

Between 2006 and 2012, the Philippine National Influenza Centre detected HAdV in 1294 samples of patients with ILI. Serotype determination was done in select samples using microneutralization, polymerase chain reaction (PCR), and sequencing methods.

Results

A total of 8 serotypes were identified (HAdV 1–7 and 11), with HAdV-2 (27.8%), and HAdV-3 (27.8%) being the most prevalent. The majority of HAdV infections were found in children below 5 years of age (79.9%).

Conclusions

The identification of HAdV circulating serotypes may serve as guide for designing disease intervention and control strategies and will provide important information regarding the contribution of this virus to respiratory infections, particularly in children, which remain a public health burden in the Philippines.

Full text link <https://tinyurl.com/45frj3mb>

Article title: Human adenoviruses associated with severe acute respiratory infections in the Philippines

Authors: C. Calzado, V. L. Arguelles, J. Morin, M.T. Quimpo, H. Base, et al.

Publication title: International journal of infectious diseases: IJID: official publication of the International Society for Infectious Diseases 101:517-518, December 2020

Abstract:

No available

Full text link <https://tinyurl.com/2p83fnss>

Article title: Molecular epidemiology of coxsackievirus A6 causing hand-foot-and-mouth disease in the Philippines, 2012–2017

Authors: Janiza M. Foronda

Publication title: International journal of infectious diseases: IJID: official publication of the International Society for Infectious Diseases 101:499, December 2020

Abstract:

No abstract

Full text link <https://tinyurl.com/4tk88322>

Article title: Epidemiological and clinical comparison of influenza virus infections including meteorological parameters affecting influenza activity in the Philippines, 2006–2012

Authors: V.L.F. Arguelles, Janiza M. Foronda, M. Inobaya

Publication title: International journal of infectious diseases: IJID: official publication of the International Society for Infectious Diseases 79:95, February 2019

Abstract:

No available

Full text link <https://tinyurl.com/42x2tm78>

**DR. JOVAL N. MARTINEZ***Biology***Sex:** Male**Education:**

Doctor of Philosophy in Biological Sciences, Tokyo Metropolitan University, 2019

Bachelor of Science in Biology, University of the Philippines Visayas, 1999

Field of Specialization:

Environmental microbiology

Gel Electrophoresis

Microbial Biotechnology

Microbial Culture

Microbial Isolation

General Microbiology

DNA

Bacteriology

DNA Extraction

Researches:**Article title:** Draft Genome Sequence of the Thermophilic Unicellular Cyanobacterium *Synechococcus* sp. Strain C9**Authors:** Megumi Kono, Joval N. Martinez, Takeshi Sato, Shin Harutaa**Publication title:** Microbiology Resource Announcements 11(8), July 2022**Abstract:**

This study presents the genome sequence of *Synechococcus* sp. strain C9 (= CCME 5213 = ATCC 700244), a thermophilic unicellular cyanobacterium that was originally isolated from a thermal pool at Octopus Spring, Yellowstone National Park, USA. The genome consists of a 2,958,309-bp chromosome with a GC content of 52.9% and 2,854 protein-coding sequences

Full text link <https://tinyurl.com/4hufkpm>

Article title: Metagenome-Assembled Genome Sequences Recovered from Epilithic River Biofilm in the Tama River, Japan

Authors: Joval Navas Martinez, Arisa Nishihara, Shin Haruta

Publication title: Microbiology Resource Announcements 10(38), September 2021

Abstract:

Draft genome sequences of putatively novel bacteria were assembled from the metagenome of epilithic biofilm samples collected from the Tama River (Tokyo, Japan). The metagenome contains 44,630,724 sequences, 44,792 contigs, and 48% G+C content. Binning resulted in 31 metagenome-assembled genomes (MAGs) with >50% completeness.

Full text link <https://tinyurl.com/navnj48m>

Article title: In-Situ Metatranscriptomic Analyses Reveal the Metabolic Flexibility of the Thermophilic Anoxygenic Photosynthetic Bacterium *Chloroflexus aggregans* in a Hot Spring Cyanobacteria-Dominated Microbial Mat

Authors: Shigeru Kawai, Joval N. Martinez, Mads Lichtenberg, Erik Trampe, Michael Küh, Marcus Tank, Shin Haruta, Arisa Nishihara, Satoshi Hanada and Vera Thiel

Publication title: Microorganisms 9(3):652, March 2021

Abstract:

Chloroflexus aggregans is a metabolically versatile, thermophilic, anoxygenic phototrophic member of the phylum Chloroflexota (formerly Chloroflexi), which can grow photoheterotrophically, photoautotrophically, chemoheterotrophically, and chemoautotrophically. In hot spring-associated microbial mats, *C. aggregans* co-exists with oxygenic cyanobacteria under dynamic micro-environmental conditions. To elucidate the predominant growth modes of *C. aggregans*, relative transcription levels of energy metabolism- and CO₂ fixation-related genes were studied in Nakabusa Hot Springs microbial mats over a diel cycle and correlated with microscale in situ measurements of O₂ and light. Metatranscriptomic analyses indicated two periods with different modes of energy metabolism of *C. aggregans*: (1) phototrophy around midday and (2) chemotrophy in the early morning hours. During midday, *C. aggregans* mainly employed photoheterotrophy when the microbial mats were hyperoxic (400–800 µmol L⁻¹ O₂). In the early morning hours, relative transcription peaks of genes encoding uptake hydrogenase, key enzymes for carbon fixation, respiratory complexes as well as enzymes for TCA cycle and acetate uptake suggest an aerobic chemomixotrophic lifestyle. This is the first in situ study of the versatile energy metabolism of *C. aggregans* based on gene transcription patterns. The results provide novel insights into the metabolic flexibility of these filamentous anoxygenic phototrophs that thrive under dynamic environmental conditions.

Full text link <https://tinyurl.com/2p89uu9d>

Article title: Draft Genome Sequence of a Filamentous Anoxygenic Phototrophic Bacterium, "Candidatus *Roseilinea* sp. Strain NK_OTU-006," Recovered from Metagenomic Data of a Hot Spring Microbial Mat

Authors: Joval N. Martinez, Shigeru Kawai, Mohit Kumar Saini, aMarcus Tank, Satoshi Hanada, Vera Thiel

Publication title: Microbiology Resource Announcements 9(50):3, December 2020

Abstract:

We report here the metagenome-assembled draft genome of an uncultured filamentous anoxygenic phototroph of the phylum Chloroflexota (formerly Chloroflexi), "Candidatus Roseilinea sp. strain NK_OTU-006," recovered from hot spring-associated microbial mats. The 3.6-Mb genome is estimated to be 94% complete and comprises 117 contigs encoding 3,203 predicted genes, including a full-length rRNA operon.

Full text available upon request to the author/s.

Article title: Vertical Distribution and Diversity of Phototrophic Bacteria within a Hot Spring Microbial Mat (Nakabusa Hot Springs, Japan)

Authors: Joval Navas Martinez, Arisa Nishihara, Mads Lichtenberg, Erik Trampe, Shigeru Kawai, et al.

Publication title: Microbes and Environments 34(4), November 2019

Abstract:

Phototrophic microbial mats are assemblages of vertically layered microbial populations dominated by photosynthetic microorganisms. In order to elucidate the vertical distribution and diversity of phototrophic microorganisms in a hot spring-associated microbial mat in Nakabusa (Japan), we analyzed the 16S rRNA gene amplicon sequences of the microbial mat separated into five depth horizons, and correlated them with microsensor measurements of O₂ and spectral scalar irradiance. A stable core community and high diversity of phototrophic organisms dominated by the filamentous anoxygenic phototrophs, *Roseiflexus castenholzii* and *Chloroflexus aggregans* were identified together with the spectral signatures of bacteriochlorophylls (BChls) a and c absorption in all mat layers. In the upper mat layers, a high abundance of cyanobacteria (*Thermosynechococcus* sp.) correlated with strong spectral signatures of chlorophyll a and phycobiliprotein absorption near the surface in a zone of high O₂ concentrations during the day. Deeper mat layers were dominated by uncultured chemotrophic Chlorobi such as the novel putatively sulfate-reducing "Ca. *Thermonerobacter* sp.", which showed increasing abundance with depth correlating with low O₂ in these layers enabling anaerobic metabolism. Oxygen tolerance and requirements for the novel phototroph "Ca. *Chloroanaerofilum* sp." and the uncultured chemotrophic Armatimonadetes member type OS-L detected in Nakabusa hot springs, Japan appeared to differ from previously suggested lifestyles for close relatives identified in hot springs in Yellowstone National Park, USA. The present study identified various microenvironmental gradients and niche differentiation enabling the co-existence of diverse chlorophototrophs in metabolically diverse communities in hot springs.

Full text link <https://tinyurl.com/35dspdz9>

Article title: "Candidatus *Thermonerobacter thiotrophicus*," A Non-phototrophic Member of the Bacteroidetes/Chlorobi With Dissimilatory Sulfur Metabolism in Hot Spring Mat Communities

Authors: Vera Thiel, Amaya M. Garcia Costas, Nathaniel W. Fortney, Joval N. Martinez, Marcus Tank, Eric E. Roden, Eric S. Boyd, David M. Ward, Satoshi Hanada, Donald A. Bryant

Publication title: Frontiers in Microbiology 9:3159, 2019

Abstract:

In this study we present evidence for a novel, thermophilic bacterium with dissimilatory sulfur metabolism, tentatively named “Candidatus Thermomonobacter thiotrophicus,” which is affiliated with the Bacteroides/Ignavibacteria/Chlorobi and which we predict to be a sulfate reducer. Dissimilatory sulfate reduction (DSR) is an important and ancient metabolic process for energy conservation with global importance for geochemical sulfur and carbon cycling. Characterized sulfate-reducing microorganisms (SRM) are found in a limited number of bacterial and archaeal phyla. However, based on highly diverse environmental *dsrAB* sequences, a variety of uncultivated and unidentified SRM must exist. The recent development of high-throughput sequencing methods allows the phylogenetic identification of some of these uncultured SRM. In this study, we identified a novel putative SRM inhabiting hot spring microbial mats that is a member of the OPB56 clade (“Ca. Kapabacteria”) within the Bacteroidetes/Chlorobi superphylum. Partial genomes for this new organism were retrieved from metagenomes from three different hot springs in Yellowstone National Park, United States, and Japan. Supporting the prediction of a sulfate-reducing metabolism for this organism during period of anoxia, diel metatranscriptomic analyses indicate highest relative transcript levels in situ for all DSR-related genes at night. The presence of terminal oxidases, which are transcribed during the day, further suggests that these organisms might also perform aerobic respiration. The relative phylogenetic proximity to the sulfur-oxidizing, chlorophototrophic Chlorobi further raises new questions about the evolution of dissimilatory sulfur metabolism.

Full text link <https://tinyurl.com/35vp44zb>

Article title: Rotten thallus of Red Seaweed, *Gracilariopsis heteroclada* Zhang et Xia, is Associated with Agar-Digesting *Bacillus* spp

Authors: Joval N. Martinez and Philip Ian P. Padilla

Publication title: Journal of Fisheries Sciences, 2017

Abstract:

Agar-digesting bacteria have been hypothesized to cause rotting of the thalli of economically important marine red seaweeds, *Gracilariopsis heteroclada* Zhang et Xia (Gracilariaceae, Rhodophyta). However, characterization of these causative agents accompanying seaweeds' disease in the marine environment has been poorly elucidated. Thus, agar-digesting bacteria associated with ‘rotting thallus’ of red seaweed, were isolated and characterized. Agar-digesters were selected based on their ability to digest agar by forming a clear depression around their colony and/or liquefaction of agar. Selected agar-digesters showed a positive result for gelatinase test and arginine dihydrolase test. 16S rRNA of these isolates was successfully extracted, purified, sequenced and analyzed. Phylogenetic analyses showed that bacterial 16S rRNA sequences from rotting seaweed thalli belong to *Bacillus* spp (98-99%), suggesting that the isolates were significantly associated with the rotting of red seaweeds in the present investigation.

Full text link <https://tinyurl.com/y7v37cwt>

Article title: Isolation and characterization of agar-digesting *Vibrio* species from the rotten thallus of *Gracilariopsis heteroclada* Zhang et Xia

Authors: Joval N. Martinez and Philip Ian P. Padilla

Publication title: Marine Environmental Research 119(1), 2016

Abstract:

Gracilariopsis heteroclada Zhang et Xia (Gracilariaceae, Rhodophyta) is one of the most studied marine seaweeds due to its economic importance. This has been cultivated extensively on commercial scale in the Philippines and other Asian countries. However, sustainable production of *G. heteroclada* in the Philippines could not be maximized due to the occurrence of rotten thallus disease. Thus, isolation and characterization of agar-digesting bacteria from the rotten thalli of *G. heteroclada* was conducted. A total of seven representative bacterial isolates were randomly selected based on their ability to digest agar as evidenced by the formation of depressions around the bacterial colonies on nutrient agar plates supplemented with 1.5% NaCl and liquefaction of agar. Gram-staining and biochemical characterization revealed that isolates tested were gram-negative rods and taxonomically identified as *Vibrio parahaemolyticus* (86–99.5%) and *Vibrio alginolyticus* (94.2–97.7%), respectively. It is yet to be confirmed whether these agar-digesting vibrios are involved in the induction and development of rotten thallus disease in *G. heteroclada* in concomitance with other opportunistic bacterial pathogens coupled with adverse environmental conditions.

Full text available upon request to the author/s.

**DR. JOHN SYLVESTER NAS***Biochemistry***Sex:** Male**Education:**

Master of Science in Biochemistry, University of the Philippines, 2018

Bachelor of Science in Agricultural Biotechnology, University of the Philippines, 2016

Field of Specialization:

Animal Nutrition

Animal Biotechnology

Animal Biochemistry

Neuroscience

Biochemical Genetics

Researches:**Article title:** Mammalian models of pathogen-associated muscle degeneration**Authors:** John Sylvester Nas, Trisha Jaden Galang, Anlie Bacod, Cher Agape Cervantes, Jubilee Ivy, Estrilles, Rheaa Esguera, Ryan Miguel Milleza, Paula Angeli Servino, Laarni Hannah Lacorte**Publication title:** Exploratory Animal And Medical Research 12(2):134-148, 2022**Abstract:**

Studies on pathogen-associated muscle degeneration (PAMD) seem not to progress despite the recent advancements in omics. The limited and outdated literature about pathogen-associated muscle degeneration in different animal models contradicts the thorough understanding of their genome. In this paper, we review the pathophysiology of pathogen infection through association with the physiologic, biochemical, and molecular changes happening in the skeletal, cardiac, and smooth muscles of different well-established mammalian models, namely rats (*Rattus sp.*), mice (*Mus musculus*), and rabbit (*Oryctolagus cuniculus*). The use of model organisms is beneficial to the advances in muscle degeneration research since they are inexpensive, low maintenance, and can be used for genetic screenings. This review illuminated an understanding

of the potential application of well-established model organisms in advancing the current knowledge about pathogen-associated muscle degeneration.

Full text <https://tinyurl.com/mr7psumy>

Article title: Insights on Anthocyanidins' Binding Affinity and Molecular Interactions with Zika Virus Protein Targets

Authors: John Sylvester Nas

Publication title: Asian Journal of Biological and Life Sciences 11(1), 2022

Abstract:

Neonatal microencephaly and some neurological disorders have been associated with Zika virus (ZikV) infection. In recent years, the pathophysiology of ZikV was well elucidated; hence, different drug targets have been proposed to inhibit its activities. However, there has been no approved drug against ZikV infection to date. This paper examined the binding affinity and non-covalent binding interactions of the different classes of anthocyanidins against ZikV drug targets. Anthocyanidins are plant pigments, where their bio-functionalities are reasonably well studied. Anthocyanidins and their derivatives have shown antiviral properties; however, their mechanism against ZikV remains elusive. Through in silico molecular docking, this paper illuminates the understanding of these compounds' binding interactions and binding energies with the different ZikV protein drug targets, namely NS3 helicase, NS2B-NS3 protease, NS5 methyltransferase, NS5 polymerase, and Axl kinase. Results have shown that anthocyanidins generally have a higher binding affinity with NS5 methyltransferase compared to the others. Also, the top-binding anthocyanidin differs in each protein. This paper hypothesized that the inhibitory potential of the different classes of anthocyanidins might differ due to the contrasting binding interactions with the various ZikV protein drug targets.

Full text link <https://tinyurl.com/384s7k74>

Article title: Molecular Docking of Putative Compounds in Aqueous Muntingia calabura L. Leaf Extracts with Cytochrome P450 Proteins

Authors: John Sylvester B. Nas, Jose Gabriel Felipe B. Enriquez, Anton Jose Y. Villa-Ignacio, Alice Alma C. Bungay, and Thucydides L. Salunga

Publication title: Asian Journal of Biological and Life Sciences 11(1):136-143, 2022

Abstract:

Studies claim that Muntingia calabura L. (M. calabura) exhibits antibacterial, antipyretic, antidiabetic, antioxidant, and anti-inflammatory properties. Despite these numerous claims, limited studies have shown its hepatoprotective property. Thus, we investigated the hepatoprotective property of aqueous M. calabura L. leaf extracts (AMCLE) by inhibiting salient CYP450 enzymes associated with hepatotoxicity, CYP3A4 CYP2E1, CYP1A2, and CYP2D6. Aqueous leaf extracts were subjected to phytochemical screening to identify potentially active compounds. A literature search was done to determine the specific metabolites. The identified candidates were docked with CYP450 enzymes virtually. The phytochemical screening revealed that AMCLE contains phenols, tannins, saponins, alkaloids, and flavonoids. The docking experiment showed that galangin, a flavonoid, has the highest binding affinity to the CYP450

enzymes compared to all the putative metabolites tested. Also, galangin outranked most known enzyme inhibitors, except for ritonavir and α -naphthoflavone, inhibitors of CYP3A4 and CYP1A2, respectively. These data suggest that the CYP450-associated hepatoprotective property of AMCLE may be attributed to galangin. Hence, further studies are warranted to support these findings.

Full text available upon request to the author/s.

Article title: Caenorhabditis elegans as a Model in Studying Physiological Changes Following Heart Failure

Authors: John Sylvester Nas

Publication title: Asian Journal of Biological and Life Sciences 10(3):522-526, 2021

Abstract:

For decades, *Caenorhabditis elegans* (*C. elegans*) has been at the forefront of various advances in aging, cancer, and neurodegeneration research. Despite the complete sequencing of this nematode's genome, there are only a few attempts of using *C. elegans* in studying the circulatory system and other related physiological activities. The absence of the circulatory system poses a significant challenge for researchers to conduct experiments in this organism. In this paper, the association of the heart and pharyngeal muscle in *C. elegans* was reviewed to illuminate new understanding and propose potential methods in investigating the physiological changes following pathogen-induced heart failure.

Full text available upon request to the author/s.

Article title: Effects of *Moringa oleifera* Leaf Extracts on Lipid Profile of Rats: A Meta-Analysis and Systematic Review

Authors: Laarni Hannah Lacorte, Jayson Harbey Robles, Cathleen Panganiban, John Vince Cajano, Jose Bryan Santos, Celjan Kyle Ortiz, MA Theresa Gumban, Joanne Emille Sancho, John Sylvester Nas

Publication title: Asian Journal of Biological and Life Sciences 10(3):549-558, 2021

Abstract:

Moringa oleifera (MO) has long been studied for its anti-obesity potential and its various effects on the lipid profile. However, the result of the basic researches done in rats appears to be imprecise, which may be due to the differences in the solvent extraction, dosing, and duration of administration of the extract. This paper evaluated the effects of different solvent extraction, dosing, and duration of administration of MO extracts on the lipid profile of rats, namely total cholesterol (TC), triglyceride (TG), low-density lipoproteins (LDL), and high-density lipoproteins (HDL). The articles used in this study were collected from various reputable indexing platforms. Meta-analysis was performed to compare the different treatments in the lipid profile of the rats through one-way analysis of variance (ANOVA) with Tukey's test, one-way ANOVA on ranks with Mann-Whitney test, and student t-test. Results show no significant difference ($p < 0.05$) in the rats' lipid profile after treatment of different MO extracts, suggesting that regardless of the MO solvent used results in a similar effect on the lipid profile of rats. However, the disparity of the effects on the lipid profile may be attributed to the dosing and duration of administration. We

hypothesized that the level, bioavailability, and mechanism of action of certain phytochemicals present in MO extracts such as flavonoids, phenols, anthraquinones, terpenes, phenolic acids, flavones, terpenoids, and steroids might have also contributed to these differences. Hence, isolation of bioactive compounds from MO and testing their effects on different lipid-associated enzymes may elucidate the actual impact of MO in the lipid profile.

Full text link <https://tinyurl.com/bdf3mwp9>

Article title: Anti-neurodegenerative Activity of Anthocyanin Extract from Endemic Plant Species in the Philippines: A Systematic Review

Authors: Laarni Hannah Lacorte, Sophia Asis, Jan Lance Buenaventura, Angelic Bulanlagui, Reianna Mae Male, Kristel Faith Maniquis, Joaquin Olandez, Keneth Dayle Samulde, John Sylvester Nas

Publication title: Asian Journal of Biological and Life Sciences 10(2):245-250, 2021

Abstract:

Introduction: Currently, neurodegeneration is increasingly prevalent and proves to be a serious health problem. Plant extraction containing phytochemical compounds that are rich in anthocyanin regulates several factors contributing to neurodegeneration-related conditions and are used to gain greater understanding of these diseases. Aim: Anti-neurodegenerative activity studies have been used in different kinds of anthocyanin-plant cultivated in other countries. The aim of this study was to gain an understanding of anti-neurodegenerative activity of anthocyanin-containing plants found in the Philippines and discover its neuroprotective effect. Methods: The related research and studies are limited within the past 5 years of the review's submission, anthocyanin-containing plant species in the Philippines, and the records are monitored thoroughly by excluding duplicates and full-text articles were assessed for eligibility. Results: A study showed that a dose of 24mg/kg a day of anthocyanin (ANC) for 2 weeks prevented production of reactive oxygen species (ROS) and inhibited neurodegeneration as well as neuroinflammation in mice by reversing the phosphor-c-Jun N-terminal kinase 1 (P-JNK). Evidences highlight the anthocyanin effectivity in rat models which destabilizes a β (amyloid beta) by blocking its oligomeric structure formation. The induced metal toxicity, evidence of remyelination and neuron survival by ANC was discovered as well. The related studies reviewed showed relevant findings of anthocyanin content in Philippine plants and their impact in neuroprotection; plants like Bignay (*Antidesma bunius*) showed 436.602 mg/100 mL, Dragon fruit (*Hylocereus* spp.) noted 81.75+ 1.43 mg/100g, Rambutan (*Nephelium lappaceum* L.) Husk showed 393 mg/100g, and lastly Purple yam (*Dioscorea alata*) with 560 mg/100 g. Conclusion: With the gathered data, this reveals that ANC directly impacts the brain and a number of effectors, including oxidative and nitrosative stress, glial inflammation, protein aggregation, and toxicity.

Full text link <https://tinyurl.com/2arjv23c>

Article title: *Caenorhabditis elegans* as a Model Organism for Special Environment

Authors: Shania Jeanne Cosme, Maria Alysha Nicole Agustin, Francesca Louise Remedios, Camille Jedidiah Dianko, Florielie Ungria, Stacey Loraine Villanueva, John Sylvester Nas

Publication title: Asian Journal of Biological and Life Sciences 10(2):258-267, 2021

Abstract:

Organisms living in special environments, namely deep-sea, high altitude, and space environment experience physiological, biochemical, and genetic changes. Human study in special environments may be time consuming and expensive, hence, the authors are proposing the use of *Caenorhabditis elegans* (*C. elegans*). This non-parasitic nematode has been widely used as model organism for various human diseases, such as cancer, neurodegenerative disorders, and aging-associated diseases. There are also physiological and biochemical parameters in humans established in *C. elegans*. Similarly, *C. elegans* carry ortholog genes that are associated with human genes. This paper reviews the physiological, biochemical, and genetic changes in humans under the different special environments and correlate these effects in the current understanding of the special environments in *C. elegans*. Both the deep-sea and high-altitude environment leads to hypoxia due to do the decrease in oxygen supply in humans. Hypoxia in *C. elegans* is regulated by p38 mitogen activated protein kinase (MAPK), which inhibits the oxygen sensor EGL-9 and activates hypoxia-inducible factor 1 (HIF-1). In space environment, humans and *C. elegans* experience are observed to have decreased muscle mass. The muscle morphogenesis in humans is associated with MyoD, which interestingly has a counterpart in *C. elegans*, *ceMyoD*. Even though there were studies using *C. elegans* in different special environments, there were some physiological and biochemical changes that are still not elucidated. It is interesting to study the effects of these different special environments by mimicking various environmental conditions on the lifespan and health span in *C. elegans*.

Full text link <https://tinyurl.com/2ybkkp9m>

Article title: In silico Identification of Novel Compounds as Quorum-Sensing Inhibitors in Selected Waterborne Pathogens

Authors: Khirsten Marie Bawar, Leannie Praise Cruz, Kristine Bernadette Ilao, Julianne Mica Justiniano, Lara Mae Panganiban, Diane Laine Fabito, Christine Joy Amayun, and John Sylvester Nas

Publication title: Asian Journal of Biological and Life Sciences 21(2):366-377, 2021

Abstract:

Quorum sensing (QS) is a process involved in producing, detecting, responding, and releasing signaling molecules to maintain physiological activities of most utilized by both gram-positive and gram-negative bacteria in various environmental conditions. This study aims to identify novel compounds that have potential QS inhibitory mechanisms against the gram-positive bacteria *Staphylococcus aureus* (*S. aureus*) and *Streptococcus pneumoniae* (*S. pneumoniae*), and the gram-negative bacteria *Salmonella typhi* (*S. typhi*) and *Escherichia coli* (*E. coli*). Compounds that are structurally similar to the known QS inhibitors were identified using ligand-based screening. Candidate compounds with 40 to 80% similarity with the known QS inhibitors were further evaluated through molecular docking with the QS-associated enzymes, namely ComA, ComE, LsrF, LsrK, AgrC, AgrA, LsrB, and Hfq. The binding affinity was visualized to identify the different non-covalent binding interactions. Compounds with <-8.0 kcal/mol docking score were considered for evaluation for their distribution coefficient (LogD) at different optimal growth of the bacteria, such as pH 4, 6, 7.4, 7.8, 8, and 9. Out of the 63

compounds evaluated, only three compounds demonstrated a high binding affinity, namely 1-phenyl-3-[5-(phenylcarbamoylamino)naphthalen-1-yl]urea and 1-naphthalen-1-yl-3-[5-(naphthalen-1-ylcarbamoylamino)naphthalen-1-yl]urea with ComE of *S. pneumoniae* and 3-[(4-Methylphenyl)sulfonyl][1,2,3]triazolo[1,5-a]quinazolin-5(4H)-one to AgrA of *S. aureus*. Their high binding affinity may be attributed to the numerous hydrogen bonds and hydrophobic interactions.

However, only 3-[(4-Methylphenyl)sulfonyl][1,2,3]triazolo[1,5-a]quinazolin-5(4H)-one has comparable LogD value with its QS inhibitor of AgrA, savarin, at the optimal growth pH for *S. aureus*. These findings suggest that the use of 3-[(4-Methylphenyl)sulfonyl][1,2,3]triazolo[1,5-a]quinazolin-5(4H)-one may be effective in controlling *S. aureus* growth probably through inhibition of AgrA. However, further studies are needed to confirm these findings.

Full text link <https://tinyurl.com/36z649cs>

Article title: Molecular Interactions of Cyanidin-3-glucoside with Bacterial Proteins Modulate the Virulence of Selected Pathogens in *Caenorhabditis elegans*

Authors: John Sylvester Nas, Annlyn Sanchez, Jenina Camille Bullago, Jhowel Ken Fatalla, and Francisco Gellecanao Jr.

Publication title: Asian Journal of Biological and Life Sciences 10(1):150-158, 2021

Abstract:

Anthocyanins are plant pigments known for their radical scavenging activity. However, the current understanding of the effects of anthocyanins in bacterial infection is limited to crude extracts. Additionally, most studies about cyanidin-3-glucoside (C3G), an anthocyanin compound from the cyanidin class, were limited to in vitro experiments. This paper investigated the protective mechanism of C3G against selected pathogens, namely *Staphylococcus aureus* (*S. aureus*), *Enterococcus faecalis* (*E. faecalis*), *Klebsiella pneumoniae* (*K. pneumoniae*), and *Proteus mirabilis* (*P. mirabilis*) using *Caenorhabditis elegans* (*C. elegans*) as the infection model. The nematodes were supplemented with varying sublethal concentrations of C3G every day after hatching. Besides, the concentrations of C3G used exhibit no bacterial growth suppression against the pathogens. The nematodes transferred to different plates were flooded with varying bacteria. The number of surviving worms were counted every day until all worms were deceased. To hypothesize the protective mechanism of C3G, its 3D structure was docked in the crystal structures of the different proteins produced by each pathogen. These protein molecules represent their virulence factors, which are available in the Protein Data Bank. The docked crystal structures were evaluated for their binding energies and binding interactions. Results show that C3G rescues *C. elegans* against *S. aureus* but not from *E. faecalis*, despite both are gram-positive. This observation is similar to the gram-negative pathogens where *C. elegans* were protected from *P. mirabilis* treatment but not against *K. pneumoniae*. Consistently, the docked crystal structures of C3G reveal to have a high binding affinity with amidohydrolase and exfoliative toxin A, which are virulence factors of *P. mirabilis* and *S. aureus*, respectively. These findings suggest that the protective mechanism of C3G against pathogens may influence the virulence factors of certain bacteria only.

Full text available upon request to the author/s.

Article title: Effects of Commercial Antioxidants Applied in Ovo on Chorioallantoic Membrane and Putative Plasma Vitellogenin of Philippine Mallard (*Anas platyrhynchos* L.)

Authors: Renato S.A. Vega, Christine B. Adiova, John Sylvester B. Nas, Desiree Joy V. Cerico, and David D. Manalo

Publication title: IOP Conference Series Earth and Environmental Science 690(1):012026, March 2021

Abstract:

Two experiments were conducted to evaluate the effects of different antioxidants and its overdose (4x) in ovo. Experiment 1 were grouped as vitamin C, MegaAntioxidant® and Proflavanol C®, while experiment 2 were grouped as 100, 200 and 400ppm of MegaAntioxidant® having positive and negative control for both. The 200 fertile eggs in each experiment were injected with 100 ul/ egg of treatment solution and placebo (positive control), except negative control. Embryonic weight and body measurements were taken weekly (7-21 d). The anti-angiogenesis using CAM at day 4 was accomplished. Determination of putative vitellogenin (VTG) was done at 28 th day using SDS-PAGE. Both experiments showed comparable embryonic weight, body length, and head diameter indicating no deleterious effects of different antioxidants and MegaAntioxidants® at high doses. Absence of red blemishes of liver was observed in three different antioxidants. The CAM resulted to lesser blood vessel formation significantly at 200 and 400 ppm MegaAntioxidant®. Further, the 175 kDa putative VTG, was present in vitamin C, Proflavanol C®, positive control and negative control, except MegaAntioxidant®. The results imply that MegaAntioxidant® having 32 different antioxidants could have protected the liver, spared VTG synthesis and had anti-angiogenic property at 200 and 400ppm doses.

Full text link <https://tinyurl.com/dv22e5kh>

Article title: Elucidating the Differences in the Biofilm Suppression Mechanism of 6-Gingerol and 6-Shogaol in *Pseudomonas aeruginosa* through Molecular Docking

Authors: John Sylvester B. Nas, Francisco R. Gellecanao, Danica M. Malacad, Jose Alfonso G. Manugas, Gildred Christian L. Mutia, Mikaela D. Paguibitan, Mark Johndel M. Quilala, Trisha Joy Basille A. Rodriguez, Mary Janniezl S. Tee

Publication title: International Journal of Biosciences (IJB) 18(2):1-10, February 2021

Abstract:

The virulence of *Pseudomonas aeruginosa* (*P. aeruginosa*) is associated with its biofilm formation via quorum sensing. Compounds present in *Zingiber officinale* (*Z. officinale*) such as 6-gingerol and 6-shogaol show antibacterial property against different bacteria. However, the mechanism of action of these compounds is underexplored. Hence, we compared the biofilm reduction of these compounds and visualized their binding interactions to different pathways to hypothesize a possible mechanism of action associated with the biofilm reduction. In this study, the biofilm formation of *P. aeruginosa* treated with varying concentrations of either 6-shogaol or 6-gingerol was determined through biofilm accumulation assay. The binding affinity of 6-gingerol and 6-shogaol with various enzymes involved in the membrane integrity, lipopolysaccharide formation, motility, and fatty acid synthesis were ranked through molecular docking. The crystal

structures of the compounds docked to the top 3 enzymes with the most negative docking score were evaluated. Results show that 6-gingerol suppressed the biofilm formation of *P. aeruginosa* significantly higher ($p < 0.05$) than 6-shogaol. Besides, 6-gingerol has a strong binding affinity to an enzyme associated with membrane integrity while 6-shogaol to a motility-related enzyme. The top enzymes were associated with membrane integrity, lipopolysaccharide formation, and motility. The differences in the binding affinity of 6-gingerol and 6-shogaol may be attributed to the varying substructures involved during the non-covalent interactions. Moreover, we speculate that there are other factors involved that resulted in a higher binding affinity of 6-shogaol despite having fewer interactions. These factors may be independent or complementary with the non-covalent bonding, which may be essential to their biofilm suppression property.

Full text link <https://tinyurl.com/5fenpdey>

Article title: Peonidin-3-glucoside extends the lifespan of *Caenorhabditis elegans* and enhances its tolerance to heat, UV, and oxidative stresses

Authors: John Sylvester B. Nasa,, Rafael Vincent M. Manalo, Paul Mark B. Medina

Publication title: ScienceAsia 47(4):457, 2021

Abstract:

Anthocyanins have long been established for their benefits to various organisms, ranging from lifespan extension and healthspan improvement in animal models to enhanced immunity and organ function in humans. In Asia, staple food, such as potatoes and rice, contains peonidin, a flavylum-bearing anthocyanin. However, its benefits have only been demonstrated in crude or partially purified extracts, with scarce data on its purified form. In this study, peonidin-3-glucoside (P3G) was tested for antioxidant properties and was administered to *Caenorhabditis elegans* under various forms of stresses (ultraviolet, heat, and oxidative stress). P3G showed free radical scavenging activity with an EC₅₀ 6.9-fold higher than that of ascorbic acid but was twofold lower than that of CoQ10 (150 µg/ml). Using its sublethal concentration (50 µg/ml), P3G extended the lifespan of *C. elegans* by 14% greater than that of vehicle (dH₂O) but comparable with CoQ10 (16%). In addition, 50 µg/ml P3G increased the pharyngeal pumping rate of *C. elegans* by 8.3%, which is an indicator of healthspan improvement. When compared with dH₂O under ultraviolet (UVA), heat (30 °C), and H₂O₂ (100 µM) stressors, P3G continued to increase the lifespan of *C. elegans* by 23%, 25%, and 47%, respectively; which CoQ10 was not able to achieve except under H₂O₂ stress. Meanwhile, egg-laying ability—which is another indicator of healthspan—did not improve with either P3G or CoQ10. Taken together, P3G enhanced the lifespan and healthspan of *C. elegans* in the presence of UV, heat, and oxidative stresses, with mechanisms possibly diverging from its antioxidant activity that warrant further investigation.

Full text link <https://tinyurl.com/fatspyus>

Article title: *Solanum melongena* (Eggplant) Crude Anthocyanin Extract and Delphinidin-3-glucoside protects *Caenorhabditis elegans* against *Staphylococcus aureus* and *Klebsiella pneumoniae*

Authors: John Sylvester Nas

Publication title: Philippine Journal of Health 23(4):17:24, 2020

Abstract:

Background and Objective: During infection, ROS signaling is activated to protect the cells from invading microorganisms. However, high level of ROS may also damage the host tissue. The anthocyanin delphinidin is known to have a strong antioxidant activity which protects cells from oxidative damage. We explored the potential of crude anthocyanin extract from the fruit of *Solanum melongena* (Eggplant) and Delphinidin-3- glucoside in enhancing the innate immunity in *Caenorhabditis elegans* against *Staphylococcus aureus* and *Klebsiella pneumoniae*. **Methodology:** We used *Caenorhabditis elegans* to study innate immune response because it lacks adaptive immunity. First, we determined the sublethal concentration of *S. melongena* crude anthocyanin extract (SMCAE) and Delphinidin-3-glucoside (D3G) in *C. elegans*. We used the sublethal concentration of SMCAE and D3G to supplement the nematodes during its exposure to *S. aureus* and *K. pneumoniae*. We then observed its survival rate until day five post-L4. We also tested SMCAE and D3G for probable antimicrobial activity against *Staphylococcus aureus* and *Klebsiella pneumoniae*. **Results and Conclusion:** We found out that both SMCAE and D3G showed no inhibitory effect on the growth of the bacteria. However, both SMCAE and D3G enhanced the survival of the nematode when exposed to *S.aureus* and *K. pneumoniae*. Overall, we speculate that the anthocyanin delphinidin in *S. melongena* crude extract protected the *C. elegans* against *S. aureus* and *K. pneumoniae* infection through its antioxidant activity.

Full text link <https://tinyurl.com/2476nvn6>.

