

PHILIPPINE SCIENCE AND TECHNOLOGY ABSTRACTS

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DEPARTMENT OF SCIENCE AND TECHNOLOGY

**Science and Technology
Information Institute**

ABOUT THE COVER

The cover is inspired by a honeycomb structure, which reflects the content of PSTA. Apart from the common knowledge that a honeycomb represents bees' house, this structure is also referred to other scientific and technological studies such as in Archaeology, Architecture, Computer Science, Genetics, Geology, Information and Communications Technology, Mathematics, and Physics. Similarly, the PSTA encompasses a variety of S&T disciplines and is consolidated into one sourcebook.

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PHILIPPINE SCIENCE AND TECHNOLOGY ABSTRACTS

JUNE 2022

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PHILIPPINE SCIENCE AND TECHNOLOGY ABSTRACTS

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Agro-morphological Characterization and Fatty Acid Composition Analysis of Selected Sunflower Accessions

Aquino, John Dave C. , Gaban, Paula Blanca V. , Flores, Erick Allain C. , Manalili, Christine

Sunflower is one of the most important oil crops, with the essential fatty acids of its oil considered to be important in the human diet. Various sunflower accessions necessitate morphological and oil research. This study evaluates the agro-morphological characteristics of sunflower using the guidelines developed by the International Union for the Protection of New Varieties of Plants (UPOV). Moreover, it also assessed the distinctness, uniformity, and stability among accessions through the agglomerative clustering method, with the morphological diversity estimated using the Shannon-Weiner diversity index that ranges from low to moderate. A significant relationship was observed between pollen diameter and sunflower oil. Twenty (20) accessions were extracted to determine the oil content and fatty acid composition using gas chromatography–mass spectrometry (GC-MS). Out of 20 sunflower germplasms, 18 accessions had oil extracted. CL-SF20 obtained the highest amount of extracted oil. GC-MS analysis revealed that CL-SF14 has 71.5% oleic acid, 6.86% palmitic acid, and the lowest polyunsaturated/saturated fatty acid (P/S) index of 0.4228. **(Author's abstract)**

Keywords: *Fatty acid composition, Morphological traits, Oleic acid, Sunflower oil, Agriculture*

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NP

ANALYSIS OF THE WILLINGNESS TO PAY FOR CHARCOAL BRIQUETTES OF FOOD ESTABLISHMENTS IN LOS BAÑOS, LAGUNA, 2018

Lumanog, Johannah Ma

This study was undertaken to analyze the willingness to pay for charcoal briquettes of food establishments and to provide recommendations that will increase the marketability of the product. Hence, increasing the demand for the briquetting technology.

Descriptive statistics, Chi-Square Test, Attribute Importance Rating Analysis, Satisfier-Dissatisfier Analysis, and Price Sensitivity Analysis were employed to analyze the data obtained from the surveys conducted through personal interview of 42 registered food establishments in the municipality of Los Baños, Laguna as of 2017.

Based on the results of the study, 59.5 percent of the respondents are willing to pay for charcoal briquettes; 7.1 percent will utilize the briquettes as a main fuel source of their business, 9.5 percent as an additional fuel source, and the rest of the 42.9 percent as an alternative fuel source. Their willingness to pay ranges from 15 to 80 PhP/kg, with a mean of PhP44.28/kg. However, most are willing to pay at PhP30/kg. Price Sensitivity Analysis, on the other hand, revealed that the acceptable price per kilo of charcoal briquettes ranges from PhP36.00 to PhP66.50 with indifferent and optimum prices per kilo at PhP43.00 and PhP55.00, respectively.

The respondents are more willing to pay for the product when briquettes are easier to handle, easier to ignite, emit higher intensity of heat, has manageable heat intensity, last longer, and has lower selling price. Product improvement, introduction of product complement, market penetration, and appropriate product positioning,

promotion and pricing must be taken into account to increase the marketability of the charcoal briquettes. (Author's abstract)

Keywords: *Willingness, WTP, Charcoal, Briquettes, Biomass, Agriculture*

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2019,
(Filipiniana Analytics)
NP

0003

COMPARISON OF EGG QUALITY TRAITS IN DIFFERENT POULTRY SPECIES AND BREEDS

Ramos, Ana Rose , Bondoc, Orville L., Ebron, Aldrin O. , Santiago, Rene

Using 815 eggs randomly collected from 29 breeds of chickens, mallard, Muscovy, quails, guinea fowl, turkey, and ostrich, this study compared internal and external egg quality traits between poultry species and between breeds within species. Among poultry species used for commercial egg production, the mallard ducks had significantly ($P<0.05$) the highest weight of egg, yolk, albumen, and shell, shell thickness, short, and long circumference which is followed by chickens and quails. Both quail and mallard eggs have higher yolk-albumen ratio than chicken eggs. Chicken egg yolks are more deeply hued than quail and mallard. Both mallard and chicken eggs were more elongated (less round) than quail eggs. Philippine native chickens (Banabang Kalabaw, Joloano, Paraoakan, and Palawan-lasak) have significantly ($P<0.05$) lower egg weight, albumen weight, short, and long circumference than commercial egg-type and dual-purpose breeds. Percent yolk, percent albumen, yolk-albumen ratio, yolk color, albumen height, Haugh unit, and external egg quality traits were significantly different ($P<0.05$) among the native breeds. Itik-Pinas (IP) mallard breeds (IP-Itim, IP-Khaki, and Kayumanggi-IP) were significantly different ($P<0.05$) for yolk weight, percent yolk, percent albumen, yolk-albumen ratio, yolk color, albumen height, Haugh unit, shell weight, percent shell, shell thickness, and short circumference. Quail and turkey eggs showed significant breed differences ($P<0.05$) for percent yolk, percent albumen and yolk-albumen ratio. **(Author's abstract)**

Keywords: *Egg quality, Chickens, Mallard, Muscovy, Quails, Guinea fowl, Turkey, Ostrich, Agriculture*

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NP

0004

Corn-cob Biochar Characterization and Application Effects to Carbon Dioxide (CO₂) Evolution in Acid Soil Added with Different Types of Fertilizers

Cubelo, Jose Edwin C. , Villegas-Pangga, Gina , Bulfa, Jr., Arse

Biochar, a carbon (C) rich material produced from biomass, is an inexpensive means of removing C from the atmosphere by incorporating it into the soil, where C sinks are formed for sequestration. The slow release of carbon dioxide (CO₂) from the soil is related to C sequestration, long-term storage of CO₂, or other forms of C that help lessen CO₂ concentration. An incubation study was conducted in a laboratory to determine the effect of corn-cob

biochar (CCB) application on Luisiana clay (Orthoxic Palehumults) acidic soil. The CO₂ evolution from the incubation of various mixtures of organic materials, inorganic fertilizers added with CCB was measured using a titration of hydrochloric acid (HCl). The biochar application rate was 10 t/ha, and the organic fertilizers at 5 t/ha. Results show that CCB contained essential plant elements like C, K (potassium), Si (silicon), Cu (copper), Na (sodium), and Cl (chlorine). It also possesses a large surface area and high average pore size. The CO₂ evolution increased in the first two weeks with a peak at Day 2, and the amount of cumulative CO₂ decreased after that in all treatments during the incubation period. Treatments with CCB showed a constant reduction in the amount of CO₂.
(Author's abstract)

Keywords: Biochar, Biomass, CO₂ evolution, Corn-cob, Fertilizers, Organic carbon, Agriculture

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NP

0005

Diversity Assessment in the *In Vitro* Conservation Response of Philippine Yam (*Dioscorea* Species) Accessions

Descalsota, Michelle Lyka Valle , Descalsota, Jonathan C. , Uy, Jaclyn Nicole R. , Huelgas, Visitacion C. , Damasco, Oli

The National Plant Genetic Resources Laboratory maintains the largest *in vitro* germplasm collection of *Dioscorea* in the Philippines and has remained steadfast in its aim to safeguard accessions with potential use. Due to costly and time-consuming operations, most gene banks operate with the guidance of diversity assessments to measure the genetic integrity of one's collection and design appropriate protocols for conservation. Diversity assessment under *in vitro* conditions remains unexplored even with the advantages of increased security and functionality in limited spaces. This study aimed to assess the genetic diversity of the *in vitro* conservation response of yam germplasm collection of the country. Four *Dioscorea* species totaling 217 accessions were subjected to *in vitro* culture conditions. Parameters such as % surviving cultures, % shoot regeneration, and degree of tissue browning were analyzed using the Shannon-Weaver diversity index and cluster analysis. Assessment of initial culture establishment and regeneration responses revealed a high degree of variability. *D. alata* had the highest response in % surviving cultures and % shoot regeneration. Diversity analysis using the Shannon-Weaver index revealed high diversity among the species and differences in diversity within species. This high level of diversity can be attributed to the distribution of responses observed in the accessions of each species. This high genetic diversity observed in the *in vitro* cultured *Dioscorea* indicates the necessity for the development of several *in vitro* culture protocols to obtain optimum responses for regeneration, conservation, and other *in vitro* applications. (Author's abstract)

Keywords: Cluster analysis, *Dioscorea*, Diversity analysis, *In vitro* conservation, Shannon-Weaver Diversity Index, Yam, Agriculture

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2022 February,
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NP

Evaluation of Putative Single Nucleotide Polymorphism (SNP) Markers Associated with Waterlogging Tolerance in Maize (*Zea mays* L.)

Ocampo, Eureka Teresa M. , Hate, Krys

Waterlogging is an environmental stress condition that drastically affects maize growth and development. Plant breeders utilize genetic markers such as single nucleotide polymorphism (SNP) markers to incorporate traits like waterlogging tolerance to stress susceptible crops. This study aimed to validate the SNP markers observed previously from improved waterlogging tolerant maize varieties. To assess waterlogging tolerance among 214 maize lines, secondary traits [chlorophyll, number of adventitious roots (ADVR), days to silking (DS), days to anthesis (DA), anthesis-silking interval (ASI), and number of ears (NEARS)] were measured from plants grown in pots. Only 55 high-performing lines from the potted trial were used in the field trial. Twelve (12) maize lines consistently clustered together with the IPB Var 13, a high-yielding variety even under waterlogging. The study revealed that two putative SNPs from quantitative trait loci (QTLs) involved in waterlogging tolerance overlapped with flavonoid 3'-monooxygenase gene (*CYP75B1*) and very-long-chain (3R)-3-hydroxyacyl-CoA dehydratase gene (*PAS2*). These putative candidate SNPs were predicted to activate the deleterious missense variant (PZE09123105094) and splice donor variant (PZE0814653797), respectively. *CYP75B1* and *PAS2* variants were expected to affect the normal development of stressed young maize due to low antioxidant property, leading to hampered cell differentiation. Waterlogging-tolerant maize lines used in this study were heterozygous for both *CYP75B1* and *PAS2*. Expression analysis and functional studies of *CYP75B1* and *PAS2* proteins are recommended to assess their abundance and actual role in waterlogging tolerance in maize. The results of this study may contribute to the development of Philippine maize varieties that are tolerant to waterlogging stress and further improve their yield capacity. **(Author's abstract)**

Keywords: *CYP75B1, Maize, PAS2, SNP, Waterlogging tolerance, Agriculture*

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2021 June,

(Filipiniana Analytics)

NP

Exploration of Candidate Genes Derived from SNPs Associated with Phenotypic Root Plasticity Using Philippine Rice Germplasm for Drought Adaptation

Mananghaya, Teodora E. , Cabral, Maria Corazon J. , Lipio, Patrick Louie G. , Cruz, Antoinette S. , Lucob-Agustin, Nonawin, Suralta, Roel R. , Niones, Jonatha

Phenotypic root plasticity is a crucial trait for stable growth, adaptability, and productivity under abiotic-stressed growing environments. However, the genetic determinants and mechanisms controlling the trait are largely unknown, thus limiting its breeding application. We previously found 17 single nucleotide polymorphism (SNPs) significantly associated with phenotypic root plasticity traits – particularly, total root length (TRL), total nodal root length (TNRL), and total lateral root length (TLRL) – under moderate and severe drought using selected Philippine rice germplasm by employing the genome-wide association studies (GWAS) approach. Here, we present around 92 candidate genes using these SNP data. The genes were derived from various functional categories and drought intensity dependent. These were further narrowed *via* Gene Ontology and gene expression profile at root apical regions using databases to those whose putative functions were likely to be associated with root development in

response to drought stress. Sixteen (16) more interesting known or novel genes were selected and discussed. When these genes are validated, they can help improve rice adaptation to water-limited environments. **(Author's abstract)**

Keywords: *Candidate genes, Drought, Phenotypic root plasticity, Rice, Single nucleotide polymorphism, Soil moisture fluctuation, Agriculture*

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NP

0008

Fatty Acid Composition and Nutritional Indices/Ratios of Colostrum and Milk from Murrah and “Murrah × Carabao” Crossbred Buffaloes

Ramos, Ana Rose , Bondoc, Orvi

This study aims to determine the fatty acid (FA) composition and compare FA-based nutritional indices/ratios of colostrum and milk obtained on the 30th, 60th, and 90th day of lactation from 27 Murrah and 18 “Murrah × Carabao” crossbred buffaloes. The major saturated FA (SFA) in colostrum and milk is palmitic acid (C16:0), comprising 32–33% by weight of total FAs. Other important SFAs – myristic acid (C14:0), stearic acid (C18:0), and lauric acid (C12:0) – were lower ($P < 0.05$) in colostrum than in milk. Oleic acid (C18:1-n9c), a monounsaturated fatty acid (MUFA), is the second most abundant FA in colostrum (28.5%) and milk (18.0–18.8%). Arachidonic acid (C20:4-n6, AA) is the dominant polyunsaturated fatty acid (PUFA) in colostrum (0.92%) and milk (0.42–0.45%). Conjugated linoleic acid (C18:2-c9t11, CLA) was higher in colostrum (0.64%) than in milk (0.14–0.16%). Colostrum and milk had a very low PUFA/SFA ratio (0.02–0.06: 1). The linoleic acid (C18:2-n6, LA) to α -linolenic acid (C18:3-n3, ALA) ratio was higher in colostrum (3.21: 1) than in milk (0.62–1.55: 1). The omega-6 (LA and AA) to omega-3 [ALA and docosahexaenoic acid (C22:6-n3, DHA)] or n-6/n-3 ratio was more balanced for milk (1.76-2.34: 1) than colostrum (3.37: 1). Colostrum had lower atherogenicity (2.53 vs. 4.50–4.66), lower thrombogenicity (2.68 vs. 4.48–4.59), and higher health-promoting index (0.39 vs. 0.21–0.22) than milk. The hypocholesterolemic/hypercholesterolemic (h/H) ratio was higher for colostrum (0.64: 1) than milk (0.34–0.36: 1). Except for AA, the FA composition of colostrum and milk were not significantly different between Murrah and “Murrah × Carabao” crosses ($P > 0.05$). **(Author's abstract)**

Keywords: *Colostrum, Fatty acids, Milk, Murrah, Murrah × Carabao buffaloes, Nutritional indices, Agriculture*

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NP

0009

Genetic Diversity Assessment of Philippine Germplasm Collections of Yautia [*Xanthosoma sagittifolium* (L.) Schott] Using Morpho-agronomic Traits

Garcia, Jose Nestor M. , de Chavez, Hidelisa D. , Ignacio, Rhesa Miren A. , Mateo, John Marty C. , Villavicencio, Maria Lea H., Villancio, Virgilio

Xanthosoma sagittifolium (L.) Schott or “yautia” belongs to the Araceae family. In the Philippines, the traditional varieties are categorized based on the color of the corms, leaves, and petioles. However, there is a limited production of this crop and, thus, the production data is reported with another edible aroid – “taro.” A total of 148 accessions of yautia germplasm were collected from 32 provinces in the country and are conserved *ex situ* at the National Plant Genetic Resources Laboratory (NPGRL), Institute of Plant Breeding (IPB), University of the Philippines Los Baños (UPLB). These were morphologically characterized to determine the genetic diversity of the germplasm accessions. The data gathered a total of 57 qualitative and 21 quantitative parameters for the whole plant per accession. The results of diversity analysis showed a total of five qualitative and 10 quantitative characters obtaining high index values, ranging from 0.67–0.96 H'. The shape of corm (0.96) had the highest H' among the qualitative characters while the lamina length: breadth ratio (0.90) was the highest H' among the quantitative characters observed. The results of the principal component analysis (PCA) have shown that the first five components have eigenvalues up to 1.03, which explains 85.03% of the total variation among the genotypes of *Xanthosoma*. The phenotypes or traits with loading values of ≥ 0.50 explained the total variation within each component. Furthermore, outliers can be seen in the scree plots, which means these accessions have the least similarities in either of the groupings formed. The germplasm collections at the NPGRL are highly diverse in terms of the morpho-agronomic characteristics established on the basis of the results of the diversity analysis using the Shannon-Weaver diversity index, multivariate analysis using SAHN (sequential, agglomerative, hierarchical, and nested) clustering, and PCA. (Author's abstract)

Keywords: Genetic diversity, Germplasm, Morphological characters, *Xanthosoma sagittifolium*, Yautia, Agriculture

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NP

0010

Genetic Diversity of Philippine Carabao (*Bubalus bubalis*) Using Mitochondrial DNA D-loop Variation: Implications to Conservation and Management

Nomura, Koh , Takahashi, Yukimizu , Villamor, Lilian P., Amano, Tak

Developing rational conservation programs for Philippine carabao (PC) (*Bubalus bubalis*) requires knowledge on the pattern of genetic variability within and between populations of swamp buffalo. Studying the genetic diversity and phylogeographic structure is essential to understand the distribution of the Philippine swamp buffalo maternal haplotypes towards the PC conservation. This study aimed to determine the genetic diversity and the phylogeographic structure of PC using molecular approaches. D-loop of the mitochondrial DNA (mtDNA) on the PC *B. bubalis* (n = 107) were randomly selected from 23 populations across the islands of Luzon, Visayas, and Mindanao as major islands sub-groups. DNA was isolated from the whole blood, and the D-loop region of the swamp buffalo was amplified using the polymerase chain reaction (PCR). Purified PCR products were sequenced with the Applied Biosystems Automated 3730. Results showed that the phylogenetic analyses detected 16 mtDNA haplotypes observed with 12 variable sites and haplotype and nucleotide diversities of 0.695 ± 0.042 and 0.004 ± 0.001 , respectively. This study also identified the delineation of swamp buffalo populations into major and minor groups. Among the major groups, 14 haplotypes were included, and sequences were incorporated in the maternal lineage A. Minor groups which fell in the maternal lineage B identified two new haplotypes. Thus, the current findings revealed the moderate mtDNA haplotype diversity and weak phylogeographic structure of the PC. In addition, the results of this study will serve as a vital starting point in planning effective strategies and prioritizing the genetic resources for PC conservation and management programs. (Author's abstract)

Keywords: Genetic diversity, mtDNA D-loop, Phylogenetic, Philippine carabao, Conservation, Agriculture

0011

Growth and Profitability of Broilers with Vermimeal on Ration Under Two Management *Bollido,*

The study was conducted to evaluate the growth and profitability of broilers in the different levels of vermi (*Eisenia fetida*) meal ration under two management systems. 120 day old chicks were tested in Randomized Complete Block Design with 4 treatments: commercial feeds, 2% vermi meal (vm)+local ingredients(li), 3% vm+li, 5% vm+li in three replications. Result revealed that total confinement (TC) had higher body weight (bw) and weight gain (wg) with a difference of 35.60 grams and 36.90 grams respectively compared to that of free-range (FR) that had lesser feed consumption (fc) with a difference of 81.10 grams and high in net income and ROI. Infeed ration, fc increased when given a higher percentage of vm, and it was significantly different from the commercial feeds (cf). In 3 different levels of vm, though they did not have a significant difference to each other, the 2% level of vm was comparable to cf and showed a difference in terms of bw 296.70 grams in TC; 326.00 grams in FR. In wg 296.67 grams in TC and 370.97 grams in FR in both management systems. Consequently, 2% level vm had an optimum result in final body weight, wg, and high in feed conversion. **(Author's abstract)**

Keywords: *Vermi, Free-range, Total confinement, Profitability, Agriculture*

0012

Innovation Culture of Selected Agricultural State Universities and Colleges (SUCs) in Regions III and VIII

Baconguis, Rowena DT. , Leron, Paul Jer

This paper extends the concept of innovation culture to higher education institutions (HEIs), particularly in the context of doing research and development (R&D) in agricultural state universities and colleges (SUCs). Through the synthesis of related literature, we learned the different organizational, human, and collaborative dimensions of innovation culture. Using case study research design, 40 R&D managers and administrators, innovators, and faculty-research personnel from selected Levels 3 and 4 agricultural SUCs from Regions III and VIII were involved in a series of in-depth interviews and focus group discussions (FGDs). Institutional statements such as mission, vision, and organizational goals were used as secondary data. Explication techniques and content analysis were applied to identify themes and concepts related to innovation, innovation culture, and the challenges in doing R&D in the university. Results revealed that the aspects of innovation and the concept of innovation culture were embedded in the institutional statements, as well as in the values of the participants. It was observed that the participants widely understood and appreciated the concept and attributes of innovation culture in relation to R&D activities in the university. We learned that creativity and flexibility, innovation resources, training and capacity development, and coaching and mentoring were key elements of innovation culture that can help address the managerial and institutional challenges in the university. Lastly, identifying, assessing, and determining the impacts of the specific

dimensions and elements of innovation culture on R&D productivity, as well as in producing innovative graduates, were deemed relevant areas for research. **(Author's abstract)**

Keywords: *Agricultural state universities and colleges, Innovation culture, Research and development productivity, Agriculture*

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NP

0013

Life History of *Thrips hawaiiensis* (Morgan) Reared on Flower of “Saba” Banana (*Musa acuminata* x *balbisiana* Colla)

Castillo, Jamaica T. , Copuyoc, Maria Katherine M. , Reyes, Cecilia P., Guzman, June

Thrips hawaiiensis (Morgan) is a pest of banana, mango, and pomelo. The study aimed to determine the development and reproductive capacity of thrips under laboratory condition. To start the culture, female thrips were collected from Beltran “Saba” banana plantation in Tuao, Cagayan, Philippines. Thrips were reared on fresh banana flowers in glass containers covered with cotton gauze pad sealed with rubber bands at temperatures of 25 ± 1.0 to 32 ± 2.0 °C, relative humidity of 78–99%, and photoperiod of 12:12 h (L:D). Forty (40) eggs laid within 8 h by first-generation female were observed from 05 Oct–16 Nov 2020. Three (7.5%) males and 37 (92.5%) females emerged from unfertilized eggs. Male average egg incubation, first instar, and second instar larval, prepupal, and pupal days were 1.33 ± 0.47 , 1.33 ± 0.47 , 1.33 ± 0.47 , 1.00 ± 0.00 , and 1.33 ± 0.47 , respectively. Male average total development period and lifespan were 8.67 ± 0.62 and 9.33 ± 0.94 , respectively. Female average egg incubation, first instar larva, second instar larva, prepupa, and pupal periods were 1.24 ± 0.43 , 1.24 ± 0.43 , 2.38 ± 0.48 , 0.59 ± 0.20 , and 2.38 ± 0.48 , respectively. Female average total development period from egg to adult emergence and lifespan from egg to post oviposition until the adults are dead were 8.89 ± 0.52 and 23.19 ± 7.07 , respectively. Female average pre-oviposition, oviposition, and post-oviposition periods were 1.05 ± 0.38 , 12.27 ± 6.69 , and 0.95 ± 1.20 , respectively. The average number of eggs laid by each female was 196.92 ± 75.70 . Female second instar larva and pupa development period were longer – which could be due to the bigger body size – and the average lifespan was twice as long as that of male. *T. hawaiiensis* is a short-lived, asexual insect with high fecundity; based on the life span of female thrips studied, between 7–8 thrips generations could be developed annually. (Author's abstract)

Keywords: *Development, Insect, Reproductive capacity, Thrips, Agriculture*

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NP

0014

Morphological Characters of Papaya (*Carica papaya* L.) for Drought Tolerance

Aguilar, Edna A. , Noel, Michael R. , Magdalita, Pablito M., San Pascual, Alangelic

Papaya plants (*Carica papaya* L.) were assessed for tree and fruit morphological traits. During eight months of drought conditions, papaya plants showed signs of drought from March to May 2016. Drought affected fruit development and fruit qualities. Significant decrease in fruit weight, length, width, flesh thickness, and seed weight were observed in drought-affected papayas; however, total soluble solids (TSS) of fruit flesh were significantly higher compared to the TSS of fruits harvested during normal conditions. Drought-tolerant papaya trees were selected based on morphological responses. Drought-tolerant papaya trees were significantly taller and had thicker stems, wider crowns, and more functional green leaves compared to drought-affected trees. Selected plants that thrived well under drought condition were identified for use in breeding. Recovery of plants was evident in increase in fruit weight, length, and width. Correlation of fruit characters of selected drought-tolerant papaya trees revealed that fruit weight was strongly positively correlated with fruit length, fruit width, peel weight, flesh thickness, and TSS. (Author's abstract)

Keywords: *Carica papaya*, Drought, Fruit characters, Recovery, Tree characters, Agriculture

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NP

0015

Morphology, Life Stages, and Longevity of a New Report of *Stenocranus* near *pseudopacificus* (Kirkaldy) in Kalinga, Philippines

Yap, Sheryl A. , Abella, John Dave M. , Clemente, Apel Jae N., Alviar, Kare

A new report of *Stenocranus* near *pseudopacificus* Kirkaldy is documented as an insect pest of corn in Kalinga, Luzon, Philippines. As the identification of this insect species was done only again in the first quarter of 2021, work understanding its biology and life history is in its infancy compared to other planthoppers with corn as the primary plant host, which may share similar genome organization and vectorial capacity to transmit phytopathogens. Very little knowledge is known regarding its biological and ecological characteristics. Here, the number of nymphal stages of *S. nr. pseudopacificus* – as well as its longevity on corn – were determined. Morphological identification of *S. nr. pseudopacificus* indicated that these planthoppers have whitish vertex slightly broader in the apex, reddish-brown band between median and lateral carinae running down to the frons, and similar built and yellow-orange coloration to *S. pacificus* Kirkaldy except in genitalia. To check for the longevity and life stages of *S. nr. pseudopacificus* Kirkaldy a total of 150 macropterous adults were collected from a local corn field in Tabuk City, Kalinga. Results showed that *S. nr. pseudopacificus* has four nymphal stages. Moreover, the incubation period of eggs was 11–12 d, first nymphal (N1) stage lasted for 4–5 d, 3–6 d for the second nymphal stage (N2), 6–7 d for the third nymphal stage (N3), 2–6 d for fourth nymphal stage (N4), and 9–13 d for the adult stage. Based on these results, it was found that *S. nr. pseudopacificus* completes its life cycle, excluding its egg incubation period, from 24–37 d. The results of this study provided relevant new information about this species' life-history traits. Its presence in the key corn planting region of the country merits further data and survey collection for its impact on corn production. (Author's abstract)

Keywords: *Corn pest*, Life stage, Longevity, Morphology, *Stenocranus nr. pseudopacificus*, Agriculture

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NP

Neighborhood Effects in Hybrid Rice Adoption in Davao del Sur, Philippines

Novero, Annabelle U. , Calag, Vicente B. , Limpoco, Marie Analiz April A. , Estaña, Leo Manuel B. , Sarmiento, Jon Marx P. , Miguel, Charisse B., Alviola, IV, Pedr

The Philippines adopted the hybrid rice technology in 1998 to increase productivity; however, the adoption rate is 9% of the total rice area in 2016. Thus, it is important to understand the adoption decision of farmers in relation to hybrid rice technology. Previous studies of rice technology adoption in the Philippines did not consider the spatial dependencies, wherein the choice of adoption of a farmer is influenced by the choice of the neighboring farmers. Hence, this study identifies the factors that influence the farmers' adoption decision of hybrid rice technology, focusing on the role of spatial proximity. A survey involving 122 rice farmer-respondents using proportional random sampling was conducted in Padada and Hagonoy, Davao del Sur, Philippines in 2016. Using the Bayesian-Markov Chain Monte Carlo spatial autoregressive probit estimation, this study found that proximity to neighbors is associated with the choice of the farmers to adopt hybrid rice technology. Moreover, the sex of the household head (HH), household size, non-farm income, and rainfall are the major determinants of adopting hybrid rice technology. Thus, the interventions should focus on delivering better access of female farmers to productive resources and those with relatively higher household size, improve access to non-farm livelihood and employment opportunities, and reinforce proven risk mitigation practices in terms of providing stable water sources in the farming community. **(Author's abstract)**

Keywords: *Hybrid rice, Neighborhood effect, Spatial probit, Technology adoption, Agriculture*

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NP

Non-destructive On-field Determination of Pineapple (*Ananas Comosus* L.) Maturity using Acoustic Impulse Impedance Technique

Llaban, Au

This study analyzed the Hiligaynon speakers' emotive language and communication devices in online conversation. Issues that went viral on the opening of online classes served as the interaction objects. The researcher used the qualitative research method, specifically, linguistic discourse analysis, to describe the online texts in various contexts. Result analysis revealed positive and negative emotive language to the viral posts on learning from home: sarcasm, disgust, optimism, and empathy. Sarcasm and disgust are common in attacks and humor, while optimism and empathy in hypocoristics/endearment and appeals as language devices. The study promotes optimism and empathy for it broadens the students' attention and thinking towards new learning. These positive feelings give a favorable interest in response to online interaction or other communication situations. With the absence of negativity, positive emotions actively produce health and wellbeing as well. Sarcasm challenges creativity and motivation towards action. **(Author's abstract)**

Keywords: *Acoustic impulse impedance technique, Pineapple maturity, Non-destructive maturity determination, Agriculture*

CMU Journal of Science, Volume No. 25 Issue No. 1, 19-25
2021,
(Filipiniana Analytics)

Physiological and Yield Responses of Selected Mungbean Genotypes to Terminal Drought

Ocampo, Eureka Teresa M. , Reyes, Melquiades Emmanuel C. , Delfin, Evelyn F. , Reyes, Jose Ar

Extreme drought conditions have been a major limiting factor in legume production worldwide. The development of drought-resilient crops should help mitigate adverse effects of unfavorable environmental conditions such as drought; however, initial characterization is necessary to ensure that the germplasm has the essential genetic variation for drought tolerance. In this study, a field trial was conducted to characterize drought response and potential drought tolerance of 100 mungbean genotypes through the evaluation of several physiological parameters and seed yield. The genotypes were subjected to terminal drought stress before flowering (~ 30 d after planting), reducing soil moisture content (SMC) from 25.0–30.0% to 13.0–15.0% during treatment imposition. Significant differences were observed between mungbean genotypes for total chlorophyll content (Chl), total scavenging activity (SA), electrolyte leakage (EC), and chlorophyll fluorescence (Fv/Fm) during drought. Furthermore, by transforming each physiological parameter into principal components (PCs) *via* principal component analysis (PCA), five distinct clusters were generated. Based on their physiological response and seed yield, Clusters I and II were identified as potential drought susceptible group, Cluster III was moderately susceptible, and Clusters IV and V were identified as the potential drought-tolerant group. Correlation analysis and PCA also demonstrated the significant relationship among several key traits for drought tolerance such as chlorophyll content, electrolyte leakage, and antioxidant scavenging to chlorophyll fluorescence – suggesting the suitability of fluorescence parameter in mungbean mass screening for drought tolerance. Although weak correlation between physiological parameters to seed yield was present ($0.3 < r < 0.5$), correlations among each physiological parameter were moderately strong ($0.5 < r < 0.7$). The findings suggest that a physiological characterization during initial screening for drought tolerance was an effective approach in identifying possible sources of drought tolerance traits complementary with yield-related traits. The evaluation of chlorophyll fluorescence, scavenging activity, electrolyte leakage, and chlorophyll content was enough to differentiate and characterize the drought response of several mungbean genotypes and will be vital in the development of climate-resilient crops. **(Author's abstract)**

Keywords: *Antioxidant, Drought, Electrolyte leakage, fv/fm, Mungbean, PCA, Agriculture*

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(Filipiniana Analytics)
NP

New Records of Scarab Insect Pests of Cacao (*Theobroma cacao* L.) in the Philippines

Rosales, Avelita M. , Caoili, Barbara L. , Adorada, Jessamyn R. , Adorada, Joel L. , Calcetas, Orlando A., Dimapilis, Eda

New records of scarab pests of cacao (*Theobroma cacao* L.) were reported in the Philippines: the rhizotrogine chafer, *Holotrichia bipunctata* Brenske, 1892 (Coleoptera: Scarabaeidae: Melolonthinae: Rhizotrogini) and diplotaxine chafer *Apogonia palawana* Heller, 1897 (Coleoptera: Scarabaeidae: Melolonthinae: Diplotaxini). The feeding patterns of the two insect pests are characterized, and some integrated pest management recommendations were cited. **(Author's abstract)**

Keywords: *Diplotaxine chafer, June beetle, Rhizotrogine chafer, Scarabs, Agriculture*

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NP

0020

Response of High Yielding Varieties of Sugarcane (*Saccharum officinarum*) to Waterlogging

Samson, Emmanuel G. , Descalsota, Michelle Lyka V. , Delfin, Evelyn F. , Gandia, Jayson L., PeA±a, Mar

Unfavorable weather in the Philippines leaves the sugarcane industry vulnerable to losses from flooded fields. A system of identification should be developed to supplement the country's lack of sugarcane varieties tolerant to waterlogging. This study investigated the effect of waterlogging imposed during the early stalk elongation stage on sugarcane grown in contrasting soil types. In 2017–2018, two split-plot trials at the Institute of Plant Biology (IPB) University of the Philippines (UP) Los Baños experimental area and UP La Granja (La Carlota City, Negros Occidental) evaluated the response of 10 high yielding varieties (HYVs) to flooding for 2 wk during stalk elongation stage [6 mo after planting (MAP)]. Waterlogged sugarcane varieties showed a location-dependent response in terms of projected ton cane per hectare ($Tc\ ha^{-1}$) and sugar yield in 50-kg bags per hectare ($Lkg\ ha^{-1}$). Waterlogging in the UP La Granja trial affected cane and sugar yield with Phil 2000-2569, Phil 2000-1419, Phil 2000-2155, and Phil 2003-1389 losing 22.3–35.8% in cane tonnage. The IPB trial showed no significant effect of waterlogging, primarily due to continuous reflooding. Geometric mean productivity (GMP) and stress tolerance index (STI) values confirm varietal productivity is location-dependent. Phil 2000-1419 and Phil 2000-2569 have the highest GMP and STI for the IPB trial and UP La Granja trial, respectively. GMP and STI models provide aid in selection for waterlogging tolerance. **(Author's abstract)**

Keywords: *Geometric mean productivity, Stress tolerance index, Sugarcane, Waterlogging tolerance, Agriculture*

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0021

Seed Germination and Vigor of Four Philippine Rice Varieties as Influenced by Hydropriming and Storage at Various Durations

Bayogan, Emma Ruth V. , Tac-an, Marina Isabel A. , Lacap, Angelyn T. , Ranmeechai,

Rice seed germination and vigor are vital qualities to improve seedling growth and eventual yield. This study determined the effects of different hydropriming (0, 6, 12, or 18 h) and storage duration (0, 1, 2, and 3 mo) on the seed germination properties and seedling vigor of three irrigated varieties 'Angelica', 'Tubigan 14', 'Tubigan 24', and a rainfed variety 'Sahod Ulan 9'. The seed quality and germination responses after hydropriming were evaluated every month during storage in ambient conditions ($28 \pm 2\ ^\circ C$; $85 \pm 5\% RH$) for 3 mo. 'Sahod Ulan 9' showed tolerance to low moisture content (MC), higher germination percentage (GP) and germination index (GI), plus faster mean germination time (MGT) and days to radicle emergence (DRE); it also produced seedlings with longer shoots

compared to ‘Angelica’, ‘Tubigan 14’, ‘Tubigan 24’. On the other hand, the irrigated varieties showed a higher seed vigor index (SVI) because of their high GP plus longer roots and seedlings. Hydropriming seeds for 6 or 12 h maintained a lower MC, which resulted in higher GP, GI, and SVI; fastest MGT and DRE; and longer shoot, root, and seedling. This study suggests that hydropriming rice seeds of these varieties for 6 h is sufficient to improve germination and vigor. The results suggest that hydropriming rice seeds for 6 h is sufficient to boost the rice germination and vigor of the four rice varieties tested, especially ‘Sahod Ulan 9’. Storage in ambient room conditions is suggested to be limited to only 1 mo after hydropriming as the germination responses decline thereafter. Moreover, the interaction effects of genotype, hydropriming duration, and storage time were found in GP; GI; DRE; root, shoot, and seedling lengths; and SVI. **(Author's abstract)**

Keywords: *Ambient seed storage, Germination, NSIC rice variety, Seed invigoration, Vigor index, Agriculture*

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0022

Sunflower (*Helianthus annuus* L.) Floral Nectar Characterization and Gene Expression Analysis of Sucrose Hydrolyzing Gene *HaCWINV2* ***Gaban, Paula Blanca V. , Juan, Xyrelle P. , Aquino, John Da***

Pollination enhances the seed setting of cross-pollinated crops and maintains the floral diversity in the ecosystem. Honeybees are benefited as they pollinate and obtain nectar as their main source of food. However, the honeybee population is declining due to excessive use of pesticides, climate change, and lack of nectar source plants, which could lead to a decline in honey production in the beekeeping industry. Sunflower has the potential to become a source of nectar and the honey derived is one of the most in-demand due to its nutraceuticals and flavor. This study was conducted to evaluate floral parts and nectar of sunflower germplasm collected by the Central Luzon State University (CLSU) and identify accessions with potential as a nectar source for bees. The focus was on nectar volume, sugar concentration and composition, and relative gene expression levels of the cell wall invertase 2 gene (*HaCWINV2*) responsible for hydrolyzing sucrose to glucose and fructose, as pollinators have different sugar preferences. Among the 23 accessions, six were single heads, and 17 were multiflorous, which contributed to the difference in the amount of nectar. CL-SF18 accession had the highest average nectar volume. In terms of sugar concentration based on total soluble solids, five accessions had values higher than the viscous dippers pollinators such as the bee's optimum sugar requirement. They were the sweetest accessions – namely, CL-SF1 with 71.83, CL-SF9 with 63.50, CL-SF27 with 63.33, CL-SF14 with 61.67, and CL-SF4 with 61.50 oBrix, respectively. The morphological parameters gathered in this study were not significantly correlated to the nectar volume except for the number of heads. Moreover, there was a weak positive linear association between sugar concentration and head diameter, and the disc floret. High expression of the gene has a negative, moderate linear association with low sucrose content. Meanwhile, glucose and fructose had a strong linear association with the gene expression of *HaCWINV2*. Gene expression analysis of the *HaCWINV2* gene showed that CL-SF27 had the highest gene expression level among 10 selected accessions. The same accession had the highest glucose (2.01 g/L) and fructose (1.14 g/L) content. The selected sunflower accessions, CLSF1 and CL-SF 27, are recommended as a potential source of nectar for the beekeeping industry. **(Author's abstract)**

Keywords: *Agriculture, Gene expression, HaCWINV2, Nectar, Sunflower*

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Thrips (Insecta: Thysanoptera) Species Infesting Garlic (Batanes Red) in Selected Farms in Batanes, Philippines

Copuyoc, Maria Katherine , Reyes, Ceci

The study aimed to determine the species of thrips infesting garlic (Batanes Red) in the Department of Agriculture–Batanes Experiment Station (DA-BES) in Ihubok 1, Basco; DA-BES Dibtung, Radiwan, Ivana; and in the Calderon Farm in Radiwan, Ivana, Batanes. Sampling was done in February 2020. A total of 950 adult female thrips were collected from all study sites. The majority of the thrips were collected from DA-BES Farm in Ihubok 1, Basco with 89.89%, followed by the Calderon Farm in Ridawan, Ivana with 5.16%, and DA-BES Farm in Dibtung, Ridawan, Ivana with 4.95%. Thrips were represented by two terebrantian species, namely: *Thrips tabaci* Lindeman (Thripidae) with 97.37%, *Anaphothrips sudanensis* Trybom (Thripidae) with 2.32%, and a tubuliferan species *Haplothrips gowdeyi* (Franklin) (Phlaeothripidae) with 0.31%. *T. tabaci* was the dominant species in all study sites. *A. sudanensis* was found in all the study sites but in low number, while *H. gowdeyi* was present in two DA-BES study sites but absent in the Calderon Farm. This is the first report of *A. sudanensis* and *H. gowdeyi* infesting garlic in the Philippines. **(Author's abstract)**

Keywords: *Anaphothrips sudanensis*, *Haplothrips gowdeyi*, *Thrips tabaci*, Agriculture

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Yield, Proximate Composition, and Phytochemical Screening of “Lagikway,” *Abelmoschus manihot* (L.) Medik.

Mateo, John Marty C. , Oraye, Claudette D. , Maghirang, Ro

“Lagikway” is an underutilized vegetable in the Philippines. One of the reasons for its low utilization is the lack of information in terms of production and nutritional quality under Philippine conditions. Hence, yield trial and nutritional quality evaluation were conducted from June 2017 to February 2018 involving three lagikway entries – including RXII 13-003, RXII 13-019, and Lag 152649. The effect of blanching on the phytochemicals of leaves for consumption was also determined. Lagikway rooted cuttings were transplanted in 5 m x 1 m plots with 50 cm x 50 cm distance, and the experiment was carried out in a randomized complete block design (RCBD) with four replications. Young leaves and shoots considered for consumption were harvested 1 mo after transplanting (MAT) and continued at 2-wk intervals. Data revealed that potential yield is at 24.5 tons/ha for RXII 13-003, 21.36 tons/ha for RXII 13-019, and 21.94 tons/ha for Lag 152649. For proximate analysis, the moisture content is highest in RXII 13-019, the fat content is highest in RXII 13-003, and the protein content and the nitrogen-free extract are highest in Lag 152649. Ash and fiber content were the same from all the three lagikway accessions. Significant differences were also observed on the different lagikway accessions in terms of phytochemicals and antioxidant activity, and blanching had greatly affected these parameters. Lag 152649 had the highest phenolics, flavonoids, tannins, and radical scavenging activity (RSA). Hence, Lag 152649 will be recommended for mass propagation and distribution, which will eventually lead to further promotion and utilization of this underutilized vegetable. **(Author's abstract)**

Keywords: *Abelmoschus manihot*, Blanching, Lagikway, Nutritional quality, Yield, Agriculture

ARCHITECTURE

0025

Adaptability and Performance of Slag Cement As Partial Replacement to Ordinary Portland Cement in Concrete

Manaloto, John Ar

Portland cement is extensively used in the construction industry, making it one of the biggest construction expenditures in the Philippines and worldwide. It plays a vital role in concrete technology and is also the one used more often as compared to the other types of cement. In this study, the feasibility of partially replacing Portland cement with Slag cement, an industrial byproduct of iron manufacturing was investigated. This provides alternative and sustainable solutions to concrete design that could aid in the construction cost reduction. In this research, the effect of replacing Portland cement with 0 percent, 30 percent, 40 percent and 50 percent slag cement in concrete mix design were investigated for compressive and flexural strengths. For the determination of strengths, a Universal Testing Machine (UTM) was used to apply compressive and flexural loads to concrete cylindrical and beam samples, respectively. Water demand, slump and slump retention at constant water-cement ratio for the said proportions were also tested. The results show that concrete using slag cement has lower water demand as it achieves higher slump and better slump retention versus concrete using pure Portland cement. Moreover, with the increasing amount of slag cement replacement to Portland cement, the compressive and flexural strength of concrete increases. An optimum replacement of 50 percent slag cement to Portland cement in concrete is therefore recommended for both compressive strength and flexural strength designs. **(Author's abstract)**

Keywords: *Concrete mix design, Portland cement replacement, Slag cement, Architecture*

0026

Cebu Archdiocesan Commission for Cultural Heritage of the Church — in the Service of Professional Heritage Conservation

Lanyi, B

This research analyzes the history, statutes, and opportunities of the Cebu Archdiocesan Commission for Cultural Heritage of the Church (CACCHC) to increase its efficiency. As the representative of the Archbishop of Cebu, the Commission carries the responsibility for the quality and quantity of architectural conservation activities of the Archdiocese which are still dominated by amateurish approaches. The Archdiocese is seriously interested in heritage conservation but ignorance and lack of resources create obstacles. This study's main objective is to analyze the

reasons of inefficiency and to offer an updated operational model. The results and findings of the study may contribute to the making of an efficient Commission that promotes knowledge on the history of architecture in Cebu and understanding the Filipino cultural identity through a better state of sacred heritage.

The study's scope includes objective and subjective factors of the Commission's efficiency and the proposed new model. The research was limited to the field of competency of the Commission. Its study population consists of persons who were involved in the work of the Commission from 2014 to 2015, the timeframe of the research. The research design is envisioned to lead to a better operational model based on cross-sectional descriptive data from interviews, documents, and case studies which made it possible to compare the Commission's performance with its intentions. To achieve the intended output, input variables (i.e., financial and manpower resources, and field of responsibility) were analyzed and recommended to be enhanced. **(Author's abstract)**

Keywords: *Heritage conservation, Monument management, Church administration, Sacred architecture, Concept of heritage, Architecture*

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0027

Developing an Automated Philippine National Building Code Compliance Check for R-1 Projects in BIM Using Visual Programming

Balane, Ronald S. , Lopez, Karen Ther

The construction industry is inefficient and has plenty of communication and coordination issues that can lead to an increase of 20–25 percent on project delivery costs (Allen & Shakantu, 2016). The design process is tedious and filled with revisions. The issue of code compliance amidst these changes and revisions further complicates the process. Code compliance checking can be cumbersome. This is mainly because most designers check 2D text and documents manually, which is very error-prone. Building Information Modeling or BIM is a 3D parametric-based methodology that is now being used by around a third of the construction industry in the Philippines (ASEP, 2013). It is strongly being used by other countries and has a high adoption rate worldwide (Kalfa, 2018). Programming and visual programming further enhances the capability of BIM to automate tasks and manipulate data. This can be used to create an actual automated code compliance check tool to address issues of compliance with building standards. The purpose of this study was to create an automated code compliance checker of the National Building Code of the Philippines for R-1 projects. The results for the automated code check were then compared with the results of the manual code check of the 2D documents of the projects, to evaluate if the developed automated code compliance checker was accurate, efficient, and feasible. The results showed that the percentage discrepancies between the two forms of code checks did not exceed 6 percent, most of which were from human modeling errors. Moreover, the automated code check took approximately five minutes per project compared to the manual code check that took approximately one hour. The developed automated code compliance checker is usable at its current state and it has potential for improvement in the future. The construction industry is inefficient and has plenty of communication and coordination issues that can lead to an increase of 20–25 percent on project delivery costs (Allen & Shakantu, 2016). The design process is tedious and filled with revisions. The issue of code compliance amidst these changes and revisions further complicates the process. Code compliance checking can be cumbersome. This is mainly because most designers check 2D text and documents manually, which is very error-prone. Building Information Modeling or BIM is a 3D parametric-based methodology that is now being used by around a third of the construction industry in the Philippines (ASEP, 2013). It is strongly being used by other countries and has a high adoption rate worldwide (Kalfa, 2018). Programming and visual programming further enhances the capability of BIM to automate tasks and manipulate data. This can be used to create an actual automated code compliance check tool to address issues of compliance with building standards. The purpose of this study was to create an automated

code compliance checker of the National Building Code of the Philippines for R-1 projects. The results for the automated code check were then compared with the results of the manual code check of the 2D documents of the projects, to evaluate if the developed automated code compliance checker was accurate, efficient, and feasible. The results showed that the percentage discrepancies between the two forms of code checks did not exceed 6 percent, most of which were from human modeling errors. Moreover, the automated code check took approximately five minutes per project compared to the manual code check that took approximately one hour. The developed automated code compliance checker is usable at its current state and it has potential for improvement in the future. **(Author's abstract)**

Keywords: *BIM, Visual Programming, Compliance Check, Building Code, Automated, Architecture*

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0028

Empirical Analysis of the Compressive Strengths of Composite Materials: The Case of Rice Straw and Cement

Manaloto, John Ar

In the Philippines, rice straw is an agricultural waste product which is disposed through incineration. Using it as a composite material in green building construction can reduce cost and environmental hazards caused by crop burning. A fiber (rice straw) reinforced concrete, through proper mixing and proportion of its design, can achieve good strength and insulation properties. This study focuses on determining the effectiveness of rice straw/stalk with cement as an alternative eco-friendly and light building material. Moreover, this study aims to determine the effects of using various percentages of chopped rice straw in different concrete mixtures to optimize the compressive strength of the composite material. The rice straw samples used for this study came from Barangay Salvacion, Tabaco, Albay. The samples were dried in various drying durations of five days, eight days and 10 days and then cured in water for 24 hours. Afterward, concrete cylinder samples using steel molds were prepared for compressive strength determination. In the concrete mixes, different proportions were prepared by replacing the coarse aggregates with 25 percent, 50 percent and 100 percent rice straw. In the course of mixing the composite materials, water retardant and foaming agent admixtures were also introduced. The samples were cured for one day, three days, seven days, 14 days, and 28 days for compressive strength determinations. The results show that the compressive strength is inversely proportional with the rice straw content of concrete. The sample with 100 percent rice straw replacement attained a compressive strength value of 266.00 psi on the 28th day of curing while the zero percent rice straw attained 1,526.00 psi. The compressive strength value was found to be reduced by at most 82.56 percent. Using 100 percent rice straw as aggregates decreased the mixtures' workability resulting to a higher concrete water demand but also made it lighter with decreased density, hence making it lightweight. An air entraining admixture was mixed with plasticizer to help increase the workability of the concrete mixture. **(Author's abstract)**

Keywords: *Rice Straw, Low-cost Materials, Eco-friendly, Sustainable Material, Lightweight Concrete, Architecture*

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Examining the Value of Jury Critique for Architectural Design Studio Courses

Santos, Fre

A common evaluation tool used in an architectural design studio course is the critique. The critique is the process by which students present their final design work as answer to a design problem, have their work examined, and receive feedback on their work from a jury while being observed by faculty and fellow students. The jury in the study were instructors and design professionals with no involvement in conducting the studio courses prior to final critique, while the faculty were instructors who officially handled said courses during the semesters. Students' works were then given scores by both faculty in-charge and jury, with the scores weighted within the students' final grades based on the evaluation method and criteria designed by the faculty in-charge.