Article title: Evaluation of anticancer potential of *Eleusine indica* methanolic leaf extract through Ras- and Wnt-related pathways using transgenic *Caenorhabditis elegans* strains

Authors: Nas, John; Dangeros, Sheryl; Chen, Princess; Dimapilis, Rosemarie; Gonzales, Daniel; Hamja, Fatima; Ramos, Cathdrin; Villanueva, Ashera

Publication title: Journal of Pharmaceutical Negative Results 11(1):42, January 2020

Abstract:

Background: In the Philippines, many accounts have resurfaced claiming different herbal and therapeutic advantages of *Eleusine indica*. One of these advantages is its anticancer potential. Despite some studies showing that the crude extract has cytotoxic and radical scavenging activity, it is still insufficient and further scientific evidence is needed to support this claim. **Aim:** Hence, we evaluate the anticancer potential of *E. indic* a methanolic leaf extract (EMLE) by focusing on two cancer-related pathways, Ras and Wnt pathways. **Subjects and Methods:** We used wild-type and transgenic *Caenorhabditis elegans* strains which have an irregular Ras or Wnt signaling. We determined the average number of eggs laid of each strain and the multivulva development of the Ras-mutant strain. **Results:** Our experiments show that EMLE does not affect the number of eggs laid of the wild-type, Ras-mutant-and Wnt-mutant worms. Furthermore, EMLE was not able to reduce Ras-mutant population demonstrating multi-vulva. **Conclusion:** Taken together, our data suggest that the anticancer potential of EMLE may be independent of Ras and Wnt signaling pathways.

Full text available upon request to the author/s.

Article title: Exploring the binding affinity and non-covalent interactions of anthocyanins with aging-related enzymes through molecular docking

Authors: John Sylvester B. Nas

Publication title: Philippine Journal of Health 24(3):1-11, 2020

Abstract:

Background and Objective: Anthocyanins are associated with aging and longevity. However, the mechanism involving the pure anthocyanin compounds in aging remains elusive. To investigate the possible mechanism of action of the different anthocyanin compounds towards aging-associated enzymes, the lead-likeness, binding affinity, and binding interactions were evaluated. Methodology: The different anthocyanin compounds such as cyanidin, delphinidin, malvidin, pelargonidin, peonidin, and petunidin were assessed for lead-likeness following the criteria of Lipinski's rule of five (Ro5). These same compounds were virtually docked to different aging-related enzymes involved in MAPK, AMPK, and insulin signaling pathways. The top binding anthocyanins for each enzyme were visualized and compared to the enzyme inhibitors. Results: The different anthocyanin compounds abide with Ro5 denoting its potential as a lead compound. For each enzyme, there were different top-binding anthocyanins. The crystal structures of the docked anthocyanins reveal that there were different substructures involved during the non-covalent interaction. Some substructures, particularly the hydroxy groups, have different roles during the H-bond formation. These findings suggest that the various anthocyanin compounds may have a distinct mechanism of action towards a specific enzyme. Conclusion: Taken together, these results suggest that the anthocyanin compounds may have varying effects in aging enzymes, which may be due to the differences in their substructures. Nonetheless, further investigations are needed to understand these findings using cells and animal models.

Full text link <https://tinyurl.com/43wxura4>

Article title: Delphinidin Protects Caenorhabditis Elegans Against Bacterial Infections

Authors: John Sylvester Nas

Publication title: Science International (Lahore) 32(6): 699-703, 2020

Abstract:

Delphinidin-3-glucoside (D3G) is a pigment widely represented in various fruits and vegetables. Being an anthocyanin compound, D3G offers an antioxidant property which could influence oxidative damage. In this paper, the researchers are interested in pathogen-associated oxidative damage. Hence, this paper investigates the protective property of D3G on Caenorhabditis elegans (C. elegans) against different pathogens such as Staphylococcus aureus (S. aureus), Enterococcus faecalis (E. faecalis), Klebsiella pneumonia (K. pneumonia), and Proteus mirabilis (P. mirabilis). The C. elegans were nourished with varying concentrations of D3G and were infected with different pathogens. The lifespan of the nematode was observed in these other conditions. Results show a significant increase ($p \leq 0.05$) in the lifespan of C. elegans when exposed to S. aureus, E. faecalis, K. pneumonia, and P. mirabilis. However, the efficiency of D3G against the different pathogens differ. Taken together, the researchers speculate *Full text link <https://tinyurl.com/yck6su4y>*

**DR. LEILA OMBAT***Biology***Sex:** Female**Education:**

Doctor of Philosophy in Biology, Mindanao State University-Iligan Institute of Technology, 2016
Master of Science in Biology, Mindanao State University-Iligan Institute of Technology, 2000
Bachelor of Science in Biology, Mindanao State University - Marawi, 1988

Field of Specialization:

Microbial Culture
Inoculation
Phytochemical Analysis
CAM Assay
Vermicomposting
Biofertilizers
Microbial Isolation

Researches:

Article title: Neonauclea formicaria (Rubiaceae) Leaf Extract Inhibits Vascularization in the Chorioallantoic Membrane of Duck Embryos

Authors: Jonathan Vergaraa, Meljan Demetillob, Leila Ombatc and Jashin Rosal

Publication title: International Letters of Natural Sciences 83:22-31, July 2021

Abstract:

Plants are reservoirs of bioactive compounds with the potential for pharmaceutical use. In this study, the secondary metabolites of Neonauclea formicaria leaf crude ethanolic extract were determined using phytochemical screening. The plant's leaf extract was then used to test its angiogenesis activity using the chorioallantoic membrane (CAM) assay. Four concentrations of the extract were prepared—0.1 mg/L, 1.0 mg/L, 10.0 mg/L, and 100.0 mg/L and were topically applied on the CAM. Phytochemical screening revealed that N. formicaria leaves contain heavy amounts of flavonoids and tannins, while alkaloids, saponins, and steroids were present in trace amounts. The crude ethanolic extract was anti-angiogenic, as indicated by the significant decrease of vascular density at higher concentrations ($P < 0.05$). The 100 mg/L extract

concentration showed the highest vascular inhibition (50.93%) among the other concentrations, suggesting its angiopreventive potential ($P < 0.05$). Further investigation on the embryo's gross morphometry revealed no significant effects in the weight, crown-rump length, head-beak length, forelimb length, and hind limb length. Also, these indices were not associated with the angiogenesis activity on the CAM. Further studies exploring the specific metabolites of the different plant parts of *N. formicaria* and the plant's angiopreventive potential are recommended.

Full text link <https://tinyurl.com/wx2d59vd>

Article title: Ethnozoological study of traditional medicinal animals and their products used by the Manobo Umayamnon tribe in the Southern Philippines

Authors: Elizabeth D. Gomez, Eve F. Gamalinda, Archie A. Along, Leila A. Ombat, and Florence Jhun F. Almadin

Publication title: Journal of Ecosystems Sciences and Eco-Governance (JESEG) 3(1), 2021

Abstract:

This study documented the species of animals used by the Manobo Umayamnon tribe in Loreto, Agusan del Sur, Philippines. The animal parts for medicinal purposes and the treatment process of the ethnomedicinal species were surveyed. The most commonly used animals were determined using Fidelity Level (FL) and Informant Consensus Factor (ICF). The Relative Frequency of Citation (RFC) that indicated each species' local importance was also determined. A total of 100 respondents from six barangays were interviewed regarding the utilization of animals for medicinal purposes. Manobo Umayamnon listed a total of 11 species of medicinal animals that belong to 11 families. Python snake bile was the most commonly used animal organ, decoction was the most widely used preparation method, and drinking was the most frequent way of administering medicine. Based on RFC values, the family Pythonidae (Baksan) accounted for 94.59% of the animals. The findings provide a detailed inventory of valuable medicinal animals utilized by the Manobo Umayamnon tribe and serve as a physical record of their culture.

Full text link <https://tinyurl.com/53fk4txb>

Article title: Geometric morphometrics of leaf blade shape in water hyacinth (*Eichhornia crassipes*: Pontederiaceae) population from Lake Mainit, Philippines

Authors: C.C. Cabuga, Jr, I.C.B. Delabahan, J.I.C. Dedel, M.A. Ayaton, L.A. Ombat, M.L.M. Budlayan

Publication title: Computational Ecology and Software 8(2):46-56, 2018

Abstract:

This study was carried out in order to investigate the leaf blade shape variation in the populations of water hyacinth (*Eichhornia crassipes*) from Lake Mainit, Philippines using geometric morphometric analysis. A total of 120 leaf individuals were randomly collected in the four Barangays (Bunga, San Pablo, Dinarawan and San Roque) of which each area consists of 30 samples. To identify morphological variations in the leaf blade shape of water hyacinth, digital imaging was prepared and the acquired images were loaded into tpsDig2 program. Using thin-plate spline (TPS) series, landmark analysis was completed and subjected to symmetry and

asymmetry in geometric data (SAGE) software. Results in Procrustes ANOVA showed high significant differences ($P < 0.0001$) in the two factors analyzed: the sides and the individuals by sides which denoting high fluctuating asymmetry. This could be inferred that asymmetric variability might be associated to the outcomes of fluctuating asymmetry that have been derived from genetic and non-genetic influences. Moreover, differences of leaf blade shape have been observed from the collected leaf samples and among the study areas. Thus, using geometric morphometric analysis enables to identify morphological variations within and among species of the same taxa.

Full text link <https://tinyurl.com/3ah725h7>

Article title: Antibacterial and antifungal assays of the stem extracts of two Philippine lianas, *Bauhinia integrifolia* Roxb. and *Strongylodon paucinervis* Merr.

Authors: Leila A. Allado-Ombat and Franco G. Teves

Publication title: ELBA Bioflux 7(2), 2015

Abstract:

Bauhinia integrifolia Roxb. and *Strongylodon paucinervis* Merr. stem decoctions are used by Manobo tribe in Butuan City, Philippines to treat relapse. The fresh latex of *S. paucinervis* is applied to wounds and its decoction is also used to cure dysentery and diarrhea. This study aimed to assess the antibacterial and antifungal potentials of the stem extracts of these liana species against selected test microorganisms. The aqueous and acetone extracts of the stems were prepared and applied to two Gram positive bacteria (*Bacillus cereus* and *Staphylococcus aureus*), two Gram negative bacteria (*Escherichia coli* and *Klebsiella pneumonia*) and two fungi (*Aspergillus niger* and *Saccharomyces cerevisiae*) using disc diffusion method. Among the test organisms, only the Gram positive bacteria were sensitive to the extracts, with the diameter of zone of inhibition ranging from 10.08 ± 0.30 mm to 20.67 ± 0.88 mm. The minimal bactericidal concentration (MBC) of the acetone extracts ranged from 6.25 to 50 mg mL⁻¹, while the aqueous extracts ranged from 25 to 100 mg mL⁻¹. These results suggest that the tribes can continue using these plants as ethnomedicine to prevent wound infection and treat diarrhea, and new antibacterial agents can be discovered to control pathogenic bacteria under study.

Full text link <https://tinyurl.com/28nydac2>

Article title: Species distribution and abundance of amphibians in two vegetation types of Agusan Marsh, Philippines

Authors: Rainer P. Sularte, Lilia Z. Boyles, Nilo H. Calomot, Meljan T. Demetillo, Leila A. Ombat, Me C. M. Ngilangil, Gee M. Binag

Publication title: AES Bioflux 7(1): 2015

Abstract:

Agusan Marsh is the 1009 th RAMSAR site, a wildlife sanctuary which harbour unique and pristine faunal species. It is considered one of the most ecologically significant wetland ecosystems in the Philippines. The study assessed species distribution and abundance using Geographic Information System Map in Agusan Marsh between Sago Palm and Terminalia Forest. Results showed a total of 322 individuals, 11 species and 6 families of amphibians

documented. Of the 11 species of amphibians documented in Sago Palm and Terminalia Forest, 6 were Philippine endemics, 3 were invasive species in the area. Terminalia forest had the highest number of individuals documented during the conduct of the study. Sago Palm and Terminalia Forest have almost the same type of vegetation where amphibian species thrive most. Furthermore, ecological and environmental threats (conversion of Terminalia Forest to agricultural land, runoff of environmental pollutants, pesticides runoff and Kaingin or Slash and Burns) being identified in the two habitat types should be given urgent attention. This shows that Agusan Marsh particularly Sago Palm and Terminalia Forest still harbour unique features of endemic amphibian species despite of the ongoing anthropogenic activities in the said areas.

Full text link <https://tinyurl.com/5n7nmssz>

Article title: Anti-angiogenic and non-cytotoxic potentials of aqueous and acetone extracts of the stem of Philippine Bauhinia integrifolia Roxb

Authors: Leila A. Allado-Ombat and Franco G. Teves

Publication title: International Journal of Biosciences 7(5):184-191, 2015

Abstract:

The decoction of Bauhinia integrifolia stem is recommended by Manobo tribe herbalists to treat relapse that are experienced by most mothers after child birth while some used it as abortifacient and birth control. To test its anti-angiogenic and cytotoxic potentials, the bioactive compounds in the stem of B. integrifolia were extracted using 70% acetone and water through decoction. The anti-angiogenic activity of the extracts was assessed using duck chorion-allatoic membrane. The result of the assay showed that both acetone and aqueous extracts exhibited dose dependent anti-angiogenic activity. As the extracts' concentration increased from 10 mg ml⁻¹ to 1000 mg ml⁻¹, the formation of new blood vessels decreased. However, acetonc extracts showed significantly more lower blood vessel formation compared to the decoction. The evaluation of the cytotoxic activity of the stem extracts employing brine shrimp lethality assay, showed that both extracts are non-cytotoxic since the acetonc extract has LC₅₀ of 9,444 µg ml⁻¹ and the nauplii survived in all concentrations of aqueous extract. With the above results, it is concluded that the extract of B. Integrifolia is non-cytotoxic anti-angiogenic agent. The isolation and further test of the active component possessed by this plant are recommended.

Full text link <https://tinyurl.com/mr2uym6t>

**DR. LARRY PADILLA***Biology***Sex:** Male**Education:**

Doctor of Philosophy in Biology, De La Salle University, 2018

Master of Science in Marine Biology, University of the Philippines, 2008

Bachelor of Science in Biology, Pamantasan ng Lungsod ng Maynila, 2004

Field of Specialization:

Marine Ecology

Phytoplankton

Phytoplankton Ecology

Eutrophication

Water Quality

Aquatic Ecology

Marine Environment

Marine Biodiversity

Ecosystem Ecology

Plankton Ecology

Researches:**Article title:** Exploring the potential of clay in mitigating *Pyrodinium bahamense* var. compressum and other harmful algal species in the Philippines**Authors:** Larry V. Padilla, Maria Lourdes San Diego-McGlone & Rhodora V. Azanza**Publication title:** Journal of Applied Phycology 22(6):761-768, 2010**Abstract:**

Harmful algal bloom occurrences worldwide have prompted the testing and use of methods to control and mitigate their detrimental effects. This study investigates the potential of Philippine clay minerals to physically remove phytoplankton cells under laboratory conditions. Ball clay had the highest removal efficiency (~95%) for *Pyrodinium bahamense* (paralytic shellfish poisoning causative organism) cells. A slight decrease in the efficiency by 10–20% was seen when culture

volume was increased from 50 mL to 1 L. Removal efficiency was reduced to ~95% when water motion was introduced. Removal of other phytoplankton species (*Gymnodinium sanguineum*, *Amphidinium carterae*, *Pyrophacus horologium*, *Chatonella marina*, and *Alexandrium* sp.) using ball clay was less efficient (<70%). Cell removal efficiencies differed with phytoplankton species belonging to the same taxonomic group. Possible mechanisms for cell removal are described.

Full text available upon request to the author/s.

Article title: Immune response of tilapia (*Oreochromis niloticus*) after vaccination with autoclave-killed, heat-killed, and formalin-killed whole cell *Aeromonas hydrophila* vaccines as possible serotype-independent vaccines

Authors: Ivan Daryl C. Bactol, Larry V. Padilla and Allan L. Hilario

Publication title: International Journal of Agriculture and Biology 20(4):846-850, 2018

Abstract:

Nile tilapia, *Oreochromis niloticus*, is the most commonly produced and consumed fish in the Philippines. This fish is highly susceptible to *Aeromonas hydrophila* infection brought about by wastewater contamination. Since antibiotics are not routinely recommended in aqua farming, vaccination is the alternative way in preventing such bacterial infection. This study aimed to evaluate the immune response of Nile tilapia after vaccination with autoclave-killed, heat-killed and formalin-killed whole cells vaccine derived from *Aeromonas hydrophila* as possible serotype-independent vaccines. One hundred twenty Nile tilapia were randomly distributed into four tanks with corresponding treatments: normal saline solution (NSS), autoclave-killed vaccine (AKV), heat-killed vaccine (HKV), and formalin-killed vaccine (FKV) and were subjected to blood extraction 2 weeks after acclimatization and 2 weeks after vaccination. Immune response was evaluated using agglutination test. On post-vaccination, AKV had the highest mean antibody titer ($p < 0.05$). Pre-vaccination antibody level was significantly different to the post-vaccination antibody levels in AKV, HKV, and FKV ($p < 0.05$). This study showed that autoclave-killed, heat-killed, and formalin-killed whole cell *Aeromonas hydrophila* vaccines are possible serotype-independent whole cell vaccines that produced significant immune response in Nile tilapia.

Full text link <https://tinyurl.com/2tmrkfzj>

Article title: Preliminary Results On The Use Of Clay To Control Pyrodinium Bloom - A Mitigation Strategy

Authors: Larry V. Padilla, Maria Lourdes San Diego-McGlone, Rhodora V. Azanza

Publication title: Science Diliman 18(1):35-42, 2006

Abstract:

The frequent and expanded occurrence of *Pyrodinium bahamense* var *compressum* blooms in the Philippines since 1983 has prompted the need to find mechanisms to control the harmful effects of these toxic dinoflagellates. A promising method now being explored is the use of powdered clay minerals which when added to the growth media is capable of flocculating with the algal cells. In this study, the efficiency of ball clay, brown bentonite, and Malampaya Sound sediments to remove *Pyrodinium* cells in seawater was tested. The addition of 1 g/L of

suspended ball clay to 50 mL of cultured Pyrodictum cells ($\sim 1.037 \times 10^6$ cells/L) removed 99.56% of the algal cells after 2.5 hours. Prolonging the exposure time to 5 and 24 hours showed no significant increase in flocculation. Brown bentonite and Malampaya Sound sediments showed low to moderate removal efficiency not exceeding 70% and 50%, respectively. The effect of ball clay addition on seawater chemistry showed no change in ammonia concentration but nitrate decreased after 5 and 24 hours of clay addition. Results for nitrite and phosphate were however more variable.

Full text link <https://tinyurl.com/yzt2rjmw>

Article title: Effects Of Chronodisruption On The Locomotor Activity Of Zebrafish (Danio Rerio) Larvae

Authors: Larry V. Padilla, Divine Joy A. Mauhay, Fe Corazon A. Jacinto, Eileen Z. Vitug

Publication title: International Journal of Scientific & Technology Research 9(3):7255-7259, 2020

Abstract:

Zebrafish (Danio rerio) has been used as a vertebrate model organism for various biological assays and scientific studies. It has been reared and bred because of its importance to science and the aquarium industry. Rearing and breeding conditions varies depending on the operational procedures implemented by each rearing facility. Some of the disruptive factors affecting their growth, development, and behavior in these facilities are water quality, light, temperature and feeding cycles. There may be facilities that operate beyond the reported optimal light/dark cycle of 14L/10D for zebrafishes, hence affecting their physiology including their locomotor activity. In this study, the effects of disruption of light and dark cycles on the locomotor activity of zebrafish larvae were investigated. The zebrafish larvae were exposed after acclimation to optimal light cycle (from 1dpf to 5dpf) to different hemeral light and dark cycles (from 6 to 7 dpf): 1L/23D, 7L/17D, 14L/10D, 17L/7D, and 23L/1D. Results show that higher zebrafish larvae locomotor activity in terms of swimming bouts and swimming indices were obtained for those placed under shorter light cycles or longer dark periods. Zebrafish exposed to longer dark periods probably exhibited quiescent to low locomotor activity during dark phases, which enabled them to conserve energy for eventual use at the onset of light cycle. Higher swimming bouts were recorded for those exposed at 1L/23D and 7L/17D set ups than those placed under 17L/7D and 23L/1D set ups. No definitive trends were seen for swimming velocity and routine turns although variations in the activities were recorded among the different treatments. Statistical results showed that light disruption may affect locomotor activity in terms of routine turns and swimming velocity as early as 24 hours after changing the light and dark cycles. The disruptive effect was statistically significant for swimming bouts at 8 dpf. It is possible that prolonged exposure of these zebrafishes to disruption in light and dark cycles could aggravate the effects, not just to swimming bouts and index, but also for other physiological responses. The experiment only ran until 8 dpf, however, the influence of light as a zeitgeber had already been manifested.

Full text link <https://tinyurl.com/5n92aecp>

Article title: Critical evaluation of the hydrological, biological and sociological impacts of the implementation of flood control check dams in the Upper Marikina River Basin Protected Landscape, Philippines

Authors: Rej Winlove M. Bungabong, Wade L. Hadwen, Larry V. Padilla

Publication title: International Journal of River Basin Management 2021

Abstract:

Check dams, installed to control sediment and flood risk along streams, can significantly influence the hydrology and ecology of aquatic ecosystems. Few studies assessing its impacts have been done in some countries, however, such has not been the case in the Philippines. Implementation of check dam projects in the Philippines has not been paired with monitoring and evaluation strategies to determine their success or impacts in relation to their objective to manage sediment and flow. This study focused on assessing check dams impacts on hydrology, biology, and stakeholders reflection on check dam purpose and success in Upper Marikina River Basin Protected Landscape (UMRBPL), Philippines. To explore the balance in socioeconomic and ecological sustainability of check dam installation, interviews with stakeholders revealed a wide range of perceptions around the project's success and potential impacts. The findings revealed a clear need for the enhancement of the enabling environment (i.e. data baselining and implementation of management strategies) and institutional arrangements (i.e. coordinated management action). There is also an urgent need for the development of management instruments (i.e. monitoring and evaluation programme and communication and awareness strategy) to improve stakeholders' understanding of the project's objectives and outcomes and to improve sustainable management throughout UMRBPL.

Full text available upon request to the author/s.

Article title: Endozoochory and Germination of Selected Ingested Seeds by Malayan Box Turtles (*Cuora amboinensis*) from Laguna Province, Philippines

Authors: Kliff Eldry G. Ibañez and Larry V. Padilla

Publication title: Journal of Advances in Biology & Biotechnology 24(3):19-27, 2021

Abstract:

Aims: Malayan box turtles' (*Cuora amboinensis*) ecological niche are essential in an ecosystem but are often overlooked. This study investigated the germination of selected seeds that passed through the gut of Malayan box turtles to determine its role in promoting seed dispersal and aiding seed germination. **Study Design:** Experimental approach. **Place and Duration of Study:** Pamantasan ng Lungsod ng Maynila (University of the City of Manila) and Dasmarinas, Cavite between June 2016 to March 2017. **Methodology:** The seeds that passed through the turtle's gut (Gut Passed Seeds) and seeds that did not pass through its gut (Mechanically Extracted Seeds) underwent comparative germination test. The Germination Rate (GR) and Percent Germination (%GR) of each group were determined in the study. Seed shadowing was also conducted to evaluate the turtle's seed dispersal capacity (endozoochory). **Results:** Results showed that after gut passage, seed GR and %GR were enhanced on *Lycopersicon esculentum*, *Carica papaya*, *Psidium guajava*, and *Muntingia calabura*. However, Germination Rate and Percent Germination of *Passiflora quadrangularis* decreased after gut passage. Statistical

analyses revealed that there is a significant difference in the GR and %G of *M. calabura* and %G of *L. esculentum*, and *P. quadrangularis*. Thread trailing method showed that *C. amboinensis* can disperse seeds at a distance of 24.8 to 52.8 meters. Conclusion: This study demonstrates the important role of *C. amboinensis* in the ecosystem through its contribution to plant seed germination and dispersal. It showed that Malayan box turtles are not only seed dispersal agents but are also important in the germination of seeds that they have ingested and defecated.

Full text link <https://tinyurl.com/26a9psfr>

Article title: Morphological Variation In Pollen Grains Of Philippine Hibiscus Rosa-Sinensis Hybrids

Authors: Divine Joy A. Mauhay, Larry V. Padilla, Fe Corazon A. Jacinto, Eileen Z. Vitug

Publication title: International Journal of Scientific & Technology Research 9(3):10-15, 2020

Abstract:

Hybridization of both plants and animals has innumerably benefitted man. An example of which is the numerous hybrids of *Hibiscus rosa-sinensis* which are primarily used for aesthetic purposes because of their colourful flowers. Phenotypic variations can already be observed in various parts of *H. rosa-sinensis* because of hybridization; hence, it is likely that modifications are occurring on microscopic structures such as the pollen. Through time, such variations could change the frequencies of alleles in the gene pool and could possibly lead to microevolution of the species. This study focused on the determination of variations in pollen grain morphology of ten (10) selected *H. rosa-sinensis* hybrids from the Institute of Plant Breeding of the University of the Philippines-Los Banos, specifically in terms of pollen aperture, size, shape, length of spine and sculpturing. The pollen shape, type of aperture and sculpturing were determined qualitatively. One-way ANOVA was employed if there is significant difference among the pollen of the hybrids in terms of the said quantitative characters. Pollen shape variation was determined through Elliptic Fourier Coefficient Analysis. Results showed that all hybrids have pantoporate type of aperture, echinate type of sculpturing, and spheroidal shape. Among the characters observed, variation was noted in their pollen size and spine length. Pollen size ranges from large to very large and long to very long spine length. Majority of the hybrids observed (7 out of 10) have very large pollen size and long pollen spines. One (1) hybrid has very large pollen size and short spines while two (2) have large pollen size and short pollen spines. There was also significant difference among the samples in terms of these characters based on statistical analysis. The hybrids with variations (Claire Baltazar x Cely Hermosa, Diamond Star and Vicky) cannot be considered outgroups on the basis of the said quantitative characters alone. Nevertheless, such variations observed should not be discounted as a possible modification in pollen morphology in progress as a result of hybridization.

Full text link <https://tinyurl.com/mr2etetz7>

Article title: Anti-Quorum Sensing Activity of *Tetracera scandens* and *Aleurites moluccana* Leaf Extracts against *Chromobacterium violaceum*

Authors: John Paul Matthew D. Guzman and Larry V. Padilla

Publication title: Microbiology Research Journal International 22(1):1-10, January 2017

Abstract:

No abstract

Full text link <https://tinyurl.com/2758hnaz>

**KATHLEEN PORNOBI***Parasitology***Sex:** Female**Education:**

Master of Science in Zoology, Southern Luzon State University, 2026

Field of Specialization:

Animal Parasitology

Zoonotic Diseases

Molecular Parasitology

Researches:**Article title:** Prevalence and Host Specificity of Bat Flies (Streblidae) from Selected Caves in Unisan, Quezon, Philippines**Authors:** Maria Camila N. Obdianela · Ma. Patricia Venice V. Guanlao · Essex Vladimer E. Samaniego · Kathleen O. Pornobi**Publication title:** Acta Parasitologica 66:983–988, 2021**Abstract:**

Purpose Bats belong to different guilds and thus differ in the environmental resources that they exploit. They also evolved to have a very rich diversity of roosting and feeding habits. Therefore, it enables them to harbor different species of parasites that could be zoonotic and may pose public health importance. T on balls. Results Eight bat species belonging to four families, namely Hipposideridae, Vespertilionidae, Rhinolophidae, and Pteropodidae, were recovered from the study. Results showed that 130 out of 202 (64.36%) bats were infested with streblids with an overall mean intensity of 1 ectoparasite/bat. Out of four streblid species, *Brachytarsina wernerii*, *Brachytarsina amboinensis*, and *Raymondia pseudopagodarum* were classified as stenoxenous. High specificity index was recorded for *R. pseudopagodarum* (STD = 3) and low specificity index for *Brachytarsina* species. Conclusion These results can be used by the local government in providing necessary actions that may lead to public awareness as these bats may also play a role in the transmission of zoonotic parasites in the area.

Full text link <https://tinyurl.com/4uu38vr3>.

Article title: Prevalence of *Angiostrongylus cantonensis* among different species of snails in the village of Bagong Sikat Muñoz, Nueva Ecija, Philippines and its associated risk factors for zoonotic transmission

Authors: Jerico R. Cawas, Christine Joy T. Quisao, Diane Shiela C. Castillo, Kathleen O. Pornob

Publication title: Journal of Parasitic Diseases 44(6 Supplement 2), 2020

Abstract:

Snails are good source of protein and one of the delicacies in majority of the areas in the Philippines. However, they may act as an intermediate host for several parasites such as *Angiostrongylus cantonensis*. This parasite is commonly found in South East Asia especially in agricultural countries like the Philippines. Hence, the present study aims to determine the prevalence of *A. cantonensis* in their intermediate host in Village Bagong Sikat, which is situated at the rice granary of the Philippines. A total of 947 snails were randomly collected within 50 m × 50 m transect line through handpicked method. The third larvae (L3) stage from the snails was recovered through artificial tissue digestion. Results showed that 173 out of 947 snails (18.27%) were found positive with *A. cantonensis* L3 larvae. Three species of snails were recovered having *Melanoides tuberculata* to have the highest prevalence of *A. cantonensis* (21.54%) followed by *Pomacea canaliculata* (17.75%) and *Vivipara angularis* (17.74%). Statistical analysis further showed that prevalence of *A. cantonensis* and the length of snails has no significant difference ($p > 0.05$). The species of snails collected and found infected in the present study are considered part of the delicacies of the locals in Nueva Ecija. Thus, these results highlight the need to raise awareness of the locals regarding the zoonotic potential of *A. cantonensis*, which are of public health importance.

Full text link <https://tinyurl.com/zdzc6ku2>

Article title: Detection of Potentially Zoonotic *Cryptosporidium* and *Giardia* among Livestock in Sariaya, Quezon, Philippines

Authors: Arianne Lleva Afable, Kim Joshua De Belen Coquilla, Zosimo Galang Battad II and Kathleen Ordoñez Pornobi

Publication title: Pertanika Journal of Tropical Agricultural Science 42(2):557-568, 2019

Abstract:

Livestock plays a great role in the economic development of smallholder farmers. However, the population of livestock has been affected by diseases such as cryptosporidiosis and giardiasis. Sariaya has a large production of livestock that is being distributed in Quezon Province. Thus, the current study aimed to identify the presence of *Cryptosporidium* sp. and *Giardia* sp. in livestock in selected farms of Sariaya, Quezon. Risk factors were also assessed in the present study. A total of 103 collected faecal samples from livestock were subjected to microscopic and molecular detection. Faecal samples were processed through Formalin-Ether Concentration Technique (FECT) and Polymerase Chain Reaction. Microscopy results revealed that 14 out of 103 (13.59%) samples were positive for *Giardia* with meant intensity of 13 cysts per gram (cpg) of faeces, while molecular detection confirmed that 13 out of 103 (12.62%) had amplified for the target gene of *Giardia*, *tpi*, with expected band size of 530 bp. Sequenced samples of *G.*

intestinalis were characterised as assemblages A, B and E. Moreover, pigs showed the highest prevalence (15.91%), while cattle had the highest mean intensity (14 cpg) for Giardia. Cryptosporidium were absent in all the samples. Statistical analysis of the risk factors such as diet, feeding floor, habit, presence of illness and faecal consistency of the animals revealed no significant association ($p>0.05$) in the presence of Giardia. This study revealed the presence of zoonotic Giardia species in the 558 Pertanika J. Trop. Agric. Sc. 42 (2): 557-568 (2019) area; however, future investigation in other possible risk factors such as the season and age is still recommended.

Full text link <https://tinyurl.com/pdhea62y>

Article title: Parasite Contamination of Freshly Harvested Vegetables from Selected Organic and Conventional Farms in The Philippines

Authors: Kathleen N. Ordoñez, Yvonne Ai-Lian Lim, Xiang Ting Goh and Vachel Gay V. Paller

Publication title: Pertanika Journal of Tropical Agricultural Science 41(4):1741-1756, 2018

Abstract:

Vegetables are considered as an important part of a healthy diet. However, there have been reports showing contamination of vegetables with parasites. This study aimed to assess parasite contamination of freshly harvested vegetables from selected organic and conventional farms in the Philippines. A total of 252 freshly harvested vegetables were collected from 20 farms through systematic random sampling and were processed by means of sedimentation technique. Positive samples were subjected to molecular analysis for further identification of species. Results showed that 58 out of 252 (23.02%) vegetable samples were contaminated with parasites eggs/cysts/oocysts. The parasites found were Ancylostoma ceylanicum, Toxocara sp., Trichuris trichiura, Ascaris suum, Hymenolepis sp., unknown trematode egg, Isospora, Balantidium, Giardia intestinalis and Cryptosporidium. Ascaris suum had the highest contamination rate in organic and conventional farms at 13.09% and 8.33%, respectively. Cryptosporidium (≥ 800 oocysts/kg) and Giardia intestinalis (≥ 240 cysts/kg) had the highest mean density in both farms. Also, lettuce showed the highest contamination rate among the sampled vegetables in both types of farms. Furthermore, results revealed that texture of vegetables, distance to the soil substrate, and farming practices could possibly contribute to the parasite contamination of vegetables in this study. These findings have important implications on public health that may aid regulatory agencies for prevention and control strategies for food safety.

Full text link <https://tinyurl.com/4a3cjbhd>

**DR. MARK CHRISTIAN REDILLAS***Biology***Sex:** Male**Education:**

Doctor of Philosophy in Biological Science, Myongi University, South Korea

Master of Science in Environmental Engineering and Biotechnology, Myongi University, South Korea

Bachelor of Science in Biology major in Microbiology, University of the Philippines Los Baños

Field of Specialization:

Plant Biology

Plant Genetics

Plant Physiology

Plant Molecular Biology

Plant Biotechnology

Genetics

Cloning

Genomics

Gene Regulation

Molecular Biology

Researches:

Article title: The overexpression of OsNAC9 alters the root architecture of rice plants enhancing drought resistance and grain yield under field conditions

Authors: Mark C.F.R. Redillas, Jin S.Jeong, Youn S. Kim, Harin Jung, Seung W. Bang, Yang D.Choi, Sun-Hwa Ha, Christophe Reuzeau and Ju-Kon Kim

Publication title: Plant Biotechnology Journal 10(7):792-805, May 2012

Abstract:

Drought conditions limit agricultural production by preventing crops from reaching their genetically predetermined maximum yields. Here, we present the results of field evaluations of rice overexpressing OsNAC9, a member of the rice NAC domain family. Root-specific (RCc3)

and constitutive (GOS2) promoters were used to overexpress OsNAC9 and produced the transgenic RCc3:OsNAC9 and GOS2:OsNAC9 plants. Field evaluations over two cultivating seasons showed that grain yields of the RCc3:OsNAC9 and the GOS2:OsNAC9 plants were increased by 13%-18% and 13%-32% under normal conditions, respectively. Under drought conditions, RCc3:OsNAC9 plants showed an increased grain yield of 28%-72%, whilst the GOS2:OsNAC9 plants remained unchanged. Both transgenic lines exhibited altered root architecture involving an enlarged stele and aerenchyma. The aerenchyma of RCc3:OsNAC9 roots was enlarged to a greater extent than those of GOS2:OsNAC9 and non-transgenic (NT) roots, suggesting the importance of this phenotype for enhanced drought resistance. Microarray experiments identified 40 up-regulated genes by more than threefold ($P < 0.01$) in the roots of both transgenic lines. These included 9-cis-epoxycarotenoid dioxygenase, an ABA biosynthesis gene, calcium-transporting ATPase, a component of the Ca^{2+} signalling pathway involved in cortical cell death and aerenchyma formation, cinnamoyl CoA reductase 1, a gene involved in lignin biosynthesis, and wall-associated kinases, genes involved in cell elongation and morphogenesis. Interestingly, O-methyltransferase, a gene necessary for barrier formation, was specifically up-regulated only in the RCc3:OsNAC9 roots. Such up-regulated genes that are commonly and specifically up-regulated in OsNAC9 transgenic roots may account for the altered root architecture conferring increased drought resistance phenotype.

Full text link <https://tinyurl.com/3ttuash9>

Article title: Accumulation of trehalose increases soluble sugar contents in rice plants conferring tolerance to drought and salt stress

Authors: Mark C. F. R. Redillas, Su-Hyun Park, Jang Wook Lee, Youn Shic Kim, Jin Seo Jeong, Harin Jung, Seung Woon Bang, Tae-Ryong Hahn, Ju-Kon Kim

Publication title: Plant Biotechnology Reports 6(1), 2011

Abstract:

Trehalose is a nonreducing sugar composed of two glucose units linked in an α,α -1,1-glycosidic linkage. Present in a wide variety of organisms, this sugar may serve as a source of energy and carbon and as a protective molecule against abiotic stresses. In this study, trehalose-producing transgenic rice plants (*Oryza sativa*) expressing a bifunctional fusion enzyme TPSP (Ubi1:TPSP) were utilized to dissect the enigmatic role of trehalose in conferring stress tolerance to plants. Grown under normal conditions, the Ubi1:TPSP plants produced high amounts of soluble sugars (glucose, fructose and sucrose), ranging from 1.5- to 3.5-fold over NT controls. In the time course of drought treatment, the transcripts for the drought degradable-marker genes (RbcS, FBPase, and PBZ1) persisted for two more days in Ubi1:TPSP plants before being completely degraded relative to those in NT plants, confirming the tolerance of the transgenic plants to drought. This was further supported by a delayed increase in transcript levels of the stress-inducible genes SalT, Dip1, and Wsi18 during drought stress. Similarly, Ubi1:TPSP plants showed tolerance to salt levels of up to 150 mM NaCl, as evidenced by the seedling growth and the delayed decay in RbcS and delayed increase in SalT transcript levels. The growth of NT plants was found to be slightly affected by exogenous trehalose feeding, whereas Ubi:TPSP plants remained resistant, validating the protective role of internally produced trehalose. These results suggest that the elevated production of trehalose in

rice, through TPSP overexpression, increases the soluble sugar contents and enhances tolerance to both drought and salt stress.