While a common occurrence in architecture design studio courses, the value of jury critique has not been adequately examined. It is unclear if the value of jury critique lies in student grading, evaluation approaches, or both. Under these parameters, the study aims to investigate the degree of similarities and disparities between jury and faculty as well as among jurors in evaluating final output through jury critique. This was performed using statistical analysis, where the variable observed was scores given by juries to students that presented their Design course plates, in addition to surveys of jurors who have taken part in courses covered by the study. Particularly, average jury scores were compared to faculty scores and individual juror scores were compared with each other in an attempt to find a pattern of agreement or disagreement among evaluators, with survey responses used to complement and add significance to statistical analysis. A key finding was that a value of jury critique is its ability to accurately evaluate students' output without the potential biases that faculty may have from being reflected in the students' grades. This is significant as a basis to guide how to appropriately use juries as evaluators of students' plates and how grading responsibilities may be divided among jury and faculty. Recommendations were then made based on findings to maximize its effectivity within the architecture design studio course. **(Author's abstract)**

Keywords: *Jury Critique, Jury Grading, Architectural Design Studio, Architectural Design Evaluation, Architectural Design Assessment, Architecture*

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NP

Flood Control Projects in the Philippines: A Historical Overview

Maki, Norio , Rinen, Richard Mar

Floods have been a natural occurrence in the Philippines since the pre-Hispanic time because most settlements are in very close proximity to bodies of water. These floods often result in calamities that are aggravated by the uncontrolled urbanization which brings about even bigger problems. In order to mitigate the effects of flooding, especially in highly urbanized areas, different flood control projects have been undertaken by the Philippine government. But, despite these efforts, the problem persists and continues to threaten the growing population especially with climate change. This paper looked into different projects in combating flooding from the Hispanic period to the present. This is done by looking into flood control projects through the archives of the Bureau of Public Works (Department of Public Works and Highways) and other literature and categorizing them as risk reduction strategy or risk avoidance strategy. As a result, it can be noted that in the past, the placement of towns and villages and even the design of houses and buildings took into consideration flooding and other natural phenomena in their location and design, an effective risk avoidance strategy as in the case of the relocation of San Juan in Batangas. However, with the establishment of the Bureau of Public Works flood control projects focused mainly on costly

structural solutions or risk reduction strategies as in the case of the Manggahan Floodway. Failure to finish and/or maintain these projects render them ineffective just like what happened during Typhoon Ondoy. Therefore, the most effective solutions in mitigating the effects of flooding are mostly non-structural in nature, however, there are situations where structural solutions are inevitable and therefore a combination of strategies with focus more on risk avoidance strategies should be considered. **(Author's abstract)**

Keywords: *Disaster, Disaster preparedness, Risk avoidance, Flood control, Risk reduction, Architecture*

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0031

Landscape Image H.A.C.K.: Human Activity Captured Kernels

Bimbao, Jose Anto

In this twenty-first century, social media has introduced digital disruption as online methods created to consume services. Responsible for this are the people who do not subscribe to traditional ways of procuring services; they opt to use the internet instead, such as having an online photo album in Facebook. Through these online activities, big data is created – information that are accessible for designers of the landscape. Using the internet for design purposes has been a regular part of the landscape design process – mood boards created to provide visualization for the client in design conceptualization. This research explores the use of big data as a source of information with the Instagram platform. Since Instagram is the most popular image-sharing platform online, designers can also take advantage of the volume of its content. What makes Instagram unique is that its images come from accounts of the online community. Information from every active account leads to a glimpse to what they hold valuable through the act of posting an image they took. There has been a method developed in a Master in Tropical Landscape Architecture (MTLA) at the University of the Philippines Diliman to evaluate landscape representation from Instagram landscape images (Bimbao, 2017). To further the research on this online resource, this paper considers scrutiny of the human representations included within the studied landscape representations. The connections of human and landscape representation in a landscape image inform and remind the landscape designer to appreciate the landscape use of the online community. Through the methodology, the following were revealed; a more passive landscape usage, importance of water elements, and the need to develop a specific human activity recognition method for landscape analysis. **(Author's abstract)**

Keywords: *Instagram content analysis, Human Activity Recognition, Landscape Value, Landscape Image, Architecture*

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0032

Landscapes of Mobility in Metro Manila's Business Districts

Boquet, Y

Metro Manila has witnessed the blossoming of several business districts outside its historical core. Located mostly near the EDSA ring road and South Luzon Expressway, these business districts have become powerful attractors of office workers and shopping mall patrons, hence generating heavy commuter flows. Current urban dynamics reinforce the role of these districts as engines of growth for the whole country and define Manila as a multi-centered urban region. In addition to Ermita/Malate area, five major districts of Metro Manila are identified: Makati CBD, Bonifacio Global City, Ortigas, Alabang and the new Quezon City CBD (Vertis North) that is recently developed. These districts are not just office and shopping centers but they are also spaces of transit and transfer, whose residential component is growing with upper-end high-rise condominiums. There is indeed an expanding gap between higher-end “quality” vertical living that excludes the poor and their transport mode, and the horizontal city of the poor living in slum-like areas poorly served by many transport modes. Private developers appear to play a major role in the re-shaping of the metropolitan area, both by their new “townships” currently under development and with their influence in the design of future enhancements of the metropolitan rail system. **(Author's abstract)**

Keywords: *Edge Cities, Metro Manila, Philippines, Transitoriented development, Architecture*

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NP

0033

Public Market Energy Intensity and a Design of an Energy Efficient, Effective, Healthy and Vibrant Public Market Infrastructure

Dalisay, Jon Dewitt E. , Espina, Mary Ann A. , Manegdeg, Ferdinand G., Pascual, Azero

Typical public markets in the Philippines are untidy, musty, and energy inefficient. This paper addresses the evaluation framework for energy intensity and general redesign of Philippine public markets considering low energy intensity, effective, healthy and vibrant conditions, and pleasing aesthetics as primary design considerations. Ten public markets were audited and evaluated. The average embodied energy is 4.7 PJ/m² and average monthly operation energy intensity is 19.2 MJ/m². Optimizing the existing designs resulted to a 10.6 percent lower embodied energy and 64 percent lower operation energy intensity than the average of the study samples.

However, considering the better criteria, an actual design has an embodied energy 10 percent more as expected but 55 percent lower operation energy intensity than the average of the study samples. It is recommended that the building code of public market include solar photovoltaic array and water heater, cold storage, bio-digester, solid waste disposal system, wastewater treatment, deodorizing and passive ventilation, and natural lighting. **(Author's abstract)**

Keywords: *Public markets, Building energy efficiency, Energy consumption opportunities, Architecture*

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2019,
(Filipiniana Analytics)
NP

0034

Role of Cultural Development and Public Space Usage for the Poor: Impact to Government Policy and Community Relations: (A Philippine Case Study)

Morales, Mark Anth

This research focuses on social exclusion due to poverty as observed in urban areas; a phenomenon seen to limit engagement opportunities, lower self-esteem and weaken social access of poor individuals; particularly those based in high human concentration areas typical in cities. Since most people-to-people interactions demand a spatial component to host such activities, the role of public spaces are likewise highlighted due to its accessibility among city residents and visitors. To address the above mentioned social dilemma, cultural development - celebrating binding beliefs and values among people through expression of their culture – was found to create opportunities wherein public space usage is able to bridge social divisions and accommodate opportunities of communal interaction and city development.

This study looks at cultural development and its impact to policy, people, and public space through a medium (art) that highlights unique features embedded in cities and communities. After establishing the theoretical base of this study, case study areas were identified and policy documents were examined to see how governments – amidst limited resources - expand cultural development alongside partner stakeholders. Key-informant interviews were also done to fill data gaps. Research shows that government engages with volunteer groups to strengthen its cultural development agenda; at the same time, poor individuals are found to join volunteer art-groups to learn new skills and expand network opportunities. The collaboration between government and volunteer groups led to events and activities that better utilize socio-spatial potentials of urban areas; using citizen engagement via cultural development to promote social access especially for the poor, while opening public space development and management opportunities for the city. Together, a participative development strategy among poor individuals, volunteer groups and government is promoted; a culture-driven governance policy hinged on improving community relations, social acceptance, and spatial growth opportunities in the city. **(Author's abstract)**

Keywords: *Local governance, Volunteer groups, Cultural development, Public space, Social access, Architecture*

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2019,
(Filipiniana Analytics)
NP

0035

The Spatial Expression of Informal Livelihoods: An Examination of Charcoal Production in Tondo, Manila and Resettlement

Sicam, Olivia A

Access and provisions for livelihood are mandated by policies in housing resettlement. However, while the design and planning of housing developments typically focus on the particulars of housing units, little attention is given to the spatial details of livelihood reconstruction. The study addresses this issue by examining Ulingan, an informal settlement engaged in the communal production of charcoal, clarifying its spatial organization, and comparing it with St. Martha Estate Housing, the resettlement site. By examining charcoal-making in Ulingan and its spatial characteristics, the research sheds light on the organization of space in communal livelihoods within informal human settlements and highlights how it compares with socialized housing templates. The study suggests that, although spatial organization influences the cultivation of systems of cooperation in livelihoods, it is also important to consider the broader context in which informal livelihoods thrive. Future studies should examine the impact of spatial organization in different types of resettlement sites (e.g., in-city, off-city, slum upgrading) across various types of informal economies to inform planning for livelihood reconstruction. **(Author's abstract)**

Keywords: *Informal economy, Informal settlements, Livelihood reconstruction, Resettlement, Socialized housing, Architecture*

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NP

0036

A Study on Total Volatile Organic Compound Emission of Plywood: Finish, Age and Environment

Bo-ot, Luis Maria , Dia, Erika

In this paper, actual emissions of total volatile organic compounds (TVOCs) of Philippine plywood were measured. The measurements were taken with the plywood having different finishes during the time period of May to October. The finishing considered was unpainted panels of plywood, newly painted with regular and green-labelled paint, and the readings were conducted in a controlled room with accompanying readings of temperature and relative humidity. Each set of test samples was measured every hour for seven straight days and compared to guideline emission and behaviour of TVOC in plywood in other countries. This study can contribute as a baseline data for the TVOC emissions of a Philippine building material. **(Author's abstract)**

Keywords: *Total volatile organic compound (TVOC), Indoor air, Philippine plywood, Architecture*

Muhon: A Journal of Architecture, Landscape Architecture, and the Designed Environment, Volume No. 7 Issue No. , 32-40
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(Filipiniana Analytics)
NP

0037

Teaching Tropical Design Through Simulating Scale Models

Chua, Johannes Vinc

The challenge of teaching a Tropical Design course to undergraduate students of an Architecture program of the University of the Philippines Diliman, College of Architecture is assisting students in visualizing the impact of heat gain in their design. This paper's objective is to illustrate that simulating scale models is an effective pedagogical tool.

Architecture students have high spatial intelligence. Effective spatial learning requires visual representations in communication and exploration. Two-dimensional graphics have its limitations, while 3-dimensional models offer a richer presentation and development of design.

Application, as Washburn's fourth building block of learning, introduces practice as utilization of the lessons learned in the course. Thus, an effective exercise and application for the Tropical Design Course is the construction of a scale model exposed to direct sunlight and simulating the critical positions and angles of the sun for an entire year. It

provides a sufficient conceptual understanding of heat gain. The advantages of scale models are providing learning through their physical creation and manipulation, and they offer immediacy and richness in conveying information and insights.

The scale model needs to be monochromatic, well-built, sturdy, lightweight, and able to withstand physical manipulation. The appropriate scale is from 1:50m to 1:100m, depending on the design brief, but small enough to carry around, and large enough to provide details, such as sunshade devices. The objective of the model is to demonstrate the ability of their design features to protect from heat gain. The instructor provides a shadow guide to assist the student in rotating the model under the sun. Successful testing entails prevention of direct sunlight from entering the interior of the scale model, which the students document extensively through photographs. The paper also presents student works as examples.

Success of the exercise is based on the grade given by the instructor as a component (sun-shading and heat-gain solution) of an evaluation rubric that covers also the other aspects of the plate. Out of 91 student works, over 93 percent were adjudged to have scored satisfactorily or better. **(Author's abstract)**

Keywords: *Tropical design, Simulation, Scale model, Architectural education, Architecture*

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(Filipiniana Analytics)
NP

BIOLOGY

0038

2SIR-VD Model to Compare Idealized COVID-19 Vaccine Distribution Strategies in the Philippines

Austriaco, Nicanor , Lazaro, Red , Diego, Mary Chelsea E. , White, Angus , Almajose, Allan Paolo L.,

COVID-19 is a novel respiratory disease first identified in Wuhan, China, that is caused by the novel coronavirus, SARS-CoV-2. It has triggered a global pandemic of historic proportions. The government of the Philippines began its national vaccine drive on 01 Mar 2021, with the goal of vaccinating 70 million of its citizens by the end of the calendar year. To determine the optimum geographical distribution strategy in the Philippines for the limited supply of vaccines that is currently available, we developed and adapted a basic SIR (susceptible-infected-recovered) model that allows us to understand the evolution of a pandemic when public health authorities are vaccinating two susceptible populations within a country with different vaccine rates. Our analysis with our 2SIR-VD (two-population susceptible-infected-recovered-vaccinated-deceased) model of an idealized pandemic scenario revealed that prioritizing vaccine deployment to the National Capital Region (NCR) of the Philippines minimized the number of COVID-19 cases in the country. We, therefore, recommend deploying 80–90% of the available vaccine supply to the NCR to mitigate viral transmission there. The remaining doses would allow the rest of the archipelago to vaccinate all of their medical frontliners, senior citizens, and adults with comorbidities – thus shielding this vulnerable population against severe disease and death from COVID-19. **(Author's abstract)**

Keywords: *COVID-19, Philippines, SIR model, Vaccine distribution, Biology*

Philippine Journal of Science, Volume No. 150 Issue No. 6B, 1765-1778
2021 December,
(Filipiniana Analytics)
NP

Amphibians and Reptiles of Mount Busa, Sarangani Province:: a Glimpse of the Herpetological Community of Southern Mindanao, Philippines

Afuang, Leticia E. , Saavedra, Aljohn Jay L. , Pitogo, Kier Mitc

The herpetological knowledge of southern Mindanao is one of the largest gaps in Philippine herpetology. To augment this, we generated a comprehensive list of amphibians and reptiles found along the southern slope of Mount Busa in Sarangani Province, Philippines between June 2018 and August 2020 using opportunistic sampling in various microhabitats across different forest types. We recorded at least 68 species of herpetofauna, of which 28 species were amphibians and 40 species were reptiles. Around 65% of the species recorded are endemic to the Philippines. Mount Busa appears to harbor a relatively rich herpetological diversity that is needing conservation and scientific attention. Our study provides a glimpse of the herpetological diversity of southern Mindanao, but we emphasized that more field-based research is needed in nearby areas to improve our understanding of the herpetological community in the region, thereby overcoming Linnean and Wallacean shortfalls in our knowledge of Philippine amphibians and reptiles. **(Author's abstract)**

Keywords: *Biodiversity, Busa Mountain Range, Herpetofauna, Herpetofaunal inventory, Philippine herpetology, Southern Mindanao biodiversity, Biology*

Philippine Journal of Science, Volume No. 150 Issue No. 5, 1279-1306
2021 October,
(Filipiniana Analytics)
NP

Anatomical Properties and Utilization of 3-, 5-, and 7-yr-old *Falcata* [*Falcataria moluccana* (Miq.)] Barneby & J. W. Grimes] from Caraga Region, Mindanao Philippines

Marasigan, Oliver S. , Domingo, Emmanuel P. , Jimenez, Juanito P. , Gilbero, Dennis M. , Bondad, Elvina O. , Alipon, Mar

The anatomical properties – namely, fiber length, fiber diameter, lumen diameter, cell wall thickness, vessel length, and width – of young (3-, 5-, and 7-yr-old) *Falcataria moluccana* (Miq.) Barneby & J. W. Grimes from Caraga Region, Philippines were evaluated to determine the variations among ages between and among trees, tree height, and their derived values as well, henceforth as a basis in recommending the potential of the species for various end-uses. Three trees per age of known seed origin were collected and used as materials. FPRDI standard procedures for determining anatomical properties were followed. Data were analyzed using three-factorial in complete randomized design (CRD) and Tukey's honestly significant difference (HSD) test was used to determine significant differences among treatment means. Except for cell wall thickness, the variations in anatomical properties among age and tree were highly significant but not significant among height levels. Fiber diameter and lumen diameter increased as the trees aged. The cell wall was very thin with mean values of 0.0033 mm (3-yr-old), 0.0032 mm (5-yr-old), and 0.0031 mm (7-yr-old). Vessel length and width decreased from 3- to 5-yr-old and increased at 7-yr-old. Fiber length's mean values increased from near pith (NP), middle (M), to near bark (NB) at all three ages and height levels except in the 3-yr middle (1.1665, 1.2032, and 1.1541 mm) and 7-yr butt (1.1541, 1.2326, and 1.2009 mm). Other anatomical properties at three ages showed no consistent trend of variations from NP to NB. The potential

uses of younger falcata based on their anatomical properties were for pulp and paper, veneer, and light construction applications where strength and durability are not important. **(Author's abstract)**

Keywords: Cell wall thickness, Fiber diameter, Fiber length, Lumen diameter, Vessel length, Vessel width, Biology

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2021 October,
(Filipiniana Analytics)
NP

0041

Antibacterial activity of Kantutay *Lantana camara* L. crude leaf extract
Sabiwang, Samira A. , Husain, Hanan M. , Deano, Ivanhoe B. , Almarez, Angeli M. , Alzate, Flore

The study aimed to determine the antibacterial activity of Kantutay (*Lantana camara* L.) crude leaf extract against Gram-positive and Gram-negative bacteria. Ethanolic leaf extract was prepared by rotavaporation and its antibacterial activity determined by the Kirby Bauer Method. Using Gentamicin (10 μ g) / Tetracycline (30 μ g) as positive control and distilled water as negative control, the extract was tested against reference strains of Gram-positive *Bacillus cereus* (ATCC 11778) and *Bacillus subtilis* (ATCC 11774), and Gram-negative *Pseudomonas aeruginosa* (ATCC 25619) and *Escherichia coli* (ATCC 25922). The Zones of Inhibition (ZI) were measured in millimeters using a caliper. Results of the experimentation showed that the grand mean Zone of Inhibition (ZI) of Kantutay leaf extract against Gram positive bacteria *B. cereus* and *B. subtilis* were 11.9mm and 14.4mm, respectively; while a 0mm ZI was observed against Gram-negative *P. aeruginosa* and *E. coli*. Results further exhibit that Kantutay (*Lantana camara* L.) crude leaf extract was inactive in inhibiting *P. aeruginosa* and *E. coli* (gram negative bacteria) growth, partially active in inhibiting the *B. cereus* growth, and active against *B. subtilis*. Hence, it may be concluded that Kantutay crude leaf extract does not have antibacterial effect against Gram-negative bacteria like *P. aeruginosa* and *E. coli* but have antibacterial effect against Gram positive bacteria like *B. cereus* and *B. subtilis*. **(Author's abstract)**

Keywords: Medical laboratory science, Kantutay *Lantana camara* L., Gram-positive bacteria, Gram-negative bacteria, Zone of Inhibition (ZI), Kirby Bauer Method, Philippines, Biology

Optima, Volume No. 1 Issue No. 1, 89
2013,
(Filipiniana Analytics)
NP

0042

Antibacterial activity of the crude ethanolic extracts of *Etlingera elatior* and *Etlingera philippinensis*

Gultiano, Analyn G. , Alinapon, Cresilda V. , Barbosa, G

Due to the emergence of multidrug resistant bacteria, researchers are on search for a new source of antimicrobial agents such as plants. This study reports the antibacterial activities of the leaves and rhizomes of *E. philippinensis* and *E. elatior* against Gram-positive (*M. luteus*, *S. aureus* and *S. marcescens*) and Gram-negative bacteria (*E. coli* and *P. aeruginosa*, *B. cereus*). Disc diffusion method was employed in determining the antibacterial activity of the plant ethanolic extracts with concentrations of 3000 ppm and 10000 ppm. Highest antibacterial activity was exhibited by the leaves and rhizomes of the Philippine endemic *E. philippinensis* (10000 ppm) against *M. luteus* (12.00 ± 0.56) and *P. aeruginosa* (11.50 ± 0.45), respectively. Of all extracts, only the leaves *E. elatior* (10,000 ppm) showed antibacterial activity against *S. marcescens* which is 6.57 ± 0.49 . (Author's abstract)

Keywords: Antibacterial, *Etlingera elatior*, *Etlingera philippinensis*, Biology

CMU Journal of Science, Volume No. 24 Issue No. 2, 40-45
2020,
(Filipiniana Analytics)
NP

0043

Anticoagulant activity of horseradish *Moringa oleifera* and *Oregano coleus aromaticus* leaf extracts and kamias *Averrhoa bilimbi* fruit juice on human blood samples

Sapilan, Julidette B. , Sarpong, Ma. Lydia S. , Dayaganon, Avee Joy B., Dagoc, Angelie

Blood tests are routine laboratory analyses that require the use of anticoagulants like ethylene diamine tetraacetic acid (EDTA). Commercially prepared EDTA tubes are costly. The study aimed to investigate and compare the anticoagulant property of three plants namely horseradish (*Moringa oleifera*), oregano (*Coleus aromaticus*), and kamias (*Averrhoa bilimbi*) towards development of possible alternative for EDTA. *M. oleifera* and *C. aromaticus* ethanolic leaf extracts and *A. bilimbi* fruit juice were prepared by standard laboratory protocols. Human blood cells were appropriately NSS-suspended, stained, and treated with the plant extracts, analyzed microscopically and macroscopically and compared with cells treated with EDTA as positive control. Results showed that of the test treatments, *C. aromaticus* leaf extract showed the highest capability as an anticoagulant. *M. oleifera* leaf extract showed a similar anticoagulant effect but could hold the blood sample for a shorter period. *A. bilimbi* fruit juice exhibited the shortest period of anticoagulation and most clumping and crenation of cells. Statistical analysis using Analysis of Variance (ANOVA) of the experimental data demonstrates significant difference ($p < 0.05$) on the anticoagulant activity of the four treatments; meaning, *C. aromaticus*, *M. oleifera*, and *A. bilimbi* extracts and EDTA had varying in vitro capacity to hold the normal structure of the human blood cells. Post hoc multiple statistical analysis showed no significant difference ($p < 0.05$) between *C. aromaticus* anticoagulant activity and that of EDTA as positive control; meaning, *C. aromaticus* leaf extract and EDTA showed comparable capacity to hold blood normal structure *in vitro*. Hence, *C. aromaticus* leaf extract can potentially be developed as an alternative to commercial EDTA as blood anticoagulant. (Author's abstract)

Keywords: Medical laboratory science, Phytochemical assessment, Ethylene diamine tetraacetic acid (EDTA), *Coleus aromaticus*, *Moringa oleifera*, *Averrhoa bilimbi*, Anticoagulant, Philippines, Biology

Optima, Volume No. 1 Issue No. 1, 11-25
2013,
(Filipiniana Analytics)
NP

Antimicrobial activity of *Mangifera indica* (Carabao Mango) fruit and seed extract

Merosa, Ellen Mae , Elizalde, Christine , Acanto, Christylene Mae , Sarabia, Ace Ron

Common bacterial infections are eliminated by means of commercially available antibiotics. Nonetheless, the presence of resistant strains of bacteria leads to ineffective treatment. One of the plants who were believed to possess an antimicrobial property is the *Mangifera indica*. This study aims to prove the idea that there is a possibility that people can derive new drugs from this plant. Furthermore, this study intends to find out if there will be significant difference on the activity of ripe and unripe seed and fruit extracts against *Staphylococcus aureus* (ATCC 25923) and *Pseudomonas aeruginosa* (ATCC27853). The different plant extracts together with the positive and negative controls were impregnated into disks and placed into the agar plates to determine their zones of inhibition against the test bacteria. Statistical analysis showed a significant difference on the action of mango extracts against *S. aureus* and *P. aeruginosa*. Ripe fruit extract showed no activity against *P. aeruginosa* while ripe and unripe seed extracts were active with the ripe seed extract showing the highest inhibitory action. **(Author's abstract)**

Keywords: Antimicrobial, Zone of inhibition, *Mangifera indica*, *Pseudomonas aeruginosa* , *Staphylococcus aureus*, Philippines, Biology

Optima, Volume No. 1 Issue No. 1, 57-65
2013,
(Filipiniana Analytics)
NP

Assessment of Genotoxicity and Cytotoxicity of Leached Chemicals from HDPE Plastic Commonly Used by Ambulant Vendors

Hipolito, Ralph S. , Lloren, Ana Victoria R. , Yanza, Eliard Roswell S. , Garcia, Lex Aaron I. , Florita, Mary Hazel B. , Babaran, Han

Plasticizers and additives in plastics like polyethylene terephthalate (PET) bottles have been found to leach – especially when exposed to certain stresses, including temperature. Frequent exposure to these chemicals is associated with a higher risk of developing developmental and reproductive disorders and cancer. In this study, water at varying temperatures (28, 65, 75, and 85 °C) was contained in high-density polyethylene (HDPE) plastic “labo,” a food packaging material common in the Philippines. Gas chromatography–mass spectrometry (GC-MS) analysis showed that the leached chemicals were derivatives of plastic additives and compounds or degradation compounds of these chemicals. Notable leachates include dimethyl sulfoxide, isosorbide, and cyclohexene derivatives. Different compounds leached at different temperatures. The *Allium cepa* test revealed chromosomal aberrations such as anaphase with bridge, sticky chromosomes, and chromosomal breaks. These signify that the compounds may be genotoxic to *Allium cepa* root tip cells. The *Allium cepa* test, brine shrimp lethality assay, and MTT assay on MCF-7 cells were also conducted as preliminary cytotoxicity tests. Results showed an increase in mitotic activity for *Allium cepa* root tip cells and induced proliferation of MCF-7 cells. Moreover, the mortality rates of *Artemia salina* were low after 24 h of exposure. These findings provide additional information regarding the leaching from plastic labo – the identity of leached chemicals and the effects of exposure on various cell lines and organisms. These findings may be used as a basis for existing policies regarding the use of plastic as food packaging material. **(Author's abstract)**

Keywords: Cytotoxicity, Genotoxicity, HDPE, Leaching, Plastic, Biology

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2021 June,
(Filipiniana Analytics)
NP

0046

Association of Sex and Zinc Deficiency with Glucose-6-Phosphate Dehydrogenase Deficiency in Filipino Children

Gonzaga, Alex , Litan, Richard Ron R. , Javier, Lia Margret , Nicolas, Marilou G., Punzalan, Jerve

In the Philippines, one of every 54 newborns has glucose-6-phosphate dehydrogenase (G6PD) deficiency. While most were determined to have a familial origin, at least 15% of cases have unknown etiology. This study investigated sex, regional malaria incidence, and zinc deficiency as factors contributing to the high incidence of G6PD deficiency in Filipinos. The study used both retrospective and experimental approaches. The retrospective study analyzed demographic data reported in 8,158 clean archival records from 2010–2015 of 0–5-yr-old Filipino children with G6PD deficiency; the regional distribution data from DOH of malaria was also included for possible correlation with the regional frequency of malaria in the Philippines. The experimental approach determined plasma zinc concentrations of 138 deficient and 41 normal neonates and children aged 0–11 mo using atomic absorption spectroscopy to determine if the zinc level was associated with G6PD activity. Results showed that the major peak for G6PD activity for the male cluster was at 0.5–3.5 U/g Hb, while there were two major peaks for females – one at 0.5–2.5 U/g Hb and another at 3–9.5 U/g Hb. These results are consistent with G6PD-deficiency being an X-linked disorder and for Filipinos, a sex-based reference standard in the newborn screening for G6PD activity of Filipino children is, therefore, being proposed. The incidence of malaria in the country showed no association with G6PD incidence ($p = 0.06$; $p = 0.983$). On the other hand, the mean plasma zinc concentration of G6PD-deficient children aged 0.5–3 mo old at $43.11 \pm 1.68 \mu\text{g/dL}$ was significantly different from that of normal controls at $51.89 \pm 3.00 \mu\text{g/dL}$. These results showed, therefore, that there is a probable association between zinc deficiency and the disorder in 0–3-mo-old children, implying mother's micronutrient health as a risk factor in the high prevalence of G6PD among Filipino children. **(Author's abstract)**

Keywords: Deficiency, Filipino children, Glucose-6-phosphate dehydrogenase, Zinc, Biology

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2022 February,
(Filipiniana Analytics)
NP

0047

Bacterial Composition of *Scotophilus kuhlii* Guano from Plant Roost around Rice Farms in South-central Mindanao, Philippines

Cabasan, Ma. Teodora N. , Tabora, John Aries G. , Jumao-as, Crom

Conventional farming relies on the heavy application of synthetic agrochemicals, especially fertilizers. Thus, the search for an alternative sustainable source of safe agricultural inputs is imperative. Bat guano is an organic material that improves plant growth due to its rich chemical content and associated beneficial microorganisms. However,

farmers still have a negative perception towards its utilization due to its associated microbiological hazards and limited supply. This study was conducted to determine the bacterial composition of guano produced by *Scotophilus kuhlii* to elucidate the potential benefits and hazards it poses when utilized as a soil amendment. The bacterial composition of a 24-h-old guano was investigated by sequencing the amplified 16S rRNA gene under Illumina MiSeq 250 PE system. A total of 78,670 valid DNA reads were obtained and clustered to 196 operational taxonomic units (OTUs). Eight bacterial phyla were identified dominated by Proteobacteria (40.52%), Bacteroidetes (21.43%), Actinobacteria (21.15%), and Firmicutes (16.58%). Under these phyla, 85 genera were identified dominated by *Acinetobacter* (32.16%), *Sphingobacterium* (12.94%), and *Glutamicibacter* (12.25%). Among all generated OTUs, 39 species were identified dominated by *Dietzia cinnamomea* (19.91%), *Sphingobacterium multivorum* (14.65%), *Acinetobacter variabilis* (14.57%), and *Enterococcus faecalis* (13.51%). The study revealed that guano of *S. kuhlii* harbors a diverse bacterial community, which could be a determinant of its usability as an organic soil amendment. Despite the presence of plant-growth promoters and biodegraders of hazardous environmental contaminants, the abundance of Proteobacteria indicates a high number of pathogenic species in the fresh guano. The results suggest the importance of crafting safety guidelines and protocols for guano processing that apply to small-scale farming to maximize the agricultural benefits of guano while reducing the risks imposed by its associated pathogenic bacteria.