Full text link <https://tinyurl.com/54ajhwm3>

Article title: JIP Analysis on Rice (*Oryza sativa* cv Nipponbare) Grown under Limited Nitrogen Conditions

Authors: Mark Christian Felipe Reveche Redillas, Jin Seo Jeong, Reto Jörg Strasser, Youn Shic Kim, and Ju-Kon Kim

Publication title: Journal of the Korean Society for Applied Biological Chemistry 54(5), 2011

Abstract:

Nitrogen deficiency significantly reduces the CO₂ assimilation capacity of plants and the quantum yield of photosynthesis. Here, we employed the JIP test to determine the effects of nitrogendeficiency on the plant's photosynthetic ability on the basis of chlorophyll fluorescence. Nitrogendeficient and nitrogen-replete rice plants were analyzed for the fluorescence transients of the plant leaves in comparison with the nitrogen-sufficient controls. Results showed that 7 day-replete plants behaved normally while 5, 3, and 1 day-replete plants were significantly affected from nitrogen starvation. More specifically, nitrogen starvation of plants resulted in an inactivation of photosystem II (PS II) reaction centers and a decline in electron transport beyond the reduced plastoquinone (QAA⁻), and a decrease in both the pool size and the reduction of end electron acceptors at the PS I. The affected plants were fully recovered from the deficiency after 7 days of nitrogen repletion, as evidenced by the similar level of fluorescence transients to the positive controls. Thus, our results demonstrated that the movement of electron carriers leading to the reduction of end electron acceptors was affected by nitrogen limitation leading to a more pronounced decrease in the reduction of end electron acceptors. Together with the fact that nitrogen-deficiency limits the CO₂ assimilation of plants, this study indicates that nitrogen metabolism is tightly coupled with photosynthetic ability.

Full text link <https://tinyurl.com/3tkdb3vj>

Article title: The use of JIP test to evaluate drought-tolerance of transgenic rice overexpressing OsNAC10

Authors: Mark C. F. R. Redillas, Reto J. Strasser, Jin Seo Jeong, Youn Shic Kim, Ju-Kon Kim

Publication title: Plant Biotechnology Reports 5(2):169-175, 2011

Abstract:

In this study, the JIP test was exploited to assess drought-tolerance of transgenic rice overexpressing OsNAC10. Two types of promoters, RCc3 (root-specific) and GOS2 (constitutive), were used to drive the transcription factor OsNAC10, a gene involved in diverse functions including stress responses. Three-month-old plants were exposed to drought for 1week and their fluorescence kinetics was evaluated. Our results showed that drought-treated non-transgenic plants (NT) have higher fluorescence intensity at the J phase (2ms) compared to transgenic plants, indicating a decline in electron transport beyond the reduced plastoquinone (QA⁻). As manifested by negative L bands, transgenic plants also showed higher energetic connectivity and stability over NT plants under drought conditions. Also, the pool size of the end

electron acceptor at the photosystem I was reduced more in NT than in transgenic plants under drought conditions. Furthermore, the transgenic plants had higher PI_{total} , a combined parameter that reflects all the driving forces considered in JIP test, than NT plants under drought conditions. In particular, the PI_{total} of the RCc3:OsNAC10 plants was higher than that of NT plants, which was in good agreement with their differences in grain yield. Thus, the JIP test proved to be practical for evaluating drought-tolerance of transgenic plants.

KeywordsChlorophyll a fluorescence–JIP test–Transgenic rice–Drought stress– OsNAC10

Full text link <https://tinyurl.com/yckktj4d>

Article title: Allantoin accumulation through overexpression of ureide permease1 improves rice growth under limited nitrogen conditions

Authors: Mark Christian Felipe R. Redillas, Seung Woon Bang, Dong-Keun Lee, Youn Shic Kim, Harin Jung, Pil Joong Chung, Joo-Won Suh, Ju-Kon Kim

Publication title: Plant Biotechnology Journal 17(7):1289-1301, 2019

Abstract:

In legumes, nitrogen (N) can be stored as ureide allantoin and transported by ureide permease (UPS) from nodules to leaves where it is catabolized to release ammonium and assimilation to amino acids. In non-leguminous plants especially rice, information on its roles in N metabolism is scarce. Here, we show that OsUPS1 is localized in plasma membranes and are highly expressed in vascular tissues of rice. We further evaluated an activation tagging rice overexpressing OsUPS1 (OsUPS1OX) under several N regimes. Under normal field conditions, panicles from OsUPS1OX plants (14 days after flowering (DAF)) showed significant allantoin accumulation. Under hydroponic system at the vegetative stage, plants were exposed to N-starvation and measured the ammonium in roots after resupplying with ammonium sulfate. OsUPS1OX plants displayed higher ammonium uptake in roots compared to wild type (WT). When grown under low-N soil supplemented with different N concentrations, OsUPS1OX exhibited better growth at 50% N showing higher chlorophyll, tiller number and at least 20% increase in shoot and root biomass relative to WT. To further confirm the effects of regulating the expression of OsUPS1, we evaluated whole-body-overexpressing plants driven by the GOS2 promoter (OsUPS1GOS²) as well as silencing plants (OsUPS1RNAⁱ). We found significant accumulation of allantoin in leaves, stems and roots of OsUPS1GOS² while in OsUPS1RNAⁱ allantoin was significantly accumulated in roots. We propose that OsUPS1 is responsible for allantoin partitioning in rice and its overexpression can support plant growth through accumulation of allantoin in sink tissues which can be utilized when N is limiting.

Full text link <https://tinyurl.com/462ypzx7>

Article title: A nitrogen molecular sensing system, comprised of the ALLANTOINASE and UREIDE PERMEASE 1 genes, can be used to monitor N status in rice

Authors: Dong-Keun Lee, Mark C F R Redillas, Harin Jung, Seowon Choi, Youn Shic Kim, Ju-Kon Kim

Publication title: Frontiers in plant science 9:444, 2018

Abstract:

Nitrogen (N) is an essential nutrient for plant growth and development, but its concentration in the soil is often insufficient for optimal crop production. Consequently, improving N utilization in crops is considered as a major target in agricultural biotechnology. However, much remains to be learnt about crop N metabolism for application. In this study, we have developed a molecular sensor system to monitor the N status in rice (*Oryza sativa*). We first examined the role of the ureide, allantoin, which is catabolized into allantoin-derived metabolites and used as an N source under low N conditions. The expression levels of two genes involved in ureide metabolism, ALLANTOINASE (OsALN) and UREIDE PERMEASE 1 (OsUPS1), were highly responsive to the N status. OsALN was rapidly up-regulated under low N conditions, whereas OsUPS1 was up-regulated under high N conditions. Taking advantage of the responses of these two genes to N status, we generated transgenic rice plants harboring the molecular N sensors, proALN::ALN-LUC2 and proUPS1::UPS1-LUC2, comprising the gene promoters driving expression of the luciferase reporter. We observed that expression of the transgenes mimicked transcriptional regulation of the endogenous OsALN and OsUPS1 genes in response to exogenous N status. Importantly, the molecular N sensors showed similar levels of specificity to nitrate and ammonium, from which we infer their sensing abilities. Transgenic rice plants expressing the proUPS1::UPS1-LUC2 sensor showed strong luminescence under high exogenous N conditions (>1 mM), whereas transgenic plants expressing the proALN::ALN-LUC2 sensor showed strong luminescence under low exogenous N conditions (<0.1 mM). High exogenous N (>1 mM) substantially increased internal ammonium and nitrate levels, whereas low exogenous N (<0.1 mM) had no effect on internal ammonium and nitrate levels, indicating the luminescence signals of molecular sensors reflect internal N status in rice. Thus, proALN::ALN-LUC2 and proUPS1::UPS1-LUC2 represent N molecular sensors that operate over a physiological and developmental range in rice.

Full text link <https://tinyurl.com/538vpdkn>

Article title: Overexpression of OsERF48 causes regulation of OsCML16 , a calmodulin-like protein gene that enhances root growth and drought tolerance

Authors: Harin Jung, Pil Joong Chung, Su-Hyun Park, Mark Christian Felipe Reveche Redillas, Youn Shic Kim, Joo-Won Suh, Ju-Kon Kim

Publication title: Plant Biotechnology Journal 15(10):1295-1308, 2017

Abstract:

The AP2/ERF family is a plant-specific transcription factor family whose members have been associated with various developmental processes and stress tolerance. Here, we functionally characterized the drought-inducible OsERF48, a group Ib member of the rice ERF family with four conserved motifs, CMI-1, -2, -3 and -4. A transactivation assay in yeast revealed that the C-terminal CMI-1 motif was essential for OsERF48 transcriptional activity. When OsERF48 was overexpressed in an either a root-specific (ROXOsERF48) or whole-body (OXOsERF48) manner, transgenic plants showed a longer and denser root phenotype compared to the nontransgenic (NT) controls. When plants were grown on a 40% polyethylene glycol-infused medium under in vitro drought conditions, ROXOsERF48 plants showed a more vigorous root growth than OXOsERF48 and NT plants. In addition, the ROXOsERF48 plants exhibited higher grain yield than OXOsERF48 and NT plants under field-drought conditions. We constructed a

putative OsERF48 regulatory network by cross-referencing ROXOsERF48 root-specific RNA-seq data with a co-expression network database, from which we inferred the involvement of 20 drought-related genes in OsERF48-mediated responses. These included genes annotated as being involved in stress signalling, carbohydrate metabolism, cell-wall proteins and drought responses. They included, OsCML16, a key gene in calcium signalling during abiotic stress, which was shown to be a direct target of OsERF48 by chromatin immunoprecipitation-qPCR analysis and a transient protoplast expression assay. Our results demonstrated that OsERF48 regulates OsCML16, a calmodulin-like protein gene that enhances root growth and drought tolerance.

Full text link <https://tinyurl.com/y98yna36>

Article title: OsNAC5 overexpression enlarges root diameter in rice plants leading to enhanced drought tolerance and increased grain yield in the field

Authors: Jin Seo Jeong, Youn Shic Kim, Mark C. F. R. Redillas, Geupil Jang, Harin Jung, Seung Woon Bang, Yang Do Choi, Sun-Hwa Ha, Christophe Reuzeau, Ju-Kon Kim

Publication title: Plant Biotechnology Journal 11(1):101-114, 2013

Abstract:

Drought conditions are among the most serious challenges to crop production worldwide. Here, we report the results of field evaluations of transgenic rice plants overexpressing OsNAC5, under the control of either the root-specific (RCc3) or constitutive (GOS2) promoters. Field evaluations over three growing seasons revealed that the grain yield of the RCc3:OsNAC5 and GOS2:OsNAC5 plants were increased by 9%-23% and 9%-26% under normal conditions, respectively. Under drought conditions, however, RCc3:OsNAC5 plants showed a significantly higher grain yield of 22%-63%, whilst the GOS2:OsNAC5 plants showed a reduced or similar yield to the nontransgenic (NT) controls. Both the RCc3:OsNAC5 and GOS2:OsNAC5 plants were found to have larger roots due to an enlarged stele and aerenchyma at flowering stage. Cell numbers per cortex layer and stele of developing roots were higher in both transgenic plants than NT controls, contributing to the increase in root diameter. The root diameter was enlarged to a greater extent in the RCc3:OsNAC5, suggesting the importance of this phenotype for enhanced drought tolerance. Microarray experiments identified 25 up-regulated genes by more than three-fold ($P < 0.01$) in the roots of both transgenic lines. Also identified were 19 and 18 up-regulated genes that are specific to the RCc3:OsNAC5 and GOS2:OsNAC5 roots, respectively. Of the genes specifically up-regulated in the RCc3:OsNAC5 roots, GLP, PDX, MERI5 and O-methyltransferase were implicated in root growth and development. Our present findings demonstrate that the root-specific overexpression of OsNAC5 enlarges roots significantly and thereby enhances drought tolerance and grain yield under field conditions.

Full text link <https://tinyurl.com/4z73w489>

Article title: Characterization of the root-predominant gene promoter HPX1 in transgenic rice plants

Authors: Su-Hyun Park, Jin Seo Jeong, Eun Hyang Han, Mark C. F. R. Redillas, Seung Woon Bang, Harin Jung, Youn Shic Kim & Ju-Kon Kim

Publication title: Plant Biotechnology Reports 7(3), 2012

Abstract:

Gene promoter(s) specialized in root tissues is an important component for crop biotechnology. In our current study, we report results of promoter analysis of the HPX1, a gene expressed predominantly in roots. The HPX1 promoter regions were predicted, linked to the gfp reporter gene, and transformed into rice. Promoter activities were analyzed in various organs and tissues of six independent transgenic HPX1:gfp plants using the fluorescent microscopy and q-RT-PCR methods. GFP fluorescence levels were high in root elongation regions but not in root apex and cap of the HPX1:gfp plants. Very low levels of GFP fluorescence were observed in anthers and leaves. Levels of promoter activities were 16- to 190-fold higher in roots than in leaves of the HPX1:gfp plants. The HPX1 promoter directs high levels of gene expression in root tissues producing GFP levels up to 0.39 % of the total soluble protein. Thus, the HPX1 promoter is predominantly active in the root elongation region during the vegetative stage of growth.

Full text link <https://tinyurl.com/bde82vm7>

Article title: Analysis of the APX, PGD1 and R1G1B constitutive gene promoters in various organs over three homozygous generations of transgenic rice plants

Authors: Su-Hyun Park, Seung Woon Bang, Jin Seo Jeong, Harin Jung, Mark Christian Felipe Reveche Redillas, Hyung Il Kim, Kang Hyun Lee, Youn Shic Kim, Ju-Kon Kim

Publication title: Planta 235(6):1397-408, 2012

Abstract:

We have previously characterized the constitutively active promoters of the APX, PGD1 and R1G1B genes in rice (Park et al. 2010 in J Exp Bot 61:2459-2467). To have potential crop biotechnology applications, gene promoters must be stably active over many generations. In our current study, we report our further detailed analysis of the APX, PGD1 and R1G1B gene promoters in various organs and tissues of transgenic rice plants for three (T_{3-5}) homozygous generations. The copy numbers in 37 transgenic lines that harbor promoter:gfp constructs were determined and promoter activities were measured by real-time qPCR. Analysis of the 37 lines revealed that 15 contained a single copy of one of the three promoter:gfp chimeric constructs. The promoter activity levels were generally higher in multi-copy lines, whereas variations in these levels over the T_{3-5} generations studied were observed to be smaller in single-copy than in multi-copy lines. The three promoters were further found to be highly active in the whole plant body at both the vegetative and reproductive stages of plant growth, with the exception of the APX in the ovary and R1G1B in the pistil and filaments where zero or very low levels of activity were detected. Of note, the spatial activities of the PGD1 promoter were found to be strikingly similar to those of the ZmUbi1, a widely used constitutive promoter. Our comparison of promoter activities between T_3 , T_4 and T_5 plants revealed that the APX, PGD1 and R1G1B promoters maintained their activities at comparable levels in leaves and roots over three homozygous generations and are therefore potentially viable alternative promoters for crop biotechnology applications.

Full text link <https://tinyurl.com/mw6vtfuy>

Article title: Transgenic overexpression of UIP1, an interactor of the 3' untranslated region of the Rubisco small subunit mRNA, increases rice tolerance to drought

Authors: Su-Hyun Park, Jin Seo Jeong, Mark C. F. R. Redillas, Harin Jung, Seung Woon Bang, Youn Shic Kim & Ju-Kon Kim

Publication title: Plant Biotechnology Reports 7(1), 2012

Abstract:

Gene regulation at the post-transcriptional level is a well-organized process to adjust plants in response to environmental changes. Here, we identified a novel RNA-binding protein (RBP) possessing a CBS (cystathionine- β -synthase) domain through yeast three-hybrid screening. This RBP, 3'-UTR-interacting protein 1 (UIP1), interacts with 3' untranslated region of the Rubisco small subunit mRNA (3' RbcS)—the major mRNA element that mediates the stress-induced mRNA decay (SMD) under drought and salt stress conditions. Six deletion constructs were made to delineate the binding domain of the UIP1 protein. Co-transformation of yeast with these constructs together with three different hybrid RNAs in various combinations showed that deletion of 51 N-terminal amino acids resulted in a loss of sequence-specific binding affinity. Further deletion at the region between 52 and 212 amino acids revealed that the CBS domain of UIP1 is necessary for binding to 3' RbcS. Transgenic overexpression of UIP1 in rice resulted in an increase in tolerance to drought stress at the vegetative stage of growth. Under drought, high salt and low temperature conditions, the maximum photochemical efficiency of photosystem II (F_v/F_m) of UIP1 plants was higher than those of the nontransgenic plants. Interestingly, the effect of UIP1 overexpression on tolerance to stress was much more pronounced under drought than under high salt and low temperature conditions. Taken together, our results demonstrate that UIP1 interacts with 3' untranslated region of RbcS1 mRNA and increases tolerance of transgenic overexpressors to drought stress.

Full text link <https://tinyurl.com/58w9bsmf>

Article title: Comparison of reactive porous media for sulfur-oxidizing denitrification of high nitrate strength wastewater

Authors: Grace M. Nisola, Mark C.F.R. Redillas, Eulsaeng Cho, Midoek Han, Namjong Yoo, Wook-Jin Chung

Publication title: Biochemical Engineering Journal 58(1):79-86, 2011

Abstract:

Three packing materials for sulfur oxidizing denitrification packed bed systems seeded with acclimated anoxic sludge were evaluated. Two porous media were prepared via thermal fusion with sodium bicarbonate as porogen: sulfur fused with powdered (1) calcium carbonate (CaCO_3) (SCa) and (2) oyster shell (SCr). Randomly packed sulfur and limestone granules (S+L) media were used as the control. Results revealed that SCr is the most suitable media as it exhibited the highest nitrate removals and lowest nitrite accumulation. It has macrovoidal pores which facilitated microbial attachment. Additionally, SCr had the highest CaCO_3 loading per unit volume and highest media dissolution rate which was favorable to avert pH decrease. But due to high denitrification activity, high sulfate levels in SCr may necessitate a post-treatment step prior to effluent discharge. Due to poor biomass attachment, S+L is most sensitive to change in

fluid flow condition. As hydraulic retention time is decreased, S+L exhibited intensive and irreversible performance decline. Inferior denitrification performance of SCa was mainly due to low CaCO_3 loading per unit volume, low dissolution kinetics and low alkalinity consumption by denitrifiers. Using modified Stover–Kincannon kinetic model, overall performance and denitrification capacities can be arranged as $\text{SCr} > \text{S+L} > \text{SCa}$.

Full text link <https://tinyurl.com/mwj8adbx>

Article title: NH_3 gas absorption and bio-oxidation in a single bioscrubber system

Authors: Grace M. Nisola, Eulsaeng Cho, Jennica D. Orata, Mark C.F.R. Redillas, Danvir Mark C. Farnazo, Enkhdul Tuuguu, Wook Jin Chung

Publication title: Process Biochemistry 44(2):161-167, 2009

Abstract:

A combined ammonia gas absorption and nitrification was conducted in a single bioscrubber. The reactor was consisted of a bubble column (gas absorption) and a packed bed (nitrification) which contained poly-urethane foams with immobilized nitrifying activated sludge. The entering gas and scrubbing liquid were contacted countercurrently. The bubble column elimination capacity (EC) was 26.74 g NH_3/m^3 h at >99% ammonia gas removal and effluent gas concentration lower than 2 ppmv. Without ammonium supplement, EC can reach 35.66 g NH_3/m^3 h which is equivalently the highest tolerable ammonia loading rate of 700 g N/ m^3 day (1650 mg N/L) at the packed bed. At this level, 593 g N/ m^3 -day ammonia removal rate was achieved via nitrification, dominated by ammonia oxidation. Partial recycling ($R/Q = 0.5$) of scrubbing solution reduced the secondary wastewater volume by producing 233% more concentrated nitrified products. Hydraulic retention time (HRT) of 24 h was found optimal for both processes (gas absorption and nitrification).

Full text link <https://tinyurl.com/ms2urb9r>

**DR. RHODA MAE SIMORA***Fisheries***Sex:** Female**Education:**

Doctor of Philosophy in Fisheries, Auburn University, USA

Master of Science in Environmental Biotechnology, Gyeongsang National University, South Korea

Bachelor of Science in Fisheries (Fish Processing Technology), University of the Philippines Visayas

Field of Specialization:

Antiviral immunity

Antiviral activity

Molecular cloning

cDNA Cloning

Molecular Virology

Cell culture

Cloning

Researches:

Article title: Improved Growth and High Inheritance of Melanocortin-4 Receptor (mc4r)

Mutation in CRISPR/Cas-9 Gene-Edited Channel Catfish, *Ictalurus punctatus*

Authors: Michael Coogan, Veronica Alston, Baofeng Su, Karim Khalil, Ahmed Elawwad, Mohd Khan, Andrew Johnson, De Xing, Shangjia Li, Jinhai Wang, Rhoda M. C. Simora, Cuiyu Lu, Patrick Page-McCaw, Wenbiao Chen, Max Michel, Wenwen Wang, Darshika Hettiarachchi, Tasnuba Hasin, Ian A. E. Butts, Roger D. Cone & Rex A. Dunham

Publication title: Marine Biotechnology 24:843–855, 2022

Abstract:

Effects of CRISPR/Cas9 knockout of the melanocortin-4 receptor (mc4r) gene in channel catfish, *Ictalurus punctatus*, were investigated. Three sgRNAs targeting the channel catfish mc4r gene in conjunction with Cas9 protein were microinjected in embryos and mutation rate,

inheritance, and growth were studied. Efficient mutagenesis was achieved as demonstrated by PCR, Surveyor® assay, and DNA sequencing. An overall mutation rate of 33% and 33% homozygosity/bi-allelism was achieved in 2017. Approximately 71% of progeny inherited the mutation. Growth was generally higher in MC4R mutants than controls (CNTRL) at all life stages and in both pond and tank environments. There was a positive relationship between zygosity and growth, with F1 homozygous/bi-allelic mutants reaching market size 30% faster than F1 heterozygotes in earthen ponds ($p=0.022$). At the stocker stage (~50 g), MC4R × MC4R mutants generated in 2019 were 40% larger than the mean of combined CNTRL × CNTRL families ($p=0.005$) and 54% larger than F1 MC4R × CNTRL mutants ($p=0.001$) indicating mutation may be recessive. With a high mutation rate and inheritance of the mutation as well as improved growth, the use of gene-edited MC4R channel catfish appears to be beneficial for application on commercial farms.

Full text available upon request to the author/s

Article title: CRISPR/Cas9 - Mediate knock-in method can improve the expression and effect of transgene in P1 generation of channel catfish (*Ictalurus punctatus*)

Authors: De Xing, Baofeng Su, Max Bangs, Shangjia Li, Jinhai Wang, Logan Bern, Rhoda Mae C Simora, Wenwen Wang, Xiaoli Ma, Michael Coogan, Andrew Johnson, Yi Wang, Zhenkui Qin, Rex Dunham

Publication title: Aquaculture 560:738531, 2022

Abstract:

Transgenesis has a wide range of applications in fish breeding and generation of fish models. Previously, it was common to produce transgenic fish by transferring plasmid DNA into early embryos, resulting in random integration, but more precision, targeted integration is possible with CRISPR/Cas9 technology. Channel catfish (*Ictalurus punctatus*) is an economically important farmed fish in the United States. To make channel catfish an even richer source of nutrients, we produced P1 fish carrying masu salmon (*Oncorhynchus masou*) elovl2 (OmElovl2) transgene to increase the content of omega-3 (n-3) fatty acids with CRISPR/Cas9-mediated knock-in targeting non-coding region of chromosome 1, and random integration methods. Mosaicism, transgene expression and fatty acids contents were determined. Integration rates of seven-month-old channel catfish generated by CRISPR/Cas9 and random integration methods were 19% and 27.3%, respectively. However, when we tested five tissues including barbel, fin, muscle, liver and kidney of three channel catfish, 13 out of 15 total observations were verified to carry the transgene from three positive P1 fish produced by CRISPR/Cas9 technology. Only five of 15 tissues carrying transgene were detected in three positive P1 fish produced by random integration. Genomic quantitative real-time PCR (qRT-PCR) also suggested that CRISPR/Cas9 transgenic fish had extremely higher average transgene copy numbers than randomly integrated transgenic fish. Additionally, reverse transcription PCR (RT-PCR) and fatty acids analysis revealed that CRISPR/Cas9 P1 fish had strong OmElovl2 transgene expression in most tissues and 20.7% higher DHA than their controls, while randomly integrated P1 fish did not have detectable OmElovl2 expression in any of five tissues detected. There were no significant differences for any fatty acids between transgenic fish produced by random integration and their non-transgenic controls. CRISPR/Cas9 mediated knock-in technology

efficiently reduced mosaicism, improved transgene expression and the biological effects of the foreign gene in P1 generation compared to the conventional random integration method. Therefore, transgenesis based on CRISPR/Cas9 technology would shorten breeding programs and improve applications of gene function studies.

Full text available upon request to the author/s

Article title: Response of cecropin transgenesis to challenge with *Edwardsiella ictaluri* in channel catfish *Ictalurus punctatus*

Authors: Nermeen Y. Abass, Rhoda Mae C. Simora, Jinhai Wang, Shangjia Li, De Xing, Michael Coogan, Andrew Johnson, David Creamer, Xu Wang, Rex A. Dunham

Publication title: Fish & Shellfish Immunology 126:311-317, 2022

Abstract:

Constructs bearing the cecropin B gene from the moth *Hyalophora cecropia*, driven by the cytomegalovirus (CMV) promoter, or the common carp beta-actin (β -actin) promoter were transferred to channel catfish, *Ictalurus punctatus* via electroporation. One F3 channel catfish family transgenic for cecropin transgene driven by the CMV promoter, and one F1 channel catfish family transgenic for cecropin transgene driven by the common carp β -actin promoter were produced. F3 and F1 individuals exhibited enhanced disease resistance when challenged in tanks with *Edwardsiella ictaluri*, the causative agent of enteric septicemia of catfish (ESC). Inheritance of the transgene by the F1 and F3 generation was 15% and 60%, respectively. Growth rates of the cecropin transgenic and non-transgenic full siblings (controls) channel catfish were not different ($P > 0.05$). All transgenic fish showed significant resistance to infection by ESC at day 3 and day 4 post exposure ($P = 0.005$). No correlation was detected between body weight and time to death for all genetic groups ($P = 0.34$). Results of our study confirmed that genetic enhancement of *E. ictaluri* resistance can be achieved by cecropin transgenesis in channel catfish. In addition to survival rate, improving survival time is essential because the extension of survival time gives a better chance to apply treatments to stop the bacterial infection.

Full text available upon request to the author/s

Article title: CRISPR/Cas-9 induced knockout of myostatin gene improves growth and disease resistance in channel catfish (*Ictalurus punctatus*)

Authors: Michael Coogan, Veronica Alston, Baofeng Su, Karim Khalil, Ahmed Elawwad, Mohd Khan, Rhoda M.C. Simora, Andrew Johnson, De Xing, Shangjia Li, Jinhai Wang, Cuiyu Lu, Wenwen Wang, Darshika Hettiarachchi, Tasnuba Hasin, Jeffery Terhune, Ian A.E. Butts, Rex A. Dunham

Publication title: Aquaculture 557:738290, 2022

Abstract:

Channel catfish, *Ictalurus punctatus*, is the most produced aquaculture species in the United States, although production levels have decreased since their peak in 2003. Myostatin (mstn) regulates skeletal muscle growth and has been identified as an important gene for increasing body weight in aquaculture species. In this study, the effects of CRISPR/Cas9 knockout of the

mstn gene in channel catfish were investigated. Three sgRNAs targeting exon 1 of the channel catfish myostatin gene were microinjected with Cas9 protein in embryos. A total of 209 fish survived to 6 mph after microinjection of Cas9 and sgRNA targeting exon 1 of the mstn gene over the 3 yr experiment (2017–2019) with an average mutation rate of 58%. Successful generation of myostatin knockout (MSTN KO) F1 heterozygotes was achieved in 2019 by individually mating two pairs of control females with MSTN homozygous KO males. The offspring of both families inherited the mutation at a mean rate of 88%. Growth was generally higher in MSTN mutants than controls at all life stages and environments. P1 MSTN mutants were 88% larger than controls at the stocker stage (100 to 200 g) and 27% larger than controls at market size. Heterozygous F1 mutants were 218% larger than controls at the stocker stage. MSTN mutants had reduced overall expression levels of mstn compared to controls. When challenged with *Edwardsiella ictaluri*, the causative agent of enteric septicemia of catfish, MSTN mutants performed equally or better than controls. With a high mutation rate and inheritance as well as improved growth and disease resistance, using MSTN gene-edited channel catfish could greatly benefit commercial farms.

Full text available upon request to the author/s

Article title: Effectiveness of Cathelicidin Antimicrobial Peptide against Ictalurid Catfish Bacterial Pathogens

Authors: Rhoda Mae C. Simora, Wenwen Wang, Michael Coogan, Nour El Hussein, Jeffery S. Terhune, Rex A. Dunham

Publication title: Journal of Aquatic Animal Health 33(2), 2021

Abstract:

One of the major goals in aquaculture is to protect fish against infectious diseases as disease outbreaks could lead to economic losses if not controlled. Antimicrobial peptides (AMPs), a class of highly conserved peptides known to possess direct antimicrobial activities against invading pathogens, were evaluated for their ability to protect Channel Catfish *Ictalurus punctatus* and hybrid catfish (female Channel Catfish × male Blue Catfish *I. furcatus*) against infection caused by the fish pathogen *Aeromonas hydrophila* ML09-119. To identify effective peptides, the minimum inhibitory concentrations against bacterial pathogens *Edwardsiella ictaluri* S97-773, *Edwardsiella piscicida* E22-10, *A. hydrophila* ML09-119, *Aeromonas veronii* 03X03876, and *Flavobacterium columnare* GL-001 were determined in vitro. In general and overall, cathelicidins derived from alligator and sea snake exhibited more potent and rapid antimicrobial activities against the tested catfish pathogens as compared to cecropin and pleurocidin AMPs and ampicillin, the antibiotic control. When the peptides (2.5 µg of peptide/g of fish) were injected into fish and simultaneously challenged with *A. hydrophila* through immersion, increased survival rates in Channel Catfish and hybrid catfish were observed in both cathelicidin (alligator and sea snake) treatments as compared to other peptides and the infected control ($P < 0.001$) with alligator cathelicidin being the overall best treatment. Bacterial numbers in the kidney and liver of Channel Catfish and hybrid catfish also decreased ($P < 0.05$) for cathelicidin-injected groups at 24 and 48 h after challenge infection. These results show the potential of cathelicidin to protect catfish against bacterial infections and suggest that an approach overexpressing the peptide in transgenic fish, which is the long-term goal of this

research program, may provide a method of decreasing bacterial disease problems in catfish as delivering the peptides via individual injection or feeding would not be economically feasible.

Full text available upon request to the author/s

Article title: CRISPR/Cas9-mediated knock-in of alligator cathelicidin gene in a non-coding region of channel catfish genome

Authors: Rhoda Mae C. Simora, De Xing, Max R. Bangs, Wenwen Wang, Xiaoli Ma, Baofeng Su, Mohd G. Q. Khan, Zhenkui Qin, Cuiyu Lu, Veronica Alston, Darshika Hettiarachchi, Andrew Johnson, Shangjia Li, Michael Coogan, Jeremy Gurbatow, Jeffery S. Terhune, Xu Wang & Rex A. Dunham

Publication title: Scientific Reports 10(1), 2020

Abstract:

CRISPR/Cas9-based gene knockout in animal cells, particularly in teleosts, has proven to be very efficient with regards to mutation rates, but the precise insertion of exogenous DNA or gene knock-in via the homology-directed repair (HDR) pathway has seldom been achieved outside of the model organisms. Here, we succeeded in integrating with high efficiency an exogenous alligator cathelicidin gene into a targeted non-coding region of channel catfish (*Ictalurus punctatus*) chromosome 1 using two different donor templates (synthesized linear dsDNA and cloned plasmid DNA constructs). We also tested two different promoters for driving the gene, zebrafish ubiquitin promoter and common carp β -actin promoter, harboring a 250-bp homologous region flanking both sides of the genomic target locus. Integration rates were found higher in dead fry than in live fingerlings, indicating either off-target effects or pleiotropic effects. Furthermore, low levels of mosaicism were detected in the tissues of P1 individuals harboring the transgene, and high transgene expression was observed in the blood of some P1 fish. This can be an indication of the localization of cathelicidin in neutrophils and macrophage granules as also observed in most antimicrobial peptides. This study marks the first use of CRISPR/Cas9 HDR for gene integration in channel catfish and may contribute to the generation of a more efficient system for precise gene integration in catfish and other aquaculture species, and the development of gene-edited, disease-resistant fish.

Full text available upon request to the author/s

Article title: Occurrence of Histamine and Histamine-forming Bacteria in Philippine Traditional Dried-salted Fish Products

Authors: Rhoda Mae C. Simora and Ernestina M. Peralta

Publication title: Asian Fisheries Science 3:73–88, 2018

Abstract:

Twenty-one dried-salted fish products sold at major retail markets in the province of Iloilo, Philippines were purchased and tested to determine the occurrence of histamine and histamine-forming bacteria. The levels of pH, salt content, moisture content, water activity (A_w), total volatile basic nitrogen (TVBN), aerobic plate count (APC), *Escherichia coli*, *Salmonella* and *Staphylococcus aureus* in all samples ranged from 6.36 to 6.71, 2.55 % to 15.84 %, 21.12 % to 49.99 %, 0.67 to 0.87, 19.25 to 69.05 mg.100 g⁻¹, 3.0 to 7.39 log CFU.g⁻¹, <3 to 28 MPN.g⁻¹,

absent in 25 g and 3.58 to 6.89 log CFU.g⁻¹, respectively. Ten (47.6 %) dried fish samples had histamine levels greater than the United States Food and Drug Administration guideline of 5 mg.100 g⁻¹ for scombroid fish and/or scombroid products, whereas seven (33.3 %) samples contained histamine levels greater than 20 mg.100 g⁻¹ which is sufficient to cause the symptoms of scombroid poisoning according to the Centers for Disease Control and Prevention. Seven histamine-forming bacterial strains were isolated and identified biochemically and morphologically as belonging to genus *Vibrio*, *Salmonella*, *Staphylococcus*, *Bacillus* and *Pseudomonas*. The presence of these bacteria in dried fish is indicative of poor standards of process hygiene and sanitation as well as mishandling during storage.

Full text available upon request to the author/s

Article title: Isolation and Identification of Protease-Producing *Pseudomonas* sp. PD14 in the Gut of Rabbitfish *Siganus guttatus* (Bloch 1787)

Authors: Cindy D. Armada and Rhoda Mae C. Simora

Publication title: Asian Fisheries Science 29:82-95, 2016

Abstract:

Bacterial enzymes associated with the gut of fish are known to aid in digestion and nutrition of the host. Isolation, identification and characterisation of protease-producing bacteria from the gut of rabbitfish *Siganus guttatus* (Bloch 1787) were carried out in the present study. Protease-producing bacteria were isolated in peptone gelatin agar (PGA) plates and the isolated strains were qualitatively and quantitatively screened for enzyme production. Highest protease activity, 25.32±1.06 U. mg⁻¹ protein, was observed in bacterial isolate PD14. Biochemical and molecular analysis revealed that the isolate is 99% homologous to *Pseudomonas* sp. The 16S rRNA gene sequence of the isolate was deposited in GenBank with accession number KR779515. Qualitative tests on enzyme production through measurement of the zone of hydrolysis further suggest that optimum protease production was 36 h at 40 °C, pH 7-8 in a peptone gelatin agar with 2% NaCl.

Full text available upon request to the author/s

Article title: Deproteination and demineralization of shrimp waste using lactic acid bacteria for the production of crude chitin and chitosan

Authors: Francisco, Farramae C; Simora, Rhoda Mae C; Nuñal, Sharon N. Aquaculture, Aquarium, Conservation & Legislation; Cluj-Napoca

Publication title: AACL Bioflux 33(1):9, 2015

Abstract:

Deproteination and demineralization efficiencies of shrimp waste using two *Lactobacillus* species treated with different carbohydrate sources for chitin production, its chemical conversion to chitosan and the quality of chitin and chitosan produced were determined. Using 5% glucose and 5% cassava starch as carbohydrate sources, pH slightly increased from the initial pH of 6.0 to 6.8 and 7.2, respectively after 24 h and maintained their pH at 6.7 to 7.3 throughout the treatment period. Demineralization (%) in 5% glucose and 5% cassava was highest during the first day of treatment which was 82% and 83%, respectively. Deproteination (%) was highest in 5% cassava starch on the 3rd day of treatment at 84.4%. The obtained chitin from 5% cassava

and 5% glucose had a residual ash and protein below 1% and solubility of 59% and 44.3%, respectively. Chitosan produced from 5% cassava and 5% glucose had protein content below 0.05%; residual ash was 1.1% and 0.8%, respectively. Chitosan solubility and degree of deacetylation were 56% and 33% in 5% glucose and 48% and 29% in 5% cassava, respectively. The advantage this alternative technology offers over that of chemical extraction is large reduction in chemicals needed thus less effluent production and generation of a protein-rich liquor, although the demineralization process should be improved to achieve greater degree of deacetylation.