(Author's abstract)

Keywords: *Bacteria, Bat, Chemical, Guano, Organic fertilizer, Biology*

Philippine Journal of Science, Volume No. 151 Issue No. 2, 643-654
2022 April,
(Filipiniana Analytics)
NP

0048

Blood mercury level of employees from selected small-scale mining industries in Maco, Comval Province

Libumfacil, Jhuana Mae S. , Barrete, Vanessa Jan O. , Rosalinda, Gilroy S. , Racacho, Dency Mae V. , Ribo, Annabe

Gold mining is economically significant yet it poses various harmful effects like mercury poisoning. The study determined the mercury level in blood samples taken from employees of selected small-scale mining industries in Barangay Limbo, Maco Comval Province. Specifically, it documented the profile of the miners in terms of age, length of employment, job description, and their corresponding blood mercury level and how this compares with the tolerable limit of mercury in the blood set by the DOH. Blood samples were collected by venipuncture and tested using Cold Vapor-Atomic Absorption Spectrophotometer. The findings of the study show that in terms of age; 6 miners were within the age of 16-30 years old, 3 miners were 31-47 years old, 2 were 48-62 years old, and 2 were 63-77 years old with mean mercury levels of 0.390 ppm, 0.097 ppm, 0.199 ppm, 0.149 ppm respectively. For the years of employment; 4 miners were active for <1 year while 8 miners were active for 2-3 year and only 1 miner was active for >3 years with mean mercury levels of 0.099ppm, 0.341ppm, 0.197ppm respectively. In terms of job description, 6 were involved in crushing of ore in ballmill, 5 were involved in addition of mercury, and 2 were involved in recovering gold by torching with mean mercury levels of 0.398ppm, 0.073ppm, and 0.158ppm respectively. All these blood mercury levels exceed the tolerable limit of 0.015 ppm set by DOH. nonetheless, there was no significant difference in the level of mercury in the subjects' blood samples in terms of age, length of employment and job description. That the blood mercury levels of the subject all fell over the tolerable limit is alarming since the small scale mining industries included in the study mostly have young miners as employees.

(Author's abstract)

Keywords: *Blood analysis, Mercury, Miners, Small-scale mining, Philippines, Biology*

Case Report of Infanticide by a Wild Long-tailed Macaque (*Macaca fascicularis*)
Fauzi, Richsy M. , Noerwana, Ona , Widayati, Kanthi A., Tsuji, Yam

Infanticide is common among non-human primates. There are a few cases of infanticide reported in wild groups of the genus *Macaca*, but in *Macaca fascicularis*, it is only reported under captive conditions. The present report describes the first case of infanticide observed in wild *M. fascicularis* in Pangandaran Nature Reserve, West Java, Indonesia, in which an adult male was seen carrying and repeatedly biting an infant. The male attacked a female (presumably the infant's mother) who approached him. We discuss several explanations for the observed infanticide from the perspectives of sexual selection and socio-pathology. **(Author's abstract)**

Keywords: *Indonesia, Infanticide, Macaca fascicularis, Pangandaran, Biology*

Philippine Journal of Science, Volume No. 151 Issue No. 2, 751-753
2022 April,
(Filipiniana Analytics)
NP

Catalog of the Genus *Glenea* Newman, 1842 (Coleoptera: Cerambycidae: Lamiinae: Saperdini) with Key to the Sub-genera in the Philippines
Mantilla, Leslae Kay Cataytay , Barsevskis, Arvids , Pepito, Mark John , Cabras, Analyn A. , Torrejos, Chrestine , Medina, Milton Norman D., Vitali, France

A comprehensive and updated catalog of the genus *Glenea* Newman, 1842 is presented with the key to the subgenera for Philippine species. The genus counts 87 species (77 species and 10 subspecies), ranged in seven subgenera. *Glenea caraga invittaticollis* Breuning, 1966 rest. status = *Glenea caraga subvittaticollis* Breuning, 1968 n. syn. (un. repl. nom). **(Author's abstract)**

Keywords: *Abundance, Biodiversity, Endemism, Longhorn, Biology*

Philippine Journal of Science, Volume No. 150 Issue No. 6B, 1663-1675
2021 December,
(Filipiniana Analytics)
NP

Characterization of Echolocation Calls from Insectivorous Bats in Puting Bato Cave 5, Burdeos, Polillo Island, Philippines

Lit, Jr., Ireneo L. , Cruz, Florante A. , Alviola, Phillip A. , Taray, Kirk J., Gonzalez, Juan Carlo

Acoustic recording is rarely applied in studying Philippine bats, which is reflected by the scarcity of related publications in the country. As a result, the echolocation calls of many local bat species are still unknown, and a reliable bat call library does not exist. Here, we described the echolocation call of some insectivorous bats in Polillo Island and used the call characteristics to define each species. We captured and recorded the echolocation calls of cave-dwelling bats in Puting Bato Cave 5 in October and November 2019. Using BatSound, we measured the spectral and temporal call characteristics and determined the call structure and duty cycle of all recorded individuals. Then, we applied multivariate discriminant function analysis (DFA) to classify the calls into species and identify the call parameter with the highest discriminating power. In total, we recorded 104 individual bats from five species belonging to four families. All species from families Miniopteridae and Vespertilionidae produced steep frequency-modulated (FM) sweeps, while the species belonging to families Hipposideridae and Rhinolophidae emitted calls with constant frequency and FM components. Among the recorded species, *Hipposideros coronatus* had the highest peak frequency record (> 150 kHz), while *Myotis macrotarsus* had the lowest (< 40 kHz). Meanwhile, the longest call duration was recorded from *Rhinolophus arcuatus* (> 40 ms), while *Miniopterus paululus* produced the shortest call (< 3 ms). The DFA perfectly classified the calls into the correct species and peak frequency was the most important predictor among the call parameters measured. Our results provide strong evidence that insectivorous bats in Puting Bato Cave 5 produce species-specific echolocation calls, and acoustic recording can be a reliable method to enhance research on these cave-dwelling bats. **(Author's abstract)**

Keywords: *Bat echolocation, Bioacoustics, Call characterization, Cave, DFA, Polillo Island, Biology*

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NP

0052

Citizen Science Reveals the Prevalence of the 2020 Mass Coral Bleaching in One Town

Mordeno, Princess Zyrlyn B. , Licuanan, Wilfr

Mass coral bleaching in recent decades is driven mainly by thermal stress and is of global concern. In mid-2020, the coral reefs of western Luzon, Philippines were exposed to unusually warm waters of up to 4.3 degree-heating weeks. Monitoring by a citizen science (CS) team based in Lian, Batangas showed 9–42% of the average hard coral cover (HCC) in each of six monitoring stations were bleached by July 2020. The HCC in the six stations in October 2020 was not significantly different from the sum of HCC and bleached coral cover in July, but the coral cover was mostly higher in 2019. These results suggest that loss of HCC happened earlier in the bleaching event of 2020, and the bleached corals in July had all recovered by October. The CS monitoring in Lian, Batangas demonstrates that local communities can measure the impact of disturbances like coral bleaching on reefs provided adequate methods and tools are available, and there is support from the government. **(Author's abstract)**

Keywords: *Citizen science, Coral bleaching, Coral reefs, Hard coral cover, Monitoring, Biology*

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NP

**Colonization and Various Parameters Affecting Egg Hatch and Development of the Old
Balara Strain (Philippines), *Aedes aegypti***
Javier-Hila, Abigaile Mia V., Obra, Gle

Aedes aegypti strain obtained from field collections in Old Balara, Quezon City, Philippines was colonized at the Department of Science and Technology–Philippine Nuclear Research Institute (DOST-PNRI) laboratory. The number of eggs and their weight followed a significant linear relationship for the *Ae. aegypti* colony. Storing the hatching solution composed of nutrient broth (NB) and brewer's yeast (BY) longer for at least 16 h hatched the mosquito fastest within 4h. Among the different ages tested, 2-wk-old eggs had the highest hatch rate. After collecting eggs from rearing cages, eggs for 6 wk still produced a high hatch rate and pupal recovery. Mosquito eggs can be effectively stored in cup and ziplock with a hatch rate of at least 77% on the third week, and at least 71% on the fourth week. Eggs stored in plastic cups can be best stored at 17–20 °C in the incubator 4 wk without a decrease in hatch rate. Eggs at these temperatures still produced about 50% egg hatch even until 3 mo. **(Author's abstract)**

Keywords: *Egg age, Egg quantification, Egg storage, Sterile insect technique, Biology*

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(Filipiniana Analytics)
NP

**Community Structure of Resident and Migratory Bird Species in Talabong Mangrove
Forest, Bais City, Negros Oriental, Philippines**
Sumondong, Kriztein Lydnel P., Canja, Julius Diyeng D., Paalan, Renee B., Oracion, Jean He

Mangrove forests throughout the world are recognized as stopover sites by many migratory birds – including waders – as they contain ample food resources such as invertebrates, fruits, and flowers that are beneficial to most birds. In connection, the Talabong Mangrove Forest located in Bais, Negros Oriental, Philippines is recognized as a wildlife sanctuary, but no recent data on birds could supplement this. Thus, this study aims to assess the distribution patterns of migratory and resident birds in the said site during the southward migration which encompasses both wet and dry seasons. Also, the investigation determines whether Talabong mangrove could function as a stopover site for migratory birds. To examine the community structure, the populations of resident and migratory bird species were assessed for species composition, diversity, density, and abundance in three sampling periods: pre-migration, migration, and post-migration. The line transects and point-count methods were employed with four transect lines laid out on the study site. Each line stretched a kilometer long with a 250-m interval with five points for point-counting and was visited on each sampling period. Points were marked for a consistent sampling. For each sampling period, results showed that the birds' abundance, diversity, and density remained consistently high throughout each sampling. Specifically, the species composition and the number of resident birds did not seem to alter and remained high as well. On the other hand, migrants had an abrupt increase during migration sampling and decreased towards the end. But similarity analyses suggest species composition remained approximately similar for the migrants. The results showed that Talabong mangrove forest contained some migratory species – making it a decent stopover site, although not as many migrants as in other protected mangroves and wetlands in the Philippines. The resident birds occupying the site may also have served as cues for the migrants. **(Author's abstract)**

Keywords: *Avifauna, Community structure, Mangrove ecosystem, Migration, Migratory birds, Resident birds, Biology*

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NP

0055

Comparing the Efficacy of Bacteriophages and Antibiotics in Treating *Salmonella enterica* Serovar Typhimurium on Streptomycin-pretreated Mice

Gutierrez, Tracey Antaeus D. , Serna, Adelyn Gale S. , Cuento, Meryl Grace R. , Acebes, Ronniel Alfred N., Papa, Donna Ma

The misuse of antibiotics had contributed significantly to the development of antibiotic resistance, hence decreasing its efficacy. Non-typhoidal *Salmonella* is a global problem causing gastroenteritis in humans. Since there are various antibiotics in treating *Salmonella* infections, its potential to become multidrug-resistant remains a considerable problem. The use of host-specific bacteriophages as a biocontrol is one possible intervention by which *Salmonella* colonization could be reduced. Isolated and purified from sewage water, a dose of 4.30×10^{10} PFU (plaque-forming units) *Salmonella* phages were used to treat gastroenteritis on streptomycin-mouse models. Lack of treatment yielded 2.06×10^6 CFU (colony-forming units)/g of *Salmonella* 24 h post-infection, which exponentially dropped to 3.80×10^3 CFU/g 24 h post-infection in bacteriophage treatment before gradually decreasing. However, the antibiotic treatment inhibited growth with 3.58×10^2 CFU/g 24 h post-infection, but it did not retain the decrease of the pathogen. Results also showed that the microflora of the gut was preserved with the appearance of various colonies in phage treatment, which aided recovery in a phenomenon known as “microbial interference.” In contrast, antibiotic treatment depleted the normal microflora, allowing colonization of *Salmonella* and resurgence of pathogenic growth in the gut. Bacteriophage therapy demonstrated a significant decrease in bacterial load when compared to the antibiotic ciprofloxacin. The high specificity of the treatment also allowed the phages to synergize with the gut microbiota, thereby inhibiting colonization and further increase in bacterial growth. **(Author's abstract)**

Keywords: *Bacteriophage, Bacteriophage therapy, Biotechnology, Drug resistance, Salmonella, Salmonellosis, Biology*

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NP

0056

Computerized System of Data Organization at the Philippine Plant Germplasm Repository *Huelgas, Visitacion C., Dizon, Louis Samuel H. , Hermoso, Richard*

The National Plant Genetic Resources Laboratory (NPGR) serves as the national repository of important and potentially useful agricultural crops, including the wild and weedy relatives in the Philippines. NPGR is committed to conserving for national posterity the endemic and introduced plant genetic resources (PGR) to provide a broad

genetic base for crop improvement by the Institute of Plant Breeding (IPB) plus national and international programs, as well as to coordinate with national efforts in the conservation and management of PGR. NPGRL practices *ex situ* approach in the conservation of seeds and live plants of different PGR. PGR conservation and management entails acquisition, characterization, conservation and management, regeneration, documentation, and distribution.
(Author's abstract)

Keywords: Database system, PGR documentation, PGR conservation and management, Plant genetic resources, Biology

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(Filipiniana Analytics)
NP

0057

A correlation study on the hygienic practices and parasitic infection to the academic performance of the students in Waan National High School, Buhangin, Davao City
Montante, Monique , Espargoza, Kriza Karla , Deomampo, Hanna Lousie , Basoc, Regine , Cynthia D

Parasitic infections can cause mild discomfort and this may affect the academic performance of school-aged individuals. This study concerned the students living in the countryside who are not exposed to community health services such as de-worming. Volunteer students of Waan National High School, Barangay Waan, Buhangin District, Davao City were the respondents of the study. The study aimed to correlate the hygienic practices and parasitic infection to the academic performance of the students. Detection of parasitic infection was done through microscopic examination of feces/ stool samples obtained from the respondents using Kato-Katz technique and Direct Fecal Smear. A Survey questionnaire was used to evaluate the hygienic practices of the respondents and their average grades were the basis for their academic performance. From the results obtained, it showed that among the 22 respondents, only 2 were found negative of parasite infection. The common parasites that infected the students are: *Ascaris lumbricoides*, *Trichuris trichiura*, *Entamoeba coli*, Hookworm and *Enterobius vermicularis*. Based on the data analysed using Chi-square Distribution and Eta-Correlation Methods, results indicated that there is no correlation between hygienic practices and parasitic infection towards the academic performance of the students.
(Author's abstract)

Keywords: Correlation study, Hygienic practices, Parasitic infection, Academic performance, Waan National High School, Philippines, Biology

Optima, Volume No. 1 Issue No. 1, 66-71
2013,
(Filipiniana Analytics)
NP

0058

Cost Optimization of the Intensified Rabies Control Program in Davao City, Philippines
Using Linear Programming

Alviola, IV, Pedro A. , Oguis, Giovanna Fae R. , Lachica, Zythron Paul T. , Herrada, Novelyn J. , Diamante, Eliezer O., Mata, May Ann

Davao City, the largest city in the Philippines with 11 legislative districts, is among the top cities with high rabies incidence. To eliminate the rabies incidence, the City Veterinarian's Office (CVO) has been implementing the Intensified Rabies Control Program (IRCP) that is composed of mass dog vaccination, dog neutering, dog impounding, and information and education campaigns (IEC). In this paper, we formulated a linear programming (LP) model that minimizes the IRCP operational cost while satisfying the different targets set by the CVO for each of the IRCP component as well as its allocated budget. From the analysis, the CVO should be lessening the number of dogs to be vaccinated in districts whose vaccine coverage is already above 70%. This is to ensure that the number of dogs to be vaccinated in other districts can be increased and achieve 70% vaccine coverage. However, the model suggests that it is optimal that 90% of the dogs in the Talomo district (the most populous district in the city) should be vaccinated. Furthermore, with the 24:1 ratio of the number of vaccinated dogs to the impounded dogs, it is optimal to neuter one dog for every 239 vaccinated dogs. Additionally, the model suggests impounding more dogs to highly populated districts. Lastly, the model suggests maintaining the average number of IEC participants. By doing these interventions firmly, dogs in Davao City can potentially achieve herd immunity, and the human's risk to contract rabies will be lowered. **(Author's abstract)**

Keywords: Cost minimization, Linear programming model, Mass vaccination, Philippines, Rabies control, Biology

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NP

0059

Distribution of the Mindanao Spiky-helmed Pygmy Grasshopper *Misythus echinatus* (Stål, 1877) (Tetrigidae: Cladonotini)

Amoroso, Victor B. , Mohagan, Alma B. , Patano, Jr., Ro

Misythus Stål, 1877 (Tetrigidae: Cladonotinae) is a diverse genus of pygmy grasshoppers with 27 species and two subspecies, all of which are endemic to the islands of the Philippines. Here, the emphasis is put on the spiky wingless pygmy grasshopper, *Misythus echinatus* (Stål, 1877). The species is endemic to northern Mindanao and adjacent islands (Siargao Island, Bucas Island, Surigao, Iligan, and Butuan). The last published records originate from 1916 and most of the specimens hitherto reported lacked habitat descriptions and especially images of the species in its natural environment. In this study, we report the species for the first time from Bukidnon and Davao regions; we update its distribution in Mindanao and describe its natural habitat with supporting images. An updated distribution map for this species is provided, together with detailed measurements of male and female specimens, in order to make a comparison between different populations possible. **(Author's abstract)**

Keywords: Endemic species, Measurements, Montane forest, Mt. Malimumu, Pronotum, Ultramafic substrate, Biology

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0060

Diversity of Bacteria in Ants (Hymenoptera: Formicidae) from Canopy and Understory of Selected Trees at Mount Makiling Forest Reserve, Laguna, Philippines

Bautista, Ma. Anita M. , Zarate, Jocelyn T. , Sabino, Noel G. , Ballesteros, Alfredo Jose C. , Amoranto, Mia Beatriz C. , Gatpatan, Michael P., Villegas, Lucill

The Mount Makiling Forest Reserve (MMFR) is a biodiversity hotspot and listed as one of the 170 conservation priority areas established by the Philippine government. Its flora and fauna diversity has been reported, but knowledge gap has been identified concerning the bacterial communities associated with the flora and fauna. This study focused on ants (Hymenoptera: Formicidae), which are dominant in forest canopy and play essential roles in the ecosystem functionality. A metagenomic sequencing approach based on amplified V3–V4 regions of the 16S rRNA was employed to investigate the bacterial communities associated with five arboreal ant species collected from MMFR. The collected ants were identified as *Dolichoderus thoracicus*, *Myrmecaria* sp., *Colobopsis leonardi*, *Polyrhachis mindanaensis*, and *Polyrhachis semiinermis*. The sequence analyses revealed that Proteobacteria, Spirochaetes, Firmicutes, Bacteroides, and Actinobacteria were the most abundant phyla. Individual analysis of the bacterial genera associated with the five ant species showed that unclassified members of Rhizobiaceae, Orbaceae, and Burkholderiaceae were dominant in *D. thoracicus*. Unclassified members of Rhizobiaceae, Spirochaetaceae, and Ruminococcaceae were dominant in *Myrmecaria* sp. On the other hand, *Candidatus Blochmannia*, and *Wolbachia* were abundant in Camponotini ants *C. leonardi*, *P. mindanaensis*, and *P. semiinermis*. Bray-Curtis distance and UPGMA cluster analyses showed that the microbiomes of the Camponotini group clustered together, while *D. thoracicus* and *Myrmecaria* sp. exhibited unique bacterial profiles. Predictive gene profile analysis showed that the most functional categories were those associated with metabolism and biosynthesis of amino acids, pathways for metabolism of nucleotide, amino sugars and nitrogen, and utilization of different carbon sources. (Author's abstract)

Keywords: Bacterial diversity, Canopy and understory, Formicidae, Metagenomics, Mount Makiling Forest Reserve, Biology

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0061

Diversity of Endomycorrhizas in *Falcataria moluccana* (Miq.) Barneby & J.W. Grimes Affected by Gall Rust Disease in Laguna, Philippines

Carandang, Wilfredo M. , Manalo, Mutya Ma. Q. , Pampolina, Nelson M. , Soriano, Janine Kay

Endomycorrhizas or arbuscular mycorrhizal fungi (AMF) are microfungus associates known to facilitate nutrient absorption in higher plants that benefit growth and survival. Studies have shown that they can induce systemic host resistance against pathogenic fungi, but little information is known about its contributions to gall rust disease in *Falcataria moluccana*, an important plantation tree species. This paper investigated the community of endomycorrhizas under *F. moluccana* stand affected by *Uromycladium* rust from a secondary-growth forest in Laguna, Philippines. Three transects (1.5 km) were established wherein matured *F. moluccana* trees (n = 32) were assessed for gall rust incidence and disease severity index (DSI) using a five-point rating scale to categorize infection. Composite rhizosphere samples were collected from nine sampling plots for macronutrient analysis and AMF assessment. Endomycorrhizal spores were isolated from dissolved 100-g soil solution following wet-sieving and decanting method then characterized morphologically for identification, spore density, and diversity analysis. Results of the tree health survey showed 100% disease incidence with moderate infection (DSI = 30–44). Overall, 13 morphospecies of endomycorrhizal fungi were identified from three orders and five families. The eight genera associated with *F. moluccana* were *Acaulospora*, *Ambispora*, *Diversispora*, *Entrophospora*, *Funneliformis*,

Gigaspora, *Glomus*, and *Rhizophagus*. The Shannon diversity index (H') revealed a significant ($p < 0.002$) difference in all sites [$F(2, 31) = 7.46$]. The findings suggest that species abundance and density of AMF fungi are related to soil phosphorous and the severity of gall rust. This study presents the potential of important AMF species for the integrated management of gall rust disease affecting *F. moluccana*. **(Author's abstract)**

Keywords: *Arbuscular mycorrhiza, Endomycorrhizal diversity, Falcataria, Symbiotic, Uromycladium, Biology*

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NP

0062

DNA Barcoding of Six Ethnomedicinal and Economically Important *Pandanus* Parkinson (Pandanaceae) in the Philippines