Full text available upon request to the author/s

Article title: Characterization of extracellular enzymes from culturable autochthonous gut bacteria in rabbitfish (*Siganus guttatus*) 1

Authors: Rhoda Mae C. Simora, Rex Ferdinand M. Traifalgar, Francis S. Legario

Publication title: ELBA Bioflux 7(1), 2015

Abstract:

The intestinal microenvironment of bacteria in fish influences the host in many ways, including the metabolism of several nutrients. Isolation, enzymatic activities, and molecular identification of culturable bacteria associated with the gastrointestinal tract of rabbitfish, *Siganus guttatus* Bloch, were investigated in the present study. Occurrence and distribution of enzyme-producing bacteria in the proximal (PI), middle (MI), and distal (DI) gut segments were determined and data were presented as log viable counts g⁻¹ intestine (LVC). The heterotrophic bacterial population (LVC = 6.95) as well as the amylolytic, proteolytic, cellulolytic, and carrageenolytic populations had the highest occurrence in the DI region (LVC = 5.73, 5.46, 3.21 and 5.00, respectively). The isolates were qualitatively screened on the basis of their extracellular enzyme producing ability. The selected strains were further quantitatively assayed for amylase, protease, and cellulase activities. Results of enzymatic studies revealed that three most promising bacterial isolates possess multienzyme activities and were studied through 16S rRNA gene sequence for identification. Isolates CP6, CM8 and PM14 showed high similarity to *Bacillus cereus*, *Bacillus megaterium* and *Bacillus flexus*, respectively. The NCBI Genbank accession numbers of the 16S rRNA gene sequences for isolates CP6, CM8, and PM14 were KR779513, KR779512, and KR779516, respectively. To date, this is the first time that characterization and enzymatic activities of gut bacteria in rabbitfish have been reported. The present study might offer scope for further research to evaluate prospects for application of the gut-associated extracellular enzyme-producing bacteria in fish nutrition.

Full text available upon request to the author/s

Article title: Molecular cloning and antiviral activity of IFN- γ promoter stimulator-1 (IPS-1) gene in Japanese flounder, *Paralichthys olivaceus*

Authors: Rhoda Mae C. Simora, Maki Ohtani, Jun-ichi Hikima, Hidehiro Kondo, Ikuo Hirono, Tae Sung Jung, Takashi Aoki

Publication title: Fish & Shellfish Immunology 29(6):979-86, 2010

Abstract:

The mitochondrial adaptor, IFN- β promoter stimulator-1 (IPS-1), also known as MAVS/VISA/Cardif, plays a key role in the signal transduction of the RIG-1/MDA5 pathway to induce the production of interferons (IFNs) and other cytokines. In the present study, Japanese flounder (*Paralichthys olivaceus*) IPS-1 cDNA was cloned from Japanese flounder spleen using PCR-based methods. The full-length cDNA has 2235 nucleotides and encodes a polypeptide of 641 amino acids. The putative Japanese flounder IPS-1 protein contains an N-terminal CARD-like domain, a central proline-rich domain, a C-terminal transmembrane domain, and exhibits similarity to other teleost counterparts ranging from 20% to 34%. Semi-quantitative RT-PCR showed that Japanese flounder IPS-1 mRNA was expressed in all tissues examined. The expression level of flounder IPS-1 gene was unchanged in viral hemorrhagic septicemia virus (VHSV)-infected kidney as measured by quantitative real-time PCR (Q-PCR). In addition, Japanese flounder IPS-1-overexpressing cells were protected against hirame rhabdovirus (HIRRV) and VHSV infection as manifested by the delayed appearance of cytopathic effect (CPE) and decreased viral titers. Expression of IFN-inducible genes including Mx, ISG15 and IRF3 were also induced in the IPS-1-overexpressing cells. These results suggest that Japanese flounder IPS-1 is involved in the antiviral immunity as a one of the adaptors in fish IFN-activation pathway.

Full text available upon request to the author/s

**DR. SONNIE A. VEDRA***Environmental Science*

Sex: Male

Education:

Doctor of Philosophy in Environmental Science, Mindanao State University Naawan

Field of Specialization:

Freshwater ecology

Aquatic ecology

Fish Biology

Water quality

Biodiversity

Ecosystem Ecology

Conservation Biology

Environmental Biology

Water Quality Assessment

Researches:

Article title: Species Account of Mangroves in the Coastal Zones of Naawan, Misamis Oriental

Authors: Jeanbee D. Gutierrez, Ramon Francisco Q. Padilla and Sonnie A. Vedra

Publication title: International Journal of Science and Management Studies (IJSMS) 6(2), 2023

Abstract:

Changes in the zonation pattern of mangroves can be a measure of natural and anthropogenic perturbations. As such, mangroves in the coastal zones of Naawan were surveyed using the belt transect method. There were a total of 8 species belonging to 4 families of mangroves, namely, *Avicennia rhizophoroides*, *Avicennia marina* and *Avicennia alba* in Family Acanthaceae; *Sonneratia alba* in Family Lythraceae; *Rhizophora mucronata*, *Ceriops zippeliana*, and *Bruguiera parviflora* in Family Rhizophoraceae; and lastly, *Excoecaria agallocha* in Family Euphorbiaceae. Families Acanthaceae and Rhizophoraceae dominated the coastal zones and moving towards the foreshore riverine portion. Diversity and evenness indices indicated a

relatively diverse and proportionally distributed mangrove species across the coastal zones of Naawan. This study could help some mangrove restoration initiatives to avoid introduction of certain species in the area based on site-specificity and sensitivity among mangrove species.

Full text available upon request to the author/s

Article title: Occurrence and Distribution of Dengue-Causing Mosquito in Iligan City and Its Implication to Environmental Management

Authors: Michael Mar L. Demecillo, Ramon Francisco Q. Padilla, Rodolfo B. Trinidad, Wesceslao A. Coronado, Aida D. Perpetua, Magdalena D. Dulay and Sonnie A. Vedra

Publication title: International Journal of Science and Management Studies (IJSMS) 6(2), 2023

Abstract:

The occurrence and geographic distribution of *Aedes aegypti* mosquito was assessed in different barangays of Iligan City. This mosquito species is known to be the carrier of dengue virus that cause deaths among the constituents of Iligan City. Standard collection and identification of mosquito larval specimens were done at Iligan City Sanitary Inspector's laboratory. Results showed that majority of dengue-carrying mosquito species, *Aedes aegypti* were collected and identified apart from *Aedes albopictus*, known as a secondary dengue virus carrier. Overall, larval specimens of *A. aegypti* had the highest number with a total of 240 individuals per sample collected in the six sampling barangays, whereas *A. albopictus* had a total of 90 individuals. This number of individuals of dengue-carrying species of mosquitoes might put the barangays of Iligan City at potential risks of dengue occurrence and eventual adverse impacts to the constituents. Hence, it is imperative to increase the level of awareness among the constituents and do some preventive measures such as regular clean up and other concerted efforts of the health authorities, government, private sector, academe and other sectors.

Full text available upon request to the author/s

Article title: Macrobenthic Assemblages in the Riverine Systems in Kauswagan, Lanao del Norte, Philippines

Authors: Sonnie A. Vedra, Ramon Francisco Q. Padilla, Rafael J. Vicente

Publication title: Biodiversity Journal 14 (1):167–171, 2023

Abstract:

Received 01.08.2022; accepted 12.01.2023; published online 16.02.2023 Determining the composition of taxa and diversity of benthic macrobenthos could serve as reference in understanding the structure and function of riverine ecosystems. In this study, temporal and spatial variations in the distribution of macrobenthos were determined in dry and wet seasons in four sampling stations in the river and creek systems in Kauswagan, Lanao del Norte. A total of 272 specimens/m² benthic macrobenthos belonging to 6 taxa were identified, namely, Nematoda (42.28%), Oligochaeta (22.06%), Annelida (11.40%), Amphipoda (9.19%), Rotifera (8.46%), and Polychaeta (6.62%). Diversity index analyses indicated that Simpson index varied from 0.65 to 0.78, Shannon diversity values ranged from 1.21 to 1.62, while Dominance index

ranged from 0.22 to 0.35, respectively, for all sampling stations during wet and dry seasons. Composition and diversity of taxa in all sampling stations for both wet and dry seasons were not significantly different ($p>0.05$). This means that macrobenthos population did not thoroughly changed through time and space. Thus, this study can be used in determining patterns and dynamics of biodiversity in ecosystems and try to manage their main aspects.

Full text available upon request to the author/s

Article title: Indigenous fishes inhabiting the Talabaan river system of Naawan, Misamis Oriental, Northern Mindanao, Philippines

Authors: Sonnie A. Vedra, Ramon Francisco Q. Padilla and Rafael J. Vicente

Publication title: Turkish Journal of Fisheries and Aquatic Sciences 10(4):23-27, 2022

Abstract:

The species composition, abundance, diversity, evenness and similarity of the indigenous fish population inhabiting the upstream, midstream and downstream parts of Talabaan River system in Naawan, Misamis Oriental was determined. Specimens were collected using hand-held seine and cast nets. Total number of individuals of all fish species captured was 150, with 46 (30.66%), 57 (38.00%) and 47 (31.33%), respectively, recorded in the upstream, midstream, and downstream parts of the river. Eleven fish species were recorded in six families namely, Xiphophorus hellerii (44.67%), Sicyopterus lagocephalus (20.00%), Giuris margaritacea (8.00%), Glossogobius celebius (6.67%), Awaous melanocephalus (5.33%), Rhyacichthys aspro (5.33%), Glossogobius giuris (2.67%), Oreochromis niloticus (2.67%), Anguilla marmorata (2.00%), Gerres limbatus (1.33%), and Mesopristes cancellatus (1.33%). The 11 fish species might indicate that Talabaan River is a good freshwater ecosystem that could support their food and habitat requirements and other ecological needs. It is imperative therefore, that the river must be protected from overexploitation and pollution impacts. This is to sustain the economic and ecological benefits of this fishery resource for the present and future generations of Naawanons and nearby communities as well.

Full text available upon request to the author/s

Article title: Diversity and distribution of Avifauna in Mapawa Nature Park, Cugman, Cagayan de Oro City, Misamis Oriental

Authors: Clarise L. Parreno, Irene V. Sanchez, Angela A. Vasallo, Sonnie A. Vedra, Richel E. Relox

Publication title: Journal of Biodiversity and Environmental Sciences (JBES) 17(6):1-8, 2020

Abstract:

Bird population is an indicator of the quality of habitat as they respond to threats and varying ecological conditions. Descriptive type of research was used in the study which aimed to assess the species composition, abundance, diversity, endemism, richness, conservation status and distribution of birds in the area. Birds were sampled using point-count method and mist netting methods. Geographic Information System (GIS) was used to determine the distribution of the avifauna species. It was found out that Mapawa Nature Park of Barangay Cugman, Cagayan De Oro City, Misamis Oriental harbors 47 avifauna species which belong to 10 Orders and 24

Families. In which, 16 species are endemic in the Philippines, 27 are resident birds, three are migratory and one is near endemic. Among the avifauna, Philippine Bulbul has the highest relative abundance (28.4%) while Zebra Dove, Mangrove KingFisher, Whiskered Tree Swift, Philippine Hawked Owl, Philippine Dwarf King Fisher, Red Bellied Pita and Blue Tailed Bee-Eater are the least abundant species (0.20%). The area has high diversity index ($H=3.03$) and evenness ($E= 0.49$) which means that it is diverse in terms of avifauna species. For species distribution, an omnivorous bird was the most abundant, Philippine Bulbul due to the availability of food in their habitat. Furthermore, Mapawa Nature Park is a home of abundant, rich and diverse birds in Northern Mindanao. Information and awareness strategies must be implemented inside the area for the protection and conservation of bird species.

Full text available upon request to the author/s

Article title: Bioremediation Potential Of Common Ricefield Plants And Animal Species for Heavy Metals: Cadmium, Chromium and Lead

Authors: Gaspar S. Cantere, Jr, Ma. Luisa B. Salingay, Rodolfo B. Trinidad and Sonnie A. Vedra

Publication title: World Journal of Environmental Sciences & Development Research
2(1):1-10, 2019

Abstract:

Bioremediation potential of *Commelina benghalensis*, *Fimbristylis miliacea*, *Cyperus iria*, *Pomacea canaliculata* and *Hirudo medicinalis* for bioremediation of heavy metals such as cadmium, chromium, and lead was conducted. The experiments were allowed for three (3) days of accumulation. Relative growths, bioaccumulation factors, bioaccumulation coefficients and translocation factors were determined to evaluate the bioremediation potential of the plant and animal species. Presence of heavy metals was quantified using Flame Atomic Absorption Spectroscopy. Results showed that relative growths of plants were generally affected with the increase of heavy metal concentrations. Cadmium concentrations at 100ppm and > 25 ppm demonstrated to be toxic to *C. benghalensis* and *F. miliacea*, respectively, while *C. iria* showed tolerance in 25-100ppm. The concentrations > 50 ppm and > 25ppm of chromium and lead respectively had demonstrated to be detrimental to the growth of the three species. Relative growths of *P. canaliculata* and *H. medicinalis* showed to be sensitive in cadmium, chromium and lead even in very minute amounts. Chromium and lead accumulation of the three species were not statistically significant. *P. canaliculata* and *H. medicinalis* showed to be capable of accumulating cadmium and lead even in minimal amounts (0.050-0.075 ppm). In chromium accumulation, the two species showed accumulation in 0.100 and 0.125 ppm. *C. benghalensis*, *F. miliacea*, and *C. iria* were classified heavy metal excluders. *P. canaliculata* and *H. medicinalis* are also excluders of the three heavy metals mentioned above. Heavy metal translocation factors classified *C. 2 benghalensis* as effective translocators of cadmium within the range of 25-75 ppm. *C. benghalensis* proved to be effective translocator of chromium at 50, 100, and 200 ppm. However, the other two species of plants had shown no potential in translocating lead.

Full text available upon request to the author/s

Article title: Assessing Macroinvertebrate Population Inhabiting the Talabaan River, Naawan, Misamis Oriental, Philippines

Authors: Michael James O. Baclayon, John Philip A. Viajedor, Cristobal C. Tanael, Juvelyn B. Lugatiman, Dinnes M. Cortes, Aldrin B. Librero, Jan Rey M. Flores, Florante G. Requina, Romersita D. Dadayan, QuiniGine W. Areola, Sotico P. Micabalo, Ruth S. Talingting, Geralyn D. Dela Peña, and Sonnie A. Vedra

Publication title: World Journal of Environmental Sciences & Development Research 2(1):1-5, 2017

Abstract:

Water pollution is rampant due to uncontrolled human activities and using bioindicators could contribute some promising results. As such, this study tried to describe the Talabaan River in terms of the macroinvertebrate population, of which, could be used to assess the water quality condition of the River. Standard methods of specimen collection were done. Results showed that the water quality condition of the upstream until midstream portions of Talabaan River were relatively good, while relatively polluted water was observed at downstream, although it harboured all macroinvertebrate species. Dominance of pollution-sensitive macroinvertebrate was observed in the upstream, while the pollution-tolerant species were observed at downstream. The result of the study could provide preliminary information to be translated into some regulatory measures in a form of implementing the resolutions and ordinances enacted. This is to mitigate further degradation of the water quality conditions of Talabaan River, and in turn could be used for various socio-economic and ecological purposes, which to be undertaken by all possible stakeholders.

Full text available upon request to the author/s

Article title: Biodiversity and Habitat Assessment of Mount Malindawag Naawan, Misamis Oriental, Philippines

Authors: Edgar D. Castañares, Sonnie A. Vedra, Jessie G. Gorospe

Publication title: International Letters of Natural Sciences 62:20-27, 2017

Abstract:

Habitat fragmentation results to displacement of inhabiting floral and faunal species. The resulting geographic isolation of various species affect regeneration, genetic flows and recruitment. Hence, a study was conducted in a forested area of Mt. Malindawag in Naawan, Misamis Oriental. Sampling stations were designated at the agro-forest, mid-forest and upper-forest habitat types. Species characterizations were based on DAO 2007-01 and IUCN Red List for conservation status. Results showed highest diversity index of flora at mid-forest while lowest diversity was observed in the agro-forest area. A tree species *Canarium racemosum* obtained highest Species Importance Value (SIV) at 38.6%, 42% and 30.8%, respectively in the three habitat types. The highest endemism of flora was at mid-forest with 24% per DAO 2007-01 and 26% per IUCN conservation status. Majority of faunal species were birds that were mostly resident and common and were usually observed at upper-forest habitat. The relatively low diversity and endemism of flora and fauna species could be due to the influx of human population. Various activities undertaken were threatening the inhabiting biodiversity,

and therefore, demand immediate protection and conservation measures from formulating policies to increasing awareness of various stakeholders. Future related studies were recommended to increase scientific understanding on the interrelationships of socio-economic and ecological interactions of biodiversity to the inhabiting human population.

Full text available upon request to the author/s

Article title: Modelling Resource Extractions: Way Forward to Sustainable Development of Layawan River, Northern Mindanao, Philippines

Authors: Geralyn D. Dela Peña, QuiniGine W. Areola, Cristobal C. Tanael, Florence C. Paler, Dinnes M. Cortez, Aldrin B. Librero, Jan Rey M. Flores, John Philip A. Viajedor, Juvelyn B. Lugatiman, Ruth S. Talingting and Sonnie A. Vedra

Publication title: American Journal of Social Sciences, Arts and Literature 4(1):1-5, 2017

Abstract:

Unregulated extraction of resources might lead to degradation and unsustainability. Thus, it is imperative that projections of an economic value in the future might help resource-users for future sustainable development. Data were extracted from survey questionnaires, key informant interviews and focused group discussions. The values derived were analyzed using Stella model version 9.0.2. Results showed that economic value projections of 10 years for sand and gravel quarry would have an estimated value of PhP3,946,188,000,000, for fishery resources it would be PhP394,619,425,000.00, extraction of water for domestic use and other agricultural purpose is estimated at PhP394,350,000,000.00, for the two major recreation and ecotourism activities, swimming and zipline adventure were estimated at PhP394, 615,000,000.00, and lastly, for the existence and bequest values were estimated to be at PhP394, 675,000,000.00. These values were considered as economic reserves for future utilization of the resources, and yet might project utilization patterns that would make these resources sustainable. This would entail conservative efforts of various stakeholders to sustain the resources for the future generations.

Full text available upon request to the author/s

Article title: Adaptive measures to climate change among the Higaonon communities in Naawan and Initao, Misamis Oriental, Mindanao, Philippines

Authors: Geralyn D. Dela Peña, QuiniGine W. Areola, Cristobal C. Tanael, Florence C. Paler, Dinnes M. Cortez, Aldrin B. Librero, Jan Rey M. Flores, John Philip A. Viajedor, Juvelyn B. Lugatiman, Ruth S. Talingting and Sonnie A. Vedra

Publication title: American Journal of Social Sciences, Arts and Literature 4(1):1-7, 2017

Abstract:

Traditional knowledge systems of indigenous peoples are now acknowledged globally as crucial in combatting climate change. Thus, this study was conducted to determine the adaptive measures to climate change undertaken by the Higaonon communities within the hinterlands of Initao and Naawan, Misamis Oriental, Philippines. Collections of data were done through Focused Group Discussion (FGD) and Key Informant Interview (KII) using semi-structured open-ended questionnaires. Results showed that the resiliency to climate change among the

Higaonon communities in Initao and Naawan was inhibited by the absence of land entitlement, although claimed customarily and within their ancestral lands. Logging concession in the last decades, arrivals of migrants and further encroachment to their ancestral lands exacerbate the impacts of climate change into their lives and survival. These impacts had adversely affected their cultural practices and rights, thus, adoption of the modern techniques in fishing, farming and hunting was the alternative solutions for their communities to survive. Massive information campaign on the ill-effects of climate change, resource conservation and sustainable development and exercise of indigenous 2 people's rights are highly recommended to be implemented. This is geared to understand better the present and future impacts of climate change to these indigenous communities.

Full text available upon request to the author/s

Article title: Responses of fruit bats to habitat quantity and quality of selected forest patches in mt. kitanglad range, Bukidnon, Philippines

Authors: Richel E. Relox, Leonardo M. Florece, Enrique P. Pacardo, Nicomedes D. Briones

Publication title: Journal of Biodiversity and Environmental Sciences (JBES) 10(6):1-13, 2017

Abstract:

Mega chiropterans maintain high quality and quantity of the remaining forest ecosystem in Mt. Kitanglad Range. Hence, this study determined the different species of fruit bats in forest patches with varied quantity and quality influenced by human activities. Mist-netting technique was used comprising a total of 522 net-nights established in selected forest patches in Mt. Kitanglad Range. Results showed three Mindanao Faunal Region endemic species (*Alionycteris paucidentata*, *Ptenochirus minor* and *Megaerops wetmorei*), three Philippine endemic species (*Haplonycteris fischeri*, *Ptenochirus jagori* and *Harpyionycteris whiteheadi*), and three non-endemic species (*Rousettus amplexicaudatus*, *Macroglossus minimus* and *Cynopterus brachyotis*). There were nine species under Family Pteropodidae Order Chiroptera. Endemic species dominated the large, diverse forest areas with minimal human activities while non-endemic species inhabited the small forest areas with high level of human disturbances such as agricultural encroachment and growing population densities. The presence of highly tolerant species despite human disturbances in small forest areas would indicate a relatively degrading forest habitat that in turn, may affect the ecosystem services provided by the forest ecosystem of Mt. Kitanglad Range. Thus, endemic fruit bats were associated to large forested areas rendering high quality ecosystem services. This study suggested urgent reforestation of degraded areas to attain high forest quality and quantity and stable ecosystem services.

Full text available upon request to the author/s

Article title: Impacts of management programs to biophysical resources of Cagayan de Oro River, Northern Mindanao, Philippines

Authors: Ramon Francisco Q. Padilla, Sonnie A. Vedra, Wenceslao A. Coronado, Rodolfo B. Trinidad, Richel E. Relox

Publication title: AES Bioflux 8(3), 2016

Abstract:

The study was undertaken to determine the status of recent management programs implemented and initiated by various multi-sectoral organizations from the Local Government, NGAs, Academe, and National Agencies towards the Cagayan de Oro River resources and to its immediate community. Secondary data obtained on water quality revealed that domestic, socio-economic and cultural factors did not significantly influence on the water quality of the river, but that population growth magnifies the impact, it is also supported that *Escherichia coli* from domestic wastes is highest at downstream which is densely populated compared to upstream. Validation survey suggests that people are knowledgeable that river discharges runoff from upstream activities, and agrees that there are existing organizations and government agencies in the barangay that implement environmental programs. The river still hosts a lot of organisms, but the respondents would attest that the past conditions of the river and its resources are better compared to the present. Majority of the respondents agree that Cagayan de Oro River is already polluted. However, they have expressed intent to participate in management and conservation programs for the betterment of its resources. The benefits derived from the river are critical to the functioning of the life support system of the communities by which people are willing to pay minimum monetary value for its sustainability. Further it is recommended that management efforts must be narrowed down to the community level in order to elicit participation and because they are most knowledgeable on the status of the existing river resources. Thus, there is a need for scientific inputs for resource-based studies in order to update data and provide reliable baseline for the application of appropriate management programs, and considering reforestation efforts to also focused on riparian zones, with appropriate financial allocation and lastly, the need for inter-council agreements should be enhanced and clarified to address geographical contexts and jurisdiction on the implementation of programs.

Full text available upon request to the author/s

Article title: Assessment of flood risk and adaptation efforts of the communities of Jabonga, Agusan del Norte, Philippines 1

Authors: Emeline S. Crisologo, Richel E. Relox, Rodolfo B. Trinidad, Sonnie A. Vedra

Publication title: AES Bioflux 8(3), 2016

Abstract:

Lake Mainit is an important ecosystem shared by the provinces of Agusan del Norte and Surigao del Norte. It is the fourth largest lake in the Philippines. It plays a vital role in the lakeshore communities considering that it brings lots of beneficial uses to local people. Because of some anthropogenic activities within its headwaters, flooding incidents in Jabonga become frequent. These brought risks to people's lives and properties. This study aimed to assess the awareness level of lakeshore communities in Jabonga and its adaptation efforts. The study reveals that the people in surveyed lakeshore communities are aware of the risks brought by frequent flooding to their lives and properties however, they still prefer to settle to this identified flood hazard areas. This entails that there is a need to enhance the existing flood risk management program to lessen the vulnerability of the people settling near the lake. This is to achieve sustainability on environmental and social developments. Key Words: Lake Mainit, flood, Jabonga, awareness, ecosystem, Kalinawan River.

Full text available upon request to the author/s

Article title: Sexual Dimorphism of Flathead Mullet (*Mugil cephalus*) from Northern Mindanao Rivers Using Geometric Morphometric Analysis

Authors: Rose Ann Silos, Brent Joy Hernando, Juzavil Juario, Sheryl Patiño, Princess Angelie Casas, Jazzie D'Zeim Arreza, Angelo Responde, Sonnie A. Vedra

Publication title: International Letters of Natural Sciences 45:34-48, 2015

Abstract:

Sexual dimorphism is biologically important for determining the morphological traits of marine species. Flathead mullet (*Mugil cephalus*) was examined based on the patterns of sexual dimorphism from the two rivers in Northern Mindanao. The samples were collected from Cagayan de Oro River and Mandulog River to investigate phenotypic divergence and sexual dimorphism in two different populations of wild-caught *M. cephalus* using geometric morphology based on landmark basis. A total of 17 landmarks were identified to describe the left and right body shapes of the specimen using the TpsRelw (version 1) to obtain the warp scores of each population. Results of the Relative Warp Analysis show no significant variation in the body shape within the sexes in the respective sampling sites. Results of the discriminant function analysis (DFA) show that in Cagayan de Oro River there is no significant variation in the body shape of mullets between sexes suggesting no sexual dimorphism in the flathead mullets in Cagayan de Oro River. In contrast, Discriminant Function Analysis show that there is significant variation in body shape between sexes in Mandulog River in Iligan City suggesting presence of sexual dimorphism in the area which can be due to the presence of abundant and highly diverse predator species in Mandulog River. Sexual dimorphism can be used by fishes as an adaptive mechanism to maximize predator-escape performance and survival capacity. Furthermore, there is a significant shape variation between populations of mullets in Cagayan de Oro and Mandulog River which can be interpreted as due to geographic isolation which serves as a physical barrier on the gene pool. In conclusion, many factors could account for variation in body shape of *Mugil cephalus* including predation and biogeographical barriers.

Full text available upon request to the author/s

Article title: The Fishery Potential of Freshwater Gobies in Mandulog River, Northern Mindanao, Philippines

Authors: Sonnie A. Vedra and Pablo Ocampo

Publication title: Asian Journal of Agriculture and Development (AJAD) 11(1):95-103, 2014

Abstract:

Freshwater gobies, particularly fry and some adult species, have been used as an alternative fishery resource. Mandulog River in Iligan City, northern Mindanao, Philippines, is one of the areas known for goby-fry fishery. This study described the potentials of the goby population in Mandulog River in terms of its fishery aspects. Households along the Mandulog River were the respondents of the survey. Results show that most of the freshwater gobies were caught as alternative food while goby-fry were sold in the market. Goby fishing was done five times a year using nets and traps. The maximum catch per fishing session was one to three kilograms and

sold at more or less PHP 10 (Philippine Peso) (USD 0.23) per kilogram. Monthly income from goby fishing was from PHP 100 to PHP 200 (USD 2.35 to USD 4.71) only. Goby species such as *Sicyopterus lagocephalus*, *Oxyeleotris lineolata*, *Awaous melanocephalus*, *A. ocellaris*, *Giuris margaritacea*, and *Rhyacichthys aspro* were the preferred prey species. Findings suggest that goby fishing was not a major source of livelihood as fishers were not earning much from it. However, as a bycatch, the goby population is under threat, with their economic and ecological benefits not utilized. Destructive fishing methods such as cyanide fishing, electric fishing, and use of fine mesh nets might also adversely affect the goby population, despite being non-target species. Therefore, protection of target species from overexploitation would also benefit the goby species.

Full text available upon request to the author/s

Article title: Indigenous Goby Population in Mandulog River System and its Conservation by Communities in Iligan City, Philippines

Authors: Sonnie A. Vedra, Pablo P. Ocampo, Ayolani V. de Lara, Carmelita M. Rebancos, Enrique P. Pacardo and Nicomedes D. Briones

Publication title: Journal of Environmental Science and Management 16(2):11-18, 2013

Abstract:

Threats of water pollution, unregulated extraction of resources, and sprawling urbanization are some of the common issues of Mandulog River, a home for indigenous freshwater gobies. This study was conducted to assess the status of freshwater gobies and how the resident communities exert conservation efforts to the river and the inhabiting gobies. Standard method of collection of gobies was done. Interviews with semi-structured questionnaires were used to know the conservation measures of the residents. Ten goby species belonging to three families namely, Family Eleotridae (*Belobranchus belobranchus*), *Giuris margaritacea*, and *Oxyeleotris lineolata*, Family Gobiidae (*Awaous melanocephalus*), *Awaous ocellaris*, *Glossogobius celebius*, *Glossogobius giuris*, *Periophthalmus barbarus* and *Sicyopterus lagocephalus*, and Family Rhyacichthyidae (*Rhyacichthys aspro*), can be an alternative source of food and livelihood. They were caught by-catch, while employing some destructive fishing methods like cyanide fishing, electric fishing, and use of fine mesh nets. The awareness of the residents to the adverse impacts of water pollution, unregulated human activities, and destructive fishing had strengthened their conservation measures. A multi-stakeholder management approach is created through concerted proactive conservation measures like protection of the goby population, the river-riparian ecosystems, enhanced scientific information, and the legal intervention of the local government

Full text available upon request to the author/s

Article title: Utilization and management of electronic goods by different households in Cagayan de Oro City, Philippines

Authors: Maricel V. Cultura, Edgardo C. Aranico, Sonnie A. Vedra, Ruben F. Amparado Jr.

Publication title: AES Bioflux 5(3), 2013

Abstract:

Electronic device purchases in the Philippines are increasing due to the thriving economic situation in the country. People are buying more electrical and electronic equipment (EEE) because these are made affordable and upgraded in a fast pace. Maximum utilization of EEE leads to the increasing number of e-wastes which contain hazardous materials that may occupy huge space in the landfills. Yet, there is no such specific law on e-waste available in our country today. This study was conducted in Cagayan de Oro which is considered as one of the most progressive cities in the Philippines. The objective of this paper was to determine the amount of e-wastes generated and the management practices by the households. Only households that were willing to be interviewed and participated were considered for the study. The information on knowledge level, attitude, practice on use, EEE disposal and the quantity of e-waste generated were collected using a survey questionnaire. To guarantee the high response rate, interviews were also employed. The finding shows that mobile phones and chargers were the most utilized equipment and the most e-waste generated among the EEE's. The preferred methods of e-waste disposal by the households were the following: sell to scrap dealers, keep at home or repair. Most of the households do not know where and how to dispose in a proper manner. Moreover, there is no collection mechanism in the area. Therefore, public awareness and proper management of e-wastes are necessary to minimize disposal to landfills and prevent the adverse effects of these substances to human society and to the environment

Full text available upon request to the author/s

**DR. LUCILLE JOANNA S. BORLAZA***Earth Science*

Sex: Female

Education:

Doctor of Philosophy in Earth Science and Environmental Engineering, Inhalation Toxicology, Gwangju Institute of Science and Technology, South Korea, 2018

Master of Science in Atmospheric Science, Ateneo de Manila University, 2013

Bachelor of Science in Applied Physics major in Instrumentation, University of Santo Tomas, 2010

Field of Specialization:

Particulate matter

Air quality

Air pollution studies

Atmospheric solution

Air sampling

Aerosol Science

Aerosol Chemistry

Exposure Assessment

Health Impact Assessment

Health Risk Assessment

Researches:

Article title: Impact of COVID-19 lockdown on particulate matter oxidative potential at urban background versus traffic sites

Authors: Lucille Joanna S. Borlaza, Vy Dinh Ngoc Thuy, Stuart Grange, St'ephane Socquet, Emmanuel Moussu, Gladys Mary, Olivier Favez, Christoph Hueglin, Jean-Luc Jaffrezo and Gaëlle Uzu

Publication title: Environmental Science: Atmospheres 2023

Abstract:

In Europe, COVID-19 lockdown restrictions were first implemented in March 2020 to control the spread of the disease from the SARS-CoV-2 virus. Many studies have focused on the influence of the applied measures on pollution levels during this period, but very limited information on the oxidative potential (OP), an emerging metric of particulate matter (PM) exposure. Furthermore, most previous studies also commonly used comparative methods with historical datasets, which may not be estimating the real pollution levels without the lockdown restrictions in place. In this study, the OP of PM collected at an urban background (Grenoble, France) and traffic (Bern, Switzerland) sites were assessed using dithiothreitol (DTT) and ascorbic acid (AA) assays. These measurements were also compared with PM and black carbon (BC) mass concentrations, including the wood burning and fossil fuel fractions of BC. To obtain a more realistic pollution level, assuming there were no lockdown restrictions in place, a machine learning technique called Random Forest (RF) regression model was applied to predict a business-as-usual (BAU) level for OP, PM, and BC in both sites. This model provided a good estimate of the BAU levels, allowing a more realistic assessment of the pollution changes during the lockdown period. Results indicate a clear decrease in OP found in the traffic site, while a more modest change in OP was found at the urban background site, likely due to sustained contributions from wood burning sources for residential heating. Overall, this study confirms the major roles of both of these combustion sources on the OP levels in ambient air.

Full text available upon request to the author/s

Article title: Prenatal Exposure to PM_{2.5} Oxidative Potential and Lung Function in Infants and Preschool- Age Children: A Prospective Study

Authors: Anouk Marsal, Rémy Slama, Sarah Lyon-Caen, Lucille Joanna S. Borlaza, Jean-Luc Jaffrezo, Anne Boudier, Sophie Darfeuil, Rhabira Elazzouzi, Yoann Gioria, Johanna Lepeule, Ryan Chartier, Isabelle Pin, Joane Quentin, Sam Bayat, Gaëlle Uzu, Valérie Siroux, and the SEPAGES cohort study group

Publication title: Environmental Health Perspectives 131(1), 2023

Abstract:

Background: Fine particulate matter (PM_{2.5}) has been found to be detrimental to respiratory health of children, but few studies have examined the effects of prenatal PM_{2.5} oxidative potential (OP) on lung function in infants and preschool children. Objectives: We estimated the associations of personal exposure to PM_{2.5} and OP during pregnancy on offspring objective lung function parameters and compared the strengths of associations between both exposure metrics. Methods: We used data from 356 mother-child pairs from the SEPAGES cohort. PM filters collected twice during a week were analyzed for OP, using the dithiothreitol (DTT) and the ascorbic acid (AA) assays, quantifying the exposure of each pregnant woman. Lung function was assessed with tidal breathing analysis (TBFVL) and nitrogen multiple-breath washout (N₂MBW) test, performed at 6 wk, and airwave oscillometry (AOS) performed at 3 y. Associations of prenatal PM_{2.5} mass and OP with lung function parameters were estimated using multiple linear regressions. Results: In neonates, an interquartile (IQR) increase in OPvDTT (0.89 nmol/min/m³) was associated with a decrease in functional residual capacity (FRC) measured by N₂MBW [β = -2.26 mL; 95% confidence interval (CI): -4.68, 0.15]. Associations with PM_{2.5} showed similar patterns in comparison with OPvDTT but of smaller

magnitude. Lung clearance index (LCI) and TBFVL parameters did not show any clear association with the exposures considered. At 3 y, increased frequency-dependent resistance of the lungs (Rrs7-19) from AOS tended to be associated with higher OPvDTT ($\beta=0.09$ hPa \times s/L; 95% CI: -0.06, 0.24) and OPvAA (IQR=1.14 nmol/min/m³; $\beta=0.12$ hPa \times s/L; 95% CI: -0.04, 0.27) but not with PM_{2.5} (IQR=6.9 μ g/m³; $\beta=0.02$ hPa \times s/L; 95% CI: -0.13, 0.16). Results for FRC and Rrs7-19 remained similar in OP models adjusted on PM_{2.5}. Discussion: Prenatal exposure to OPvDTT was associated with several offspring lung function parameters over time, all related to lung volumes. <https://doi.org/10.1289/EHP11155>.

Full text available upon request to the author/s

Article title: Source apportionment study on particulate air pollution in two high- altitude Bolivian cities: La Paz and El Alto

Authors: Valeria Mardoñez, Marco Pandolfi, Lucille Joanna S. Borlaza, Jean-Luc Jaffrezo, Andrés Alastuey, Jean-Luc Besombes, Isabel Moreno R., Noemi Perez, Griša Močnik, Patrick Ginot, Radovan Krejci, Vladislav Chrastny, Alfred Wiedensohler, Paolo Laj, Marcos Andrade, and Gaëlle Uzu

Publication title: Atmospheric Chemistry and Physics 2022

Abstract:

La Paz and El Alto are two fast-growing high-altitude Bolivian cities forming the second largest metropolitan area in the country, located between 3200 and 4050 m a.s.l. Together they host a growing population of around 1.8 million people. The air quality in this conurbation is strongly influenced by urbanization. However, there are no comprehensive studies that have assessed the sources of air pollution and their impacts on health. Despite being neighboring cities, the drastic change in altitude and topography between La Paz and El Alto together with different socio-economic activities lead to different sources, dynamics and transport of particulate matter (PM). In this investigation, PM₁₀ samples were collected at two urban background stations located in La Paz and El Alto between April 2016 and June 2017. The samples were later analyzed for a wide range of chemical species including numerous source tracers (OC, EC, water-soluble ions, sugar anhydrides, sugar alcohols, trace metals, and molecular organic species). The US-EPA Positive Matrix Factorization (PMF v.5.0) receptor model was then applied for source apportionment of PM₁₀. This is the first source apportionment study in South America that incorporates a large set of organic markers (such as levoglucosan, polycyclic aromatic hydrocarbons – PAH, hopanes and alkanes) together with inorganic species. The multisite PMF resolved 11 main sources of PM. The largest annual contribution to PM₁₀ came from two major sources: the ensemble of the four vehicular emissions sources (exhaust and non-exhaust), together responsible for 35 % and 25 % of the measured PM in La Paz and El Alto, respectively, and dust contributing 20 % and 32 % to the total. Secondary aerosols contributed 22 % (24 %) in La Paz (El Alto). Agriculture-related smoke from biomass burning originated in the Bolivian lowlands and neighboring countries contributed to 8 % (7 %) of the total PM₁₀ mass annually. This contribution increased to 17 % (13 %) between August–October. Primary biogenic emissions were responsible for 13 % (7 %) of the measured PM₁₀ mass. Finally, it was possible to identify a profile related to open waste burning occurring between the months of May and August. Despite the fact that this source contributed only to 2 % (5 %) of the

total PM10 mass, it constitutes the second largest source of PAHs, compounds potentially hazardous to health. Our analysis resulted in the identification of two specific traffic-related sources. In addition, we also identified a lubricant source (not frequently identified) and a non-exhaust emissions source. This study shows that PM10 concentrations in La Paz and El Alto region are mostly impacted by a limited number of local sources. In conclusion, dust, traffic emissions, open waste burning and biomass burning are the main sources to target in order to improve air quality in both cities.

Full text available upon request to the author/s

Article title: Personal exposure to PM2.5 oxidative potential and its association to birth outcomes

Authors: Lucille Joanna S. Borlaza, Gaëlle Uzu, Marion Ouidir, Sarah Lyon-Caen, Anouk Marsal, Samuël Weber, Valérie Siroux, Johanna Lepeule, Anne Boudier, Jean-Luc Jaffrezo, Rémy Slama and the SEPAGES cohort study group

Publication title: Journal of Exposure Science & Environmental Epidemiology 2022

Abstract:

Background: Prenatal exposure to fine particulate matter (PM2.5) assessed through its mass concentration has been associated with foetal growth restriction in studies based on outdoor levels. Oxidative potential of PM2.5 (OP) is an emerging metric a priori relevant to mechanisms of action of PM on health, with very limited evidence to indicate its role on birth outcomes. Objectives: We investigated the association of OP with birth outcomes and compared it with that of PM2.5 mass concentration. Methods: 405 pregnant women from SEPAGES cohort (Grenoble area) carried PM2.5 personal dosimeters for one or two one-week periods. OP was measured using dithiothreitol (DTT) and ascorbic acid (AA) assays from the collected filters. Associations of each exposure metric with offspring weight, height, and head circumference at birth were estimated adjusting for potential confounders. Results: The correlation between PM2.5 mass concentration and [Formula: see text] was 0.7. An interquartile range increase in .. was associated with reduced weight (adjusted change, -64 g, -166 to -11, $p = 0.02$) and height (-4 mm, -6 to -1, $p = 0.01$) at birth. PM2.5 mass concentration showed similar associations with weight (-53 g, -99 to -8, $p = 0.02$) and height (-2 mm, -5 to 0, $p = 0.05$). In birth height models mutually adjusted for the two exposure metrics, the association with [Formula: see text] was less attenuated than that with mass concentration, while for weight both effect sizes attenuated similarly. There was no clear evidence of associations with head circumference for any metric, nor for [Formula: see text] with any growth parameter. Impact: PM2.5 pregnancy exposure assessed from personal dosimeters was associated with altered foetal growth. Personal OP exposure was associated with foetal growth restrictions, specifically decreased weight and height at birth, possibly to a larger extent than PM2.5 mass concentration alone. These results support OP assessed from DTT as being a health-relevant metric. Larger scale cohort studies are recommended to support our findings.

Full text available upon request to the author/s

Article title: Nine-year trends of PM 10 sources and oxidative potential in a rural background site in France

Authors: Lucille Joanna Borlaza, Samuël Weber, Anouk Marsal, Gaëlle Uzu, Véronique Jacob, Jean-Luc Besombes, Mélodie Chatain, Sébastien Conil, Jean-Luc Jarezo

Publication title: Atmospheric Chemistry and Physics 22(13):8701-8723, 2022

Abstract:

Long-term monitoring at sites with relatively low particulate pollution could provide an opportunity to identify changes in pollutant concentration and potential effects of current air quality policies. In this study, 9-year sampling of PM₁₀ (particles with an aerodynamic diameter below 10 µm) was performed in a rural background site in France (Observatoire Pérenne de l'Environnement or OPE) from 28 February 2012 to 22 December 2020. The positive matrix factorization (PMF) method was used to apportion sources of PM₁₀ based on quantified chemical constituents and specific chemical tracers analysed on collected filters. Oxidative potential (OP), an emerging health metric that measures PM capability to potentially cause anti-oxidant imbalance in the lung, was also measured using two acellular assays: dithiothreitol (DTT) and ascorbic acid (AA). The sources of OP were also estimated using multiple linear regression (MLR) analysis. In terms of mass contribution, the dominant sources are secondary aerosols (nitrate- and sulfate-rich) associated with long-range transport (LRT). However, in terms of OP contributions, the main drivers are traffic, mineral dust, and biomass burning factors. There is also some OP contribution apportioned to the sulfate- and nitrate-rich sources influenced by processes and ageing during LRT that could have encouraged mixing with other anthropogenic sources. The study indicates much lower OP values than in urban areas. A substantial decrease (58 % reduction from the year 2012 to 2020) in the mass contributions from the traffic factor was found, even though this is not clearly reflected in its OP contribution. Nevertheless, the findings in this long-term study at the OPE site could indicate effectiveness of implemented emission control policies, as also seen in other long-term studies conducted in Europe, mainly for urban areas.

Full text available upon request to the author/s

Article title: Cellulose in atmospheric particulate matter at rural and urban sites across France and Switzerland

Authors: Adam Brighty, Véronique Jacob, Gaëlle Uzu, Lucille Borlaza, Sébastien Conil, Christoph Hueglin, Stuart K. Grange, Olivier Favez, Cécile Trébuchon, and Jean-Luc Jaffrezo

Publication title: Atmospheric Chemistry and Physics 22(9):6021-6043, 2022

Abstract:

The spatiotemporal variations in free-cellulose concentrations in atmospheric particles, as a proxy for plant debris, were investigated using an improved protocol with a high-performance liquid chromatography with pulsed amperometric detection (HPLC-PAD) method. Filter samples were taken from nine sites of varying characteristics across France and Switzerland, with sampling covering all seasons. Concentrations of cellulose, as well as carbonaceous aerosol and other source-specific chemical tracers (e.g. elemental carbon, EC; levoglucosan; polyols; trace metals; and glucose), were quantified. Annual mean free-cellulose concentrations within PM₁₀ (particulate matter) ranged from 29 ± 38 ng m⁻³ at Basel (urban site) to 284 ± 225 ng

m⁻³ at Payerne (rural site). Concentrations were considerably higher during episodes, with spikes exceeding 1150 and 2200 ng m⁻³ at Payerne and ANDRA-OPE (Agence nationale pour la gestion des déchets radioactifs Observatoire Pérenne de l'Environnement; rural site), respectively. A clear seasonality, with highest cellulose concentrations during summer and autumn, was observed at all rural and some urban sites. However, some urban locations exhibited a weakened seasonality. Contributions of cellulose carbon to total organic carbon are moderate on average (0.7 %–5.9 %) but much greater during “episodes”, reaching close to 20 % at Payerne. Cellulose concentrations correlated poorly between sites, even at ranges of about 10 km, indicating the localised nature of the sources of atmospheric plant debris. With regards to these sources, correlations between cellulose and typical biogenic chemical tracers (polyols and glucose) were moderate to strong ($R_s = 0.28\text{--}0.78$, $p < 0.0001$) across the nine sites. Seasonality was strongest at sites with stronger biogenic correlations, suggesting the main source of cellulose arises from biogenic origins. A second input to ambient plant debris concentrations was suggested via resuspension of plant matter at several urban sites, due to moderate cellulose correlations with mineral dust tracers, Ca²⁺, and Ti metal ($R_s = 0.28\text{--}0.45$, $p < 0.007$). No correlation was obtained with the biomass burning tracer (levoglucosan), an indication that this is not a source of atmospheric cellulose. Finally, an investigation into the interannual variability in atmospheric cellulose across the Grenoble metropole was completed. It was shown that concentrations and sources of ambient cellulose can vary considerably between years. All together, these results deeply improve our knowledge on the phenomenology of plant debris within ambient air.

Full text available upon request to the author/s

Article title: Source apportionment of atmospheric PM₁₀ oxidative potential: synthesis of 15 year-round urban datasets in France

Authors: Samuël Weber, Gaëlle Uzu, Olivier Favez, Lucille Joanna S. Borlaza, Aude Calas, Dalia Salameh, Florie Chevrier, Julie Allard, Jean-Luc Besombes, Alexandre Albinet, Sabrina Pontet, Boualem Mesbah, Grégory Gille, Shouwen Zhang, Cyril Pallares, Eva Leoz-Garziandia, and Jean-Luc Jaffrezo

Publication title: Atmospheric Chemistry and Physics 21(14):11353-11378, 2021

Abstract:

Reactive oxygen species (ROS) carried or induced by particulate matter (PM) are suspected of inducing oxidative stress in vivo, leading to adverse health impacts such as respiratory or cardiovascular diseases. The oxidative potential (OP) of PM, displaying the ability of PM to oxidize the lung environment, is gaining strong interest in examining health risks associated with PM exposure. In this study, OP was measured by two different acellular assays (dithiothreitol, DTT, and ascorbic acid, AA) on PM₁₀ filter samples from 15 yearly time series of filters collected at 14 different locations in France between 2013 and 2018, including urban, traffic and Alpine valley site typologies. A detailed chemical speciation was also performed on the same samples, allowing the source apportionment of PM using positive matrix factorization (PMF) for each series, for a total number of more than 1700 samples. This study then provides a large-scale synthesis of the source apportionment of OP using coupled PMF and multiple linear regression (MLR) models. The primary road traffic, biomass burning, dust, MSA-rich, and

primary biogenic sources had distinct positive redox activity towards the OPDTT assay, whereas biomass burning and road traffic sources only display significant activity for the OPAA assay. The daily median source contribution to the total OPDTT highlighted the dominant influence of the primary road traffic source. Both the biomass burning and the road traffic sources contributed evenly to the observed OPAA. Therefore, it appears clear that residential wood burning and road traffic are the two main target sources to be prioritized in order to decrease significantly the OP in western Europe and, if the OP is a good proxy of human health impact, to lower the health risks from PM exposure.

Full text available upon request to the author/s

Article title: Disparities in particulate matter (PM₁₀) origins and oxidative potential at a city scale (Grenoble, France) – Part 2: Sources of PM₁₀ oxidative potential using multiple linear regression analysis and the predictive applicability of multilayer perceptron neural network analysis

Authors: Lucille Joanna S. Borlaza, Samuël Weber, Jean-Luc Jaffrezo, Stephan Houdier, Rémy Slama, Camille Rieux, Alexandre Albinet, Steve Micallef, Cécile Trébluchon, and Gaëlle Uzu

Publication title: Atmospheric Chemistry and Physics 21(12):9719-9739, 2021

Abstract:

The oxidative potential (OP) of particulate matter (PM) measures PM capability to potentially cause anti-oxidant imbalance. Due to the wide range and complex mixture of species in particulates, little is known about the pollution sources most strongly contributing to OP. A 1-year sampling of PM₁₀ (particles with an aerodynamic diameter below 10) was performed over different sites in a medium-sized city (Grenoble, France). An enhanced fine-scale apportionment of PM₁₀ sources, based on the chemical composition, was performed using the positive matrix factorization (PMF) method and reported in a companion paper (Borlaza et al., 2020). OP was assessed as the ability of PM₁₀ to generate reactive oxygen species (ROS) using three different acellular assays: dithiothreitol (DTT), ascorbic acid (AA), and 2,7-dichlorofluorescein (DCFH) assays. Using multiple linear regression (MLR), the OP contributions of the sources identified by PMF were estimated. Conversely, since atmospheric processes are usually non-linear in nature, artificial neural network (ANN) techniques, which employ non-linear models, could further improve estimates. Hence, the multilayer perceptron analysis (MLP), an ANN-based model, was additionally used to model OP based on PMF-resolved sources as well. This study presents the spatiotemporal variabilities of OP activity with influences by season-specific sources, site typology and specific local features, and assay sensitivity. Overall, both MLR and MLP effectively captured the evolution of OP. The primary traffic and biomass burning sources were the strongest drivers of OP in the Grenoble basin. There is also a clear redistribution of source-specific impacts when using OP instead of mass concentration, underlining the importance of PM redox activity for the identification of potential sources of PM toxicity. Finally, the MLP generally offered improvements in OP prediction, especially for sites where synergistic and/or antagonistic effects between sources are prominent, supporting the value of using ANN-based models to account for the non-linear dynamics behind the atmospheric processes affecting OP of PM₁₀.

Full text available upon request to the author/s

Article title: Disparities in particulate matter (PM₁₀) origins and oxidative potential at a city scale (Grenoble, France) – Part 1: Source apportionment at three neighbouring sites

Authors: Lucille Joanna S. Borlaza, Samuël Weber, Gaëlle Uzu, Véronique Jacob, Trishalee Cañete, Steve Micallef, Cécile Trébuchon, Rémy Slama, Olivier Favez, and Jean-Luc Jaffrezo

Publication title: Atmospheric Chemistry and Physics 21(7):5415-5437, 2021

Abstract:

A fine-scale source apportionment of PM₁₀ was conducted in three different urban sites (background, hyper-center, and peri-urban) within 15 km of the city in Grenoble, France using Positive Matrix Factorization (PMF 5.0) on measured chemical species from collected filters (24 h) from February 2017 to March 2018. To improve the PMF solution, several new organic tracers (3-MBTCA, pinic acid, phthalic acid, MSA, and cellulose) were additionally used in order to identify sources that are commonly unresolved by classic PMF methodologies. An 11-factor solution was obtained in all sites, including commonly identified sources from primary traffic (13 %), nitrate-rich (17 %), sulfate-rich (17 %), industrial (1 %), biomass burning (22 %), aged sea salt (4 %), sea/road salt (3 %), and mineral dust (7 %), and the newly found sources from primary biogenic (4 %), secondary biogenic oxidation (10 %), and MSA-rich (3 %). Generally, the chemical species exhibiting similar temporal trends and strong correlations showed uniformly distributed emission sources in the Grenoble basin. The improved PMF model was able to obtain and differentiate chemical profiles of specific sources even at high proximity of receptor locations, confirming its applicability in a fine-scale resolution. In order to test the similarities between the PMF-resolved sources, the Pearson distance and standardized identity distance (PD-SID) of the factors in each site were compared. The PD-SID metric determined whether a given source is homogeneous (i.e., with similar chemical profiles) or heterogeneous over the three sites, thereby allowing better discrimination of localized characteristics of specific sources. Overall, the addition of the new tracers allowed the identification of substantial sources (especially in the SOA fraction) that would not have been identified or possibly mixed with other factors, resulting in an enhanced resolution and sound source profile of urban air quality at a city scale.

Full text available upon request to the author/s

Article title: Comparison of physical and chemical characteristics and oxidative potential of fine particles emitted from rice straw and pine stem burning

Authors: Ilhwa Seo, Kwangyul Lee, Min-Suk Bae, Minhan Park, Shila Maskey, Arom Seo, Lucille Joanna S. Borlaza, Enrique Mikhael R. Cosep, Kihong Park

Publication title: Environmental Pollution 267, 2020

Abstract:

Agricultural burning and forest fires are common in Northeast Asia and contribute to the elevation of fine particulate pollution, which greatly affects air quality. In this study, chemical and physical attributes, as well as the oxidative potential of fine particles produced from rice straw and pine stem burning in a laboratory-scale chamber were determined. The burning of rice straw generated notably lower emissions of fine particles and elemental carbon (EC) than did

the burning of pine stems. The longer retention of ultrafine particles was observed for rice straw burning likely caused by this material's longer period of initial flaming combustion. Organic carbon (OC), OC/EC, K+/OC, K+/EC, Zn, and alkanolic acid were higher in the fine particles of rice straw burning, while EC, K+/Cl⁻, Fe, Cr, Al, Cu, and levoglucosan were higher for pine stem burning particles. Chemical data were consistent with a higher hygroscopic growth factor and cloud formation potential and lower amount of agglomerated soot for rice straw burning particles. Rice straw burning particles displayed an oxidative potential seven times higher than that of pine stems.

Full text available upon request to the author/s

Article title: Simultaneous Measurements of Chemical Compositions of Fine Particles during Winter Haze Period in Urban Sites in China and Korea

Authors: Minhan Park, Yujue Wang, Jiho Chong, Haebum Lee, Jiho Jang, Hangyul Song, Nohhyeon Kwak, Lucille Joanna S. Borlaza, Hyunok Maeng, Enrique Mikhael R.Cosep, Ma. Cristine Faye J. Denna, Shiyi Chen, Ilhwa Seo, Min-SukBae, Kyoung-Soon Jang, Mira Choi, Young Hwan Kim, Moonhee Park, Jong-Sik Ryu, Sanghee Park, Min Hu, and Kihong Park

Publication title: Atmosphere 11(3):292, 2020

Abstract:

We performed simultaneous measurements of chemical compositions of fine particles in Beijing, China and Gwangju, Korea to better understand their sources during winter haze period. We identified PM_{2.5} events in Beijing, possibly caused by a combination of multiple primary combustion sources (biomass burning, coal burning, and vehicle emissions) and secondary aerosol formation under stagnant conditions and/or dust sources under high wind speeds. During the PM_{2.5} events in Gwangju, the contribution of biomass burning and secondary formation of nitrate and organics to the fine particles content significantly increased under stagnant conditions. We commonly observed the increases of nitrogen-containing organic compounds and biomass burning inorganic (K⁺) and organic (levoglucosan) markers, suggesting the importance of biomass burning sources during the winter haze events (except dust event cases) at both sites. Pb isotope ratios indicated that the fraction of Pb originated from possibly industry and coal combustion sources increased during the PM_{2.5} events in Gwangju, relative to nonevent days.

Full text available upon request to the author/s

Article title: Differential toxicities of fine particulate matters from various sources
Springer Nature

Authors: Minhan Park, Hung Soo Joo, Kwangyul Lee, Myoseon Jang, Sang Don Kim, Injeong Kim, Lucille Joanna S. Borlaza, Heungbin Lim, Hanjae Shin, Kyu Hyuck Chung, Yoon-Hyeong Choi, Sun Gu Park, Min-Suk Bae, Jiye Lee, Hangyul Song & Kihong Park

Publication title: Scientific Reports 8(1), 2018

Abstract:

Fine particulate matters less than 2.5 µm (PM_{2.5}) in the ambient atmosphere are strongly associated with adverse health effects. However, it is unlikely that all fine particles are equally

toxic in view of their different sizes and chemical components. Toxicity of fine particles produced from various combustion sources (diesel engine, gasoline engine, biomass burning (rice straw and pine stem burning), and coal combustion) and non-combustion sources (road dust including sea spray aerosols, ammonium sulfate, ammonium nitrate, and secondary organic aerosols (SOA)), which are known major sources of PM_{2.5}, was determined. Multiple biological and chemical endpoints were integrated for various source-specific aerosols to derive toxicity scores for particles originating from different sources. The highest toxicity score was obtained for diesel engine exhaust particles, followed by gasoline engine exhaust particles, biomass burning particles, coal combustion particles, and road dust, suggesting that traffic plays the most critical role in enhancing the toxic effects of fine particles. The toxicity ranking of fine particles produced from various sources can be used to better understand the adverse health effects caused by different fine particle types in the ambient atmosphere, and to provide practical management of fine particles beyond what can be achieved only using PM mass which is the current regulation standard.

Full text available upon request to the author/s

Article title: Oxidative potential of fine ambient particles in various environments

Authors: Lucille Joanna S. Borlaza, Enrique Mikhael R. Cosep, Sejong Kim, Kwangyul Lee, Hungsoo Joo, Minhan Park, Daphne Bate, Mylene G. Cayetano, Kihong Park

Publication title: Environmental Pollution 243(B):1679-1688, 2018

Abstract:

The oxidative potential (OP) and chemical characteristics of fine particles collected from urban, roadside, rural, and industrial sites in Korea during spring, summer, fall, and winter seasons and an urban site in the Philippines during dry and wet seasons were examined. Significant differences in the OP of fine particles among sites and seasons were found. The industrial site yielded the highest OP activity (both mass and volume-normalized OP) among the sites, suggesting the strongest reactive oxygen species (ROS)-generating capability of industry source-dominant PM_{2.5}. Seasonal data show that OP activities increased during the spring and summer possibly due to increased heavy metals caused by dust events and secondary organic aerosols formed by strong photochemical activity, respectively. The strength of the OP association with the chemical components highlights the influence of organic carbon and transition metals on the OP of ambient fine particles. The two OP assays (dithiothreitol (DTT) and electron spin resonance (ESR)) having different ROS-generating mechanisms were found to have different sensitivities to the chemical components facilitating a complementary analysis of the OP of ambient fine particles. Multiple linear regression model equations (OP as a function of chemical components) which were dependent on the sites were derived. A comparison of the daily OP and hazard index (HI) (the ratio of the measured mass concentration to the reference mass concentration of fine particles) suggests that the HI may not be sufficient to accurately estimate the health effects of fine particles, and a direct or indirect measurement of toxicity such as OP should be required in addition to the concentration level.

Full text available upon request to the author/s

Article title: Physicochemical properties and oxidative potential of fine particles produced from coal combustion

Authors: Hung Soo Joo, Tsatsa Batmunkh, Lucille Joanna S. Borlaza, Minhan Park, Kwang Yul Lee, Ji Yi Lee, Yu Won Chang, Kihong Park

Publication title: Aerosol Science and Technology 52(11):1-11, 2018

Abstract:

The physical and chemical properties as well as the oxidative potential (OP) of water soluble components of coal combustion fine particles were examined. A laboratory-scale pulverized-coal burning system was used to produce coal combustion particles at different burning temperatures of 550 °C, 700 °C, 900 °C, and 1,100 °C. Few studies have reported the effects of burning temperature on both the chemistry and toxicity of coal combustion particles. The highest mass emission factor of particulate matter less than 2.5 µm (PM_{2.5}) was found to be produced at 700 °C (3.51 g/kg), owing to strong elemental carbon (EC) emission and ash formation (ions and elements) resulting from the incomplete combustion of tar and char, and mineral fragmentation. The highest organic carbon in PM_{2.5} was found at 550 °C. At a temperature higher than 700 °C, the fraction of carbonaceous species decreased while the fractions of ions and elements increased owing to ash formation. Sulfate was found to be the dominant ionic species, followed by sodium, calcium, and magnesium. The highest emission of elements (Al, As, Ba, Cd, Co, Cu, Fe, Mn, Ni, Pb, Sr, Ti, V, and Zn) and the highest fractions of Fe and Al were observed at 700 °C. Intrinsic OP activities obtained from dithiothreitol (DTT) and electron spin resonance (ESR) assays showed the highest values at 550 °C, suggesting that fine particles from low-temperature coal combustion had the highest reactive oxygen species generation capability (potentially toxic) among various tested burning temperatures. The results of principal component analysis suggested a correlation between OP-DTT activity and OC, EC, Cd, Co, V, and Zn, while OP-ESR activity was associated with chloride, nitrate, Ba, Pb, Sr, and Ti.

Full text available upon request to the author/s

**DARLON V. LANTICAN***Molecular Biology*

Sex: Male

Education:

Master of Science in Molecular Biology and Biotechnology, University of the Philippines Los Baños, 2018

Bachelor of Science in Agricultural Biotechnology, Molecular Makers, University of the Philippines Los Baños, 2012

Field of Specialization:

Agricultural Biotechnology

Plant Biotechnology

Plant Breeding

Plant Molecular Biology

Plant Genetics

Molecular Plant Breeding

Molecular Markers

Molecular Marker Development

Bioinformatics

Genomics

Researches:

Article title: De Novo Genome Sequence Assembly of Dwarf Coconut (*Cocos nucifera* L. 'Catigan Green Dwarf') Provides Insights into Genomic Variation Between Coconut Types and Related Palm Species

Authors: Darlon V. Lantican, Susan R. Strickler, Alma O. Canama, Roanne R. Gardoce, Lukas A. Mueller, Hayde F. Galvez

Publication title: G3-Genes Genomes Genetics 9(8), 2019

Abstract:

We report the first whole genome sequence (WGS) assembly and annotation of a dwarf coconut variety, 'Catigan Green Dwarf' (CATD). The genome sequence was generated using the PacBio

SMRT sequencing platform at 15X coverage of the expected genome size of 2.15 Gbp, which was corrected with assembled 50X Illumina paired-end MiSeq reads of the same genome. The draft genome was improved through Chicago sequencing to generate a scaffold assembly that results in a total genome size of 2.1 Gbp consisting of 7,998 scaffolds with N50 of 570,487 bp. The final assembly covers around 97.6% of the estimated genome size of coconut 'CATD' based on homozygous k-mer peak analysis. A total of 34,958 high-confidence gene models were predicted and functionally associated to various economically important traits, such as pest/disease resistance, drought tolerance, coconut oil biosynthesis, and putative transcription factors. The assembled genome was used to infer the evolutionary relationship within the palm family based on genomic variations and synteny of coding gene sequences. Data show that at least three (3) rounds of whole genome duplication occurred and are commonly shared by these members of the Arecaceae family. A total of 7,139 unique SSR markers were designed to be used as a resource in marker-based breeding. In addition, we discovered 58,503 variants in coconut by aligning the Hainan Tall (HAT) WGS reads to the non-repetitive regions of the assembled CATD genome. The gene markers and genome-wide SSR markers established here will facilitate the development of varieties with resilience to climate change, resistance to pests and diseases, and improved oil yield and quality.

Full text available upon request to the author/s

Article title: Resistance Gene Analogs of Mango: Insights on Molecular Defenses and Evolutionary Dynamics

Authors: Darlon V. Lantican, Cris Q. Cortaga, Anand Noel C. Manohar, Fe M. dela Cueva, and Maria Luz J. Sison

Publication title: Philippine Journal of Science 149(3-a):915-934, October 2020

Abstract:

Mango is an economically important fruit crop largely cultivated in the tropics and, thus, is constantly challenged by a myriad of insect pests and diseases. However, no detailed analysis of its resistance gene analogs (RGAs) has been performed, which is a vital resource for plant breeding. Here, we analyzed the RGAs of mango via de novo assembly of transcriptomic sequences and mining of the recently published whole genome sequence (WGS). From the transcriptomic assembly, a core mango RGA database with 747 protein models was established. Meanwhile, 1,775 RGAs were identified in the mango WGS and classified based on conserved domains and motifs: 54 nucleotide binding site proteins (NBS), 107 NBS – leucine rich repeat proteins (NBS- LRR), 242 coiled-coil NBS-LRR (CNL), 79 toll/interleukin-1 receptor NBS-LRR (TNL), 78 coiled-coil NBS (CN), 30 toll/interleukin-1 receptor NBS (TN), 45 toll/interleukin-1 receptor with unknown domain (TX), 133 receptor-like proteins (RLP), 917 receptor-like kinases (RLK), 83 transmembrane coiled-coil domain protein (TM-CC), and seven NBS-encoding proteins with other domains. The transcriptome- and genome-wide RGAs have been functionally well- annotated through gene ontology (GO) analysis, and their expression profiles across different mango varieties were also examined. Phylogenetic analyses of expressed and genome-wide RGAs suggest highly divergent functions of the RGAs, which were broadly clustered into 6 and 8 major clades, respectively, based on their domain classification. From the mango RGA transcripts, 134 unique EST-SSR (expressed sequence tags – simple

sequence repeat) loci were identified and primers were designed targeting these potential markers. Moreover, comparative analysis of mango with other plant species revealed 65 species-specific RGA families (396 orthologous genes) and detected 1,005 RGA gene duplication events. To date, this is the most comprehensive analysis of mango RGAs, which also provide insights into the dynamic mango- pest co-evolutionary arms race and offer a trove of markers for utilization in resistance breeding.

Full text available upon request to the author/s

Article title: Identification and characterization of genome-wide resistance gene analogs (RGAs) of durian (*Durio zibethinus* L.)

Authors: Cris Q. Cortaga, Romnick A. Latina, Rosteo R. Habunal & Darlon V. Lantican

Publication title: Journal of Genetic Engineering and Biotechnology 20(29):1-11, 2022

Abstract:

Background

Durian (*Durio zibethinus* L.) is a tropical fruit crop which is popular in Southeast Asia but recently gaining popularity in other parts of the world. In this study, we analyzed the resistance gene analogs (RGAs) of durian through mining of the currently available reference genome of its 'Musang King' cultivar (PRJNA400310).

Results

A total of 2586 RGAs were identified in the durian genome consisting of 47 nucleotide binding site proteins (NBS), 158 NBS-leucine rich repeat proteins (NL), 400 coiled-coil NBS-LRR (CNL), 72 toll/interleukin-1 receptor NBS-LRR (TNL), 54 coiled-coil NBS (CN), 10 toll/interleukin-1 receptor NBS (TN), 19 toll/interleukin-1 receptor with unknown domain (TX), 246 receptor-like proteins (RLP), 1,377 receptor-like kinases (RLK), 185 TM-CC, and 18 other NBS-containing proteins with other domains. These RGAs were functionally annotated and characterized via gene ontology (GO) analysis. Among the RGAs with the highest copies in durian genome include the putative disease resistance RPP13-like protein 1, disease resistance protein At4g27190, disease resistance protein RPS6, Probable disease resistance protein At4g27220, and putative disease resistance protein RGA3, while 35 RGAs were found to be novel. Phylogenetic analyses revealed that the genome-wide RGAs were broadly clustered into four major clades based on their domain classification.

Conclusion

To our knowledge, this is the most comprehensive analysis of durian RGAs which provides a valuable resource for genetic, agronomic, and other biological research of this important tropical fruit crop.

Full text available upon request to the author/s

Article title: Draft Genomes of Six Philippine *Erwinia mallotivora* Isolates: Comparative Genomics and Genome-Wide Analysis of Candidate Secreted Proteins

Authors: Aira F. Waje, Darlon V. Lantican, Nandita Pathania & Fe M. Dela Cueva

Publication title: Current Microbiology 79(6), June 2022

Abstract:

Erwinia mallotivora is one of the most important bacterial pathogens of papaya and causes bacterial crown rot disease in the Philippines. In this paper, we present the draft genome sequences of six Philippine *E. mallotivora* isolates to provide insights into the genes involved in host–pathogen interactions and compare their genomes to other *Erwinia* species. The genomes were sequenced using Illumina Miseq platform. The draft whole-genome assemblies of the *E. mallotivora* isolates are composed of 36–64 contigs with N50 value ranging from 285 to 332 kbp and cover 96.2–100% of the estimated genome size. Structural genome annotation of these assemblies has predicted 4489–4749 protein-coding genes. Comparative genomic analysis using orthologous gene sets led to the identification of conserved genes within the genus and species-specific gene orthologous groups, which collectively provide a baseline for functional genomic studies to determine genes affecting virulence and host specificity. Secreted proteins of *E. mallotivora* were also predicted and characterized to unravel putative genes involved in plant–pathogen interactions. This study provides the first draft whole-genome sequences of Philippine isolates of *E. mallotivora*, thus expanding the genomic knowledge for this species in comparison with other members of the genus *Erwinia*.

Full text available upon request to the author/s

Article title: Genome-wide SNP and InDel analysis of three Philippine mango species inferred from whole-genome sequencing

Authors: Cris Q. Cortaga, John Albert P. Lachica, Darlon V. Lantican & Eureka Teresa M. Ocampo

Publication title: Journal of Genetic Engineering and Biotechnology 20(46), 2022

Abstract:**Background**

The Philippines is among the top 10 major exporters of mango worldwide. However, genomic studies of Philippine mangoes remain largely unexplored and lacking. Here, we sequenced the whole genome of the three Philippine mango species, namely, *Mangifera odorata* (Huani), *Mangifera altissima* (Paho), and *Mangifera indica* “Carabao” variety using Illumina HiSeq 2500, to identify and analyze their genome-wide variants (SNPs and InDels).

Results

The high confidence variants were identified by successfully mapping 93–95% of the quality-filtered reads to the Alphonso and Tommy Atkins mango reference genomes. Using these two currently available mango genomes, most variants were observed in *M. odorata* (4,353,063 and 4,277,287), followed by *M. altissima* (3,392,763 and 3,449,917), and lastly, *M. indica* Carabao (2,755,267 and 2,852,480). Approximately 50, 46, and 38% of the variants were unique in the three Philippine mango genomes. The analysis of variant effects and functional annotation across the three mango species revealed 56,982 variants with high-impact effects mapped onto 37,746 genes, of which 25% were found to be novel. The affected mango genes include those with potential economic importance such as 6945 genes for

defense/resistance/immune response, 323 genes for fruit development, and 338 genes for anthocyanin production.

Conclusions

To date, this is the first sequencing effort to comprehensively analyze genome-wide variants essential for the development of genome-wide markers specific to these mango species native to the Philippines. This study provides an important genomic resource that can be used for the genetic improvement of mangoes.

Full text available upon request to the author/s

Article title: A novel SNP panel developed for targeted genotyping-by-sequencing (GBS) reveals genetic diversity and population structure of Musa spp. germplasm collection

Authors: Roanne R. Gardoce, Anand Noel C. Manohar, Jay-Vee S. Mendoza, Maila S. Tejano, Jen Daine L. Nocum, Grace C. Lachica, Lavernee S. Gueco, Fe M. Dela Cueva & Darlon V. Lantican

Publication title: Molecular Genetics and Genomics 2023

Abstract:

The Philippines is situated in the geographic region regarded as the center of diversity of banana and its wild relatives (Musa spp.). It holds the most extensive collection of B-genome germplasm in the world along with A-genome groups and several natural hybrids with A- and B-genome combinations. Management of this germplasm resource has relied immensely on identification using local names and morphological characters, and the extent of genetic diversity of the collection has not been achieved with molecular markers. A high-throughput and reliable genotyping method for banana and its relatives will facilitate germplasm management and support breeding initiatives toward a marker-based approach. Here, we developed a 1 K SNP genotyping panel based on filtering of high-quality genome-wide SNPs from the Musa Germplasm Information System and used it to assess the genetic diversity and population structure of 183 accessions from a Musa spp. germplasm collection containing Philippine and foreign accessions. Targeted GBS using SeqSNP™ technology generated 70,376,284 next-generation sequencing (NGS) reads with an average effective target SNP coverage of $340\times$. Bioinformatics pipeline revealed 971 polymorphic SNPs containing 76.9% homozygous calls, 23.1% heterozygous calls and 4% with missing data. A final set of 952 SNPs detected 2,092 alleles. Pairwise genetic distance varied from 0.0021 to 0.3325 with most pairs of accessions distinguished with 250 to 300 loci. The SNP panel was able to detect seven ($k=7$) genetically differentiated groups and its composition through Principal Component Analysis (PCA) with k-means clustering algorithm and Discriminant Analysis of Principal Components (DAPC). Accession-specific SNPs were also identified. The 1 K SNP panel effectively distinguishes between genomic groups and provides relatively good resolution of genome-wide nucleotide diversity of Musa spp. This panel is recommended for low-density genotyping for application in marker-assisted breeding and germplasm management, and could be further enhanced to increase marker density for other applications like genetic association and genomic selection in bananas.

Full text available upon request to the author/s

Article title: Mining and validation of novel simple sequence repeat (SSR) markers derived from coconut (*Cocos nucifera* L.) genome assembly

Authors: Reina Esther S. Caro, Jesmar Cagayan, Roanne R. Gardoce, Anand Noel C. Manohar, Alma O. Canama-Salinas, Ramon L. Rivera, Darlon V. Lantican, Hayde F. Galvez & Consorcia E. Reaño

Publication title: Journal of Genetic Engineering and Biotechnology volume 20(71), 2022

Abstract:

Background

In the past, simple sequence repeat (SSR) marker development in coconut is achieved through microsatellite probing in bacterial artificial chromosome (BAC) clones or using previously developed SSR markers from closely related genomes. These coconut SSRs are publicly available in published literatures and online databases; however, the number is quite limited. Here, we used a locally established, coconut genome-wide SSR prediction bioinformatics pipeline to generate a vast amount of coconut SSR markers.

Results

A total of 7139 novel SSR markers were derived from the genome assembly of coconut 'Catigan Green Dwarf' (CATD). A subset of the markers, amounting to 131, were selected for synthesis based on motif filtering, contig distribution, product size exclusion, and success of in silico PCR in the CATD genome assembly. The OligoAnalyzer tool was also employed using the following desired parameters: %GC, 40–60%; minimum ΔG value for hairpin loop, -0.3 kcal/mol; minimum ΔG value for self-dimer, -0.9 kcal/mol; and minimum ΔG value for heterodimer, -0.9 kcal/mol. We have successfully synthesized, optimized, and amplified 131 novel SSR markers in coconut using 'Catigan Green Dwarf' (CATD), 'Laguna Tall' (LAGT), 'West African Tall' (WAT), and SYNVAR (LAGT \times WAT) genotypes. Of the 131 SSR markers, 113 were polymorphic among the analyzed coconut genotypes.

Conclusion

The development of novel SSR markers for coconut will serve as a valuable resource for mapping of quantitative trait loci (QTLs), assessment of genetic diversity and population structure, hybridity testing, and other marker-assisted plant breeding applications.