Bangcaya, Porferio S. , Olivar, Jay Edneil C. , Ordas, Jorge Anton D. , Santor, Propa Joy R., Nonato, Maribel G. , Alejandro, Grecebio Jonatha

Members of the genus *Pandanus* are popularly known for their variety of uses, yet there is difficulty identifying its species since discrimination is dependent on its seasonal reproductive parts. DNA barcoding was utilized to establish an ideal locus for the rapid identification and authentication of six *Pandanus* species in the Philippines. A total of 17 samples representing six species with three endemic taxa were collected and analyzed. Genomic DNA was extracted from leaf samples and was used as a template to generate the DNA barcodes. The BLAST (Basic Local Alignment Search Tool) method, divergence, and NJ (neighbor-joining) analyses were conducted to determine the efficiency of each barcode. The internal transcribed spacer, a nuclear region, was initially assessed in this study; however, plastid markers showed more universality with better amplification and sequencing success rates. In terms of discriminatory power, *trnH-psbA* revealed a significantly higher interspecific divergence compared to its intraspecific divergence. Phylogenetic analyses using the NJ approach exhibited that *trnH-psbA* has a better ability to resolve species identity and exclusive lineages than *matK*. The concatenated gene *trnH-psbA* + *matK* was able to generate better species resolution compared to the single barcodes analyzed. In general, *rbcL* performed poorly in the NJ analysis and has the lowest species discrimination based on its interspecific and intraspecific distances with close values. We provisionally recommend *trnH-psbA* as the most efficient single candidate barcode for the molecular authentication of Philippine *Pandanus* species and the combination of *trnH-psbA* + *matK* for a better discriminatory ability. **(Author's abstract)**

Keywords: *DNA barcoding, matK, Pandanaceae, Pandanus, rbcL, trnH-psbA, Biology*

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NP

0063

Effect of AMF-Cacao Association on Pod Disease Incidence in Three-year-old Cacao Trees in an Agroforest in Calauan, Laguna, Philippines

Sotto, Rachel C. , Buot, Jr., Inocencio E. , Aggangan, Nelly S. , Paguntalan, Diana P., Pangga, Irene

Cacao diseases are an important aspect of cacao production that directly translates to losses and yield. Arbuscular mycorrhizal fungi (AMF) are recently studied for their increasing role in disease resistance in many crops, including cacao. In this study, the effects of the different treatments of AMF and biochar applied singly or in combination on the incidence of pod rot diseases – especially the black pod disease – were investigated. Cacao trees were previously treated with AMF and/or biochar during their seedling stage; later, they were assessed for symptomatic pods, three years after field planting. The results showed that there was an interaction ($p = 0.043$) between treatment and cacao variety on disease incidence. In almost all instances, disease incidence was highest in the control (without AMF) set-up as compared to the amended counterparts. For all varieties, except K2, disease incidence was the lowest on trees with added AMF and biochar amendments. Isolation of fungi associated with symptomatic pods was carried out. However, *Phytophthora* (the well-known pathogen of black pod disease) was not successfully isolated; hence, the occurrence of black pod disease was unconfirmed. Other fungal genera such as *Fusarium*, *Colletotrichum*, *Pestalotiopsis*, and *Lasiodiplodia* had the highest occurrence among the fungal isolates. The results from this study support the explored role of AMF associations on disease resistance and plant health on cacao plants in field conditions. **(Author's abstract)**

Keywords: *Arbuscular mycorrhizal fungi, Black pod disease, Cacao diseases, Disease incidence, Biology*

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 (Filipiniana Analytics)
 NP

0064

Evaluation of the Antioxidant and Anti-diabetic Bioactivities of Natural Phenolics from Mango (*Mangifera indica* Linn) Branches

Gaylon, Arra , Tambalo, Fides Marciana Z. , Perez, Rodney H. , Sapin, Arsenia B., Alaon, Maria Katrin

Different parts of the mango (*Mangifera indica* Linn) tree are known to contain phenolic compounds that exhibit health-promoting bioactivities. Branches that were cut off during pruning having no significant economic value were utilized as a source for phenolic compounds in this study. Antioxidant and anti-diabetic activities of the extracted phenolics from branches of five mango varieties (“apple mango,” “carabao,” “pico,” “sinaging,” and “sipsipin”) were evaluated. The bioactivities of the phenolic extracts from mature and young branches of carabao and pico varieties were also compared. Three different methods were used to quantify the antioxidant capacity of the phenolic compounds – namely, the DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging activity assay, ABTS [2,2'-azino-bis (3-ethyl-benzothiazoline-6-sulfonic acid) diammonium salt] cation radical scavenging assay, and CUPRAC (cupric ion reduction antioxidant capacity) test. Anti-diabetic effects were evaluated by quantifying the α -amylase and α -glucosidase inhibitory activities of the phenolic extracts. Findings showed that the bioactivities were variable with respect to the varieties and maturity of the mango branches. The varieties apple mango, pico, and sinaging exhibited the highest antioxidant activity based on their EC50 values interpolated from the DPPH scavenging, ABTS scavenging, and CUPRAC assays, respectively. The anti-diabetic properties of the phenolics extracted from mango branches showed better bioactivity than the known anti-diabetic drugs, acarbose, and metformin. The findings of this present study offer a potentially huge economic impact to mango farmers as the extraction of phenolics from mango branches for medical supplement use can be a viable alternative and/or supplementary income source. **(Author's abstract)**

Keywords: *Antioxidant activity, Anti-diabetic activity, Mango, Mango branches, Phenolic compounds, Biology*

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 NP

Evaluation of the Potential for Immunomodulatory and Anti-inflammatory Properties of Phytoconstituents Derived from Pineapple [*Ananas comosus* (L.) Merr.] Peel Extract Using an *In Silico* Approach

Kusumawaty, Diah , Niode, Nurdjannah Jane , Kepel, Billy Johnson , Kalalo, Marko Jeremia , Tania, Adinda Dwi , Marfuah, Siti , Yelnetty, Afriza , Fatimawali, , Tallei, Trina Ekawati, Idroes, Rinal

Pineapple [*Ananas comosus* (L.) Merr.] has long been recognized as a source of bioactive compounds that are frequently used in health and wellness products. The benefits of pineapple, among others, include immunomodulatory and anti-inflammatory properties. This study aimed at evaluating the potential of phytochemical compounds in pineapple peel as immunomodulators and anti-inflammatory agents using an *in silico* approach. The phytochemical of the pineapple peel's n-hexane extract was analyzed using GC-MS (gas chromatography–mass spectrometry). The analysis of biological activities of the phytochemicals was performed using the PASS Online webserver. Computational toxicity estimation was performed using the ProTox II webserver. The drug-likeness of the compounds was analyzed using Lipinski's rule of five. Additionally, molecular docking of selected phytochemicals against the NLRP3 inflammasome was performed. The results suggested the presence of phytochemicals with immunomodulatory and anti-inflammatory properties in the n-hexane extract of pineapple peel. This information can be used as a starting point in the search for natural-based drugs that are effective at alleviating inflammatory symptoms, as well as in immunomodulatory aspects. **(Author's abstract)**

Keywords: Anti-inflammatory, GC-MS, Immunomodulator, In silico, Inflammasome, Pineapple peel, Biology

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(Filipiniana Analytics)
NP

Genome-wide Association Mapping for the Identification of SNPs Controlling Lateral Root Plasticity in Selected Rice Germplasms of the Philippines

Hautea, Desiree M. , Cabral, Maria Corazon J. , Cruz, Antoinette S. , Lipio, Patrick Louie G. , Niones, Jonathan M., Lucob-Agustin, Nonawin , Suralta, Roe

Lateral root plasticity is a key adaptive mechanism for drought and fluctuating moisture-induced stresses in rice. Thus, understanding the genetic control of lateral root plasticity is important to enhance the climate-resilience and productivity of rice in abiotic stressed-prone environments. Genome-wide association analysis was conducted on a selected panel of traditional rice varieties (TRVs) to find single nucleotide polymorphisms (SNPs) associated with root plasticity traits under different gradients of soil moisture stress. A total of 17 SNPs, which were significantly correlated to root plasticity traits under soil moisture stress conditions, were located in six chromosomes (2, 5, 7, 9, 10, and 12). Additionally, the accessions that showed high plasticity in total lateral root length (TLRL) under severe drought were identified from among the TRVs and assumed to possess the lone SNP associated with the trait found in Chromosome 2. Specifically, the Baksalan Kawalwal accession showed an increase in L-type lateral root length under fluctuating soil moistures (SMF) (+10.31 m) and progressive drought (PDR) (+0.90 m), relative to their continuously waterlogged (CWL) counterparts under rootbox pinboard system. This may suggest the performance of the SNP in controlling the promotion of lateral roots. Furthermore, a possible candidate gene found near the SNP in

Chromosome 2 is a member of PYR/PYL/RCAR-like protein family of abscisic acid (ABA) receptors, likely suggesting that plasticity in lateral root development in rice under severe drought could be regulated by ABA. Taken together, these novel root plasticity SNPs and the respective candidate genes on Chromosome 2 have potential use in developing climate-smart rice varieties. **(Author's abstract)**

Keywords: Drought, Genome-wide association mapping, Lateral root plasticity, Rice, Single nucleotide polymorphism, Biology

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NP

0067

Genomic Insights into the Antimicrobial and Anticancer Potential of *Streptomyces* sp. A1-08 Isolated from Volcanic Soils of Mount Mayon, Philippines

Raymundo, Asuncion K. , Zulaybar, Teofila O. , Jacildo, Arian J. , Opulencia, Rina B. , Montecillo, Andrew D. , Rosana, Albert Remus R. , Oliveros, Kristel

Antimicrobial resistance (AMR) poses a global and developmental threat to humanity. The rapid emergence and spread of drug-resistant pathogens resulted in the ineffective use of currently available antibiotics. Therefore, there is a need to continue searching for additional sources of antibiotics, such as actinomycetes, which can potentially harbor unique and effective secondary metabolites. Furthermore, it is interesting to consider poorly explored environments like volcanoes, which can be potential sources of drug leads for medically important natural products. This study reports the antimicrobial activity of actinomycetes isolated from volcanic soil samples collected from Mount Mayon, Albay, Philippines. A total of 13 out of 30 morphologically distinct actinomycete isolates showed antagonistic activity against test microorganisms. Isolate A1-08, the focus of the study, exhibited a wide spectrum of antimicrobial activity against *Salmonella enterica*, *Klebsiella pneumoniae*, *Staphylococcus aureus*, methicillin-resistant *S. aureus* (MRSA), *Candida albicans*, *Aspergillus niger*, and *Fusarium* sp. Moreover, A1-08 was found to have anti-methicillin resistant *S. aureus* (MIC = 2.50 mg/mL) and anticancer activity against human colorectal cancer (HCT116) cell line (IC₅₀ = 21.54 µg/mL). Whole-genome sequence-based phylogenetic analysis supported a novel species of *Streptomyces* closely related to *S. olivaceus* NRRL B-3009. A total of 48 biosynthetic gene clusters (BGCs) were identified that may be responsible for the biosynthesis of known and potentially novel secondary metabolites. This study concludes that *Streptomyces* sp. A1-08, a potentially novel species, is a good candidate to produce broad-spectrum antibiotics with anti-MRSA and anti-cancer activities and possibly novel secondary bioactive metabolites of medical and pharmaceutical importance. **(Author's abstract)**

Keywords: Actinomycetes, Antibiotics, Mount Mayon, *Streptomyces*, Volcanic soil, Whole-genome sequencing, Biology

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NP

0068

Geometric Morphometric Analysis of *Channa striata* (Striped Snakehead) Populations from Laguna de Bay, Philippines Reveals Shape Differences in Relation to Water Quality

Magbanua, Francis S. , Santos, Brian S. , Torres, Shenna K

Channa striata, locally known as dalag, constitute a major aquaculture resource in Laguna de Bay. Owing to its popularity as a food source, threats such as overfishing may potentially place this species at risk. However, studies regarding its status within the lake is lacking. One way to address this gap is through population studies using geometric morphometrics. In this study, a total of 82 specimens were collected across three areas of the lake, namely, Binangonan, Calamba, and Tanay. These areas were assessed using secondary data for physicochemical parameters, which revealed significantly higher ammonium-nitrogen levels in Binangonan compared to the other areas. Geometric morphometrics was then used to determine whether shape variation existed among *C. striata* populations. Results showed that shape variation was greatest in the cranial region, with fish from Binangonan and Tanay having the greatest variation in shape. On the other hand, specimens from Calamba had the highest morphometric values. Lastly, these findings were then correlated with water quality data using Canonical Correlation Analysis. Results indicated that shape variation in the cranial region was correlated with differences in dissolved oxygen and pH content of the lake. The weight and length of fish were inversely correlated to the levels of ammonium-nitrogen and total dissolved solids, with specimens from Binangonan displaying a high sensitivity to ammonium-nitrogen. (Author's abstract)

Keywords: Dalag, Freshwater fish, Shape variation, Laguna Lake, Physicochemical parameters, Biology

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(Filipiniana Analytics)
NP

0069

Identification of QTL Underlying Plant Height and First Branch Height of Cassava

Triwitayakorn, Kanokporn , Smith, Duncan R. , Srisawad, Nattaya , Sraphet, Supajit , Hmwe Hmwe

This study sought to develop a genetic map of cassava based on 91 progenies derived from a cross between “Rayong 60” (R60) and “Piroon 1” (PR1) cultivars. A total of 4,515 simple sequence repeat (SSR) primer pairs were screened against the parental lines and six progenies resulting in 656 informative polymorphic markers, which were then used to genotype the F1 population. A total of 314 linked SSR loci were identified that were distributed across 40 linkage groups (LGs) at a logarithm of the odds (LOD) score of 4.0. The total distance of the linkage map was 2,026.68 cM with an average of 13.85 cM between markers and 7.85 loci per LG. The SSR loci on each LG were categorized into the 18 chromosomes of the cassava genome. Two major quantitative trait loci (QTL) and one minor QTL controlling first branch height (FBH) were detected with phenotypic variability explained (PVE) ranging from 10.2–18.9% and 8.2%, respectively. In addition, two major QTL for plant height (PH) with PVE ranging from 16.5–24.3% were detected in the F1 population. The QTL controlling PH and FBH detected in this study will be useful for future identification of QTL and genes underlying economically important traits to accelerate molecular breeding of cassava variety improvement via marker-assisted selection. (Author's abstract)

Keywords: Genetic linkage map, *Manihot esculenta* Crantz, Molecular breeding, QTL, SSR markers, Biology

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2022 April,
(Filipiniana Analytics)
NP

Impacts of Probiotics on Water Quality and Milkfish Production (*Chanos chanos*) Grown in Polluted Ponds of Marilao and Meycauayan, Bulacan

Simbahan, Jessica F. , Migo, Veronica P. , Arboleda, Mark Dondi M. , Pleto, John Vinc

The Marilao-Meycauayan-Obando River System is known to be heavily polluted with organics and heavy metals, thus affecting the ecosystem. This study used probiotics as an ecological approach to improve environmental quality, with a focus on determining the impacts of probiotics on fish health and survival as well as water quality. Probiotics are microbial feed supplements that can improve the survival and health of organisms. Probiotics were applied at the start and after two months of culture period. Physico-chemical water quality parameters were recorded. Growth parameters such as fish body weight, feed conversion ratio (FCR), and survival rate were determined. Polymerase chain reaction- denaturing gradient gel electrophoresis (PCR-DGGE) method was used to determine the microbial community present in the guts of milkfish (*Chanos chanos*) grown in polluted water treated with probiotics. The results showed that ponds treated with probiotics had higher dissolved oxygen and lower biochemical oxygen demand (BOD) and nitrate and phosphate levels, which are beneficial for the growth of milkfish. However, higher ammonia and chemical oxygen demand (COD) were observed in the probiotic ponds. Higher survival rate (95.3%) was obtained in treated ponds compared to non-treated ponds (74.1%). The FCR was less in probiotic-treated ponds (0.74) than non-treated ponds (1.35), which is beneficial for fish production. The study showed that the probiotic strains (*Bacillus*) were not able to establish in the milkfish gut. Instead, strains related to *Cetobacterium*, *Clostridium*, *Conexibacter*, *Cyanobium*, *Cyanothece*, *Cylindrospermum*, *Helicobacter*, *Romboutsia*, *Synechococcus*, and *Vibrio* were detected in the guts of milkfish. Overall, the probiotics had an impact on water quality and fish health through improvement of growth and survival rate. **(Author's abstract)**

Keywords: Probiotics, Water quality, *Chanos chanos*, PCR-DGGE (polymerase chain reaction-denaturing gradient gel electrophoresis), Microflora, Biology

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2021,
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NP

In Silico Physical Mapping of Resistance and Resistance-associated Genes in the S_H^3 Region of the *Coffea canephora* Genome

Cao, Ernelea P. , Santos, Daisy May C. , Santos, Nick Rainier S. , Nagaño, Terrence Ferdin

Coffee production has been limited by the coffee leaf rust (CLR) disease. Genetic markers linked to resistance have been utilized for molecular breeding programs. Some of these markers have been linked specifically to a hypothetical S_H^3 gene that confers resistance against CLR. Using PrimerBLAST, the binding sites of these S_H^3 markers have been localized to a region in chromosome 3 of the coffee genome. Protein-coding genes were obtained from the Ensembl Plants website and filtered using the Orange software according to the gene annotations of their predicted products. The candidate resistance and resistance-associated genes were then data-mined and physical maps were constructed to visualize their locations. The data generated by this study may help guide future investigations regarding S_H^3 -conferred resistance. **(Author's abstract)**

Keywords: Bioinformatics, Coffee, Genome, Resistance, Biology

0072

Isolation and Antimicrobial Activity of Fructophilic Lactic Acid Bacteria from Flowers in the University of the Philippines Diliman, Quezon City

Artezuella, Renz Joseph R. , Penuliar,

Fructophilic lactic acid bacteria (FLAB) is a recently discovered group of lactic acid bacteria that prefers fructose as carbohydrate source. The isolation of FLAB from fructose-rich niches like flowers, in particular, and the gut of insect pollinators suggests that it may be used as probiotics. The objective of this study was to determine if FLAB can be isolated from flowers at the Institute of Biology, University of the Philippines Diliman, and to screen them for antimicrobial activity against bacteria that are commonly associated with intestinal diseases. A total of 20 different isolates were obtained from 14 species of flowers. All isolates were identified as LAB, but only 17 out of 18 isolates were osmotolerant in 30% fructose, and only 8 out of 15 isolates had higher absorbance in Fructose Yeast Peptone Broth, which are characteristics of presumptive FLAB. Seven isolates exhibited inhibitory activity in at least three test bacteria in the primary screening and only four isolates had inhibitory activity in at least two test bacteria, particularly against *Enterococcus faecalis* and *Campylobacter jejuni*, in the secondary screening. DNA sequencing and phylogenetic analysis identified isolates MFPS 4.1 and MFRU 7.2 as *Weissella* spp. The in vitro antimicrobial activities of these isolates can be studied further for possible applications in food and medicine, and their low sequence similarities suggest that the isolates might be novel *Weissella* species. **(Author's abstract)**

Keywords: *FLAB, Antimicrobial activity, Weissella spp., Biology*

0073

Isolation and determination of bacterial load in randomly selected restrooms in restaurant bars at Prime Square, F. Torres Street, Davao City

Nono, Benjo Romil B. , Gologan, Leslie L. , Allado, Fremae Joy D. , Catedrilla, Russefe M. , Dayaganon, Avee Joy B., Valente, Mary Doll

Bacteria can be found everywhere. Though most are relatively harmless, many microorganisms are harmful and can cause death. Bacteria can thrive in restrooms as moisture and organic wastes support their growth. Urinary tract and gastrointestinal infections are the most commonly encountered health problems acquired from restrooms. Thus, this study attempted to determine the presence of bacteria in two randomly selected male and female restrooms in restaurant bars in Prime Square, F. Torres Street, Davao City. By swabbing, Gram staining and biochemical test methods, most of the isolated microorganisms were identified to be *Neisseria* species, followed by *Staphylococcus aureus*, *S. epidermidis*, *E. coli*, *Bacillus species.*, *Enterobacter*, *Klebsiella*, *Enterococcus*, *E. saprophyticus*, *Micrococcus* and *Salmonella*. Most of the bacteria isolated were normal flora known to cause opportunistic infections of urinary tract, skin and gastrointestinal tract, and some are serious pathogens. These results show that

public restrooms lack proper maintenance and that users must practice personal hygiene after using public restrooms. **(Author's abstract)**

Keywords: *Medical laboratory science, Restaurant restrooms, Bacterial load, Bacterial identification, Philippines, Biology*

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2013,
(Filipiniana Analytics)
NP

0074

Isolation and identification of Nosocomial infection-causing bacteria in delivery room settings: Impact to quality of care to mothers and newborns

Odin, Stephanie , Talinting, Zandra Mae , Mosquera, Jother , Pagatpatan, Mary Antoinette , Ramos, Mary Joy , Asperga, Alyanna Ariene Marie , Gaspar, Charity Leene S., Wahab, Tatal

The objective of the study was to identify bacteria that cause nosocomial infection and other diseases in delivery rooms which may put the mother and the newborn at risk to infections. The identification of pathogenic bacteria was conducted in a hospital in Davao City. Six samples from a Kellypad were collected from three different duty shifts, and microbiological culture, microscopic examination, and biochemical tests were conducted. Results showed the presence of *Pseudomonas species*, *Serratia Marcescens* and *Enterobacter Cloacae*. The results of the study indicated that the delivery instruments used in sample collections were contaminated with pathogenic bacteria. Thus, the researchers recommend proper disinfections of the equipment used in the delivery room setting in order to regulate the spread of infection in the area. **(Author's abstract)**

Keywords: *Nursing, Nosocomial infection, Delivery room, Quality of care, Philippines, Biology*

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2013,
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NP

0075

Isolation and identification of oil-degrading and lead-bioaccumulating bacteria and their degree of degradation/bioaccumulation in Coaco harbor, Sasa, Davao City

Pascasio, Anthony B. , Gadayán, May Amor C. , De Leon, Vill Patrick M. , Desabelle, Rae Kristine E. , Barluado, Mary Jane G., Bacus, Elisa

Hydrocarbons like diesel oil and heavy metals like lead are known water pollutants posing serious damage to marine life. The potential use of microorganisms to remediate water environmental problems is considered a cost-effective large scale solution. Oil-degrading and lead-bioaccumulating bacteria may thrive in environments exposed to the mentioned pollutants. The study attempted to isolate and identify bacterial strain that can both degrade hydrocarbons and bioabsorb heavy metals. Water samples collected near ship refuelling site in Coaco harbor were inoculated onto Bushnell Haas Agar (BHA) and produced growth of five organisms with oil-degrading potential. They were then isolated, subjected to biochemical tests, and identified to be *Escherichia sp.*, *Micrococcus sp.*, *Citrobacter*

amalonaticus, *Enterobacter agglomerans*, *Citrobacter freundii*. They were then used to treat diesel oil-contaminated water, and the degree of oil degradation was determined by measuring the oil concentration in the treated samples through Liquid-Liquid Partition Gravimetric Method. Of the five isolates, *Citrobacter amalonaticus*, *Enterobacter agglomerans* and *Citrobacter freundii* have shown significant ability to degrade oil contaminants in test samples, with *Citrobacter freundii* exhibiting the highest capacity. The isolated oil-degrading organisms were then used to treat lead-contaminated water to determine their lead-bioaccumulating capacity, which was analyzed by determining the remaining lead concentration in the water media measured by Direct Air Acetylene Flame method. Results clearly indicated that the five bacterial isolates showed substantial ability to absorb soluble lead with *Citrobacter freundii* exhibiting the highest ability in lead absorption, showing significant difference ($p<0.05$) as compared with the negative control and the rest of the isolates. Thus, the study successfully isolated and identified organisms with both oil-degrading and lead-bioabsorbing capabilities, with *Citrobacter freundii* isolate consistently exhibiting the highest ability, making it an excellent subject for use in future bioremediation studies. **(Author's abstract)**

Keywords: Bioremediation, Oil-degrading, lead-bioaccumulating, *Citrobacter freundii*, Philippines, Biology

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2013,
(Filipiniana Analytics)
NP

0076

Isolation of Helminth Eggs Using Gasoline as Ether Substitute in Formalin-Ether Concentration Technique

Zamora, Maria Rheena Flor C. , Suberon, Rhea F. , Landero, Rhubilyn L. , Cadiente, Erylle P. , Dayaganon, Avee

To diagnose pathologic conditions due to parasitosis, several procedures may be used in order to isolate fecal parasites. These include the simple Direct Fecal Smear (DFS) to the more complex fecal concentration techniques such as Formalin-Ether Concentration Technique (FECT). This study investigates the possibility of using the more readily available gasoline as substitute for ether, which is a highly volatile organic compound, in FECT. Two hundred positive clinical fecal parasitology specimens were pre-examined by DFS and Kato's technique. The specimens were subjected to FECT as standard vis a vis a modified technique that substituted ether with regular, special, and unleaded gasoline. Samples from both techniques were examined in parallel considering three criteria: viability in the parasitic recovery rate, sample macroscopic clarity rate, and microscopic clarity rate. Both the standard and the modified techniques gave identical results ($p>0.05$) in terms of viability in the parasitic recovery rate and macroscopic clarity rate. However there is a significant difference ($p<0.05$) in the microscopic clarity rate using ether, special gasoline and unleaded gasoline when compared to regular gasoline which yielded lower microscopic clarity results. These results indicate that special and unleaded gasoline may be used as a substitute to ether in the isolation of fecal parasites using FECT. **(Author's abstract)**

Keywords: Medical Laboratory Science, Elminth eggs, Formalin-Ether Concentration Technique (FECT), Gasoline, Direct Fecal Smear (DFS), Kato Technique, Philippines, Biology

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2013,
(Filipiniana Analytics)
NP

Latundan banana *Musa sapientum* as nutrient source in microbial culture media

Bano, Gharen , Insoy, Iris , Baquiran, Leslie , Ago, Lhinnie Pearl , Barluado, Mary J

The use of culture media is necessary in growing microorganisms for the diagnosis of diseases, in research, and in many microbiological laboratory work. The study investigated the potential of Latundan banana *Musa sapientum* as sole nutrient source for microbial culture media. Banana powder was prepared from ripe and unripe banana fruit, and subjected to biochemical and chemical tests. Results revealed high amounts of carbohydrates, minerals (potassium, nitrogen, phosphorus, magnesium, calcium, and iron), and crude protein – all required for microbial growth. Solid media with different amounts of the banana powder were then formulated, and their capacity to sustain microbial growth for 24, 48 and 72 hours was tested using nutrient agar as positive control, and pure cultures of the bacteria *Staphylococcus aureus* and *Pseudomonas aeruginosa* and the fungus *Aspergillus niger* as test organisms. All banana media consistently sustained microbial growth, with the unripe fruit (16g/L) exhibiting the best growth in 72-hr period, which was comparable (no significant difference, $p>0.01$) to the growth of the same microorganisms on nutrient agar as positive control. Hence, unripe Latundan banana fruit may potentially be formulated as powder and commercialised as an alternative to nutrient agar in preparing microbial culture media.

(Author's abstract)

Keywords: Medical laboratory science, Latundan banana *Musa sapientum*, Culture media, Nutrient source, Nutrient agar, Philippines, Biology

, Volume No. 1 Issue No. 1, 1-9

2013,

(Filipiniana Analytics)

NP

Leaf Traits of *Calophyllum inophyllum* L. (Calophyllaceae) in Different Locations Suggest Suitability for Planting Outside of Natural Habitat

Combalicer, Marilyn S. , Tinio, Crusty E. , Calibo, Ma. Kristina T., Maldia, Lerma

Calophyllum inophyllum L. (*bitaog*), a native tree species in the Philippines that can be found growing in different locations (urban, coastal, and forest areas) with varying climatic conditions, were studied to compare the morphological and anatomical characters in relation to climatic factors. Nine leaf morphological characters (arrangement, apex, base, margin, shape, venation, texture, length, and width) were observed. The thicknesses of the epidermis, vascular tissues, and mesophyll were measured. One-way analysis of variance (ANOVA) was used to show significant differences in morphological and anatomical characters among locations. The linear mixed model was used to determine if leaf characters were affected by precipitation (PPT) and temperature (Temp) in each location. A significant difference in the quantitative morphological characters of *C. inophyllum* leaves was observed only in leaf length (LL), which was found negatively correlated with leaf width (LW) across locations. Palisade mesophyll (PM) and spongy mesophyll (SM) were found to have significant differences among locations. Leaves in the coastal area, which is the natural habitat of the species, had the thickest mesophyll. It was found out that *C. inophyllum* grows best in the coastal area and least in the urban area based on the quantitative measurement of leaf morphological characters such as LL and LW. On one hand, trees in the urban area have smaller LL, LW, PM, and SM as affected by the climatic variables. We, therefore, conclude that morphological and anatomical characteristics of *C. inophyllum* are altered once the species is grown outside of its natural habitat. **(Author's abstract)**

Keywords: Climatic factors, Coastal area, Forest area, Linear mixed model, Mesophyll, Urban area, Biology

***Leptin* Gene (T117C) Polymorphism and Its Association with Milk Yield Performance in Crossbred Anglo-Nubian Goats**

Mendioro, Merlyn S. , Angeles, Amado A. , Sangel, Percival P. , Moneva, Carlo Stephen O., Vega, Renato

This study was performed to determine polymorphism in the *leptin* gene (T117C) and investigate the association between genotypes and milk yield in 101 crossbred Anglo-Nubian dairy goats from Awang, Opol, Misamis Oriental and Talay, Dumaguete City, Negros Oriental in the Philippines. Milk yield performance data were standardized to 90 and 140 d milking periods. The goat's hair follicles were collected to extract genomic DNA. Polymerase chain reaction–restriction fragment length polymorphism (PCR-RFLP) was the method used in genotyping with *Nmu*CI as the restriction enzyme. Statistical analysis was performed following the two-way factorial (2 x 4) in a randomized complete block design (RCBD), where *leptin* genotypes and parity were used as main factors and farm as the blocking factor. Two genotypes (TT and TC) were obtained. Genotypic frequencies between TT (0.50) and TC (0.50) were evenly distributed, while allele T (0.75) occurred more frequently than allele C (0.25) in the total population studied. Observed heterozygosity is higher than the expected heterozygosity and the genetic variation observed in the overall population was in Hardy-Weinberg equilibrium ($p > 0.05$). Milk yield traits at 140 d milking period in crossbred Anglo-Nubian dairy goats were significantly influenced by polymorphisms in *leptin* (T117C). Goats having TT genotype had superior milk yield performance (140dADMY: $0.90L \pm 0.058L$, 140dTMP: $124.65L \pm 8.51L$) than those with TC genotype (140dADMY: $0.78L \pm 0.051L$, 140dTMP: $107.90L \pm 7.21L$). Further studies should be conducted in other goat breeds to validate associations of *leptin* polymorphism with milk production and in other economically important traits. **(Author's abstract)**

Keywords: *Anglo-Nubian, Leptin, Milk yield, PCR-RFLP, Polymorphisms, Biology*

Limnology of Lake Wood: An Ancestral Lake of the Subanen Tribe ***Papa, Rey Donne S. , Baludo, Marjohn Y., Magbanua, Franci***

Relatively limited information exists on Lake Wood's limnology and ecology, an ancestral lake of the Subanens. Here, we provide a limnological characterization of the lake – exploring its physical, chemical, and biological features. The data on lake morphometry were gathered using an echosounder; lower depth water samples were collected using a Niskin water sampler for physicochemical analyses while surface water samples were collected at five sampling sites for phosphate (PO₄) analysis; and zooplankton samples were collected at several depths through vertical towing in March–April 2019. Lake Wood, located at 320 m above sea level, has an extensive surface area covering 7.38 km² with a maximum depth of 85 m. Lake water comes from rainfall, small rivers, and groundwater and empties into the Dumanquilas Bay via its only outlet – the Biswangan River. Land use of the lake is predominantly cultivated land. Moreover, based on the trophic state index (TSI), the lake's current trophic status is

eutrophic. During the study periods, thermocline and oxycline formed at 15 m below the surface of the lake. We recorded three cladocerans (*Ceriodaphnia cornuta*, *Diaphanosoma cf. sarsi*, and *Moina micrura*) and one copepod species (*Thermocyclops crassus*) in the lake, all of which are common limnetic species found in the Philippines. Based on our findings, we recommend more efforts to manage and rehabilitate the lake to control and manage eutrophication's negative impacts. Finally, our study contributes to understanding lakes in Mindanao that are less represented in Philippine freshwater research. **(Author's abstract)**

Keywords: *Eutrophication, Mindanao Island, Trophic state index, Tropical lake, Zooplankton, Biology*

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2021 October,
(Filipiniana Analytics)
NP

0081

Low pH and Low Coral Cover at a Shallow Hydrothermal Vent Site in Batangas, Philippines

Licuanan, Wilfredo , Morris, John , Tamayo, Natasha , Magyaya, Ryan , Pavia, Richard , Isah, John OpiÁˆa Raffi , San Diegoâ€McGlone, Maria Lourdes , Reyes, Mi

The coral community and pH conditions were characterized at a shallow hydrothermal vent in Batangas, Philippines. Hard coral cover was $14.8 \pm 12.5\%$ (mean \pm standard deviation) and made up of more than 26 hard coral TAUs (taxonomic amalgamation units). Seawater pH was highly dynamic, especially near the most active vent plume, ranging from a low of 6.12 to a high of 8.09 over the 10 m x 10 m site. Fourteen (14) coral TAUs were found within 1 m of this vent plume, suggesting they can persist under variable pH conditions. These results contribute towards understanding the response of coral communities under future climate change scenarios. **(Author's abstract)**

Keywords: *Coral cover, Hydrothermal vent, Ocean acidification, Biology*

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2022 April,
(Filipiniana Analytics)
NP

0082

Microbial load determination of bacteria on the mobile phones of selected college students

Reyes, Jennifer Ashley H. , Flores, Louis Antonio T. , Enobio, Cyrille Maria Trinidad B. , Durano, Lourivy P. , Hinay, Jr., Alfr

More deaths arise due to infectious diseases in spite of the increasing awareness and preventive health practices. This alarming fact is due to the fomites such as kitchen utensils, surfaces of tables and other objects, and even gadgets such as mobile phones which can transmit bacteria. Millions of people gadgets mobile phones and this has become a part of their daily routine. This study dealt with the microbial load determination, isolation and determination of bacteria isolated from mobile phones of randomly selected second year students of the University of the Immaculate Conception. Using quota sampling, five mobile phones were subjected to investigation. Sterile swabs were used in the sampling procedure and swabbing was done before and after (APC) was used for the microbial load determination and culture using standard laboratory media was utilized in the isolation and

identification of bacteria. Results indicated that a significant difference on APC values were observed prior and after disinfection of mobile phones with 70% alcohol. Organisms that were commonly isolated were under the genus *Staphylococci* and genus *Streptococci*. Other organisms isolated included *Klebsiella pneumonia*, species of *Micrococcus*, *Pseudomonas*, *Listeria*, *Lactobacillus*, *Acinetobacter*, *Enterobacter*, *Bacillus*, *Citrobacter*, *Proteus*, *Providencia*, and *Arizona*. Although most of these bacteria are normal flora of the body, they are also still implicated in severe opportunistic infections. **(Author's abstract)**

Keywords: Medical microbiology, Mobile phones, Aerobic plate count, Culture media, Biochemical testing, Pathogenic bacteria, Philippines, Biology

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2015,
(Filipiniana Analytics)
NP

0083

Molecular Diversity and Functional Prediction of Foliar Endophytic Bacteria in *Tectona grandis* (Teak) Estimated by 16S rDNA Sequence Analysis

Jacob, John Prashanth , Warriar, Rekha R. , Kannan, Nithishkumar , Patturaj, Maheswari, Yasodha, Rama

The multi-layer structure of leaves supports endophyte colonization facilitating compatible plant-microbe interactions. Endophytic microbiota, including bacteria, influence the vital activities of plants. Yet, information on bacterial communities in leaves of forest trees largely remains unknown. This study describes the bacterial endophytes observed in *Tectona grandis* (Teak) identified by high-throughput sequencing of 16S rDNA sequences. The paper also provides details on the functional prediction of the bacterial community. Nine teak samples sequenced with 98% genome coverage provided 24,833–42,892 bacterial sequence reads, which aligned to 2827 operational taxonomic units (OTUs) of the V3–V4 conserved region with more than 97% sequence identity. Shannon Index ranged from 4.56–5.02 revealing high bacterial diversity. We identified 21 phyla, 39 classes, 65 orders, 226 families, and 127 genera. The phyla in abundance were *Firmicutes*, *Bacteroidetes*, *Proteobacteria*, and *Actinobacteria*. The identified genera include *Lactobacillus* (12.12%), *Prevotella* (9.78%), and *Bacteroides* (9.68%) and the category under unclassified genus constituted for 65.8% providing opportunities for identification of new species. The functions of the genes were studied using Phylogenetic Investigation of Communities by Reconstruction of Unobserved States (PICRUSt) analysis. It revealed the possible involvement of the bacteria in various metabolic processes with top-most functions related to transporters, DNA repair and recombination proteins, and the ribosome. Further studies on these gene interactions would help to understand the potential of bacterial endophytes in promoting growth and conferring protection. **(Author's abstract)**

Keywords: 16S rDNA sequence, Gene function profiling, Leaf endophytic bacteria, *Tectona grandis*, Biology

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2021 December,
(Filipiniana Analytics)
NP

0084

Molecular Identification of the Chinese Pond Mussel *Sinanodonta woodiana* (Lea, 1834) from Mindoro and Leyte Islands, Philippines

Fontanilla, Ian Kendrick C. , Mendoza, Rogel Victor D. , Que, Gerard Clinton L. , Fornillos, Raffy Jay C., Ong, Perr

The Chinese pond mussel *Sinanodonta woodiana* (Lea, 1834) is a large freshwater bivalve species of the family Unionidae and a known invasive alien species. Proper verification of its identity as well as its source population is crucial for the control of its spread. However, its high plastic shell morphology that resembles other non-invasive species of unionids can be an obstacle. The distribution and ecological impact of this invasive unionid is not fully understood and should be further investigated to prevent further spread in the Philippines. In this study, we used the cytochrome oxidase I (*cox1*) gene to verify the identity of putative *S. woodiana* samples collected from Bato Creek in Oriental Mindoro and Lake Danao in Leyte, Philippines and elucidate their source populations. Eighteen cytochrome oxidase subunit 1 (*cox1*) barcodes were generated from samples collected from Lake Danao, Leyte (n=13) and Bato Creek, Oriental Mindoro (n=5). These barcodes were subjected to Basic Local Alignment Search Tool (BLAST) analysis, which showed that the *cox1* sequences from the Philippine samples matched with those of *S. woodiana* (>94%) found in GenBank. The sequences were then aligned with *cox1* sequences of *S. woodiana* and other unionid representatives from GenBank. Phylogenetic and haplotype network analyses also showed three haplotypes (Hap 1, 2, and 4) of *S. woodiana* samples from Lake Danao and Bato Creek. Hap 1 and 2 are distinct haplotypes observed in Lake Danao samples while Hap 4 is shared between Lake Danao and Bato Creek samples and have clustered with conspecific specimens from Malaysia and Indonesia, suggesting their potential Island Southeast Asian origin.. (Author's abstract). **(Author's abstract)**

Keywords: *idae, DNA barcoding, Invasive Alien Species, Sinanodonta woodiana, Biology*

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2020,
(Filipiniana Analytics)
NP

0085

Naked-faced Spiderhunter (*Arachnothera clarae*): a Flower Visitor and a Potential Pollinator of the Genus *Aeschynanthus*

Senarillos, Tristan Luap P. , Mansibang, Jay

Current knowledge of flower visitors and pollination of the Philippine lipstick vine species (*Aeschynanthus* cf. *leucothamnus*) has not been properly documented. Here, we report the first photographic evidence of floral visitation by a naked-faced spiderhunter (*Arachnothera clarae*) on *A. cf. leucothamnus* from Burauen, Leyte, Philippines. We also describe the bird's foraging behavior and its potential as a pollinator of the lipstick vine genus *Aeschynanthus*. **(Author's abstract)**

Keywords: *Epiphyte, Lipstick vine, Spiderhunter, Biology*

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NP

0086

Two New Species of *Metapocyrtus* Heller, 1912 (Coleoptera: Pachyrhynchini) from Mount Natampod, Pantaron Range, Bukidnon, Mindanao, Philippines
Yap, Sheryl A. , Coritico, Fulgent P. , Maglangit, Erl Pfian T. , Mohagan, Alma B. , Amoroso, Victor B. , Patano, Jr., Ro

Mindanao is home to many unknown weevil species, specifically those remote and unexplored mountain ecosystems. Two new species, *Metapocyrtus (Metapocyrtus) mendioi* sp. nov. and *M. (M.) edmai* sp. nov. are described from Mount Natampod, Pantaron Range, San Fernando, Bukidnon, Mindanao, Philippines. Habitat, ecology, and threats are provided. Moreover, a distribution map of all known *Metapocyrtus* species in the Philippine archipelago is also provided. **(Author's abstract)**

Keywords: *Distribution, New species, Pantaron Range, Pronotum, Weevils, Biology*

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2022 April,
(Filipiniana Analytics)
NP

0087

Philippine Seven Tropical Maar Lakes are Ideal Habitats for the Invasive *Arctodiaptomus dorsalis* Marsh, 1907 (Copepoda: Calanoida)
Aguilar, Jaydan I. , Mijares, Edna Marie , Tan, John A.B. , Cusi, Sean H.L. , Biag, Irian J.L. , Tordesillas, Dino T. , de Leon, Justine R., Papa, Rey Donn

The presence of the invasive calanoid copepod *Arctodiaptomus dorsalis* in Philippine inland waters has been reported in numerous studies. Attempts to understand how it effectively proliferated in the country's freshwaters have shown its preference towards shallow and productive waters – a feature shared by most lakes in the Philippines. In this study, we compared the body size and reproductive capacity – proxied by clutch size (CS) – of ovigerous female *A. dorsalis* obtained from established populations in the seven maar lakes (SML) of San Pablo, Laguna, Philippines. These measurements were also correlated with selected water quality parameters. Collection of ovigerous *A. dorsalis* and water quality parameters were conducted on a 3-mo sampling period during the southwest monsoon season in 2016. Statistical analysis shows that there exists a significant difference between the prosome length (PL) and CS of *A. dorsalis* from the seven lakes ($p < 0.001$), with the shallowest and most productive lake containing the most fecund population. Additionally, all water quality parameters showed a positive correlation with the PL and CS of ovigerous *A. dorsalis* from the SML ($p < 0.01$). This shows that the SML provides favorable conditions for the propagation of *A. dorsalis*, making it a model for *in situ* investigation of this invasive species' ecology; the first step in incorporating zooplankton ecology as a tool for the development of lake management systems. **(Author's abstract)**

Keywords: *Freshwater zooplankton, Lake management, Morphometrics, Tropical lakes, Biology*

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NP

0088

Physicochemical and Functional Properties of Pectinase-treated Peel Powder from Carabao Mango (*Mangifera indica* cv. Carabao)

Ramirez, Teresita J. , Sapin, Arsenia B. , Alaon, Maria Katrina N., Flores, Floirend

Fruit peel wastes such as from mango can be utilized as an alternative source of dietary fiber and may further be modified to improve specific functional properties. In this study, mango peel powder was treated with pectinase to produce mango peel powder with reduced hydration properties. The resulting pectinase-treated mango peel powder (PMPP) has reduced crude pectin (0.53 g/ 100 g), greater lignin (46.88 g/ 100 g extractive free solid), protein (10.86 g/ 100 g), fat (3.94 g/ 100 g), iron (8.7 mg/ 100 g), calcium (434 mg/ 100 g) and sodium (76.5 mg/ 100 g) compared to the untreated mango peel powder (MPP). Fourier transform infrared (FTIR) analysis showed the presence of new peaks and shifted signals in PMPP but not in MPP – indicative of changes in cellulose, hemicellulose, and lignin composition. PMPP exhibited lower water holding capacity (WHC) (2.20 mL g⁻¹) and swelling capacity (SC) (4.00 mL g⁻¹) and comparable hypoglycemic properties with psyllium and metformin. Phenolic extract from PMPP showed dose-dependent antioxidant activity but weaker free radical scavenging capacity compared to MPP. Results show that pectinase treatment improved the properties of the mango peel powder and could lead to the utilization of PMPP as a food ingredient and as a dietary fiber supplement with functional and health potential. **(Author's abstract)**

Keywords: Dietary fiber, Functional properties, Hypoglycemic, Mango peel, Pectinase, Biology

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0089

Population Dynamics of the Comb Pen Shell *Atrina pectinata* (Linnaeus, 1767) (Mollusca, Bivalvia: Pinnidae) Collected by Diving from Shallow Areas of the Southwest Visayan Sea, Northeastern Panay Island, Philippines

Sanchez, Kris Angeli S. , Lapara, Switzel S. , del Norte-Campos, Ann

With the objective of determining the population dynamics of the comb pen shell (*Atrina pectinata*) (Mollusca, Bivalvia: Pinnidae) collected by divers in the southwest Visayan Sea, length-frequency data recorded between June 2018 and May 2019 were analyzed using the FiSAT software. von Bertalanffy growth parameters for the species were SL = 40.69 cm and K = 0.78 yr⁻¹, corresponding to a growth performance index (φ') of 3.11, which is well within the range of values for other fast-growing tropical bivalves. The estimated mean growth rate of 0.15 ± 0.05 cm d⁻¹ likewise supports a fast growth rate and a short lifespan (< 1 yr) of the population. The recruitment pattern shows one major and minor pulse that coincides with the northeast monsoon and just prior to the southwest monsoon, respectively. Using ELEFAN II, total mortality (Z) of 2.79 yr⁻¹ was estimated. From an averaged M/K value from the related bivalve literature (1.51) multiplied by the species' own K, natural mortality (M) of 1.18 yr⁻¹ was estimated, which when subtracted from the Z, gave fishing mortality (F) of 1.61 yr⁻¹ and an exploitation rate E of 0.58, considered overexploited. Recommended management measures for more sustainable utilization of the species include non-collection of individuals smaller than the cited minimum size at sexual maturity [20 cm shell length (SL)], and a ban on the collection at least during the major spawning season deemed to be, based on the growth rate between October and December each year. Marketing of the non-adductor portion of the viscera, normally just discarded, is also recommended to increase the income of the fishers. **(Author's abstract)**

Keywords: *Atrina pectinata*, Exploitation, Growth, Mortality, Population dynamics, Recruitment, Biology

**Predation on a Parachute Gecko *Gekko* sp. by Long-tailed Macaques *Macaca fascicularis*
(Raffles, 1821) in Mt. Apo Natural Park, Philippines**
Torrefiel, Jay T. , Sabanal, Brian T. , Gamalo, Lief Erik

Long-tailed macaques are omnivores feeding on plants and animal matter. They are known to feed on meat occasionally, and it represents a very small portion of their diet. This paper reports a predation event by long-tailed macaques on a parachute gecko in Mt. Apo Natural Park, Philippines. Two macaques were involved in the predation: a juvenile macaque responsible for catching the gecko and a subadult female macaque that consumed the prey. There is no published comprehensive list of dietary composition of the species in the Philippines, so this report adds to the existing literature on meat-eating behaviors of long-tailed macaques. The most probable explanation for the observed predation in the area is that meat provides micronutrients for the macaques, although further studies are necessary to confirm this. In this paper, we provide evidence of their unrecorded animal-based food resource that is crucial to understanding their feeding behaviors that can be used for their successful management. **(Author's abstract)**

Keywords: Long-tailed macaques, Parachute gecko, Predation, Biology

**Preliminary Study to Obtain Insights on the Proteomic Profile of Filipino Non-Small Cell
Lung Carcinoma (NSCLC)**
*Mira, Ferdinand D. , Luna, Herdee Gloriane C. , Porras, Ben Joshua O. , Zarate, Lorenzo M. , Pondevida,
Venus B. , Dimayacyac-Esleta, Baby Rorielyn T., Prieto, Elois*

NSCLC remains to be the leading cause of cancer incidence and mortality in the Philippines. Early diagnosis, a better understanding of drug resistance mechanisms, and proper treatment monitoring are necessary to lower the incidence and mortality rate of NSCLC. As a proof of concept to investigate the proteomic profile of Filipino NSCLC, this study performed quantitative proteomic analysis to identify aberrant expressions in the tumor tissue relative to the adjacent normal tissue specimen of one Filipino NSCLC patient. A total of 4518 proteins were identified and from this, 1855 proteins were found to be significantly differentially expressed. Functional and pathway analyses were done to the 860 upregulated and downregulated proteins with at least four-fold expression change. The analysis revealed the possible activation of the upregulated protein MUC1, a known oncogenic driver involved in the stimulation of pathways that promote angiogenesis in NSCLC tumors and prevent apoptosis. Signal transducers and activators of transcription (STAT1 and STAT3), also found upregulated in the tumor specimen, are known to interact with MUC1, which results in the expression of proteins for cell proliferation. The analysis also suggests the stabilization of HIF, which may allow cell growth in the hypoxic tumor environment and aid in metabolic adaptation in tumor cells. The results also suggest the activation of EIF2 signaling that may lead to

continuous translation of oncogenic proteins. Our data demonstrate the rich proteomic information that can be obtained from profiling of the NSCLC proteome and applications for a better understanding of NSCLC tumorigenicity. Further study should be performed on a larger cohort of Filipino NSCLC patients to provide the proteomic profile of Filipino NSCLC and extract information for biomarker and drug discovery. Data are available via ProteomeXchange with identifier PXD027710. **(Author's abstract)**

Keywords: *EIF2 signaling, Filipino NSCLC, MUC1, Proteomic profiling, STAT1/3, Biology*

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0092

PREVALENCE, PHENOTYPIC, AND GENOTYPIC ASSESSMENT OF ANTIBIOTIC RESISTANCE, VIRULENCE MARKERS AND MOLECULAR TYPING OF *Staphylococcus epidermidis* STRAINS ISOLATED FROM BOVINE SUBCLINICAL MASTITIC MILK

Bamzadeh, Zahra , Momtaz, Hassan , Talebi, F

Staphylococcus epidermidis is one of the causative agents of bovine mastitis with an emergence of antibiotic resistance and virulence characters. One hundred and three mastitic milk samples were collected and confirmed through the use of the California mastitis test. Samples were cultured and *S. epidermidis* isolates were identified by Loop mediated isothermal amplification (LAMP) method. Molecular typing of *S. epidermidis* isolates was performed using the Multiple-locus variable-number tandem repeat analysis (MLVA). Eighteen out of 103 (17.47%) samples were positive for *S. epidermidis*. *S. epidermidis* isolates exhibited the uppermost prevalence of resistance toward penicillin (100%), tetracycline (83.33%), erythromycin (83.33%), and cefazolin (77.77%). *ClfA* (55.55%), *agrI* (50%), *etA* (33.33%), and *agrIII* (27.77%) were the most routinely identified virulence factors. *TetM* (88.88%), *aacA-D* (83.33%), *tetK* (77.77%), *ermA* (72.22%), *msrA* (55.55%), and *ermC* (55.55%) were the most routinely identified antibiotic resistance genes. A total of five separate loci (*se1* to *se5*) were originated amongst 18 *S. epidermidis* isolates. Seventeen isolates were classified into one similar molecular cluster. The existing survey is an initial report of genetical characteristic of virulence factors and antibiotic resistance markers and MLVA-based typing of *S. epidermidis* bacteria isolated from bovine clinical mastitic milk. Similar genetical profile of *S. epidermidis* bacteria signifies the same sources of infections. The anthropogenic nature of *S. epidermidis* may display that infected milkers were the main source of udder infection. **(Author's abstract)**