Full text available upon request to the author/s

Article title: Comparative RNA-seq analysis of resistant and susceptible banana genotypes reveals molecular mechanisms in response to Banana bunchy top virus (BBTV)

Authors: Darlon V. Lantican, Jen Daine L. Nocum, and Noel C. Manohar, Jay-Vee S. Mendoza, Roanne R. Gardoce, Grace C. Lachica, Lavernee S. Gueco, Fe M. Dela Cueva

Publication title: Biorxiv, 2022

Abstract:

Banana is a major fruit crop in the Philippines and remains to be a large contributor to the country & prime dollar reserve. Among the main hindrances in global banana production,

diseases such as Banana bunchy top disease (BBTD) caused by BBTV can bring catastrophic loss to any banana plantation. To elucidate the resistance mechanism and understand the interplay of host factors in the presence of the invading pathogen, we implemented RNA-seq-based comparative transcriptomics analyses of mock- and BBTV-inoculated resistant (wild *M. balbisiana*) and susceptible (*M. acuminata* & Lakatan & banana genotypes. Similar patterns of expression for 119 differentially expressed genes (DEGs) were observed on both genotypes, representing the typical defense response of banana to BBTV. A set of 173 DEGs specific to the susceptible 'Lakatan' banana cultivar revealed potential host factors and susceptibility mechanisms involved in successful BBTV infection. Further, differential transcriptomic analysis revealed 268 DEGs exclusive to the resistant wild *M. balbisiana*, unraveling insights into the complex resistance mechanisms involved in BBTV defense such as pathogen perception, phytohormone action, reactive oxygen species (ROS), hypersensitive response (HR), production of secondary metabolites, and cell wall modification. The DEGs identified in this study will aid in the design of foreground markers for the precise integration of resistance genes during marker-assisted breeding programs. Furthermore, the application of these results will also enable the foreseen deployment of genome-edited banana cultivars targeting the resistance and host factor genes towards a future-proof banana industry.

Full text available upon request to the author/s

Article title: Identification of suitable internal control genes for gene expression analysis of banana in response to BBTV infection

Authors: Jen Daine L. Nocum, Anand Noel C. Manohar, Jay-Vee S. Mendoza, Fe M. Dela Cueva, Roanne R. Gardoce, Grace C. Lachica, Darlon V. Lantican

Publication title: Plant Gene 32(2):100383, September 2022

Abstract:

Banana is one of the most abundant crops produced annually in the Philippines. The presence of banana bunchy top virus (BBTV) leading to banana bunchy top disease is one of the factors hindering the continuous production of the fruit crop. The use of an appropriate and stable internal control gene as reference in validation of differentially-expressed genes in an organism is important. This study aims to identify appropriate internal control genes for differential gene expression analysis in *Musa balbisiana* and *Musa acuminata* specific for BBTV infection. RNA extraction, complementary DNA (cDNA) synthesis and RT-qPCR (quantitative real time polymerase chain reaction) of BBTV-resistant and BBTV-susceptible *Musa* genotypes were performed. The RT-qPCR quantification data were then subjected to analysis on RefFinder software and geomean ranking values were calculated along with the four statistical algorithms (delta Cq, Genorm, BestKeeper and NormFinder). Based on the comprehensive ranking values in the software, L2 gene was the most suitable internal control gene for the differential expression analysis of both BBTV-resistant and BBTV-susceptible banana accessions. The internal control gene is recommended for the validation of selected candidate resistance and host factor genes in response to BBTV infection.

Full text available upon request to the author/s

Article title: Reference-aided full-length transcript assembly, cDNA cloning, and molecular characterization of coronatine-insensitive 1b (COI1b) gene in coconut (*Cocos nucifera* L.)

Authors: Frenzee Kroeizha L. Pammit, Anand Noel C. Manohar, Darlon V. Lantican, Jen Daine L. Nocum, Roanne R. Gardoce & Hayde F. Galvez

Publication title: Molecular Biology Reports 49(3), June 2022

Abstract:

Background

In the Philippines, 26% of the total agricultural land is devoted to coconut production making coconut one of the most valuable industrial crop in the country. However, the country's multimillion-dollar coconut industry is threatened by the outbreak of coconut scale insect (CSI) and other re-emerging insect pests promoting national research institutes to work jointly on developing new tolerant coconut varieties. Here, we report the cloning and characterization of coronatine-insensitive 1 (COI1) gene, one of the candidate insect defense genes, using 'Catigan Green Dwarf' (CATD) genome sequence assembly as reference.

Methods and results

Two (2) splicing variants were identified and annotated—CnCOI1b-1 and CnCOI1b-2. The full-length cDNA of CnCOI1b-1 was 7919 bp with an ORF of 1176 bp encoding for a deduced protein of 391 amino acids while CnCOI1b-2 has 2360 bp full-length cDNA with an ORF of 1743 bp encoding a deduced protein of 580 amino acids. The 3D structural model for the two (2) isoforms were generated through homology modelling. Functional analysis revealed that both isoforms are involved in various physiological and developmental plant processes including defense response of plants to insects and pathogens. Phylogenetic analysis confirms high degree of COI1 protein conservation during evolution, especially among monocot species. Differential gene expression via qRT-PCR analysis revealed a seven-fold increase of COI1 gene expression in coconut post introduction of CSI relative to base levels.

Conclusion

This study provided the groundwork for further research on the actual role of COI1 in coconut in response to insect damage. The findings of this study are also vital to facilitate the development of improved insect-resistant coconut varieties for vibrant coconut industry.

Full text available upon request to the author/s

Article title: Species-specific PCR-based Marker for Rapid Detection of *Aspidiotus rigidus* Reyne (Hemiptera: Diaspididae)

Authors: Romnick A. Latina, Darlon V. Lantican, Michelle S. Guerrero, Edsel C. Rubico, Janice F. Laquinta, Barbara L. Caoili

Publication title: Journal of Asia-Pacific Entomology 25(3):101848, December 2021

Abstract:

The Philippine coconut production has been greatly affected by the recent devastating infestation of *Aspidiotus* spp. However, identification of the outbreak species, *Aspidiotus rigidus*, has been a challenge using morphological approaches. Molecular identification via PCR

sequencing of insect barcoding genes has been implemented, but the overall process is time-consuming and costly. Thus, we developed and optimized a species-specific PCR-based molecular marker for rapid, efficient and cost-effective molecular identification of *A. rigidus*. The molecular marker was designed based on the sequences of the partial 28S ribosomal RNA gene from species of *Aspidiotus* that feed on coconut in the Philippines, *A. rigidus*, *A. destructor* and *A. excisus*. Multiple alignment of nucleotide sequences revealed a conserved 16-bp insertion-deletion (InDel) site common to all *A. rigidus* specimens identified from which the *A. rigidus*-specific oligonucleotide (RIG1) primer targeting an approximately 570 bp fragment size was designed. Results showed that the species-specific DNA marker technology consistently delineated laboratory-reared and field-collected *A. rigidus* samples from *A. destructor* and *A. excisus*. The protocol offers a rapid and reliable method for the early detection of *A. rigidus* infestation in high-risk areas planted with coconut in the country.

Full text available upon request to the author/s

Article title: Development of Novel Coconut Ssr Markers Derived From Genome-Wide Bioinformatics Prediction

Authors: Reina Esther S. Caro, Jesmar Cagayan, Roanne R. Gardoce, Anand Noel C. Manohar, Alma O. Canama-Salinas, Ramon L. Rivera, Darlon V. Lantican, Hayde F. Galvez, Consorcia E. Reaño

Publication title: *Preprint*

Abstract:

In the past, simple sequence repeat (SSR) marker development in coconut is achieved through microsatellite probing in bacterial artificial chromosome (BAC) clones or using previously developed SSR markers from closely related genomes. These coconut SSR markers are publicly available in published literatures and online databases; however, the number is quite limited. Here, we used a locally established, coconut genome-wide SSR prediction bioinformatics pipeline to generate a vast amount of coconut SSR markers. A total of 7,139 novel SSR markers were derived from the genome assembly of coconut 'Catigan Green Dwarf' (CATD). A subset of the markers, amounting to 131, were selected for synthesis based on motif filtering, contig distribution, product size exclusion, and success of *in silico* PCR in the CATD genome assembly. OligoAnalyzer-tool was also employed using the following desired parameters: %GC: 40–60%; minimum ΔG value for hairpin loop: -0.3 kcal/mol; minimum ΔG value for self-dimer: -0.9 kcal/mol; and minimum ΔG value for hetero-dimer: -0.9 kcal/mol. We have successfully synthesized, optimized, and amplified 131 novel SSR markers in coconut using 'Catigan Green Dwarf' (CATD), 'Laguna Tall' (LAGT), 'West African Tall' (WAT), and SYNVAR (LAGT x WAT) genotypes. Of the 131 SSR markers, 113 were polymorphic among the analyzed coconut genotypes. The development of novel SSR markers for coconut will serve as a valuable resource for mapping of quantitative trait loci (QTLs), assessment of genetic diversity and population structure, hybridity testing, and other marker-assisted plant breeding applications.

Full text available upon request to the author/s

Article title: Genetic Structure and Diversity of Banana Bunchy Top Virus (BBTV) in the Philippines

Authors: Jay-Vee S. Mendoza, Fe M. dela Cueva, Cris Q. Cortaga, Anand Noel C. Manohar, Roanne R. Gardoce, Grace C. Lachica, Maricel C. Gonzales, John E. Thomas, Darlon V. Lantican

Publication title: *Preprint*

Abstract:

Banana bunchy top virus (BBTV) is an important disease of banana in the Philippines and in other banana-producing countries. This study was conducted to investigate the genetic structure and diversity of Philippine BBTV isolates which remain unexplored in the country. BBTV-infected plant tissues were sampled from banana-growing provinces (i.e., Cagayan, Isabela, Quirino, Batangas, Laguna, Rizal, Quezon, Palawan, Cebu, Leyte, and Davao del Sur) and the partial DNA-R gene of BBTV was sequenced. Analysis of all local BBTV isolates showed a nucleotide diversity (π) of 0.00721, average number of nucleotide differences (k) of 5.51984, and haplotype diversity (h_d) of 0.971. Neutrality tests using Fu's F_s and Tajima's D showed significant and highly negative values which suggest an excess number of rare alleles due to recent population expansion or from genetic hitchhiking. Haplotype network and phylogenetic analyses revealed that the local BBTV isolates were closely related to Southeast Asian (SEA) group and exhibited a monophyletic clade with distinct haplotype grouping from other SEA sequences. However, some Indonesian and Indian reference sequences were also clustered within the Philippine BBTV group suggesting sequence homology. Results also showed that the local BBTV isolates may be categorized into three major haplotype groups (HA, HB, and HC) but only the HC group remained distinct upon comparison with other Philippine and SEA reference sequences. BBTV isolates from Quezon were the most diverse while isolates from Palawan displayed low genetic diversity indices and belonged only in the HC group. The assessment of the degree of variability among Philippine BBTV isolates will provide a reference towards the development of high-throughput BBTV detection systems as well as enable to devise plant breeding strategies to manage the current BBTV spread and variations.

Full text available upon request to the author/s

Article title: Reference-Aided Full-length Transcript Assembly, cDNA Cloning, and Molecular Characterization of Coronatine-insensitive 1b (COI1b) Gene in Coconut (Cocos nucifera L.)

Authors: Frenzee Kroeizha L. Pammit, Anand Noel C. Manohar, Darlon V. Lantican, Roanne R. Gardoce, Hayde F. Galvez

Publication title: *Preprint*

Abstract:

In the Philippines, 26% of the total agricultural land is devoted to coconut production making coconut one of the most valuable industrial crop in the country. However, the country's multimillion-dollar coconut industry is threatened by the outbreak of coconut-scale insect (CSI) and other re-emerging insect pests promoting national research institutes to work jointly on developing new tolerant coconut varieties. Here, we report the cloning and characterization of coronatine-insensitive 1 (COI1) gene, one of the candidate insect defense genes, using 'Catigan

Green Dwarf' (CATD) genome sequence assembly as reference. Two (2) splicing variants were identified and annotated – CnCOI1b-1 and CnCOI1b-2. The full-length cDNA of CnCOI1b-1 was 7,919 bp with an ORF of 1,176 bp encoding for a deduced protein of 391 amino acids while CnCOI1b-2 has 2,360 bp full-length cDNA with an ORF of 1,743 bp encoding a deduced protein of 580 amino acids. The 3D structural model for the two (2) isoforms were generated through homology modelling. Functional analysis revealed that both isoforms are involved in various physiological and developmental plant processes including defense response of plants to insects and pathogens. Phylogenetic analysis confirms high degree of COI1 protein conservation during evolution, especially among monocot species.

Full text available upon request to the author/s

Article title: Transcriptome-wide analysis of expressed resistance gene analogs (RGAs) in mango

Authors: Darlon Vasquez Lantican, Cris Q. Cortaga, Anand Noel C. Manohar, Fe M. dela Cueva, Maria Luz J. Sison

Publication title: *Preprint*

Abstract:

Mango is an economically important fruit crop largely cultivated in the (sub)tropics and thus, is constantly challenged by a myriad of insect pests and diseases. Here, we identified and characterized the resistance gene analogs (RGAs) of mango from de novo assembly of transcriptomic sequences. A core RGA database of mango with 747 protein models was established and classified based on conserved domains and motifs: 53 nucleotide binding site proteins (NBS); 27 nucleotide binding site-leucine rich repeat proteins (NBS-LRR); 17 coiled-coil NBS-LRR (CNL); 2 toll/interleukin-1 receptor NBS-LRR (TNL); 29 coiled-coil NBS (CN); 4 toll/interleukin-1 receptor NBS (TN); 17 toll/interleukin-1 receptor with unknown domain (TX); 158 receptor-like proteins (RLP); 362 receptor-like kinases (RLK); 72 transmembrane coiled-coil domain protein (TM-CC), and 6 NBS-encoding proteins with other domains. The various molecular functions, biological processes, and cellular localizations of these RGAs were functionally well-annotated through gene ontology (GO) analysis, and their expression profiles across different mango varieties were also determined. Phylogenetic analysis broadly clustered the core RGAs into 6 major clades based on their domain classification, while TM-CC proteins formed subclades all across the tree. The phylogenetic results suggest highly divergent functions of the RGAs which also provide insights into the mango-pest co-evolutionary arms race. From the mango RGA transcripts, 134 unique EST-SSR loci were identified, and primers were designed targeting these potential markers. To date, this is the most comprehensive analysis of mango RGAs which offer a trove of markers for utilization in resistance breeding of mango.

Full text available upon request to the author/s

Article title: Glandular Trichome Gene-Linked SSR Marker Development for Genetic Diversity Analysis and Trait Association in 'Tambulilid' Coconut (*Cocos nucifera* L.)

Authors: Angelica Kate G. Gumpal, Darlon V. Lantican, Roanne R. Gardoce Melvin P. Dancel1, Jomari C. Domingo, Ronilo M. Bajaro, and Hayde F. Galvez

Publication title: Philippine Agricultural Scientist 102(Special Issue):64-76, December 2019

Abstract:

Massive infestation of coconut scale insect (*Aspidiotus* sp.) in major coconut growing regions in the country has caused serious damage to the coconut industry. Coconut 'Tambulilid', a Javanica variety grown in Bicol, was reported to exhibit antibiosis form of host-resistance against *Aspidiotus* sp. To further elucidate the mechanism of resistance of this variety, linked microsatellite (SSR) marker was designed, screened, and optimized to target each of the 10 candidate plant glandular trichome genes (PPO, ALS, GL3, SESQ, ETC3, CPC, GSD, TDA, COI1, TTG1) based on the coconut genome. Out of the ten SSR markers designed, eight SSRs were used to determine the extent of genetic differentiation among 30 'Tambulilid', 7 'Coco Niño', and 16 'Laguna Tall' representative individual palms. Four sub-populations could be differentiated at 0.17 similarity coefficient, validated by pairwise F-test (F_{ST}) statistics involving the heterozygosity of the 8 SSR markers. Sub-clusters containing 'Laguna Tall' individuals exhibit considerable genetic differentiation when compared with sub-clusters generally consisting of 'Tambulilid' coconut palms. Single-factor ANOVA of SSR marker genotype segregation with existing trichome density data revealed that the SSR markers linked to germacrene synthase D could be associated to the trichome density trait.

Full text available upon request to the author/s

Article title: Isolation of a CEL 1 Homolog in Tomato (*Solanum lycopersicum* L.) Fruit as a Cost-effective Endonuclease Source for Targeting Induced Local Lesions IN the Genome (TILLING) Analysis

Authors: Rochelle E. Alcasid, Maria Elizabeth B. Naredo, Darlon V. Lantican, and Hayde F. Galvez

Publication title: Philippine Journal of Science 148(3):465-472, September 2019

Abstract:

CEL 1, an endonuclease originally purified from celery, has been used in TILLING (Targeting Induced Local Lesions IN the Genome) analysis to cut the hairpin loop and single-strand DNA generated from heteroduplex of mutant and wild DNA molecules. However, one major limitation as with most mutation screening technologies and especially in a large-scale application is the availability of affordable sources of endonuclease. This study searched for CEL 1 gene homologs in tomato through Basic Local Alignment Search Tool for nucleotides (BLASTn) and relevant bioinformatics analysis in public genomic databases. Results showed that the SIENDO 1 gene (SGN Accession Number Solyc02g078910.1.1) of tomato (*Solanum lycopersicum*) has the highest homology of 78% to CEL 1 among all the *Solanum* species. As annotated, the SIENDO 1 gene has a genome sequence length of 2.182 Kb and consisting of eight and nine intron-exon sequences, respectively. For molecular confirmation, polymerase chain reaction (PCR) primers were designed to target the conserved gene region of SIENDO 1. The amplification and specificity of these primers were further verified first by in silico PCR prior to synthesis. The designed SIENDO 1-specific DNA marker has successfully amplified the target gene in five tomato varieties in actual wet-laboratory PCR experiments. Interestingly, the designed marker was able to cross-amplify orthologous regions (candidate regions of nuclease

PA3, TIGR LOC_Os04g54390) in Nipponbare and IR64 rice varieties. Once validated using a wide-range of crop species, the developed SIENDO 1-specific DNA marker can be potentially used in rapid detection of gene homologs in other plants. The isolation of the SIENDO 1 enzyme was also done using a modified protocol for CEL 1 isolation in celery. Through preliminary EcoTILLING with rice positive control samples, the purified SIENDO 1 from unripe fruits of non-transgenic tomato was confirmed to have the same mutation cleavage specificity as that of the CEL 1 endonuclease. Unlike celery, tomato fruits are readily available in any vegetable market, shop, or store in the Philippines. Likewise, they can easily be grown in greenhouse and field production.

Full text available upon request to the author/s

Article title: Genome-guided Molecular Characterization of Oil Genes in Coconut (*Cocos nucifera* L.)

Authors: Anand Noel C. Manohar, Darlon V. Lantican, Melvin P. Dancel, Don Emanuel M. Cardona, Alissa Carol M. Ibarra, Cynthia R. Gulay, Alma O. Canama, Roanne R. Gardoce, and Hayde F. Galvez

Publication title: Philippine Journal of Science 148(S1):183-191, March 2019

Abstract:

Coconut oil is a major source of medium chain fatty acids (MCFAs), which are health-promoting plant compounds. The MCFAs of coconut oil have been reported to exhibit various health properties such as antioxidant, antibacterial, antiviral, and cardiovascular benefits brought about by the multi-functionality of these complex MCFAs. Six (6) candidate genes involved in oil and MCFA synthesis were identified in the general seed oil biosynthetic pathway. The candidate gene sequences were mined using local BLAST in the coconut genome assembly constructed based on 15× PacBio® and 50× Illumina® MiSeq sequence reads of CATD coconut variety. Scaffolds harboring the candidate genes were mapped based on sequence homology alignment. Gene structures of all genes were elucidated using evidence-based and ab initio prediction algorithms. The coding DNA sequences of KasII and KasIII in coconut were characterized. These MCFA genes have not been characterized nor reported in coconut. Gene-specific PCR primers were designed targeting the coding regions of each gene. PCR conditions were optimized to mine natural allele variants across 48 established coconut varieties in the Philippines through EcoTILLING (Ecotype Targeting Induced Local Lesions IN Genomes). A single nucleotide polymorphism (SNP) on the lysophosphatidic acid acyltransferase genes (LPAAT) was detected in the 'West African Tall' (WAT) and 'Aguinaldo Tall' (AGDT) varieties. The partial LPAAT gene sequences of WAT and AGDT were cloned and sequenced in order to characterize the SNP. Based on the identified SNPs, robust DNA markers may be developed for high-throughput screening and selection of favorable alleles in genomics-assisted coconut breeding for outstanding high-quality oil producing varieties.

Full text available upon request to the author/s

Paper Presentation:

Article title: Genomics in Coconut Towards Insect Resistance Breeding

Authors: Hayde Galvez, Darlon Vasquez Lantican, Maria Luz Josue Sison, Roanne Gardoce
Conference title: 14th Quadrennial Congress of the International Association for Plant Biotechnology (IAPB)At: Dublin, Ireland, 2018

Article title: Genome-guided characterization of medium-chain fatty acid (MCFA) genes in coconut (*Cocos nucifera* L.) towards marker-assisted breeding

Authors: Anand Noel C. Manohar, Darlon Vasquez Lantican, Darlon Vasquez Lantican, Don Emanuel Mendoza Cardona

Conference title: 48th CSSP Scientific ConferenceAt: La Piazza Hotel, Legazpi City, Philippines, 2018

Article title: Coconut Genetics and Genomics for Host Insect Resistance

Authors: Hayde Galvez, Darlon Vasquez Lantican, Maria Luz Josue Sison, Roanne Gardoce

Conference title: Plant and Animal Genome Conference XXVIAt: Town and Country Hotel, San Diego, California, 2018

Article title: The Coconut Genome: Providing a Reference Sequence Towards Coconut Varietal Improvement

Authors: Darlon Vasquez Lantican, Susan R Strickler, Alma O. Canama-Salinas, Roanne Gardoce

Conference title: Plant and Animal Genome Conference XXVI At: Town and Country Hotel, San Diego, California, 2018

Article title: Host resistance screening in coconut against the invasive coconut scale insect, *Aspidiotus rigidus* Reyne (Hemiptera: Diaspididae)

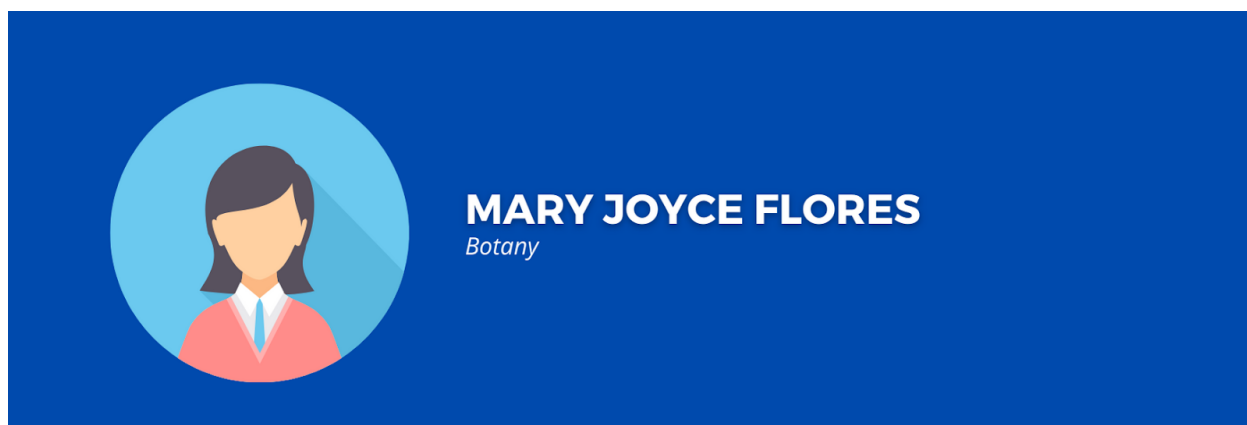
Authors: Maria Luz Josue Sison, Don Serville Del Rosario Reynoso, Joseph P. Lagman, Cris Q. Cortaga

Conference title: 49th Pest Management Council of the Philippines, Inc. (PMCP) Scientific ConferenceAt: Crown Regency Resort and Convention Center, Boracay Island, Malay, Aklan, Philippines, 2017

Article title: Development of Tomato Non-Host to Tomato Virus through Targeted Mutagenomics and Bioinformatics Approaches

Authors: Hayde Galvez, Roland Schafleitner, Alma O. Canama-Salinas, Reynaldo B. Quillooy, et al

Conference title: 44th Tomato Breeders Round Table (TBRT) MeetingAt: Chiang Mai, Thailand, 2013



Sex: Female

Education:

Doctor of Philosophy in Environmental Science, University of Los Baños, 2010

Fields of Specialization

Biodiversity

Conservation

Researches:

Article title: Mapping Hotspots of Human Impact on Native Dendroflora Biodiversity in Cebu Island, Philippines

Authors: Isabella Pauline L. Quijano, Mary Joyce L. Flores, and Chito L. Patiño

Publication title: Philippine Journal of Science 150(S1):455-466, March 2021

Abstract:

The continuing pressure on the natural environment exerted by human activities such as land conversion has been threatening to drive tens of thousands of species to extinction globally for decades. Species conservation requires identifying species ranges impacted by threats, which helps predict localized extirpations and potential extinctions. This paper assessed the human pressures that threaten the local biodiversity in Cebu Island, Philippines, to help prioritize actions to manage and mitigate human impacts on local biodiversity. Hotspots, where modeled dendroflora species richness is compromised, were identified through a spatial overlay of pre-defined high-resolution human pressure variables. A notable observation was that the largest and only protected KBA-the Central Cebu Protected Landscape (CCPL)-had the highest percentage occurrence of medium to high threats within its boundaries, which could be attributed to its proximity to highly populated municipalities and cities. More importantly, possible areas of refuge for key species were identified. These areas could be appropriated as local restoration sites by the local government units of Mt. Lanaya and Nugas forest in the south of Cebu since these KBAs had high dendroflora richness but with less occurrence of high threats. The resulting maps could also be used as important references for targeted conservation

management programs to help mitigate the threats that are driving local species to their decline and for preemptive planning of local and national conservation agenda.

Full text available upon request to the author/s

Article title: Effect of the MV St. Thomas Aquinas Oil Spill on Zooplankton Composition and Abundance in Mactan Island, Cebu, the Philippines

Authors: Mary Joyce L. Flores, Judith R. Silapan, and Brisneve Edullantes

Publication title: Journal of Nature Studies 19(1), July 2020

Abstract:

A survey of zooplankton composition and abundance was conducted on four nearshore waters last May 2014, 9 months after the oil spill by the passenger vessel "MV Saint Thomas Aquinas." Samples from three sites hypothesized to represent different degrees of oil contamination along the south coast of Mactan Island in Cebu, the Philippines were compared with those from the reference site in Dalaguete, Cebu. A total of six phyla with over 15 species and a density of 630 individuals/L of micro-and mesozooplankton were identified where ciliates specifically aloricates coming out as the most numerous. The average zooplankton density in the reference site (mean=143) differed significantly ($p=0.04$) from zooplankton density observed in S2 (mean=12.33), a moderately affected site. The aloricate ciliates, the copepods, and the zooplankton eggs were evident in all the sites. Although there was no significant spatial variation ($p<0.05$), the aloricates were more abundant in the unaffected and lesser affected sites. The copepods ($p<0.01$) and zooplankton eggs ($p=0.03$ and $p<0.01$) appeared to be good zooplankton predictors for the effects of the oil spill in this study as they have significantly higher abundance in the unaffected and least affected sites while controlling for other factors. Further investigation is recommended to monitor the temporal dynamics of the zooplankton population and abundance taking into consideration other intervening factors such as physicochemical factors, trophic relationships especially with bacteria, as well as the organisms' physiology, behavior, life stages, and sizes. The use of ratios of abundances or other indices can also be explored. Regular monitoring is strongly suggested especially in areas where the probability of oil spills is high and data is absent.

Full text available upon request to the author/s

Article title: Analyzing the Status of Mango Trees in Brgy. Cantipay, Carmen, Cebu Using Ndvi and Time Series Clustering

Authors: R. B. Navaja, F. P. Campomanes, C.L. Patiño, M. J. L. Flores

Publication title: The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences 42(4), December 2019

Abstract:

The Department of Agriculture – Region VII reports that many mango orchards in Cebu province are dying because of the absence of required post-harvest attention. Lacklustre yields and erratic pest infestations have driven some farmers and growers to abandon mango orchards. To help revive low-yielding mango orchards, there is a need to distinguish actively bearing mango trees from those that remain dormant throughout the year. Using remote sensing techniques,

mango trees from separate orchards in Brgy. Cantipay, Carmen, Cebu were mapped and studied using multi-temporal Sentinel-2 data (from January 2018 through May 2019). Prior to that, a field visit was conducted to survey the area using UAVs and field observation, and in the process, was able to identify an abandoned mango orchard. Pixel-based Normal Difference Vegetation Index (NDVI) values were extracted from each of the 822 geotagged mango trees with an average of 16 trees among 53 divisions. Time series were derived from the average of the NDVI values from each division and plotted per month of extraction from oldest to latest. Clustering was applied to the time series data using Hierarchical Clustering with Ward's Minimum Variance as an algorithm to determine the divisions with the closest time series. Using the resulting dendrogram as basis, two major clusters were selected based on the value of their distances with each other: Cluster 1 containing 29 Divisions, and Cluster 2 containing 24 Divisions. Cluster 1 contains most of the Divisions in and around the biggest active mango orchard. In contrast, Cluster 2 contains most of the Divisions that are in and around the previously identified abandoned mango orchard. An alternative dendrogram was also created by using Complete Linkage algorithm in Hierarchical Clustering, after which 3 relevant clusters were selected. The second dendrogram highlights the stark difference between Division 1, contained in Cluster 3, from the rest of the other clustered divisions at 2.17 units from the next closest one. Notably, Division 1 is located smack in the middle of the abandoned orchard. The remaining clusters, Cluster 2 with 21 divisions containing most of the divisions in the abandoned orchard, is 2.46 distance units away from Cluster 1, which has 31 and hosting most of the divisions in the active mango orchards. Two major clusters emerged from using the two algorithms. Divisions with higher and more variant NDVI values seemed to come from the mango trees which were more active during the fruiting cycle. Divisions from the abandoned mango orchards were observed to have lower and less varied NDVI values because of minimal activity in the trees. Other Divisions clustered under the abandoned orchard could have been juveniles based on their size.

Full text available upon request to the author/s

Article title: Geospatial ecological first corridor modelling in the Mount Lantoy key Biodiversity Area

Authors: I. P. Quijano, M. J. L. Flores, and A. B. Malaki

Publication title: The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences XLII-4/W19, 2019

Abstract:

In biodiversity conservation, ecological corridors are assumed to increase landscape-level connectivity and to enhance the viability of otherwise isolated wildlife populations. Mapping these corridors serves as a feasible method to support forest management efforts in pinpointing areas to give special attention to. Here, we assess the current forest presence in the 3,000 hectare Mt. Lantoy, Key Biodiversity Area in Argao, Cebu and present potential forest corridors that could enhance the canopy cover of the current protected area. We present a method to map the potential corridors through the identification of the forest patches obtained from the global forest cover dataset and the creation of a species distribution model for the black shama, an endemic bird species in Cebu island and a great biodiversity indicator for the area. Our

ecological corridors were acquired through the sum of the cost distance rasters obtained from the weighted overlay and cost surface tools of the black shama habitat suitability model. With the obtained corridors from the study, four potential forest corridors/ extensions were identified connecting five different forest patches. These corridors have areas that range from 0.47–2.17 square kilometers, with a potential to increase the forest cover in the KBA to more than 33% after corridor modelling.

Full text available upon request to the author/s

Article title: Monitoring Vegetation Cover Change Using Vegetation Indices in Tangbo River, Barangay Tangbo, Samboan

Authors: J. S. Yang, F. P. Campomanes, C. L. Patiño, and M. J. L. Flores

Publication title: The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences XLII-4/W19, 2019

Abstract:

Tangbo River is an important resource in Cebu's southern town of Samboan for being the site of Aguinid Falls, a known tourist destination. Monitoring the changes in the river's riparian vegetation is important since it has impacts on its ecological role of helping maintain biodiversity and river water quality. This study aims to detect vegetation index changes along the Tangbo River corridor using three vegetation indices: NDVI, EVI, NDMI, and Tasseled Cap indices, specifically for the years 1998, 2004, 2009, 2016, and 2019. It also aims to monitor the changes in NDVI and EVI values alongside tourism arrivals in Aguinid in 2018. Cloudless Landsat 5 (1998, 2004, 2009, and 2016) and Landsat 8 (2019) imagery were selected. Thirty reference points were plotted along the river with a 30-m distance between each point. Vegetation Indices (VI) and Tasseled Cap values were generated using data from these points and were compared for each selected year. NDVI and EVI values from the same reference points used in Landsat were generated from selected cloudless months of 2018 Planetscope imagery. Inbound tourist records were acquired from the tourism office of Samboan and the tourism arrivals for the year 2018 was then graphed with the Planetscope VI values for better visualization. Landsat imagery showed that there was a general upward trend in the vegetation indices from 1998 to 2019. Tasseled Cap Greenness and Wetness showed an increase in values from 1998–2019 while Tasseled Cap Brightness showed the opposite. Results from Planetscope data for the year 2018 showed that there was an inverse pattern between NDVI and tourism arrivals. Tourism arrivals peaked during the months of April and May based on annual records, while VI values dropped. On the other hand, both VI values peaked towards the last quarter of the year while tourist numbers dropped. This suggests that the pattern of VI values and tourism arrivals seemed to be influenced by seasonal changes rather than with each other. Findings from the study shows that further data collection is required to be able to establish a relationship between tourism and vegetation index values.

Full text available upon request to the author/s

Article title: Runoff Estimation Using SCS Runoff Curve Number Method in Cebu Island

Authors: F. C. Cayson, C. L. Patiño, and M. J. L. Flores

Publication title: The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences XLII-4/W19, 2019

Abstract:

Cebu, with its growing development and increasing demand for water, needs tools and inputs to efficiently understand and manage its water resources. Rainfall runoff models were developed to model surface runoff which may be used to assess water availability. Soil Conservation System (SCS) Runoff Curve Number (CN) method predicts runoff based on an empirical curve number for ungauged watersheds. This study aims to estimate the amount of runoff for the catchments of Cebu Island using the SCS-CN Runoff technique. The data needed for the application of the method in this study were rainfall distribution data, land use/land cover and soil texture for curve number assignment, LiDAR DEM for the delineation of the catchments, and supporting runoff measurements from a different runoff estimation model for assessment of the results. The collected data were prepared by assigning the mean statistics of the rainfall distribution and the composite curve number for each catchment using Geographic Information System (GIS). The calculation of the runoff was also done using the same framework. Maps representing Cebu Island's catchments' runoff estimates were produced. Since observed runoff data were unavailable, the results were verified by comparing the SCS-CN estimated runoff to the results of a physically-based distributed hydrologic and hydraulics modelling software, FLO-2D. The SCS-CN estimations were found to coincide with the FLO-2D runoff estimates based on various statistical assessments. Although the results may have higher uncertainties due to the unavailability of observed runoff data, the SCS-CN Runoff method provided relevant results to that of a complex simulation model. Thus, the method may be applied to estimate runoff of ungauged catchments of Cebu Island, the results of which could provide relevant information for water resource management.

Full text available upon request to the author/s

Article title: Effects of Environmental Factors and Alien Plant Invasion on Native Floral Diversity in Mt. Manunggal, Cebu Island, Philippines

Authors: Jake Joshua Chi Garces and Mary Joyce Lapa Flores

Publication title: Current World Environment 13(3):390-402, December 2018

Abstract:

The status of native floral diversity in Mt. Manunggal, Cebu Island, the Philippines in relation to environmental factors and alien plant invasion has not been recorded and published. To assess factors influencing native plant communities in Mt. Manunggal, a vegetation survey of native and alien plants, as well as selected environmental variables at two sites (Site 1- invaded plot; Site 2- adjacent uninvaded plot) were measured, and anthropogenic disturbances observed using a t-test, regression analysis, and Pearson correlation. For each site, selected environmental parameters, as well as native and alien plant abundance and diversity, were determined last October-November, 2016. There was also a characterization of sites with respect to anthropogenic disturbances. Altitude ($t = -14.11$, $p = 0.000$), soil temperature ($t = 2.68$, $p = 0.014$), and light intensity ($t = -2.61$; $p = 0.016$) significantly differed between study sites due to the complex topography and geology of Mt. Manunggal, the variation in floral cover, and degree of

anthropogenic activities. Among all environmental factors at both sites, altitude was highly positively correlated to alien plant abundance ($r=0.709$; $p=0.000$) at Site 1 while native plant abundance at Site 2 was negatively correlated with soil pH ($r=-0.579$; $p=0.003$). There was an apparent domination of alien plants in terms of species richness and abundance at both sites and this could have significantly affected native plant abundance. The strong correlation of environmental parameters to alien plant invasion could favor the continued dominance of alien plant species, resulting in a further decrease of native species.

Full text available upon request to the author/s

Article title: Abundance and population profile of *Helicostyla daphnis* (Stylommatophora: Bradybaenidae), an endemic snail of Cebu, Philippines

Authors: Mary Joyce L. Flores

Publication title: Journal of Biodiversity and Environmental Sciences (JBES) 5(1): 477-491, 2014

Abstract:

Helicostyla daphnis is a tree snail endemic to Cebu, Philippines. The study aimed to survey and compare the abundance and population profile (by age category) of *Helicostyla daphnis* in North Cebu and South Cebu in relation to season and other physicochemical factors. Sampling was done twice between April and September 2013. For snail sampling, a standardized direct search equivalent to a two-hour sampling effort in a total of eighteen quadrats in six sites was used. Elevation, air temperature, relative humidity, surface soil pH, and soil exchangeable calcium were measured on each quadrat. Independent t-test and Pearson correlation were used to relate abundance to the physicochemical variables. Snail abundance was significantly higher ($p<0.01$) during the dry season (dry=783 snails; wet=436). South Cebu had higher total abundance (dry = 477; wet = 284) compared to North Cebu (dry = 306; wet = 152). Adult snails dominated at 87% of total abundance during the dry season and 74% during the wet season. Neonates were present only during the wet season, contributing 5% to total abundance. The presence of eggs in both seasons could mean year-round reproduction; but increased egg abundance and significant presence of neonates imply higher reproductive activity during the wet season. Relative humidity and air temperature were the identified major determinants of abundance as they affect the species' ability to avoid desiccation stress. The rate of harvesting of *H. daphnis* cannot also be ruled out as a factor affecting abundance between location.