Keywords: *Antibiotic resistance properties, Mastitic milk, Molecular typing, Staphylococcus epidermidis, Virulence characters, Biology*

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NP

0093

New Record of *Ophioderma redactophylla* (Ophioglossaceae) in the Philippines and New Insights to its Morphology

Guiang, Maria Melanie M. , Cariño, Yvonne Love L. , Coritico, Fulgent P., Amoroso, Victor

Ophioderma redactophylla is a new fern species record for the Philippines discovered at Mt. Apo in North Cotabato Province, extending its original distribution from the Malay Peninsula (southern Thailand). New insights on its morphology are provided together with its conservation status and a revised dichotomous key to the *Ophioderma* in the Philippines. **(Author's abstract)**

Keywords: *Mindanao, Mt. Apo, Snake tongue fern, Biology*

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NP

0094

Response Surface Methodology Guided Optimization of the Extraction of Natural Phenolics from Mango (*Mangifera indica* Linn) Leaves

Perez, Rodney H. , Gaylon, Arra , Tambalo, Fides Marciana Z. , Alaon, Maria Katrina N. , Sapin, Arse

Despite the popularity of mango in the Philippines and the reported potential of the leaves of foreign mango cultivars as a source of polyphenolic compounds, no study had been undertaken yet investigating the potentials of the Philippine mango leaves. In this study, the extraction of the polyphenolic compounds from the leaves of the Philippine Carabao mango was optimized using the response surface methodology (RSM). The optimum conditions were also applied on the leaves of the mango cultivars “Pico,” “Apple Mango,” “Sinaging,” and “Sipsipin.” The best phenolic leaf extract was encapsulated using maltodextrin via spray drying and its polyphenolic contents and antioxidant properties were also determined. Results show that acetone and ethanol were better at extracting solvents than methanol and the optimum conditions for extraction were 15% solid loading, 60% solvent concentration, and 0.92 h (acetone) and 1.5 h (ethanol) time. Moreover, the phenolic leaf extract from Carabao contained the highest total phenolic content (TPC) while the extract from Sinaging leaves exerted the greatest free radical scavenging capacity among the different cultivars. Furthermore, the encapsulated polyphenolic leaf extract from Carabao mango contained a significant amount of mangiferin and quercetin-3-β-D-glucopyranoside. Its antioxidant capacity was also better in terms of DPPH (2,2-diphenyl-1-picrylhydrazyl) inhibition and copper reduction compared to ascorbic acid. All the results affirm the great potential of leaves from the local mango cultivars Carabao, Pico, Apple Mango, Sinaging, and Sipsipin as a source of antioxidant phenolic compounds for possible commercial application. **(Author's abstract)**

Keywords: *Mango leaves, Optimization, Phenolics, Response surface methodology, Solvent extraction, Biology*

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0095

***Rhipsalis baccifera* (J.S.Muell) Stearn, an Epiphytic Cactus of Bandung City, Indonesia: the Field Examination on the Biological Features and Host Distribution**

Wicaksono, Adhityo , Raihandhany

This study is the first report on the distribution of *Rhipsalis baccifera* (J.S.Muell) Stearn in Bandung, West Java, Indonesia. *R. baccifera* is an epiphyte cactus that generally grows on the vertical substrate of tree barks. The distribution of *R. baccifera* was examined by tagging the tree hosts using a global positioning system (GPS). Additionally, the organs and growth stages of the cactus, as well as the interactions of the cactus with the host plants, were photographed. The results show that *R. baccifera* is distributed unevenly in Bandung, as the population density is higher in the northern area of the city than in the south. This uneven distribution suggests that frugivorous birds and human activities in the area play an important role in the distribution of *R. baccifera*. The cactus has spines during its early stage, which is greatly reduced upon reaching its mature stage. However, within the same region, the cactus appears to selectively grow on specific hosts, mainly on trees with rough barks or grown by moss. In Bandung, the cactus is mostly found growing on mahogany trees (*Swietenia macrophylla* King). Not all trees adjacent to the host trees have the cactus growing on them, which further suggests the cactus' preference for specific host trees. **(Author's abstract)**

Keywords: *Cactaceae, Epiphytic plant, Facultative epiphyte, Symbiosis commensalism, Biology*

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0096

Screening, Characterization, and Isolation of Pigments from Bacteria in Mesophotic Depths of the Benham Bank Seamount, Philippine Rise Region

Nacorda, Hildie Maria E. , Rojas, Saul M. , Fernandez, Kleinberg X. , Rosana, Albert Remus R. , Batbatan, Christopher G., Raymundo, Asuncion K. , Lantican, Nacit

The exploration for pigment-producing bacteria and structurally novel pigment continues to increase, and the marine environment has recently become an attractive research site for these investigations because of its rich yet untapped biodiversity. In this study, 16S rRNA gene sequencing and HPLC (high-performance liquid chromatography) profiling of the microbial pigments produced by marine heterotrophic bacteria were described. Seven phenotypically distinct isolates of marine pigmented heterotrophic bacteria (MPHB) were isolated from near-bottom waters and coral reef sediments at mesophotic depths of the Benham Bank Seamount – namely, isolates BR14, BR61, BR63, BR100, BR101, BR144, and BR146. Four promising isolates were subjected to 16S rRNA gene sequencing and revealed that strains BR61 and BR100 were related to members of the genus *Cytobacillus*, whereas isolates BR144 and BR146 clustered with *Meridianimaribacter flavus* and *Pseudoalteromonas rubra*, respectively. Growth of the seven isolates on three media – natural sea water (NSW) Reasoner's 2A (R2A), marine agar (MA), and tryptic soy agar – revealed variable pigment production and growth yield. MA appeared to be a superior substrate, resulting in darker pigmentation and higher biomass yield. Through a liquid-liquid partitioning approach, isolates BR14 and BR100 produced pigments that were acetone-soluble, whereas isolates BR101, BR144, and BR146 are hexane soluble. Moreover, the BR146 red pigment was proposed to be a mixture of putative prodiginine analogs. The putative prodiginines produced by isolate BR146 can stain fabrics, supporting a proof-of-concept that marine bacteria can be utilized as fabric colorants. The data presented here provided new insights into the utilization of local Philippine marine microbial resources for natural marine pigments with industrial applications. **(Author's abstract)**

Keywords: *Benham Bank Seamount, Marine bioactive compound, Marine pigmented heterotrophic bacteria, Mesophotic, Philippine Rise, Prodiginosin, Biology*

Sequence Analysis of Select Terpene Synthase Genes in Philippine Coffee

Santos, Daisy May C. , Mondragon, Mig

Aroma is one of the factors used to evaluate coffee quality. Aroma profile differences between coffee varieties are dictated by the unique and diverse combination of volatiles, such as terpenes. Several studies have elucidated the phylogenetic relationships of coffee varieties using various DNA markers; however, this is the first study to directly compare the DNA sequences of their terpene synthase (TPS) genes, specifically in Philippine coffee samples. Primers were designed for select TPS genes, and phylogenetic relationships were analyzed through the neighbor-joining (NJ) method. The NJ tree successfully distinguished between the three coffee species: *Coffea arabica*, *C. canephora*, and *C. liberica*. A 10-base-pair (bp) indel in *CofarTPS8* is present in Arabica but absent in the other varieties, while a 14-bp indel in *CofTPS24* was found to be present in Robusta, Liberica, and Excelsa but absent in Arabica. Both indels occur in the intron regions of their respective genes, which may or may not have an indirect effect on the final product. Future studies may look into these particular genes to determine if there are marked differences in their respective products. (Author's abstract)

Keywords: *Coffea*, *Philippine coffee*, *Terpene synthase genes*, *Biology*

Seroprevalence of *Leptospira* and Description of Work-related Practices and Characteristics among Sewer Workers Servicing Selected Cities in the West Zone of Metro Manila, Philippines

Gloriani, Nina G. , Villanueva, Sharon Yvette Angelina M. , Jamora, Ren

Leptospirosis is a major public health problem in many countries, especially in southeast Asia, including the Philippines. It is considered an occupational risk both in rural and urban settings, notably among sewer workers. Rodents, especially rats, are the most important reservoirs of the disease and can continuously shed *Leptospira* through their urine – contaminating their surroundings, including the work environment of sewer workers. Despite the apparent occupational risk, there are limited seroprevalence studies conducted among sewer workers in the country. This study reports the current seroprevalence among sewer workers, as well as the *Leptospira* serovars they are exposed to. Serum samples obtained from 105 sewer workers in the West Zone of Metro Manila were subjected to microscopic agglutination test (MAT). A cut-off titer of 1:100 was used to detect exposure of sewer workers to *Leptospira*. Results showed that five out of 105 sewer workers were seropositive for *Leptospira*-agglutinating antibodies, particularly against serovar Mini. The seropositive sewer workers also reported work-related practices and characteristics that might have consistently exposed them to *Leptospira*-contaminated sewer environments. These practices include wading in combined sewer overflow (CSO), maintenance holes, and septic tanks as a part of

their jobs; getting sewer water splashes in their eyes, nose, or mouth while cleaning at least once or twice a week; and going to work despite having cuts or bruises. **(Author's abstract)**

Keywords: *Leptospira, Leptospirosis, Microscopic agglutination test, Seroprevalence, Sewer workers, Biology*

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NP

0099

Serum Biochemical Profile of Captive-bred Philippine Crocodiles (*Crocodylus mindorensis* Schmidt, 1935) Sub-adults

Freitag, Hendrik , Manalo, Rainier , Torres, Elyssa Marie F. , Asuncion, Marian Samantha M. , Velasquez, Stephanie F. , Ragaza, Jan

The Philippine crocodiles *Crocodylus mindorensis* Schmidt, 1935 are a critically endangered species that necessitate minimally invasive diagnostic tools for their physiological state and health assessment. In the current study, we determined the reference ranges for the serum biochemistry of male and female captive-bred *C. mindorensis* sub-adults. We collected blood samples from the post-occipital venous sinus of six male and seven female captive-bred crocodile sub-adults at the Palawan Wildlife Rescue and Conservation Center and quantified the serum biochemical values for cholesterol, triglycerides, uric acid, glucose, creatinine, aspartate aminotransferase (AST), alanine aminotransferase (ALT), albumin, total protein, and globulin. We defined reference ranges through the central 95% of the concentration values obtained. The uric acid concentrations were significantly different between male and female *C. mindorensis* sub-adults. Uric acid levels were higher ($P = 0.035$) in male sub-adults because of their higher food intake resulting from dominance and aggression during feeding times. Serum biochemical values of *C. mindorensis* exhibited similarities with and variations from other crocodile species. We briefly discussed the differences with other species and the influence of factors such as field and laboratory methodologies, environmental conditions, nutritional status, and size class. **(Author's abstract)**

Keywords: *Captive-bred crocodiles, Critically endangered species, Philippine crocodiles, Serum biochemical profile, Serum uric acid, Sex difference, Biology*

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0100

Single Nucleotide Polymorphisms (SNPs) of *OGG1* (Ser326Cys) and *APE1* (Asp148Glu; – 141T/G) Genes and Breast Cancer Risk in Filipino Women

Ramos, Maria Cristina R. , Sy-Ortin, Teresa T. , Capungcol, Mariel V. , de Guzman, Camille Rose V. , Cu, Jeanne Terese T. , Montemayor, Chrisha R. , Manaog, Jennelie B. , Bathan, Gladys I., Albano, Pia Mari

Base excision repair (BER) pathway involves repair of damaged DNA caused by spontaneous decay of DNA, reactive oxygen species, and ionizing radiation. Polymorphisms of genes involved in the pathway have been

reported to be associated with cancer risk. In this study, the association of BER gene polymorphisms with breast cancer risk in Filipino women was assessed. The polymorphisms studied included X-ray repair cross-complementing group 1 (*XRCC1*, Arg399Gln), 8-oxoguanine DNA glycosylase (*OGG1*, Ser326Cys), and apurinic/apyrimidinic endonuclease 1 (*APE1*, Asp148Glu; –141T/G). A total of 186 participants (93 breast cancer cases and 93 breast cancer-free control) were recruited for the study. The genotyping of samples was performed using polymerase chain reaction with confronting two-pair primers (PCR-CTPP). The association of polymorphisms of BER genes with breast cancer risk and gene-environment interaction was determined using the unconditional logistic regression model. Distributions of *OGG1* and *APE1* genotypes were in Hardy-Weinberg equilibrium (HWE); however, *XRCC1* genotype distribution deviated from HWE and was not further analyzed. The analysis showed that *OGG1* Ser326Cys, *APE1* Asp148Glu, and *APE1* –141T/G had no significant association with breast cancer risk. Also, there is no significant interaction between the three BER gene variants and family history of cancer. Lastly, no significant increased risk was observed when the combined effects of risk alleles of the three BER gene variants were determined. In conclusion, the study suggests that *OGG1* Ser326Cys, *APE1* Asp148Glu, and *APE1* –141T/G are not good indicators of breast cancer risk in Filipino women. **(Author's abstract)**

Keywords: *APE1*, Base excision repair, Breast cancer, *OGG1*, Single nucleotide polymorphism, Biology

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 NP

0101

Spatiotemporal Dynamics of Canine Rabies and the Rabies Control Program in Davao City, Southern Philippines, 2005–2017

Murao, Lyre Anni E. , Alviola, IV, Pedro A. , Eng, Ma. Noreen , Marquez, Gloria , Lagare, Arlene , Montajes, Kenn

Rabies is a neglected tropical disease that continues to be a public health threat despite the government's intention to eliminate it by 2022. Specifically, Davao City has implemented the Intensified Rabies Control Program (IRCP), but animal rabies remains endemic, primarily due to canine transmission. Understanding the dynamics of rabies and its control is critical in formulating strategies to hasten disease eradication. This study utilized hotspot analysis on reported canine rabies cases in Davao City from 2005–2017 to determine the spatiotemporal behavior of the disease pre- and post-IRCP. Around 42% of the barangays have had at least one reported case of canine rabies, most of which were owned dogs (82.0%) and unvaccinated or non-updated vaccination (80.1%). Using the Getis-Ord statistic, five hotspot clusters were detected during pre-IRCP, which was reduced to three new clusters in post-IRCP – all of which were highly populated barangays (> 9,000 residents). The hotspot clusters shifted to neighboring areas with recurrent hotspot barangays located at the junction of this shift, suggesting spillover mediated by the hotspots. The number of rabies cases (mean per barangay of 0.797 pre-IRCP and 0.610 post-IRCP), proportion of affected barangays (33.5% pre-IRCP and 30.2% post-IRCP), and rate of improper vaccination (mean per barangay of 31.8% pre-IRCP and 28.8% post-IRCP) did not significantly decrease post-IRCP, suggesting the need to boost the vaccination program and responsible pet ownership. There was no systematic geographical distribution of rabies control programs, hence prioritizing high-risk areas through hotspot analysis provides an efficient alternative to addressing the problem. **(Author's abstract)**

Keywords: *Hotspot analysis*, Rabies, Rabies control program, Spatiotemporal distribution, Biology

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 (Filipiniana Analytics)
 NP

Structural Analysis of Spike Protein Mutations in the SARS-CoV-2 Theta (P.3) Variant

Mallapre, Owen Tito O. , Bagoyo, Camille Anne S. , Abesamis, Kim Ivan A. , Mirano-Bascos, Denise , Bascos, Neil Andrew D., Saloma, Cynthia

A SARS-CoV-2 lineage designated as Theta (P.3) with 16 signature mutations in the Spike protein region has been reported with cases centered in Region 7 of the Philippines. Whole-genome sequencing revealed that the 33 samples under this lineage all contain the E484K, N501Y, and P681H Spike mutations previously found in the SARS-CoV-2 variants of concern (VOCs): Alpha (B.1.1.7), Beta (B.1.351), and Gamma (P.1). This report focuses on possible implications of the mutations found in the Spike protein based on the analysis of the Theta variant's structure, stability, and molecular surface character. The analyses included investigations using static models and molecular dynamic simulations between the Spike protein receptor-binding domain (RBD) and its interactions with the angiotensin-converting enzyme II (ACE2) receptor. Our results suggest that these mutations could significantly impact the possible interactions of the Spike protein with the ACE2 receptor and neutralizing antibodies, and warrants further clinical investigation. Some of the mutations affecting the N and C terminal domains suggest effects on Spike monomer and trimer stability. This report provides insights on relevant targets for the design of future diagnostics, therapeutics, and vaccines against the evolving SARS-CoV-2 variants within the Philippines. (**Author's abstract**)

Keywords: Modeling, Protein structure, SARS-CoV-2, Spike mutations, Theta (P.3) variant, Biology

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NP

Survival and Growth Performance of Planted *Kandelia candel* (L.) Druce Stand in the Philippines

Pasion, Bonifacio O. , Malabrigo, Jr., Pas

The mangrove species *Kandelia candel* (L.) Druce is distributed in tropical Southeast and East Asia but limited to one locality in the Philippines. Hence, conservation attempt was carried out through plantation in Gimaloto, Sorsogon, the Philippines. We planted 300 *K. candel* seedlings on riverbanks 1 m apart along the tidal distance – or the planting distance from seaward to landward direction from the river's mouth. We monitored seedlings monthly during the first year and then quarterly for 2 yr more for a total of 3 yr. We were interested in determining the survival probability and growth performance of *K. candel* seedlings along the tidal distance (1–300 m distance) and during different monitoring intervals (*i.e.* monthly, quarterly, bi-annual, and annual). Thirty-four (34) seedlings survived by the end of the three-year experiment, where most of the seedlings died during the first year after outplanting. Survival probability and growth increased with tidal distance, indicating that planted *K. candel* seedlings prefer the inland zone of at least 200 m from the sea line in the experimental area. Changes in growth parameters were observed between succeeding monitoring periods conducted during quarterly, bi-annual, and annual monitoring intervals but not during short-term monthly monitoring intervals, indicating growth responses due to seasonal and interannual variability. Our result suggests a possible introduction of *K. candel* outside its native population with consideration of tidal distance. We suggest mangrove rehabilitation and reforestation programs need to first conduct a zonation experiment similar to the method used in this study to identify the ecological distance

where a certain mangrove species can grow better before extensive restoration and rehabilitation programs are implemented. **(Author's abstract)**

Keywords: *Ecological zonation, Endangered species, ex situ, Mortality, Recruitment, Tropical region, Biology*

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0104

Taxonomic and Nomenclatural Notes on Philippine ferns. V. On the identity of *Asplenium lepturus*, *A. militare*, and *A. nigrescens* (Polypodiales, Aspleniaceae)
Salgado, A.

The identity of *Asplenium nigrescens*, *A. lepturus*, and *A. militare* is clarified. Diagnostic characteristics, distribution, and habitat information for each species are provided. *A. nigrescens*, *A. lepturus*, and *A. militare* are distinct species. Key and photos are provided for the identification of the species. The collections by de Vore and Hoover are discussed. **(Author's abstract)**

Keywords: *Endemic, Identification key, Malesia, Nomenclature, Pteridophyte taxonomy, Biology*

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0105

First Taxonomic Records of Epizoic Freshwater Algae on Golden Apple Snails (*Pomacea canaliculata* Lamarck) from Rice Paddies in Laguna (Philippines)
Arguelles, Eldri

In rice paddies where hard substrate is considered as a limiting resource, the hard shell of mollusks can serve as a primary settling space of algal epibionts. The study presents the first taxonomic survey to report and describe epizoic algae in freshwater snail – golden apple snail (GAS) (*Pomacea canaliculata* Lamarck) – found in agricultural areas. A total of 17 microalgal taxa belonging to 12 orders, 16 families, and 17 genera were taxonomically identified and described from the collected samples, all of which are considered new distributional records of microalgae in the Philippines. The study shows Cyanobacteria (six species) as the main group of epizoic microalgae present in shell surfaces of the mollusk, followed by Bacillariophyceae (four species), Chlorophyceae (three species), Zygnematophyceae (two species), Trebouxiophyceae (one species), and Euglenophyceae (one species). Also, the survey reported the occurrence of a photosynthetic euglenoid, *Phacus hamatus* Pochmann, described for the first time in the Philippines. Diagnostic descriptions and taxonomic keys are presented to differentiate the epizoic algal taxa associated with GAS. The survey shows important taxonomic records on the composition and species diversity of epizoic algae from freshwater snails found in terrestrial habitats of the Philippines. **(Author's abstract)**

Keywords: *Biodiversity, Cyanobacteria, Microalgae, Mollusks, Shell, Taxonomy, Biology*

***Tetrastigma leucostaphylum* (Dennst.) Alston ex Mabb. Partial Wedge Sampling, a New,
Less-invasive Solution for Stem-borne *versus* Root-borne *Rafflesia* Identification**
Wicaksono, Adhityo, Mursidawati, Sofi, Teixeira da Silva, Jaim

Tetrastigma (Vitaceae) are a genus of tropical lianas that are hosts for parasitic plants in the family Rafflesiaceae. Since the stem of *Tetrastigma* is creeping and often devoid of leaves, it is often mistakenly visually identified as a root. *Rafflesia* flowers at the ground level (*i.e.* terrestrial flowers) have been documented to grow on *Tetrastigma* roots, but it is unclear whether those that arise aurally emerge from host root or stem organs. In this study, we present a new, less-destructive means of sampling *Tetrastigma leucostaphylum*, which is a host of many *Rafflesia* species. Histological observation of two 250 cm above-ground aerial samples confirmed that both were stems, as shown by distinct anatomical features (compactly arranged vascular bundles with simple phloem bundles) in contrast to roots, which had loosely arranged vascular bundles with ramified phloem bundles. Clearer identification of *Tetrastigma* vine infected with aerial *Rafflesia* is needed to confirm whether the parasitic flower grows on a stem or on an erect aerial root to better understand the biology of this enigmatic *Rafflesia* species that have evaded cultivation and *ex situ* conservation efforts. This new sampling method may be a useful way to identify the *Tetrastigma* vine in the future due to its less invasive nature compared to severing the whole vine. **(Author's abstract)**

Keywords: *Anatomy, Parasitic plant, Plant morphology, Rafflesiaceae, Tetrastigma, Biology*

**On the Life History of *Horaga syrinx* (Lepidoptera:Lycaenidae) from Bohol Island,
Philippines**
Badon, Jade Aster T., Burlace,

Some notes on the immature stages of the yellow onyx or Ambon onyx butterfly *Horaga syrinx* are described and illustrated from specimens documented in Bilar, Bohol, Philippines. **(Author's abstract)**

Keywords: *Bohol, Philippines, Horaga, Immature, Syrinx, Biology*

Virulence-associated Gene Profile and Multilocus Sequence Type Analysis of Human and Fomite-derived Methicillin-resistant *Staphylococcus aureus*

Penuliar, Gil M. , Calicaran, John R

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a major cause of healthcare-associated (HA) and community-acquired (CA) infections. In the Philippines, isolation of MRSA has been reported from human and fomite sources, but very few studies have examined the relationship between the profiles of their virulence-associated genes (VAG) and multilocus sequence types (MLST), which is important to establish so that effective prevention strategies can be designed and implemented. In this study, 20 MRSA isolates from human and fomite sources were analyzed to determine possible associations between their VAG profiles and sequence types (ST). Results show that the *hla* and *hld* genes that code for hemolysins had prevalence levels of 95 and 100%, respectively. The *pvl* gene coding for Panton-Valentine leucocidin (PVL) had a prevalence of 30%, which puts into question its utility as a marker of CA-MRSA. MLST revealed six new ST that belonged to six clonal complexes (CC), which included three new singletons that are being reported for the first time. No significant association was observed between the VAG profiles and ST, primarily because of the high prevalence rate of the VAG analyzed in the study. **(Author's abstract)**

Keywords: Methicillin-resistant *Staphylococcus aureus*, MLST, VAG, Biology

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NP

CHEMISTRY

Antibacterial Activity of Bacteriocin from *Pediococcus pentosaceus* Strain 2397 and Application as Biopreservative for Fishballs

Ismadiah, Ghina , Fauzi, Diky Arma , Fitriani, Shanti , Yusuf, Yusmarini , Pato, Usman, Hidayah, Sabiliani, Miftahul , W

Meatballs are one of the most popular processed meats in various countries. The meats commonly used to make meatballs are beef, chicken, and fish. The purposes of this study were to evaluate the nitrogen, carbon, and Tween sources on the growth and antimicrobial activity of bacteriocin of *P. pentosaceus* strain 2397 and to assess the quality of fish balls preserved with bacteriocin from *P. pentosaceus* strain 2397 during initial storage at freezing temperature in -18°C . The experimental design used in this study was a factorial, completely randomized design. There were two factors, *i.e.* bacteriocin concentrations (0, 0.15, 0.30, 0.45, and 0.60%) and storage time (0, 3, 6, and 9 d). Data obtained were statistically analyzed using analysis of variance (ANOVA) and continued with Duncan multiple range test (DMRT) at 5% level. Meanwhile, data on microbiological counts were tabulated and analyzed descriptively. The data showed that the addition of various nitrogen, carbon, or Tween sources did not significantly ($p > 0.05$) affect the growth of *P. pentosaceus* strain 2397. The addition of peptone, beef extract or ammonium sulfate, lactose, or Tween 80 into the de Man, Rogosa, and Sharpe broth (MRSB) significantly ($p < 0.05$) increased the bacteriocin antimicrobial activity of strain 2397 against *E. coli*. Using 0.60% bacteriocin produced fish balls according to the quality standard of fish balls and maintained the quality of fish balls during initial storage for 9 d at freezing temperatures. **(Author's abstract)**