Full text available upon request to the author/s

Article title: Effects of physicochemical factors and the local ecological knowledge on the population of *Helicostyla daphnis* (Broderip, 1841) in Borbon and Sogod, Cebu, Philippines

Authors: Funesto, E.G.M. and Flores, M.J.L.

Publication title: Applied Ecology and Environmental Research 15(3):1455-1471, June 2017

Abstract:

Helicostyla daphnis (Broderip, 1841), an arboreal edible snail endemic to Cebu, Philippines that was thought to be extinct, was discovered to be still thriving. To formulate strategies for conservation of *H. daphnis*, a survey of selected physicochemical parameters and local

ecological knowledge (LEK) that could affect its population was conducted. On each the three sites, physicochemical parameters were measured and a standardized direct search method for snails was used. LEK was gathered among fifteen snail-hunting experts. Snail total abundance significantly varied across sites in the dry season ($p=0.006$), being highest at Site 1(private property), and least in at Site 2 (tree plantation). Snails were found to be more abundant in the dry season than the wet (dry=306; wet=152) but significant only at Site 1. Adult snails were the most dominant among the age categories in both the dry and wet seasons. Neonates, comprising 5% of the sampled population, were found only in the wet season. Relative humidity and air temperature were the major determinants of the total abundance. However LEK gathered pointed out that overharvesting and habitat destruction could be major contributors as well. *Ficus leucantatoma*, *Buchananiaar borescens* and *Artocarpus heterophyllus* are the vegetation most preferred by *H. daphnis*, according to LEK.

Full text available upon request to the author/s

Article title: Assessment of the Water Quality of Buhisan, Bulacao and Lahug Rivers, Cebu, Philippines Using Fecal and Total Coliform as Indicators

Authors: Eukene Bensig , Mary Joyce Flores and Fleurdeliz Maglangit

Publication title: Current World Environment 9(3):570-576, December 2014

Abstract:

This study was conducted to evaluate and compare the water quality of Buhisan, Bulacao and Lahug rivers in Cebu, Philippines using coliforms as indicators. Monthly sampling started from November 2011 to April 2012 in the upstream, midstream and downstream stations. The multiple tube fermentation technique was used for the analysis of coli forms. High total and fecal coli form counts were observed in the three rivers from February to April, but the difference in values across time was not significant. Fecal coli form counts of Buhisan and Bulacao rivers differed significantly across sampling stations. This was most likely due to the low fecal coli form (FC) values in the upstream compared with the midstream and downstream. The generally high FC and TC levels throughout the sampling period confirmed the presence of fecal pollution in the rivers. Organic pollution and the presence of coli forms could be related to the accumulation of waste water due to high impact human activities across the river networks. It is therefore recommended to conduct an inventory and monitor non-point sources of water pollution, establish waste water treatment measures and enforce policies for river protection.

Full text available upon request to the author/s

Article title: Fecal and Coliform Levels as Indicative Factors in Deteriorationof the Water Quality of Lahug River, Cebu City, Philippines

Authors: Eukene O. Bensig, Mary Joyce Lapa Flores, Fleurdeliz Maglangit

Publication title: IAMURE International Journal of Ecology and Conservation 10(1), October 2014

Abstract:

The use of surface waters such as rivers for domestic, agricultural andindustrial purposes have made them vulnerable to pollution leading to impairedwater quality. The water quality of Lahug

River in Cebu City was evaluated using coliforms as indicators, in relation with physicochemical parameters such as biological oxygen demand (BOD), conductivity, dissolved oxygen (DO), nitrate, pH, phosphate, salinity, temperature, total dissolved solids (TDS) and total suspended solids (TSS). Sampling was done once a month from November 2011 to April 2012 in three stations covering the upstream, midstream and downstream. The multiple tube fermentation technique was used for the analysis of coliforms. The level of these indicator bacteria increased from the upstream towards the lower reaches of the river especially in the months of February to April; however, the difference in values across time was not significant. This implies that there was a continuous fecal pollution in the river. There were no statistically significant correlations between FCs and TCs with the physicochemical parameters. A negative relationship was observed among FCs and TCs with pH, TSS, DO and nitrate ($p > 0.05$). These results suggest the presence of sewage and organic pollutants in the river. Keywords: Aquatic Ecology, water quality, coliform, physicochemical parameters, experimental design, Philippines
Full text available upon request to the author/s

Article title: An Assessment of the Physicochemical Parameters of Mananga River, Cebu, Philippines

Authors: Mary Joyce Lapa Flores

Publication title: IAMURE International Journal of Ecology and Conservation 4:34-61, October 2012

Abstract:

The Mananga River today is a source of potable water to meet the demands of a fast growing Cebu metropolis. The physicochemical parameters of Mananga River were studied to assess its water quality status. Six sample collections were done from February to December 2006 in 3 monitoring stations covering the upstream (S1), midstream (S2) and downstream (S3) of Mananga River. Results showed significant spatial variation ($p < 0.05$) in the studied physicochemical parameters except for alkalinity, total phosphates and nitrate-nitrogen ($\text{NO}_3\text{-N}$). Significant temporal variation ($p < 0.05$) was also observed for the factors except for stream width, biological oxygen demand (BOD_5) and total suspended solids (TSS). Flow velocity showed significant positive correlation with discharge, pH, DO and $\text{NO}_3\text{-N}$, and negative correlation with water temperature and TSS. Water temperature correlated negatively with DO and pH, and positively with TSS, with the latter showing a positive correlation with BOD_5 . The results implied that water currents play a major role in the distribution of dissolved substances and the suspension of sediments. Water quality of the studied segments of Mananga River progressively decreased downstream and was more pronounced during the dry periods. Results also indicated that the river was receiving loads of organic matter from natural and anthropogenic sources.

Full text available upon request to the author/s

Article title: Macroinvertebrate composition, diversity and richness in relation to the water quality status of Mananga River, Cebu, Philippines

Authors: Mary Joyce Lapa Flores and Macrina Zafaralla

Publication title: Philippines Science Letters 5(2), 2012

Abstract:

The water quality of Mananga River was assessed between February and December 2006 using selected physicochemical factors in combination with macroinvertebrate composition and diversity indices. Three sampling stations, each 100 m long, were established. Alkalinity, total phosphates and nitrate-nitrogen were similar in all sampling stations. The significant variation in stream depth, width and stream bed profile resulted in diminishing velocity but increasing discharge downstream. These physical characteristics led to increased total suspended solids, water temperature, and biological oxygen demand, but decreased pH and dissolved oxygen levels downstream. The physicochemical factors influenced the composition and diversity of macroinvertebrates in Mananga River. A total of 37 families representing 15 orders were recorded. Aquatic insects (Class Hexapoda) made up 58.6% of total abundance followed by the gastropods (Class Gastropoda) at 39.9%. The order Ephemeroptera of Hexapoda had the highest abundance (47.6% of total) and highest richness (6 families). Family Thiaridae was the most persistent and the most abundant macroinvertebrate taxa followed by Caenidae. Almost all taxa were represented in the upper stations, except for Neritidae, Grapsidae and Nereididae, which were limited to the downstream station. Macroinvertebrate richness and diversity were significantly higher in the upper stations, but there was an apparent lack of seasonal variation. Signs of increasing water quality deterioration were evident in the results of the physicochemical analyses, and validated by the diversity index where the upper stations came out as moderately polluted, and the downstream station as moderately to highly polluted.

Full text available upon request to the author/s

**DR. RIO JOHN DUCUSIN***Veterinary Medicine***Sex:** Male**Education:**

Doctor of Philosophy in Veterinary Internal Medicine, Obihiro University of Agriculture and Veterinary Medicine, 2003

Field of Specialization:

Phagocytosis
Gross Anatomy
Cattle Milk
Animal Production
Ruminant Medicine
Therigenology

Researches:

Article title: Detection of reston ebolavirus from pigs slaughtered in selected abattoirs of Laguna, Philippines using real time RT-PCR

Authors: Sokom Kong, BS, MS, Loinda R. Baldrias, DVM, MVS, PhD2, Rio John T. Ducusin, DVM, MAgr, PhD, Michelle Grace V. Paraso, DVM, MSc, PhD and Arman M. Parayao, BS, MS

Publication title: Philippine Journal of Veterinary Medicine 55(2):141-146, 2018

Abstract:

Detection of Reston ebolavirus (REBOV) was conducted in 384 blood samples from pigs raised and slaughtered in Laguna province which were collected at randomly selected ten (43.5%) out of the total 23 slaughterhouses in Laguna province. The slaughterhouse in Sta. Cruz had the highest number of pigs tested (107, 27.86%), while the lowest number of samples (4, 1.04%) was from the San Pablo slaughterhouse. Females had a slightly higher number, 194 (50.52%) compared to males (190, 49.48%). Blood samples came from pigs from commercial farms registering the highest number of samples at 242 (63.02%), whereas 142 (36.98%) samples came from small-hold farms. In terms of age, 373 (97.14%) were <20 months, 6 (1.56%) animals were aged 41-60 months, and only 5 (1.30%) were aged 21-40 months. The RNA

extracted from the sera of these blood samples was subjected to real-time RT-PCR test to detect and profile the occurrence of REBOV. With reference to the sampled population of swine raised and slaughtered in Laguna, no Reston ebolavirus was detected.

Full text available upon request to the author/s

Article title: Anthelmintic efficacy of jackfruit (*Artocarpus heterophyllus* L.) and tamarind (*Tamarindus indica* L.) leaves decoction against gastrointestinal nematodes of goats

Authors: Julianne Maria Undine Paz A. Hurtada, Billy P. Divina and Rio John T. Ducusin

Publication title: Philippine Journal of Veterinary Animal Science 38(2):157-166, 2012

Abstract:

Reports of increasing anthelmintic resistance to chemical dewormers used in goat farming necessitate research on alternative anthelmintics. The study was conducted to evaluate the efficacy of jackfruit and tamarind leaves decoction as alternative anthelmintics and to determine the mean effective dose (ED 50) of the different concentrations against larval development of gastrointestinal nematodes in goats. Fecal slurries with prepared decoctions at different concentrations were inoculated with 100 nematode eggs, then incubated at room temperature for seven days. Larvae were collected, enumerated and identified. Four genera of gastrointestinal nematodes were identified, namely, *Trichostrongylus* spp., *Oesophagostomum* spp., *Haemonchus* spp. and *Bunostomum* spp. Results showed that at increasing concentrations of jackfruit and tamarind leaves decoctions, the number of larvae killed increased. Both jackfruit and tamarind decoctions showed high efficacy in killing nematode larvae at high concentrations. ED50 was at 40% concentration for both decoctions. The results suggest that decoctions of jackfruit and tamarind leaves can be used as anthelmintics in goats.

Full text available upon request to the author/s

Article title: Anatomy of the Intermandibular Region of the Philippine Water Buffalo (*Bubalus bubalis* L.) (Artiodactyla: Bovidae)

Authors: Ceferino P. Maala, Jaehoon Hyung, Rio John Toledo Ducusin

Publication title: Philippine Journal of Veterinary Medicine 49(1):1-7, January 2012

Abstract:

The intermandibular region of the Philippine water buffalo was long and narrow measuring approximately 28.0-30.0 cm long, 2.0-4.0 cm wide caudally, 7.0-10.0 cm wide at the middle and 11.0-15.0 cm wide caudally. The skin was 1.0 to 1.5 cm thick rostrally, 0.4-1.0 cm thick at the middle and 0.2-0.4 cm thick caudally. The hairs were oriented slightly medio caudally and measured 3.5-5.0 cm long caudally and 1.5-2.5 cm long rostrally. Superficially, the caudal third of the intermandibular region was occupied by the sternomandibularis, omohyoideus and sternohyoideus muscles and in the rostral two-thirds by the mylohyoideus muscle. Deep in the caudo-lateral part of the intermandibular region was the digastricus muscle consisting of rostral and caudal bellies and their intervening tendon. The latter showed some degree of muscular development. The intermediate tendon was divided into a larger dorsal tendon which joined the long dorsal part of the rostral belly rostrally and a smaller ventral tendon which connected with the short ventral part of the rostral belly of the digastricus. The geniohyoideus muscle, lingual

nerve, mylohyoid nerve, the mandibular and sublingual salivary glands and their ducts showed no striking features. The intermandibular region was largely occupied by the massive tongue which measured 30.0-35.0 cm long, 1.5-2.0 cm thick at the apex, 5.0-5.5 cm thick at the body and 7.0-8.0 cm thick at the torus linguae. The present observations will be of great importance when considering the intermandibular region as an alternative approach to intraoral surgery in the Philippine water buffalo.

Full text available upon request to the author/s

Article title: Anatomy of the Superficial Lymph Nodes of the Philippine Water Buffalo (*Bubalus bubalis*) Important in Clinical Examination and Meat Inspection

Authors: Rio John T. Ducusin, DVM, MAgr, PhD; Ceferino P. Maala, DVM, MVSc, PhD and Bony Vincent L. Binarao, DVM

Publication title: Philippine Journal of Veterinary Medicine 46(1):1-15

Abstract:

The gross and microscopic anatomy of the mandibular, parotid, superficial cervical, subiliac, and superficial inguinal (scrotal and mammary) lymph nodes of the Philippine water buffalo of either sex were described. Three major difficulties encountered in palpation of these lymph nodes in live animals were the presence of obstructive adjacent tissues near the lymph nodes, thick skin and uncooperative behavior of the animals. The subiliac and superficial cervical lymph nodes had the most pronounced definition under the skin and also the most readily palpable. Except for the parotid lymph node, the lymph nodes in the carcass were generally covered by a thick pericapsular envelope consisting largely of adipose tissue. They were significantly larger ($P < 0.05$) in males than in females, but this difference may be attributed to the generally larger body size of males. The location of the lymph nodes in the carcass was generally similar to what has been reported in cattle. Microscopically, the cortex had primary and secondary lymphatic nodules, the latter being more predominant in the mandibular and parotid lymph nodes, indicating active stimulation by antigens. There was apparently more diffuse lymphatic tissue than lymphatic nodules. The medulla had trabeculae which showed many profiles of blood vessels, appeared thick and highly branched. Of the six superficially located lymph nodes described, the subiliac and superficial cervical lymph nodes were the most readily palpable and, therefore, are highly recommended for palpation during clinical examination and ante-mortem meat inspection in this animal.

Full text link <https://tinyurl.com/3k9yu4h6>

Article title: The gross anatomy of the hard palate and palatine printing in cattle

Authors: Ceferino P. Maala, DVM, MVSc, PhD; Rio John T. Ducusin, DVM, MAgr, PhD and Joseph A. Rizori, DVM

Publication title: Philippine Journal of Veterinary Medicine 44(1):1-7, 2007

Abstract:

The gross anatomy and imprints of the hard palate of 100 slaughtered cattle were described. The hard palate was significantly longer in male than in female animals ($P < 0.05$). The mucosa of the hard palate was modified into an incisive papilla and two columns of variable number of

transversely oriented palatine ridges. The palatine ridges in 67 (67%) specimens met at the midline in an end-to-end manner and in alternate fashion in 28 (28%) specimens. There were more palatine ridges on the right column in male than in female animals ($P < 0.05$). Incomplete palatine raphe was observed in 11 (11%) specimens because of fusion of some palatine ridges. The rostral region of the hard palate was wider in the male than in the female ($P < 0.05$). Mucosal pigmentation was variable. Various degrees of pigmentation were observed in 85 (85%) specimens. Complete pigmentation was observed in 10 (10%) specimens, and a non-pigmented mucosa in 5 (5%) specimens. Majority of the incisive papillae were diamond-shaped. Accessory ridges were present in 87 (87%) specimens. Imprints can be obtained from the hard palate of cattle and these showed clear images of the dental pads, incisive papilla, palatine ridges and the median palatine raphe. No two imprints were completely identical. It is suggested that palatine printing be tried in live cattle as a possible adjunct in the identification of valuable animals.

Full text link <https://tinyurl.com/musxb7jw>

Article title: Effects of extracellular Ca^{2+} on phagocytosis and intracellular Ca^{2+} concentrations in polymorphonuclear leukocytes of postpartum dairy cows

Authors: R.I.T. Ducusin, Y. Uzuka, E. Satoh, M. Otani, M. Nishimura, S. Tanabe, T. Sarashina

Publication title: Research in Veterinary Science 75(1):27-32, September 2003

Abstract:

The aim of this study was to determine the effects of extracellular Ca^{2+} concentration ($[\text{Ca}^{2+}]_e$) on phagocytosis and intracellular Ca^{2+} concentration ($[\text{Ca}^{2+}]_i$) in bovine polymorphonuclear leukocytes (PMNs). The experiments were performed by using blood samples from parturient paretic and clinically normal parturient cows and manipulating the $[\text{Ca}^{2+}]_e$ in vitro. Phagocytosis by PMNs (with and without stimulation with phorbol myristate acetate and inhibition with cytochalasin B) and resting $[\text{Ca}^{2+}]_i$ were significantly lower in parturient paretic cows. Repletion of Ca^{2+} in the extracellular media for the samples from these animals increased phagocytosis and resting $[\text{Ca}^{2+}]_i$. In the blood of clinically normal parturient cows, decreasing the $[\text{Ca}^{2+}]_e$ decreased phagocytosis and resting $[\text{Ca}^{2+}]_i$ in PMNs, but increasing the $[\text{Ca}^{2+}]_e$ did not affect phagocytosis. These results suggest that the hypocalcemic condition of parturient paretic cows in vivo causes decreased phagocytosis and resting $[\text{Ca}^{2+}]_i$ in PMNs, which may partly contribute to greater susceptibility to infection.

Full text available upon request to the author/s

Article title: Phagocytosis of Bovine Blood and Milk Polymorphonuclear Leukocytes after Ozone Gas Administration In Vitro

Authors: Rio John T. Ducusin, Masakazu Nishimura, Takao Sarashina, Yuji Uzuka, Shigeyuki Tanabe, Masayuki Otani

Publication title: Journal of Veterinary Medical Science 65(4):535-9, May 2003

Abstract:

To determine the effects of ozone on the phagocytosis of bovine polymorphonuclear leukocytes (PMNs), ozone gas was administered in vitro on the blood and milk of healthy lactating cows,

cows with acute mastitis, and cows with milk fever. In the blood of healthy dairy cattle, although there was no significant effect of ozone gas on the viability of the leukocytes, phagocytosis of PMNs significantly decreased. In contrast, ozone gas administration in vitro significantly increased phagocytosis of PMNs from the blood of cows with acute mastitis and milk fever, and from mastitic milk. These findings showed that ozone administration in vitro has positive and negative effects on bovine PMN phagocytosis, depending on the health status of the animal.

Full text available upon request to the author/s

Article title: Cryptosporidium Infection of Cattle in the Tokachi District, Hokkaido

Authors: Hiroaki Sakai, Yoshinori Tsushima, Hideyuki Nagasawa, Rio John T. Ducusin, Shigeyuki Tanabe, Yuji Uzuka, Takao Sarashina

Publication title: Journal of Veterinary Medical Science 65(1):125-7, February 2003

Abstract:

The prevalence of Cryptosporidium infection was examined in 480 healthy cattle (0-39 months old) in the Tokachi district in Hokkaido during the period from June to September in 2000 and from June to July in 2001. *C. parvum* oocysts were detected in 6 of 50 cattle (0-2 months old) in 2001; while *C. muris* was detected in 2 of 56 cattle (6-8 months old) in 2001, in 1 of 15 cattle (9-11 months old) in 2001, in 1 of 88 cattle (15-17 months old) in 2000, in 4 of 89 cattle (18-21 months old) in 2000 and in 2 of 53 cattle (21-23 months old) in 2000.

Full text available upon request to the author/s

Article title: Expression of mRNA of chemokine receptor CXCR4 in feline mammary adenocarcinoma

Authors: Yuko Tajima, T. Nakadai, H. Furuoka, T. Oomachi

Publication title: The Veterinary record 151(24):729-33, December 2002

Abstract:

The expression of mRNA of the chemokine receptor CXCR4 in 65 surgically resected mammary adenocarcinomas from cats was investigated by in situ hybridisation. No expression of the receptor's mRNA was detectable in the mammary tissue of healthy cats, but it was expressed in areas adjacent to necrosis, surrounding blood vessels and cells infiltrating the lymphatics of 47 (72.3 per cent) of the 65 samples. There was a significant relationship between lymphatic infiltration by neoplastic cells and the expression of the receptor's mRNA ($P < 0.005$), but there was no significant relationship between its expression and the one-year survival of the cats.

Full text available upon request to the author/s

Article title: Changes in Serum Thyroid Hormone Levels in Newborn Calves as a Diagnostic Index of Endemic Goiter

Authors: Kenichi Takahashi, Eiji Takahashi, Rio John T. Ducusin, Shigeyuki Tanaba, Yuji Uzuka and Takao Sarashina

Publication title: Journal of Veterinary Medical Science 63(2):175-8, March 2001

Abstract:

Maximum serum thyroxine (T4) and triiodothyronine (T3) levels of healthy calves were seen at 1 day after birth, and thereafter rapidly decreased until 5 days after birth. They stabilized until 2 weeks after birth, then gradually decreased until 4 weeks after birth. Serum T4 levels of calves with endemic goiter tended to be lower than those of healthy ones, but showed similar levels to those of adult cows. T3 levels of calves with goiter were similar to those of healthy ones, but showed higher variation. T4/T3 ratio of calves with goiter were significantly lower than those of healthy ones and adult cows. While individual levels of serum T4 and T3 at just after birth could not be considered as a diagnostic index, the T4/T3 ratio could be adopted as a diagnostic index of endemic goiter.

Full text link <https://tinyurl.com/4kcm6p26>

Article title: Phagocytic response of bovine polymorphonuclear leukocytes to different incubation conditions and following exposure to some effectors of phagocytosis and different anticoagulants in vitro

Authors: R. J. Ducusin, T. Sarashina, Y. Uzuka, S. Tanabe, M. Ohtani

Publication title: Canadian journal of veterinary research = Revue canadienne de recherche vétérinaire 65(1):38-44, February 2001

Abstract:

The ability of bovine polymorphonuclear leukocytes (PMN) to phagocytose fluorescent beads in vitro was studied using flow cytometry. The effects of varying laboratory conditions (bead:PMN ratio, length of incubation, and temperature) were first determined, then the effects of lipopolysaccharide (LPS), phorbol myristate acetate (PMA), cytochalasin B, and formyl-met-leu-phe (fMLP) on phagocytosis were evaluated. The recommended bead:PMN ratio, incubation period, and incubation temperature are 20:1, 30 min, and 38.5 degrees C, respectively. Lipopolysaccharide increased phagocytosis at a relatively high minimum dose; PMA increased phagocytosis even at low doses; cytochalasin B increased and decreased phagocytosis at low and high doses, respectively; and fMLP had no significant effect on phagocytosis. Also, the effects of ethylene diamine tetraacetic acid (EDTA) and acid citrate dextrose (ACD) as anticoagulants were compared with heparin-treated blood PMNs. Both EDTA and ACD decreased phagocytosis. Although there are reports that demonstrated that heparin reduced PMN phagocytosis, at least among the 3 anticoagulants used, heparin remains to be the standard anticoagulant for the study of PMN phagocytosis.

Full text available upon request to the author/s

Article title: Relationship Between the Incidence of Displaced Abomasum and Feeding of Cows in Tokachi District, Hokkaido, Northern Japan

Authors: F. Mori, K. Sawada, K. Watanabe, R. J. T. Ducusin, N. Kumase, S. Tanabe, Y. Uzuka, J. Takahashi, T. Sarashina

Publication title: Asian Australasian Journal of Animal Sciences 14(1):88-91, June 2001

Abstract:

In order to investigate the relationship between the incidence of displaced abomasum and feeding, the actual feeding practices and chemical compositions of roughage were examined in

2 kinds of farms at Tokachi district in Hokkaido. Examination of animal health records revealed that the annual milk yield per cow in high incidence (H-DA) farms was significantly higher than that in low incidence (L-DA) farms. The amount of concentrates fed in H-DA farms tended to be higher than that in L-DA farms during lactation. Compared to L-DA farms, the amount of juicy roughage (corn silage and grass silage) and dry roughage (hay, hay cube and roll wrap silage) during lactation in H-DA farms tended to be higher and lower, respectively. Moreover, the amount of roughage and the ratio of roughage to concentrates in H-DA farms tended to be lower than in L-DA farms. The survey indicated that displaced abomasum was associated with insufficient feeding of dietary fiber and overfeeding of concentrates.

Full text available upon request to the author/s

**AUDREI ANNE B. YBAÑEZ***Geology***Sex:** Female**Education:**

Master of Science in Geology, University of the Philippines, 2017

Bachelor of Science in Applied Physics, University of Santo Tomas, 2011

Field of Specialization:

Geohazards

Seismic Data Processing

GIS Analysis

Researches:**Article title:** Analysis of the 2020 Taal Volcano tephra fall deposits from crowdsourced information and field data**Authors:** M. I. R. Balangue-Tarriela, A. M. F. Lagmay, D. M. Sarmiento, J. Vasquez, M. C. Baldago, R. Ybañez, A. A. Ybañez, J. R. Trinidad, S. Thivet, L. Gurioli, B. Van Wyk de Vries, M. Aurelio, D. J. Rafael, A. Bermas, J. A. Escudero**Publication title:** Bulletin of Volcanology 84(3), March 2022**Abstract:**

After 43 years of dormancy, Taal Volcano violently erupted in January 2020 forming a towering eruption plume. The fall deposits covered an area of 8605 km², which includes Metro Manila of the National Capital Region of the Philippines. The tephra fall caused damage to crops, traffic congestion, roof collapse, and changes in air quality in the affected areas. In a tropical region where heavy rains are frequent, immediate collection of data is crucial in order to preserve the tephra fall deposit record, which is readily washed away by surface water runoff and prevailing winds. Crowdsourcing, field surveys, and laboratory analysis of the tephra fall deposits were conducted to document and characterize the tephra fall deposits of the 2020 Taal Volcano eruption and their impacts. Results show that the tephra fall deposit thins downwind exponentially with a thickness half distance of about 1.40 km and 9.49 km for the proximal and distal exponential segments, respectively. The total calculated volume of erupted fallout deposit is 0.057 km³, 0.042 km³, or 0.090 km³ using the exponential, power-law, and Weibull models,

respectively, and all translate to a VEI of 3. However, using a probabilistic approach (Weibull method) with 90% confidence interval, the volume estimate is as high as 0.097 km³. With the addition of the base surge deposits amounting to 0.019 km³, the volume translates to a VEI of 4, consistent with the classification for the observed height and umbrella radius of the 2020 main eruption plume. VEI 4 is also consistent with the calculated median eruption plume height of 17.8 km and sub-plinian classification based on combined analysis of isopleth and isopach data. Phreatomagmatic activity originated from a vent located in Taal Volcano's Main Crater Lake (MCL), which contained 42 million m³ of water. This eruptive style is further supported by the characteristics of the ash grain components of the distal 12 January 2020 tephra fall deposits, consisting dominantly of andesitic vitric fragments (83-90%). Other components of the fall deposits are lithic (7-11%) and crystal (less than 6%) grains. Further textural and geochemical analysis of these tephra fall deposits contributes to better understand the volcanic processes that occurred at Taal Volcano, one of the 16 Decade Volcanoes identified by the International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI) because of its destructive nature and proximity to densely populated areas. The crowdsourcing initiative provided a significant portion of the data used for this study while at the same time educating and empowering the community to build resilience. Supplementary information: The online version contains supplementary material available at 10.1007/s00445-022-01534-y.

Full text available upon request to the author/slink <https://tinyurl.com/4a972p8u>

Article title: Imaging ground surface deformations in post-disaster settings via small UAVs

Authors: Richard L. Ybañez, Audrei Anne B. Ybañez, Alfredo Mahar Francisco A. Lagmay, and Mario A. Aurelio

Publication title: Geoscience Letters 8(1), December 2021

Abstract:

Small unmanned aerial vehicles have been seeing increased deployment in field surveys in recent years. Their portability, maneuverability, and high-resolution imaging are useful in mapping surface features that satellite- and plane-mounted imaging systems could not access. In this study, we develop and apply a work plan for implementing UAV surveys in post-disaster settings to optimize the flights for the needs of the scientific team and first responders. Three disasters caused by geophysical hazards and their associated surface deformation impacts were studied implementing this workplan and were optimized based on the target features and environmental conditions. An earthquake that caused lateral spreading and damaged houses and roads near riverine areas were observed in drone images to have lengths of up to 40 m and vertical displacements of 60 cm. Drone surveys captured 2D aerial raster images and 3D point clouds leading to the preservation of these features in soft-sedimentary ground which were found to be tiled over after only 3 months. The point cloud provided a stored 3D environment where further analysis of the mechanisms leading to these fissures is possible. In another earthquake-devastated locale, areas hypothesized to contain the suspected source fault zone necessitated low-altitude UAV imaging below the treeline capturing Riedel shears with centimetric accuracy that supported the existence of extensional surface deformation due to fault movement. In the aftermath of a phreatomagmatic eruption and the formation of sub-metric fissures in nearby towns, high-altitude flights allowed for the identification of the location and

dominant NE–SW trend of these fissures suggesting horst-and-graben structures. The work plan implemented and refined during these deployments will prove useful in surveying other post-disaster settings around the world, optimizing data collection while minimizing risk to the drone and the drone operators.

Full text link <https://tinyurl.com/y69jysr8>

Article title: Hazardous base surges of Taal's 2020 eruption

Authors: A. M. F. Lagmay, M. I. R. Balangue-Tarriela, M. Aurelio, R. Ybanez, A. Bonus-Ybanez, J. Sulapas, C. Baldago, D. M. Sarmiento, H. Cabria, R. Rodolfo, D. J. Rafael, J. R. Trinidad, E. Obille Jr. & N. Rosell II

Publication title: Scientific Reports 11(15703), August 2021

Abstract:

After 43 years of repose, Taal Volcano erupted on 12 January 2020 forming hazardous base surges. Using field, remote sensing (i.e. UAV and LiDAR), and numerical methods, we gathered primary data to generate well-constrained observed information on dune bedform characteristics, impact dynamic pressures and velocities of base surges. This is to advance our knowledge on this type of hazard to understand and evaluate its consequences and risks. The dilute and wet surges traveled at 50-60 ms⁻¹ near the crater rim and decelerated before making impact on coastal communities with dynamic pressures of at least 1.7 kPa. The base surges killed more than a thousand livestock in the southeast of Taal Volcano Island, and then traveled another ~ 600 m offshore. This work is a rare document of a complete, fresh, and practically undisturbed base surge deposit, important in the study of dune deposits formed by volcanic and other processes on Earth and other planets.

Full text link <https://tinyurl.com/ym592aje>

Article title: Anatomy of the Naga City Landslide and Comparison With Historical Debris Avalanches and Analog Models

Authors: Alfredo Mahar Lagmay, Carmille Marie Escape, Audrei Anne Bonus Ybañez, John Kenneth Suarez, Genaro Cuaresma

Publication title: Frontiers in Earth Science 8, August 2020

Abstract:

Debris avalanches pose some of the most destructive geologic hazards that threaten both urban and rural populations around the world. On 20 September 2018, villages in Naga City, Cebu, Philippines, were devastated by a landslide that claimed 78 lives with 6 missing, joining other catastrophic landslides in the country like the 1628 Iriga and the 2006 Guinsaugon debris avalanches. Understanding the mechanism of these gargantuan landslides and their correct nomenclature are useful for hazard prevention and mitigation. In this study, we compare the deposit characteristics of the Naga City landslide with analog models and well-known historical debris avalanche events/deposits in the Philippines to understand factors that led to the landslide disaster in Naga City. Physical characteristics obtained from aerial and satellite imagery, ground surveys, recorded footage, borehole data, and lithologic maps provided a detailed dataset for analyzing the conditions that led to the mass movement and the observed

characteristics of the Naga landslide deposits. Comparison with analog models of hummock formation and the description of historical debris avalanche deposits show striking similarities, which were used to demonstrate that the Naga landslide was a Rockslide-Debris Avalanche. The equations of Corominas (1996) and Dade and Huppert (1998) for long-runout rockfalls support this analysis. The Naga landslide event is an example of a well-documented debris avalanche, complete with all the characteristics of this type of rapid mass movement. It is consistent with the descriptions found in the literature with respect to its deposit features and mechanical behavior as defined by laboratory models and empirically-derived equations. This study helps us understand historical and future long-runout debris avalanches in order for scientists and authorities to find ways to save lives. Unfortunately, there was a lack of appropriate hazards assessment on the site, which had warnings in the form of the development of fractures at the headscarp of the landslide, a month prior to the disaster.

Full text link <https://tinyurl.com/ycx87jak>

Article title: Flood Susceptibility Assessment of Mt. Makiling, Philippines Using Two-Dimensional Meteorological and Hydrological Modelling

Authors: Richard L. Ybañez, Bernard Alan B. Racoma, Audrey Anne B. Ybañez, and Maria Ines Rosana D. Balangue-Tarriela

Publication title: Philippine Journal of Science 147(3):463-471, September 2018

Abstract:

In a data-poor, hazard-prone country like the Philippines, interpolating distant data points and computer modelling have become the go-to methods for determining the hazards that may affect an area. The absence of monitoring stations and gauges necessitates the application of modelling techniques to build on the little data available and generate reliable hazard maps. In this study-the devastating Sep 2009 Tropical Cyclone Ketsana (local name: Ondoy) event, its atmospheric characteristics, and its effects near Mt. Makiling, Laguna-is analyzed utilizing two modelling software: the Weather Research and Forecasting (WRF) model to assess the amount of rainfall, and FLO-2D to map the flood hazard areas around the volcano using the output of the WRF. A lone meteorological observation station on Mt. Makiling provided rainfall data for comparison with the results of the meteorological and hydrological models. The WRF model yielded a mean rainfall amount in the study area of 129.92 mm over 24 h for the storm against the observed rainfall amount for the same duration at 182.3 mm from the meteorological station. The flood model using the WRF data yielded minimal inundated areas, while the flood model of the observed rainfall data showed several low-lying urban areas inundated by up to 1.5 m of floodwaters. Comparison with flood data collected by responding agencies and groups after the event shows good correlation of affected areas and flood heights, with discrepancies being attributed to the swelling of Laguna de Bay because of excess runoff from other surrounding provinces-a factor that the models could not consider. Despite this, the WRF model generated from global atmospheric data and the flood model using the WRF product appears as a feasible substitute in the absence of on-site observation points and monitoring stations.

Full text link <https://tinyurl.com/4cezrs5k>

Article title: Landslide and debris flow susceptibility mapping of Leyte Province, Philippines using remote sensing, numerical modelling, and GIS

Authors: RN Eco, DT Aquino, AMF Lagmay, I Alejandrino, AA Bonus, CM Escape, R Felix, PK Ferrer, RC Gacusan, J Galang, F Llanes, PK Luzon, KR Montalbo, IJ Ortiz, M Rabonza, V Realino, JM Sabado, JJ Sulapas, H Ariola, J Obrique, C Quina, MK Alemanian, M Magcamit, S Salvosa, and NL Timba

Publication title: Journal of the Philippine Geoscience and Remote Sensing Society 1(1), September 2015

Abstract:

When Super Typhoon Haiyan struck the Philippines in November 2013, the province of Leyte was among the most heavily damaged. Detailed hazard susceptibility maps for Leyte—including storm surge, flood, and landslide hazard maps—that could have mitigated the damage by providing crucial information on possible hazards and their extent were not available to communities prior to Haiyan. To aid future disaster prevention and mitigation efforts, we produce landslide susceptibility maps downscaled to the community-level for the entire Leyte province. We integrate remote sensing, numerical modelling, and GIS tools to maximize the use of a high-resolution digital terrain model of the province. The detailed landslide susceptibility maps are useful for identifying safe and unsafe areas for rehabilitation and reconstruction efforts for Haiyan devastated areas, as well as for community disaster planning and preparedness efforts

Full text available upon request to the author/s

**DR. LEO T. ARMADA***Earth Science***Sex:** Male**Education:**

Doctor of Philosophy in Earth System Science, National Central University, 2015

Master of Science in Geology, University of the Philippines Diliman, 2009

Bachelor of Science in Geology, University of the Philippines Diliman, 2006

Field of Specialization:

Geology

Seismology

Marine Geophysics

Tectonics

Seafloor

Geomorphology

Hydrogeophysics

Researches:

Article title: Enhanced arc magmatic productivity of the Western Pacific island arcs deduced from gravity-derived arc crustal growth rates

Authors: N. E. Parcutela, R. S. Austria, C. B. Dimalanta, G. T. V. Valera, J. A. S. Gabo-Ratio, B. D. Payot, L. T. Armada, K. J. F. Sangalang, and G. P. Yumul Jr.

Publication title: Frontiers in Earth Science 11, February 2023

Abstract:

Island arcs are postulated as the juvenile components that contribute to the growth of continental crust. Growth rates of arc crusts were previously computed using crustal thicknesses derived from seismic data. Consequently, crustal growth rates of oceanic island arcs are also constrained by the limited seismic data availability. This work presents the first comparison of gravity-derived magmatic growth rates of Western Pacific oceanic island arcs. We used the statistical correlation between Bouguer anomalies and seismic-derived crustal thicknesses to generate an empirical formula. The new empirical formula was utilized to

estimate the crustal thicknesses of oceanic island arcs using Bouguer anomalies from the EGM2008 global gravity model. The resulting crustal thicknesses were employed to compute the magmatic growth rates of western Pacific island arcs and the Philippine island arc system. The latest magmatic growth rate estimates show that the magmatic productivity of Western Pacific island arcs, which are directly associated with Pacific Plate subduction, is significantly higher (28–60 km³/km/m.y). The growth rate of the Pacific island arcs is higher compared to the magmatic growth rate computed for the other oceanic island arcs (12–25 km³/km/m.y), which are derived from the subduction of other oceanic lithospheres (i.e., the Philippine Sea Plate; Caribbean Sea Plate; and Eurasia-South China Sea slabs). This is attributed to the variation in the ages of the subducting plates. The Pacific Plate, being older, is associated with higher degrees of serpentinization and sediment cover, which introduce more volatiles inducing more robust partial melting of the mantle wedge

Full text link <https://tinyurl.com/ywnbdbzd>

Article title: Band processing of Landsat 8-OLI multi-spectral images as a tool for delineating alteration zones associated with porphyry prospects: A case from Suyoc, Benguet, Philippines

Authors: N.E. Parcutela, C.B. Dimalanta, L.T. Armada, R.S. Austria, J.A. Gabo-Ratio, and G.P. Yumul Jr.

Publication title: IOP Conference Series Earth and Environmental Science 1071(1):012022, August 2022

Abstract:

The Mankayan Mineral District in Luzon is marked by several porphyry and epithermal mineralizations. The possibility of blind porphyry mineralization in Mangga, Basig, and Palidan was forwarded based on the results of recent ground magnetic surveys in Suyoc, Mankayan, Benguet. These areas exhibited the diagnostic magnetic anomaly patterns expected of porphyry copper deposits. This signature, a magnetic core surrounded by a non-magnetic rim, is due to the alteration haloes common to porphyry systems. The magnetic core corresponds to the potassic zone dominated by iron-oxide-bearing minerals (e.g., magnetite). Meanwhile, the abundance of non-magnetic clay minerals at the periphery of the mineralized region corresponds to propylitic-argillic alteration zones. Delineation of alteration zones using remote sensing was done to further support the suggested mineralization prospects. Mixture tuned matched filtering (MTMF) was carried out to reduce the effects of vegetation cover from Landsat 8 data. Principal Components Analysis (PCA) was applied to generate bands exploiting the greatest difference between the clay and magnetite alterations with background earth materials. A classified composite map depicts the altered regions. The three sites previously identified from magnetic anomalies also display the expected alterations. Another prospect in the Lapangan area is being proposed based on magnetic anomalies and mapped alterations.

Full text link <https://tinyurl.com/bdzbu9j9>

Article title: Arc-crustal compression and its effects on the underlying mantle geometry as elucidated from the potential field signatures of the buckled Cretaceous Cebu lithosphere, Philippines

Authors: Nathaniel E. Parcutela, Rurik S.P. Austria, Carla B. Dimalanta, Leo T. Armada, Graciano P. Yumul Jr.

Publication title: Tectonophysics 831(5):229341, April 2022

Abstract:

The occurrence of long wavelength Moho undulations in continental and oceanic lithospheres is attributed to lithospheric buckling. This has been reported for Cretaceous or older lithospheres under compressional regimes. However, there is very limited data on lithospheric buckling of oceanic island arcs. The region where the Cretaceous Cebu arc is under compression due to the impingement of the Palawan micro-Continental Block (PCB) to the Philippine Mobile Belt (PMB). The configuration of the inferred buckled Cretaceous Cebu arc lithosphere is derived from geologic and combined onshore and airborne gravity and magnetics datasets. Subsurface modeling using gravity data revealed the presence of mantle upwelling beneath Central Cebu. This could be considered as one of the crests of long-wavelength Moho undulations commonly attributed to a buckled lithosphere. The oceanic basement was also modelled to determine its configuration. Euler solutions derived from magnetic data showed that the contact between the arc crustal units of the Cansi Volcanics and Pandan Formation is affected by short wavelength folding with wavelengths ranging from 5 to 15 km. The younger arc crustal units are affected by tighter folding with wavelengths ranging from 1 to 5 km. The occurrence of a buckled arc lithosphere is being considered for the first time in this area. The consistent NE-SW folding axes inferred for the folding events strongly suggest that these are consequences of the Middle Miocene collision involving the Philippine Mobile Belt and the Palawan micro-Continental Block.

Full text available upon request to the author/s

Article title: Magnetic field characterization of Macolod Corridor (Luzon, Philippines): New perspectives on rifting in a volcanic arc setting

Authors: Rurik S.P. Austria, Nathaniel E. Parcutela, Edd Marc L. Reyes, Leo T. Armada, Carla B. Dimalanta, Graciano P. Yumul Jr.

Publication title: Tectonophysics 822(1):229179, December 2021

Abstract:

The Macolod Corridor (MC) is a NE-SW trending zone of Quaternary volcanism which perpendicularly bisects the Luzon Arc. This peculiar zone of volcanism is in a junction of different tectonic elements. This led to several models of formation associated with subduction or crustal extension-related processes. New information about its subsurface structure can provide constraints in resolving outstanding questions on its tectonic development. However, elucidating the origin and deep structure of the MC has been problematic due to the extensive young volcanic deposits that blanket the area. In this study, ground magnetic and aeromagnetic datasets are merged to characterize the magnetic signature in the MC. Short wavelength and high amplitude anomalies suggest complex interactions of magnetic bodies within the region. Edge detection techniques reveal linear magnetic anomalies with NE-SW, NW-SE, and E-W trends in the Corridor. These may indicate rift structures at depth. Analytic signals show maximum amplitudes over volcanic centers suggesting maximum magnetic property contrasts due to deep structural controls. Euler solutions cluster in the NE-SW, NW-SE, and E-W trends.

These may correspond to conjugate structures at depth suggesting the primary role of the NW-SE shearing between the bounding Philippine Fault and the Sibuyan Verde Passage Fault. Clustering of solutions in a graben-like pattern is also observed beneath volcanic complexes indicating an extensional regime. The MC is also characterized by a shallow magnetic basement as reflected in the Curie point depths. This may be attributed to high heat flow associated with active volcanism and probably crustal thinning. These results skew our interpretation to a rift-related origin of the MC. Thus, it is interpreted to be the manifestation of the continuum of tectonic processes including near-field influences (shearing between the two bounding faults) and far-field influences (arc-continent collision and resulting northwestward translation of the Philippine Mobile Belt).

Full text available upon request to the author/s

Article title: Interpretation of ground magnetic data in Suyoc, Mankayan Mineral District, Philippines

Authors: Creszyl Joy J. Arellano, Leo T. Armada, Carla B. Dimalanta, Karlo L. Queaño, Eric S. Andal, Graciano P. Yumul Jr.

Publication title: Resource Geology 71(4), July 2021

Abstract:

Ground magnetic surveys conducted in Suyoc, Mankayan, Benguet led to the delineation of features related to epithermal and porphyry copper targets in the area. High reduced to equator (RTE) anomalies are observed in areas with epithermal mineralization. The high RTE anomalies are attributed to hydrothermally altered rock with quartz veins. The previously recognized porphyry copper prospect in Palasaan (Mohong Hill) is characterized by low RTE anomaly surrounded by a high RTE anomaly. One explanation for this signature is the possible presence of a magnetic core and the destruction or absence of magnetite in the alteration haloes at the periphery of a porphyry prospect. Areas such as Mangga and Liten exhibit the same magnetic signatures. This distinct magnetic pattern coupled with observed alteration and mineralization signatures led to the interpretation of prospective blind porphyry deposits in these localities. Results of the study reveal the applicability of ground magnetic data in characterizing and extracting a potential area of mineralized zones at a regional scale. The first ground magnetic surveys conducted in Suyoc, Mankayan, Benguet led to the delineation of features related to epithermal and porphyry copper targets in the area. Results of this study reveal magnetic anomalies which may be used in characterizing and determining mineralized areas at a regional scale.

Full text available upon request to the author/s

Article title: Forearc structures and deformation along the Manila Trench

Authors: Leo T. Armada, Shu-Kun Hsu, Carla B. Dimalanta Graciano P. Yumul Jr., Wen-Bin Doo, Yi-Ching Yeh

Publication title: Journal of Asian Earth Sciences: X 4(1), December 2020

Abstract:

The Manila Trench subduction zone is characterized by varying tectonic structures from north to south. Analyses of new seismic reflection data and bathymetric data indicate distinct morphological and deformational patterns in the forearc region. Differences in the nature of the subducting oceanic lithosphere (i.e. seafloor relief related to seamounts and ridges, sediment supply, reactivated features and faults associated with the South China Sea opening) cause along-strike heterogeneity in the Manila Trench and the Luzon forearc region. The northern segment is classified as an accretionary margin while the southern segment is mainly an erosive margin (with a narrow, steep, and often eroded frontal wedge). This sharp contrast is attributed to abundant sediment supply to the trench in the north and to the highly eroded frontal wedge in the south due to scarce sediment supply. The southern trench segment is prone to submarine slope failures and mass wasting processes. The 17°N latitude boundary also separates the forearc basin into the North Luzon Trough and the West Luzon Trough. Associated with this is the initiation of the Scarborough Seamount Chain (South China Sea extinct spreading ridge) subduction at 16°N latitude. A combination of forearc uplift and submarine mass movements attributed to subduction of bathymetric highs near and south of 17°N latitude produced the Stewart Bank. Seamount and other seafloor spreading features induced complex responses arising to diverse forearc architectures in the southern segment. Seamounts and other seafloor spreading-related features in the subducting slab induce slope steepening and significant vertical movement in the frontal wedge and the forearc region, respectively. Deformation associated with the subduction is overprinted by shearing related to the Philippine Fault Zone splay faults with the frontal wedge shortening associated with the ongoing subduction, further complicating the forearc development in the trench and marine forearc region.

Full text available upon request to the author/s

Article title: PHILCRUST3.0: New constraints in crustal growth rate computations for the Philippine arc

Authors: Nathaniel E. Parcutela Carla B. Dimalanta, Leo T. Armada, Graciano P. Yumul Jr.

Publication title: Journal of Asian Earth Sciences: X 4(1), December 2020

Abstract:

A revised crustal thickness map for the Philippine island arc, PHILCRUST3.0, has been generated using new gravity data from the EGM2008. The gravity-derived crustal thickness is compared with crustal thickness estimates obtained using the Sr/Y ratios. PHILCRUST3.0 shows that crustal thickness in the Philippines varies from 13 to 33 km. The Philippine arc appears to be at its thinnest in areas underlain by ophiolites and young magmatic arcs. The resulting crustal thickness values are used to revisit the growth rates of the Philippine arc from magmatic and amagmatic contributions. Arc magmatism contributes more significantly to the growth of Philippine crust with rates from specific volcanoes varying from 5 to 35 km³/km/m.y. Despite being relatively young, magmatism associated with the volcanoes of the East Philippine Arc displayed a higher growth rate (32 km³/km/m.y.) compared to volcanoes belonging to older magmatic arcs in the archipelago. This is attributed to the more hydrated oceanic lithosphere subducting beneath the Philippine Trench. PHILCRUST3.0 provides the most complete crustal

thickness map of the Philippines to date. This will enable the computation of crustal growth rate in areas within the Philippines where point gravity or geochemical data is not available.

Full text link <https://tinyurl.com/3ew5f6p>

Article title: Subduction with arrested volcanism: Compressional regime in volcanic arc gap formation along east Mindanao, Philippines

Authors: Graciano P. Yumul Jr. , Leo T. Armada, Jillian Aira S. Gabo-Ratio, Carla B. Dimalanta , Rurik S.P. Austria

Publication title: Journal of Asian Earth Sciences: X 4(1), December 2020

Abstract:

The eastern portion of the Philippine island arc system, from the Bicol Peninsula through Leyte island to the Pacific Cordillera of east Mindanao, is the overriding plate underneath which the West Philippine Basin (part of the Philippine Sea Plate) and Palau Basin oceanic plates subduct along the Miocene-Pliocene to present-day Philippine Trench. Southward younging of the trench, coupled with the presence of the left-lateral Philippine Fault Zone parallel to it, is recognized. Young volcanic centers (<7Ma to present) are well-developed in the Bicol Peninsula and in Leyte island but not in the Pacific Cordillera. There are only two volcanic centers that are exposed in the Pacific Cordillera, the Paco volcanic center in the north and the Leonard Kniassef in the south. There is a 250km volcanic arc gap distance between the two volcanic centers. Reported inland and offshore geologic structures, from onramp structures to thrust faults, and strain rate computations suggest a predominantly compressional regime in the Pacific Cordillera from the Miocene to the present. This is consistent with the hinge advance character of the Philippine Trench and the recognized E-W directed σ_1 in this part of the island arc system. It is forwarded that the prevailing compressional regime inhibited the extrusion of lavas leading to the non-formation of surficial volcanic centers between the Paco and Leonard Kniassef volcanic centers. Furthermore, the compression can also partly account for the presence of porphyry copper deposits in this part of Mindanao.

Full text link <https://tinyurl.com/4urf38t3>

Article title: Mesozoic rock suites along western Philippines: Exposed proto-South China Sea fragments?

Authors: Graciano P. Yumul Jr., Carla B. Dimalanta, Jillian Aira S. Gabo-Ratio, Karlo L. Queaño , Leo T. Armada, Jenielyn T. Padrones, Decibel V. Faustino-Eslava, Betchaida D. Payot, Edanjarlo J. Marquez

Publication title: Journal of Asian Earth Sciences: X 4(1), December 2020

Abstract:

An ancient oceanic crustal leading edge east of mainland Asia, the proto-South China Sea crust, must have existed during the Mesozoic based on tectonic reconstructions that accounted for the presence of subducted slabs in the lower mantle and the exposed oceanic lithospheric fragments strewn in the Philippine and Bornean regions. Along the western seaboard of the Philippine archipelago, numerous Mesozoic ophiolites and associated lithologies do not appear to be genetically associated with the younger Paleogene-Neogene ocean basins that currently

surround the islands. New sedimentological, paleomagnetic, paleontological, and isotopic age data that we generated are presented here, in combination with our previous results and those of others, to reassess the geological make-up of the western Philippine island arc system. We believe that the oceanic lithospheric fragments, associated melanges, and sedimentary rocks in this region are exhumed slivers of the proto-South China Sea ocean plate.

Full text link <https://tinyurl.com/54jvtf9v>



Sex: Female

Education

Doctor of Philosophy in Biological Sciences (Immunology), University of the Philippines Manila, 1989

Master of Science in Biological Sciences (Immunology), University of the Philippines Manila, 1984

Bachelor of Science in Biological Science, University of the Philippines Manila, 1980

Field of Specialization

Medicine

Human immuno virus (HIV)

Immunology

Article title: Entomological outcomes of cluster-randomised, community-driven dengue vector-suppression interventions in Kampong Cham province, Cambodia

Authors: Jacob Bigio, Leo Braack, Thy Chea, Srun Set, Sokha Suon, Pierre Echaubard, John Hustedt, Mark Debackere, Bernadette Ramirez, Didot Budi Prasetyo, Sam Bunleng, Alexandra Wharton-Smith, Jeffrey Hi

Publication title: PLoS Neglected Tropical Diseases 16(1):e0010028, January 2022

Abstract:

Cambodia has one of the highest dengue infection rates in Southeast Asia. Here we report quantitative entomological results of a large-scale cluster-randomised trial assessing the impact on vector populations of a package of vector control interventions including larvivorous guppy fish in household water containers, mosquito trapping with gravid-ovitraps, solid waste management, breeding-container coverage through community education and engagement for behavioural change, particularly through the participation of school children. These activities resulted in major reductions in Container Index, House Index, Breteau Index, Pupal Index and Adult Index (all p-values 0.002 or lower) in the Intervention Arm compared with the Control Arm in a series of household surveys conducted over a follow-up period of more than one year, although the project was not able to measure the longer-term sustainability of the interventions. Despite comparative reductions in Adult Index between the study arms, the Adult Index was

higher in the Intervention Arm in the final household survey than in the first household survey. This package of biophysical and community engagement interventions was highly effective in reducing entomological indices for dengue compared with the control group, but caution is required in extrapolating the reduction in household Adult Index to a reduction in the overall population of adult *Aedes* mosquitoes, and in interpreting the relationship between a reduction in entomological indices and a reduction in the number of dengue cases. The package of interventions should be trialled in other locations.

Full text link <https://tinyurl.com/u2vdhsns>

Article title: Fostering social innovation and building adaptive capacity for dengue control in Cambodia: A case study

Authors: Pierre Echaubard, Chea Thy, Soun Sokha, Set Srun, Claudia Nieto-Sanchez, Koen Peters Grietens, Noel R. Juban, Jana Mier-Alpano, Sucelle Deacosta, Mojgan Sami, Leo Braack, Bernadette Ramirez, and Jeffrey Hii

Publication title: Infectious Diseases of Poverty 9(1):126, September 2020

Abstract:

Background: The social-ecological systems theory, with its unique conception of resilience (social-ecological systems & resilience, SESR), provides an operational framework that currently best meets the need for integration and adaptive governance as encouraged by the Sustainable Development Goals. SESR accounts for the complex dynamics of social-ecological systems and operationalizes transdisciplinarity by focusing on community engagement, value co-creation, decentralized leadership and social innovation. Targeting Social Innovation (SI) in the context of implementation research for vector-borne diseases (VBD) control offers a low-cost strategy to contribute to lasting and contextualized community engagement in disease control and health development in low and middle income countries of the global south. In this article we describe the processes of community engagement and transdisciplinary collaboration underpinning community-based dengue management in rural primary schools and households in two districts in Cambodia.

Methods: Multiple student-led and community-based interventions have been implemented focusing on empowering education, communication for behavioral change and participatory epidemiology mapping in order to engage Cambodian communities in dengue control. We describe in particular the significance of the participatory processes that have contributed to the design of SI products that emerged following iterative consultations with community stakeholders to address the dengue problem.

Results: The SI products that emerged following our interaction with community members are 1) adult mosquito traps made locally from solid waste collections, 2) revised dengue curriculum with hands-on activities for transformative learning, 3) guppy distribution systems led by community members, 4) co-design of dengue prevention communication material by students and community members, 5) community mapping.

Conclusions: The initiative described in this article put in motion processes of community engagement towards creating ownership of dengue control interventions tools by community stakeholders, including school children. While the project is ongoing, the project's interventions so far implemented have contributed to the emergence of culturally relevant SI products and provided initial clues regarding 1) the conditions allowing SI to emerge, 2) specific mechanisms by which it happens and 3) how external parties can facilitate SI emergence. Overall there seems to be a strong argument to be made in supporting SI as a desirable outcome of project implementation towards building adaptive capacity and resilience and to use the protocol supporting this project implementation as an operational guiding document for other VBD adaptive management in the region.

Full text link <https://tinyurl.com/mrxvsb33>

Article title: Vector-borne disease and climate change adaptation in African dryland social-ecological systems

Authors: Bruce A. Wilcox, Pierre Echaubard, Michel de Garine-Wichatitsky, Bernadette Ramirez

Publication title: Infectious Diseases of Poverty 8(1), December 2019

Abstract:

Background: Drylands, which are among the biosphere's most naturally limiting and environmentally variable ecosystems, constitute three-quarters of the African continent. As a result, environmental sustainability and human development along with vector-borne disease (VBD) control historically have been especially challenging in Africa, particularly in the sub-Saharan and Sahelian drylands. Here, the VBD burden, food insecurity, environmental degradation, and social vulnerability are particularly severe. Changing climate can exacerbate the legion of environmental health threats in Africa, the social dimensions of which are now part of the international development agenda. Accordingly, the need to better understand the dynamics and complex coupling of populations and environments as exemplified by drylands is increasingly recognized as critical to the design of more sustainable interventions.

Main body: This scoping review examines the challenge of vector-borne disease control in drylands with a focus on Africa, and the dramatic, ongoing environmental and social changes taking place. Dryland societies persisted and even flourished in the past despite changing climates, extreme and unpredictable weather, and marginal conditions for agriculture. Yet intrusive forces largely out of the control of traditional dryland societies, along with the negative impacts of globalization, have contributed to the erosion of dryland's cultural and natural resources. This has led to the loss of resilience underlying the adaptive capacity formerly widely exhibited among dryland societies. A growing body of evidence from studies of environmental and natural resource management demonstrates how, in light of dryland system's inherent complexity, these factors and top-down interventions can impede sustainable development and vector-borne disease control. Strengthening adaptive capacity through community-based, participatory methods that build on local knowledge and are tailored to local ecological conditions, hold the best promise of reversing current trends.

Conclusions: A significant opportunity exists to simultaneously address the increasing threat of vector-borne diseases and climate change through methods aimed at strengthening adaptive capacity. The integrative framework and methods based on social-ecological systems and resilience theory offers a novel set of tools that allow multiple threats and sources of vulnerability to be addressed in combination. Integration of recent advances in vector borne disease ecology and wider deployment of these tools could help reverse the negative social and environmental trends currently seen in African drylands. Electronic supplementary material The online version of this article (10.1186/s40249-019-0539-3) contains supplementary material, which is available to authorized users.

Full text link <https://tinyurl.com/2yax66xc>

Article title: Research on vector-borne diseases: implementation of research communication strategies

Authors: Thomas Scalway, Mariam Otmani del Barrio and Bernadette Ramirez

Publication title: Infectious Diseases of Poverty 8(1), December 2019

Abstract:

Background: Effective communication of research findings on vector-borne diseases in Africa is challenging for a number of reasons. Following the experiences of a number of researchers over the life of a project, this article looks for lessons that can be shared with the wider research community.

Main body: Between 2014 and 2017, a set of five inter-disciplinary teams from seven African countries collaborated on a project focusing on vector-borne diseases in the context of climate change. A central objective of this work was to influence policy and programming with relevant research findings. This article examines how principles of research communication, derived from the literature and current guidelines, can be applied in practice. Several challenges and lessons are highlighted, showing that research communication takes place within difficult constraints and in complex, fluid institutional and political environments. The processes of communication between policymakers and researchers including stakeholder mapping, defining research communication plans and tailoring communication products are discussed.

Conclusions: The article concludes that while guidelines and frameworks for research communication are helpful, they should not detract from the ability of local teams to adapt to circumstances. Of key importance are the relationships and networks of local research teams.

Full text link <https://tinyurl.com/yb52xdah>

Article title: Data and tools to integrate climate and environmental information into public health

Authors: Pietro Ceccato, Bernadette Ramirez, Tawanda Manyangadze, Paul Gwakisa and Madeleine C. Thomson

Publication title: Infectious Diseases of Poverty 7(1), December 2018

Abstract:

Background During the last 30 years, the development of geographical information systems and satellites for Earth observation has made important progress in the monitoring of the weather, climate, environmental and anthropogenic factors that influence the reduction or the reemergence of vector-borne diseases. Analyses resulting from the combination of geographical information systems (GIS) and remote sensing have improved knowledge of climatic, environmental, and biodiversity factors influencing vector-borne diseases (VBDs) such as malaria, visceral leishmaniasis, dengue, Rift Valley fever, schistosomiasis, Chagas disease and leptospirosis. These knowledge and products developed using remotely sensed data helped and continue to help decision makers to better allocate limited resources in the fight against VBDs.

Main body Because VBDs are linked to climate and environment, we present here our experience during the last four years working with the projects under the, World Health Organization (WHO)/ The Special Programme for Research and Training in Tropical Diseases (TDR)-International Development Research Centre (IDRC) Research Initiative on VBDs and Climate Change to integrate climate and environmental information into research and decision-making processes. The following sections present the methodology we have developed, which uses remote sensing to monitor climate variability, environmental conditions, and their impacts on the dynamics of infectious diseases. We then show how remotely sensed data can be accessed and evaluated and how they can be integrated into research and decision-making processes for mapping risks, and creating Early Warning Systems, using two examples from the WHO TDR projects based on schistosomiasis analysis in South Africa and Trypanosomiasis in Tanzania.

Conclusions: The tools presented in this article have been successfully used by the projects under the WHO/TDR-IDRC Research Initiative on VBDs and Climate Change. Combined with capacity building, they are an important piece of work which can significantly contribute to the goals of WHO Global Vector Control Response and to the Sustainable Development Goals especially those on health and climate action. Electronic supplementary material The online version of this article (10.1186/s40249-018-0501-9) contains supplementary material, which is available to authorized users.

Full text link <https://tinyurl.com/3stphms9>

**DR. EDUARDO C. CUANSING***Physics***Sex:** Male**Education**

Doctor of Philosophy in Physics, Purdue University, West Lafayette USA

Master of Science in Physics, University of the Philippines Diliman

Bachelor of Science in Physics, University of the Philippines Diliman

Field of Specialization

Quantum Transport

Quantum Thermodynamics

Nonequilibrium

Quantum many-body systems

Critical Phenomena

Researches:**Article title:** Dynamics of electron currents in nanojunctions with time-varying components and interactions**Authors:** Eduardo Cuansing, Francis A. Bayocbo and Christian M. Laurio**Publication title:** not stated**Abstract:**

We study the dynamics of the electron current in nanodevices where there are time-varying components and interactions. These devices are a nanojunction attached to heat baths and with dynamical electron-phonon interactions and a nanojunction with photon beams incident and reflected at the channel. We use the two-time nonequilibrium Green's functions technique to calculate the time-dependent electron current flowing across the devices. We find that whenever a sudden change occurs in the device, the current takes time to react to the abrupt change, overshoots, oscillates, and eventually settles down to a steady value. With dynamical electron-phonon interactions, the interaction gives rise to a net resistance that reduces the flow of current across the device when a source-drain bias potential is attached. In the presence of dynamical electron-photon interactions, the photons drive the electrons to flow. The direction of flow, however, depends on the frequencies of the incident photons. Furthermore, the direction of

electron flow in one lead is exactly opposite to the direction of flow in the other lead thereby resulting in no net change in current flowing across the device.

Full text link <https://tinyurl.com/yc4w33ah>

Article title: Attenuation and amplification of the transient current in single-site nanojunctions with time-varying gate potentials

Authors: Eduardo C. Cuansing

Publication title: International Journal of Modern Physics B 31(14), May 2016

Abstract:

We study charge transport in a source-channel-drain system with a time-varying applied gate potential acting on the channel. We calculate both the current flowing from the source into channel and out of the channel into the drain. The current is expressed in terms of nonequilibrium Green's functions. These nonequilibrium Green's functions can be determined from the steady-state Green's functions and the equilibrium Green's functions of the free leads. We find that the application of the gate potential can induce current to flow even when there is no source-drain bias potential. However, the direction of the current from the source and the current to the drain are opposite, thereby resulting in no net current flowing within the channel. When a source-drain bias potential is present, the net current flowing to the source and drain can either be attenuated or amplified depending on the sign of the applied gate potential. We also find that the response of the system to a dynamically changing gate potential is not instantaneous, i.e., a relaxation time has to pass before the current settles into a steady value. In particular, when the gate potential is in the form of a step function, the current first overshoots to a maximum value, oscillates and then settles down to a steady-state value.

Full text available upon request to the author/s

Article title: Role of the on-site pinning potential in establishing quasi-steady-state conditions of heat transport in finite quantum systems

Authors: Eduardo C. Cuansing, Huanan Li, and Jian-Sheng Wang

Publication title: Physical Review E 86(3-1):031132, September 2012

Abstract:

We study the transport of energy in a finite linear harmonic chain by solving the Heisenberg equation of motion, as well as by using nonequilibrium Green's functions to verify our results. The initial state of the system consists of two separate and finite linear chains that are in their respective equilibriums at different temperatures. The chains are then abruptly attached to form a composite chain. The time evolution of the current from just after switch-on to the transient regime and then to later times is determined numerically. We expect the current to approach a steady-state value at later times. Surprisingly, this is possible only if a nonzero quadratic on-site pinning potential is applied to each particle in the chain. If there is no on-site potential a recurrent phenomenon appears when the time scale is longer than the traveling time of sound to make a round trip from the midpoint to a chain edge and then back. Analytic expressions for the transient and steady-state currents are derived to further elucidate the role of the on-site potential.

Full text available upon request to the author/s

Article title: Time-dependent quantum transport and power-law decay of the transient current in a nano-relay and nano-oscillator

Authors: Eduardo C. Cuansing; Gengchiao Liang

Publication title: Journal of Applied Physics 110:083704, 2011

Abstract:

Time-dependent nonequilibrium Green's functions are used to study electron transport properties in a device consisting of two linear chain leads and a time-dependent interlead coupling that is switched on non-adiabatically. We derive a numerically exact expression for the particle current and examine its characteristics as it evolves in time from the transient regime to the long-time steady-state regime. We find that just after switch-on, the current initially overshoots the expected long-time steady-state value, oscillates and decays as a power law, and eventually settles to a steady-state value consistent with the value calculated using the Landauer formula. The power-law parameters depend on the values of the applied bias voltage, the strength of the couplings, and the speed of the switch-on. In particular, the oscillating transient current decays away longer for lower bias voltages. Furthermore, the power-law decay nature of the current suggests an equivalent series resistor-inductor-capacitor circuit wherein all of the components have time-dependent properties. Such dynamical resistive, inductive, and capacitive influences are generic in nano-circuits where dynamical switches are incorporated. We also examine the characteristics of the dynamical current in a nano-oscillator modeled by introducing a sinusoidally modulated interlead coupling between the two leads. We find that the current does not strictly follow the sinusoidal form of the coupling. In particular, the maximum current does not occur during times when the leads are exactly aligned. Instead, the times when the maximum current occurs depend on the values of the bias potential, nearest-neighbor coupling, and the interlead coupling.

Full text available upon request to the author/s

Article title: Tunable heat pump by modulating the coupling to the leads

Authors: Eduardo C. Cuansing and Jian-Sheng Wang

Publication title: Physical Review E 82(2 Pt 1):021116, August 2010

Abstract:

We follow the nonequilibrium Green's function formalism to study time-dependent thermal transport in a linear chain system consisting of two semi-infinite leads connected together by a coupling that is harmonically modulated in time. The modulation is driven by an external agent that can absorb and emit energy. We determine the energy current flowing out of the leads exactly by solving numerically the Dyson equation for the contour-ordered Green's function. The amplitude of the modulated coupling is of the same order as the interparticle coupling within each lead. When the leads have the same temperature, our numerical results show that modulating the coupling between the leads may direct energy to either flow into the leads simultaneously or flow out of the leads simultaneously, depending on the values of the driving frequency and temperature. A special combination of values of the driving frequency and

temperature exists wherein no net energy flows into or out of the leads, even for long times. When one of the leads is warmer than the other, net energy flows out of the warmer lead. For the cooler lead, however, the direction of the energy current flow depends on the values of the driving frequency and temperature. In addition, we find transient effects to become more pronounced for higher values of the driving frequency.

Full text link <https://tinyurl.com/3wahx55w>

Article title: Transient behavior of heat transport in a thermal switch

Authors: Eduardo C. Cuansing and Jian-Sheng Wang

Publication title: Physical review. B, Condensed matter 81(5), October 2009

Abstract:

We study the time-dependent transport of heat in a nanoscale thermal switch. The switch consists of left and right leads that are initially uncoupled. During switch-on the coupling between the leads is abruptly turned on. We use the nonequilibrium Green's function formalism and numerically solve the constructed Dyson equation to determine the nonperturbative heat current. At the transient regime we find that the current initially flows simultaneously into both of the leads and then afterwards oscillates between flowing into and out of the leads. At later times the oscillations decay away and the current settles into flowing from the hotter to the colder lead. We find the transient behavior to be influenced by the extra energy added during switch-on. Such a transient behavior also exists even when there is no temperature difference between the leads. The current at the long-time limit approaches the steady-state value independently calculated from the Landauer formula. Comment: version accepted for publication in PRB

Full text link <https://tinyurl.com/5n8nw8ra>

Article title: Quantum transport in honeycomb lattice ribbons with armchair and zigzag edges coupled to semi-infinite linear chain leads

Authors: E. Cuansing and J.-S. Wang

Publication title: The European Physical Journal B 69(4):505-513, June 2009

Abstract:

We study quantum transport in honeycomb lattice ribbons with either armchair or zigzag edges. The ribbons are coupled to semi-infinite linear chains serving as the input and output leads and we use a tight-binding Hamiltonian with nearest-neighbor hops. The input and output leads are coupled to the ribbons through bar contacts. In narrow ribbons we find transmission gaps for both types of edges. The appearance of this gap is due to the enhanced quantum interference coming from the multiple channels in bar contacts. The center of the gap is at the middle of the band in ribbons with armchair edges. This particle-hole symmetry is because bar contacts do not mix the two sublattices of the underlying bipartite honeycomb lattice when the ribbon has armchair edges. In ribbons with zigzag edges the gap center is displaced to the right of the band center. This breakdown of particle-hole symmetry is the result of bar contacts now mixing the two sublattices. We also find transmission oscillations and resonances within the transmitting region of the band for both types of edges. Extending the length of a ribbon does not affect the

width of the transmission gap, as long as the ribbon's length is longer than a critical value when the gap can form. Increasing the width of the ribbon, however, changes the width of the gap. In ribbons with zigzag edges the gap width systematically shrinks as the width of the ribbon is increased. In ribbons with armchair edges the gap is not well-defined because of the appearance of transmission resonances. We also find only evanescent waves within the gap and both evanescent and propagating waves in the transmitting regions.

Full text available upon request to the author/s

Article title: Quantum transport in randomly diluted quantum percolation clusters in two dimensions

Authors: Eduardo Cuansing and Hisao Nakanishi

Publication title: Physica A: Statistical Mechanics and its Applications

Abstract:

We study the hopping transport of a quantum particle through finite, randomly diluted percolation clusters in two dimensions. We investigate how the transmission coefficient T behaves as a function of the energy E of the particle, the occupation concentration p of the disordered cluster, the size of the underlying lattice, and the type of connection chosen between the cluster and the input and output leads. We investigate both the point-to-point contacts and the busbar type of connection. For highly diluted clusters we find the behavior of the transmission to be independent of the type of connection. As the amount of dilution is decreased we find sharp variations in transmission. These variations are the remnants of the resonances at the ordered, zero-dilution, limit. For particles with energies within $0.25 \leq E \leq 1.75$ (relative to the hopping integral) and with underlying square lattices of size 20×20 , the configurations begin transmitting near $p\alpha = 0.60$ with T against p curves following a common pattern as the amount of dilution is decreased. Near $p\beta = 0.90$ this pattern is broken and the transmission begins to vary with the energy. In the asymptotic limit of very large clusters we find the systems to be totally reflecting in almost all cases. A few clear exceptions we find are when the amount of dilution is very low, when the particle has energy close to a resonance value at the ordered limit, and when the particle has energy at the middle of the band. These three cases, however, may not exhaust all possible exceptions.

Full text available upon request to the author/s

Article title: Quantum interference effects in particle transport through square lattices

Authors: E. Cuansing and H. Nakanishi

Publication title: Physical Review E 70(6 Pt 2):066142, January 2005

Abstract:

We study the transport of a quantum particle through square lattices of various sizes by employing the tight-binding Hamiltonian from quantum percolation. Input and output semi-infinite chains are attached to the lattice either by diagonal point-to-point contacts or by a busbar connection. We find resonant transmission and reflection occurring whenever the incident particle's energy is near an eigenvalue of the lattice alone (i.e., the lattice without the chains

attached). We also find the transmission to be strongly dependent on the way the chains are attached to the lattice.

Full text link <https://tinyurl.com/zrkb768j>

Article title: Structure and diffusion time scales of disordered clusters

Authors: E. Cuansing and H. Nakanishi

Publication title: Physica A: Statistical Mechanics and its Applications 322(1-4), July 2002

Abstract:

The eigenvalue spectra of the transition probability matrix for random walks traversing critically disordered clusters in three different types of percolation problems show that the random walker sees a developing Euclidean signature for short time scales as the local, full-coordination constraint is iteratively applied.

Full text available upon request to the author/s

Article title: Iterated Fully Coordinated Percolation on a Square Lattice

Authors: E. Cuansing and H. Nakanishi

Publication title: Journal of Statistical Physics 105(3), September 2000

Abstract:

We study, on a square lattice, an extension to fully coordinated percolation which we call iterated fully coordinated percolation. In fully coordinated percolation, sites become occupied if all four of its nearest neighbors are also occupied. Repeating this site selection process again yields the iterated fully coordinated percolation model. Our results show a large enhancement in the size of highly connected regions after each iteration (from ordinary to fully coordinated and then to iterated fully coordinated percolation); enhancements that are much larger than an extension of correlations by an extra lattice constant might suggest. We also study the universality among the three problems by determining the corresponding static and dynamic critical exponents. Specifically, a new method to directly calculate the walk dimension, d_w , using finite size scaling applied to normal mode analysis is used. This method is applicable to any geometry and requires significantly less computation than previously known calculations to determine d_w .

Full text link <https://tinyurl.com/3bt9cej4>

Article title: Geometry of fully coordinated, two-dimensional percolation

Authors: E. Cuansing, J. H. Kim, and H. Nakanishi

Publication title: Physical review A, Atomic, molecular, and optical physics 60(4 Pt A):3670-5, November 1999

Abstract:

We study the geometry of the critical clusters in fully coordinated percolation on the square lattice. By Monte Carlo simulations (static exponents) and normal mode analysis (dynamic exponents), we find that this problem is in the same universality class with ordinary percolation statically but not so dynamically. We show that there are large differences in the number and

distribution of the interior sites between the two problems that may account for the different dynamic nature.

Full text available upon request to the author/s.