Keywords: Antimicrobial activity, Bacteriocin, Fish balls, Frozen temperature, Natural biopreservative, *Pediococcus pentosaceus*, Chemistry

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NP

0110

Antibacterial Activity of Zinc Oxide Nanoparticles Using Banana Peel Extract against Antibiotic-Resistant Bacteria

Melencion, Merced G. , Gutierrez, Winson M. , Melencion, And

Synthesis of zinc oxide nanoparticles on their antimicrobial activity utilizing banana peelings could be a potential candidate to develop nano-formulated natural products as an alternative, efficient, inexpensive, and environmentally safe method with specified properties. The study aimed to investigate the biological synthesis, characterization, and antimicrobial study of zinc oxide nanoparticles (ZnONps) against clinical pathogens *Pseudomonas aeruginosa* and *Staphylococcus aureus* using *Musa acuminata* × *balbisiana* peelings. Data revealed that varying concentration, temperature, and pH level can significantly influence the antimicrobial activity and plays crucial steps in the preparation of ZnONps. Research on nanoparticles as antibacterial agents can have an essential application in the food industry as antibacterial agents in food packaging and towards foodborne pathogens. Since this study deals with the preliminary investigation on banana peelings locally grown in the Philippines as capping and reducing agent through green chemistry, it can promote potential application in the Philippine food industry. By proper incorporation of nanoparticles into packaging materials it may inhibit or cause foodborne pathogens bacterial death.
(Author's abstract)

Keywords: Antimicrobial, Nanoparticles, *Musa acuminata x balbisiana*, Chemistry

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NP

0111

Antituberculosis and Antiproliferative Activities of the Extracts and Tetrahydrobisbenzylisoquinoline Alkaloids from *Phaeanthus ophthalmicus*: In Vitro and In Silico Investigations

Macabeo,, Allan Patrick G. , Quimque, Mark Tristan J. , Bautista, Timothy John L. , Dahse, Hans-Martin , MuA±oz, John Emmanuel R. , Manzano, Joe Anthony H. , Malaluan, Iv

Tuberculosis (TB) and cancer are among the maladies with high morbidity and mortality rates to date. This prompted the utilization of natural products in the discovery and development of new anti-TB and anticancer derivatives. In this study, we explored the antitubercular and antiproliferative activities of extracts and tetrahydrobisbenzylisoquinoline alkaloids tetrandrine (1) and limacusine (2) from the Philippine medicinal plant *Phaeanthus ophthalmicus*. Antitubercular evaluation using colorimetric MABA (microplate Alamar blue assay) assays revealed antitubercular activities of the extracts and fractions [minimum inhibitory concentration (MIC) =

15.6 to < 64 µg/mL]. Among the two isolated alkaloids, limacusine (2) exhibited inhibitory activity against *Mycobacterium tuberculosis* (MIC = 42.6 µg/ml). In addition, CellTiter-Blue cell viability assay showed antiproliferative activity for limacusine (2) against K-562. Both tetrahydrobisbenzylisoquinoline alkaloids exhibited cytotoxicity on HeLa cells. To probe the binding mechanisms of 1 and 2 against putative protein targets, molecular docking simulations were carried out. Limacusine (2) showed high binding propensities to mycobacterial enzymes ATP-dependent murE ligase and enoyl acyl carrier protein reductase, thus illustrating possibilities of cell wall and mycolic biosynthesis inhibitory mechanisms, respectively. High binding affinity was also observed in 2 vs. FLT3, a protein target implicated in myeloid leukemia cell proliferation. Additionally, the limacusine-InhA and limacusine-FLT3 complexes were found to be dynamically stable as per molecular dynamics (MD) simulations. The results of *in vitro* experiments and molecular docking studies suggest tetrahydrobisbenzylisoquinoline alkaloids from *P. ophthalmicus*, especially limacusine (2), as promising natural products against TB and myeloid leukemia. **(Author's abstract)**

Keywords: *Antiproliferative, Antitubercular, Molecular docking, Phaeanthus ophthalmicus, Tetrahydrobisbenzylisoquinoline alkaloids, Chemistry*

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0112

Biochemical Properties of Coconut (*Cocos nucifera* L.) Lipase

â€™Ardhuha, Jannatin, Basri, Nurul H., Suhendra, Dedy, Aini, Roâ€™Myal, Gunawan, Erin R., Sirodjudin, Sirodjudin, Savalas, Lalu Rudyat T., Ningsih, Baiq Nil

Ubiquitous in nature, lipases represent an example of enzymes with high versatility. Plant seeds are potential sources of lipase, and they are attracting more attention for specific purposes. In this study, coconut lipase was isolated from germinating coconut seed. Biochemical characterization of coconut lipase was undertaken to reveal its substrate specificity and its subunits properties. By using various chromogenic ester of fatty acids, it was demonstrated that lauric acid is the most preferred substrate for coconut lipase esterase reaction. Calcium ions enhance its activity, whereas other metal ions such as magnesium, nickel, sodium, and potassium reduce it. Electrophoresis under native conditions showed that coconut lipase is a single protein. Since electrophoresis under denaturing conditions revealed four subunits, coconut lipase is likely a complex enzyme. It was further revealed that all subunits are active, as evident in an in-gel hydrolysis assay. However, they also hint that they do not have an equal catalytic rate against the 16-carbon-length palmitate derivative. This finding, thus, opens up a notion that those subunits have different substrates specificity yet to be determined. **(Author's abstract)**

Keywords: *Coconut lipase, in-gel assay, Lipase subunits, Native electrophoresis, Substrate specificity, Chemistry*

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 (Filipiniana Analytics)
 NP

0113

Bioefficacy of Organic Acids against *Colletotrichum gloeosporioides* (Penz.) Penz. and Sacc., Causal Organism of Mango (*Mangifera indica* L. cv. “Carabao”) Anthracnose
Sabularse, Veronica C. , Hernandez, Hidelisa P. , Yanos, Rhea M., Dalisay, Teresit

Anthracnose caused by *Colletotrichum gloeosporioides* (Penz.) Penz. and Sacc. is considered as the most serious and the most important field and postharvest disease of mango fruits. In this study, the bioefficacy of some organic acids against the pathogen isolated from mango is reported. Formic acid, acetic acid, benzoic acid (BA), salicylic acid (SA), *p*-hydroxybenzoic acid (*p*-HBA), and *m*-hydroxybenzoic acid (*m*-HBA) showed activity against *C. gloeosporioides*. The minimum inhibitory concentration (MIC) of the organic acids was 40 mM for acetic acid and formic acid, and 70 mM for BA, SA, *m*-HBA, and *p*-HBA. The minimum fungicidal concentration (MFC) was found to be the same as the MIC. The acids showed a significant inhibitory effect on conidial germination over the 72-h incubation period. Azoxystrobin (Amistar®), at its recommended dosage, delayed the onset of germination but its effect eventually diminished after 24 h. The results of this study indicate that organic acids can be used as an alternative control strategy for mango anthracnose and these acids were more effective than Amistar® when applied at the MIC. These organic acids are also safer and generally regarded as safe (GRAS) compounds. **(Author's abstract)**

Keywords: Bioefficacy, *Colletotrichum gloeosporioides*, Conidial germination, Mango anthracnose, Organic acids, Chemistry

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NP

0114

Biological Activity and Chemical Profiling of Terrestrial and Freshwater Cyanobacteria from the Philippines

Salvador-Reyes, Lilibeth A. , Ochoa, Michelle Marie T. , Susana, Shalice R. , Batucan, Jerem

A total of 23 cyanobacteria cultures were extracted and sequentially solvent partitioned with hexane, *n*-butanol (*n*-BuOH), and water. The *n*-BuOH extracts were tested for antiproliferative effects against HCT116 human colorectal adenocarcinoma cells, anti-inflammatory activity on lipopolysaccharide (LPS)-stimulated RAW 264.7 murine macrophage cells, and antimalarial activity vs. *Plasmodium falciparum* W2. Eleven (11) and two extracts showed antiproliferative and anti-inflammatory activity, respectively. None of the extracts were antimalarial. Bioactivity-guided purification of the *n*-BuOH extracts from *Hapalosiphon welwitschii* Cy 51 and *Oscillatoria obscura* Cy 13 yielded seven antiproliferative indole alkaloids. This work highlights the potential of terrestrial and freshwater cyanobacteria from the Philippines as a source of bioactive and structurally diverse natural products. **(Author's abstract)**

Keywords: Anti-inflammatory, Antiproliferative, Cyanobacteria, Indole alkaloids, Natural products, Chemistry

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0115

Cholinesterase Inhibitory Activities and *In Silico* Docking Studies of Blumeatin Isolated from *Blumea balsamifera* L. DC.

Amor, Evangeline C. , Acero, Rosemarie Ello

Cholinesterase inhibition provides symptomatic treatment for neurodegenerative diseases such as Alzheimer's disease. Commercially available drugs on the market mostly target acetylcholinesterase. However, evidence suggests that selective inhibition of butyrylcholinesterase may lead to greater efficacy with fewer side effects and slower disease progression. The aim of this research was to isolate a butyrylcholinesterase-selective inhibitor from *Blumea balsamifera* L. DC. *In vitro* cholinesterase assays were used to evaluate the inhibitory activity and mechanism of action of blumeatin. Molecular docking studies were performed to support the BuChE-selectivity of blumeatin. Blumeatin inhibited BuChE in a concentration-dependent manner, with an IC_{50} of $136.3 \pm 12.6 \mu M$ and a selectivity ratio of 1.395 for BuChE over AChE. Additionally, the K_i of blumeatin is 10 times lower in BuChE compared to AChE. Molecular docking studies confirmed the selectivity, as revealed by the tighter hydrogen bonding of blumeatin with the BuChE's active site. Blumeatin acts as a competitive inhibitor and a noncompetitive inhibitor of BuChE and AChE, respectively. With these results, blumeatin could be a potential lead as a drug treatment for AD because of its butyrylcholinesterase selectivity. **(Author's abstract)**

Keywords: *Alzheimer's disease, Butyrylcholinesterase- selective, Flavanone, Molecular docking, Chemistry*

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(Filipiniana Analytics)
NP

0116

Detection of Copper, Cadmium, Manganese, Lead, and Zinc Content in Milled Rice Using Microwave Plasma Atomic Emission Spectroscopy

Lamorena, Rheo B. , Ramos, Neri

This study validated a new method that is not only rapid and cost-effective but also accurate and reliable in the detection of trace metals in rice. The microwave plasma atomic emission spectroscopy (MP-AES) method of tracing elements in rice was validated to quantitatively measure the copper (Cu), manganese (Mn), zinc (Zn), cadmium (Cd), and lead (Pb). Validation that involved precision, accuracy, linearity and dynamic working range, standard addition for matrix effects, limit of detection (LOD), and limit of quantitation (LOQ) showed that the MP-AES method was comparable with flame atomic absorption spectroscopy (FAAS) data. The agreement between experimental values from MP-AES and the reference values of CRM 804 gave a very good means of the accuracy of the MP-AES method. The LOQ values achieved were low enough and suitable for detecting trace metals at low levels found in the samples. Thus, the proposed MP-AES method in this work is found to be precise, accurate, sensitive, and reliable. The validated method was applied successfully to rice samples collected from different areas. The MP-AES measurement results showed that trace metals such as Cu, Mn, and Zn were present in 20 rice samples collected from selected provinces of Central Luzon. Therefore, the MP-AES method can be a practical alternative technique to the established method. **(Author's abstract)**

Keywords: *Method validation, Microwave plasma atomic emission spectroscopy, Milled rice, Multi-elemental measurements, Trace metals, Chemistry*

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2021 August,
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NP

Effect of Environmental Factors on the Degradation of Organic Dyes by Electro-Fenton Using Carbon Felt Cathode

Hoa, Nguyen Thi , Duong, Le Thuy , Dung, Nguyen Trung, Huy, Nguyen

In this study, an electro-Fenton (EF) process using carbon felt (CF) as the cathode and titanium/platinum (Ti/Pt) as the anode was tested for removing rhodamine B (RhB) and other organic dyes in water. Characterization of the CF material was conducted by scanning electron microscopy (SEM) and X-ray powder diffraction (XRD). The influence of various environmental factors (*i.e.* solution pH, current density, catalyst dosage, RhB concentration, and type of dyes and electrolytes) on the dye removal was investigated. The results show that the maximum removal efficiency of RhB was 98% within 15 min at the optimal conditions of 50 mgRhB/L, 0.05 M Na₂SO₄, pH 3, 0.1 mM Fe²⁺, and 6.67 mA/cm². The decomposition of RhB follows a pseudo-first-order model with the decomposition rate constant of 0.256 min⁻¹. Radical quenching experiments show that superoxide plays a key role in RhB degradation. Finally, results show that CF has high stability and degradation efficiency, which is suitable as a cathode for the removal of organic dyes in wastewater. **(Author's abstract)**

Keywords: *Advanced oxidation process, Carbon felt, Electro-Fenton process, Organic dyes, Wastewater treatment, Chemistry*

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NP

Effect of Modified Cassava Starch in Reduced-fat Mayonnaise by Correlating Emulsion Stability with Anti-oxidation Reaction Using Gas Chromatography–Mass Spectrometry (GC-MS)

Carandang, Maricar B. , Parreño, Jr., Rona

Modified starches are essential firming additives in many food processes as they act as emulsion stabilizers. Presently, they are produced mostly from corn and potatoes, but cassava is a good alternative source to augment the rising global demand for starch. In this work, cassava starch from a native variety called *Manihot esculenta* Crantz, modified by facile heat-moisture treatment (HMT) method was used in reduced-fat mayonnaise to retain product consistency and texture but, more importantly, to contribute to the stabilizing effect of emulsions. Varying amounts of modified cassava starch in mayonnaise formulation were evaluated to correlate emulsion stability with a reduction in the amount of oil and the presence of anti-oxidation compounds that slow down chemical processes. The anti-oxidation process resulting from starch composition in the emulsion was measured by an analytical method using the combined gas chromatography and mass spectrometry (GC-MS). 2² complete factorial experiments were conducted in determining the significant effects and interactions between the amount of modified starch and oil. Correlations of these two factors with resulting stability as response variables were analyzed. Two-way ANOVA showed significant relationships in emulsion stability as directly proportional to the amount of oil in the emulsion as well as the modified starch. The results confirmed that individual factors both influenced the slowing down of emulsion breakdown of mayonnaise. However, it also revealed that modified starch had a greater influence on the concentration of acetic acid as an antioxidant than the effect of oil on the emulsion stability. Thus, this study confirmed that increasing the amount of modified cassava starch correlates to a significant occurrence of anti-oxidation reaction in reduced-fat mayonnaise. The combination of 0.60 wt% modified starch with 50 wt % oil achieved a higher stabilizing effect on emulsions as compared to other combinations. The results proved that

predictive analysis of the capacity to prevent the auto-oxidation process is one way of predicting the long-term stability of the mayonnaise after 24 h. **(Author's abstract)**

Keywords: *Anti-oxidation, Cassava, Emulsion stability, Gas chromatography, Mayonnaise, Modified starch, Chemistry*

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0119

Effects of Drying Temperature on the Amount of Secondary Metabolites and Antioxidant Activity of *Orthosiphon aristatus* (Blume) Miq. Tea Extracts

Tsutsumi, Shuhei , Ueda, Yuto , Satiemperakul, Sakchai , Taokaenchan, Narin, Yasuda,

Orthosiphon aristatus (Blume) Miq. tea is a traditional herbal tea in Thailand. This herb is used to prevent and treat a wide range of diseases such as diuresis, hypertension, and diabetes. In this study, three different drying temperatures used for herbal tea processing were evaluated (40, 50, and 60 °C) for their secondary metabolites [total phenolic content (TPC), caffeic acid (CA), rosmarinic acid (RA), and total flavonoid content (TFC)] and antioxidant activity. The herbal tea processed at 40 °C showed significantly ($P < 0.05$) higher TPC [485.26 ± 49.43 mg gallic acid equivalent (GAE)/ 100 g], CA (202.17 ± 1.00 mg/kg), RA (469.99 ± 1.56 mg/kg), TFC [356.86 ± 41.81 mg catechin equivalent (CE)/ 100 g], and 2,2-diphenylpicrylhydrazyl (DPPH) radical scavenging activity than those at other drying temperatures. Therefore, a drying temperature of 40 °C was the optimum condition for the *Orthosiphon aristatus* (Blume) Miq. leaves because it retained the secondary metabolite content with strong antioxidant potential. **(Author's abstract)**

Keywords: *Caffeic acid, DPPH radical scavenging activity, Rosmarinic acid, Total flavonoid content, Total phenolic content, Chemistry*

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(Filipiniana Analytics)
NP

0120

Fabrication and Characterization of Electrospun Copper Oxide-Cellulose Acetate Microfiber Composite

Arocena, Rhebner E. , Migo, Veronica P. , Grande, Jeanette O. , Herrera, Jokervin A., Manalo, Ronnie

Antimicrobial textiles are indispensable in medical applications. Improving these textiles through the use of fiber composites in their production can further advance its applications. Electrospinning is one of the most practical and efficient methods of producing fiber composites. This research dealt with the fabrication and characterization of electrospun copper oxide-cellulose acetate (CuO/CA) microfiber composite. CuO loading, electrospinning applied voltage, and flow rate were varied following a central composite design (CCD). Their effects on the antibacterial activity and morphology of the microfiber composites were determined. The presence of the functional groups of

CuO in the FTIR (Fourier transform infrared) spectrum of the composite proved the embedment of CuO in the microfiber. The fiber composite inhibited the growth of *Staphylococcus aureus*, but no antibacterial activity was observed against *Escherichia coli*. Statistical analysis showed that only the CuO loading has a significant effect on the antibacterial activity against *S. aureus* while applied voltage and flow rate have insignificant effects. Antibacterial activity has a direct relationship with CuO loading. The increase in CuO concentration increased the fiber diameter and reduced bead formation. Fiber diameter decreases and bead formation increases at increasing applied voltage. Increasing the flow rate increases bead formation and decreases fiber diameter. **(Author's abstract)**

Keywords: Antibacterial, Bead formation, *E. coli*, Fiber diameter, Metal oxides, *S. aureus*, Chemistry

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NP

0121

Grass/Soil Concentration Ratios (CRs) of Natural ^{226}Ra , ^{232}Th , and ^{40}K in *Vetiveria zizanioides* (Vetiver Grass) in Thailand
Saenboonruang, Kiadtisak, Mungpayaban, Harinate, Chantarot, Chitt

This work investigated the grass/soil concentration ratios (CRs) of natural radionuclides (^{226}Ra , ^{232}Th , and ^{40}K) in vetiver grass collected from three different regions of Thailand using an HPGe (high-purity germanium) gamma spectrometer. The sampled grass blades were divided into three equal parts to investigate the dependence of grass/soil CRs on the positions of grass blades. The results showed that ^{40}K had the highest grass/soil CRs due to being an essential nutrient for most plants, with ranges of 1.12–7.92, in comparison with ^{226}Ra and ^{232}Th that had ranges of 0.32–1.48 and 0.20–1.31, respectively. In addition, the results indicated that the natural radionuclides investigated were uniformly transferred and accumulated throughout grass blades ($p < 0.05$), which implied the independence of CRs on the section of the leaf. Furthermore, it was found that the soil samples collected from the central region of Thailand had the highest activity concentrations in all radionuclides, mainly due to a primary composition of dark clay, leading to the highest contents of potassium and calcium (Total K and Total Ca, respectively), and the highest cation exchange capacity (CEC) that led to high concentrations of nutrients and radionuclides. Based on the results from this work, the vetiver grass presented potentials to be utilized as radionuclide absorbers in polluted soil and water due to its high CRs in comparison with other reported plants. **(Author's abstract)**

Keywords: Activity concentration, Concentration ratios, Gamma spectroscopy, Natural radionuclides, Vetiver, Chemistry

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(Filipiniana Analytics)
NP

0122

Immobilization of Phycocyanin in a Rice Hull Nanosilica/Calcium-Alginate Bead System for Cadmium Ion Remediation
Lacsamana, Marivic S., Peralta, Milagros M., Sabulase, Veronica C., Sinad, Korina V

Phycocyanin (PC), the major phycobiliprotein found in the cyanobacterium *Spirulina platensis*, was explored as a biosorbent for cadmium removal in contaminated water. It was isolated from commercially available Spirulina tablets using 0.1 M phosphate buffer with 0.15 M NaCl (pH 7) and was purified using two-stage ammonium sulfate precipitation followed by gel filtration chromatography using Sephadex G-75. The water-soluble pigment protein thus obtained could not be directly used as a biosorbent and was subsequently immobilized on rice hull nanosilica using 3-aminopropyltriethoxysilane (APTES) and glutaraldehyde as linkers resulting in a blue-green powder composite material (SAGPC). Optimum immobilization of PC on rice hull nanosilica was achieved by using 5% v/v APTES, 1.5% v/v glutaraldehyde, and 6 mg/mL PC solution. The immobilized PC was then prepared in the form of calcium-alginate beads (SAGPC-Alg beads) to allow easy separation from effluents. The Cd adsorption efficiency ($99.80 \pm 0.20\%$) and adsorption capacity (19.72 ± 0.38 mg/g) of SAGPC-Alg beads were determined through batch sorption experiments at room temperature using the optimum working conditions at pH 7, 0.1 g wet beads, 0.5 ppm initial Cd concentration, and 60-min shaking time. (Author's abstract)

Keywords: Cadmium ion remediation, Calcium-alginate beads, Immobilization, Phycocyanin, Rice hull nanosilica, *Spirulina*, Chemistry

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NP

0123

***In Silico* Evaluation of Antidiabetic Activity and ADMET Prediction of Compounds from *Musa acuminata* Colla Peel Solidum, Judilynn N. , Bucao, Xenia El**

Diabetes is a severe chronic disease that affects 422 million adults worldwide in 2014. It was the fifth leading cause of mortality in the Philippines in 2019. The primary cause of death of diabetic patients is due to cardiovascular disease. α -Glucosidase inhibitors (AGIs) are known for their cardiovascular benefits because they prevent the postprandial glucose level from increasing, which plays a significant role in the development of cardiovascular diseases. The synthesis of AGIs is complex and requires a lot of steps. Thus, there is a need to explore and discover AGIs especially from plants, which are known sources of bioactive compounds. Drug discovery entails a complex, costly, time-consuming, and risky process. Computer-aided drug discovery/design (CADD) methods such as molecular docking and ADMET (absorption, distribution, metabolism, excretion, and toxicity) prediction have been developed to identify the promising compounds that will be tested in *in vitro* and *in vivo* experiments. This shortens the research process and helps reduce the expense and risk of failure for drug discovery. In this study, molecular docking was conducted to predict the α -glucosidase inhibitory activity of compounds from *Musa acuminata* Colla peel against human intestinal α -glucosidase. Out of 87 compounds, only 11 compounds were found to have better or comparable binding affinity with the standard, acarbose (-8.8 kcal/mol) – namely, sesamin (-9.8 kcal/mol), asarinin (-9.7 kcal/mol), quercetin-7-rutinoside (-9.4 kcal/mol), kaempferol-3-rutinoside (-9.4 kcal/mol), (-)-epicatechin (-9.0 kcal/mol), (+)-catechin (-8.9 kcal/mol), myricetin-3-rutinoside (-8.9 kcal/mol), quercetin (-8.9 kcal/mol), kaempferol-3-rhamnoside-7-glucoside (-8.9 kcal/mol), stigmasterol (-8.9 kcal/mol), and β -sitosterol (-8.8 Kcal/mol). The prediction of ADMET properties and drug-likeness revealed how the best binding compounds may behave inside the body. Some of the compounds were found to be safe and have good absorption, distribution, metabolism, and excretion properties. They showed promising potentials that may lead to their development as drugs. (Author's abstract)

Keywords: #945-glucosidase, ADMET prediction, Diabetes, Molecular docking, *Musa acuminata* Colla peel, Chemistry

***In Silico Triple Targeting of SARS-CoV-2 3CL^{pro}, PL^{pro}, and RdRp by Philippine
Antitubercular Natural Products Libraries***

***Neri, Gabriel Luis L. , Agbay, Jay Carl M. , Sales, Cale Twaine C. , Magsipoc, Ryan Joseph Y. , Hernandez,
Jenina Beatriz E. , de la Cruz, Olivia Casandra E. , Ching, James Kyle Anthony R. , Bernardo, Lorie Jean M. ,
Arturo, Hans Christian P. , Africa, Jeremiah Gabriel G., Quimque, Mark Tristan J. , Macabeo, Allan Patric***

The global pandemic disease COVID-19 commands a number of host immunological responses to deadly cytokine-storm manifestations. Mitigation of incoming infectious comorbidities ushered by immunosuppression such as tuberculosis (TB) is warranted including the requirement of new drugs. Employment of computational screening methods and intricate selection of putative viral protein targets allows identification of lead mitigating compounds against COVID-19. Antitubercular natural products may offer privileged starting points as potential antagonistic prospects for SARS-CoV-2 non-structural proteins implicated in viral replication and infection mechanisms. In this study, antitubercular natural products from Philippine medicinal plants are repurposed as inhibitors of vital SARS-CoV-2 nsps such as 3CL^{pro} (3-chymotrypsin-like protease), PL^{pro} (papain-like protease), and RdRp (RNA-dependent RNA polymerase) using *in silico* methods. A total of 67 antitubercular compounds were computationally screened using molecular docking in 3CL^{pro}, PL^{pro}, and RdRp followed by subsequent ADMET (absorption, distribution, metabolism, excretion, and toxicity) analysis of top-binding compounds to assess their drug-likeness and pharmacokinetic properties. Based on the results of our molecular docking analysis, 10 antitubercular natural product cocktails exhibited strong binding propensities against 3CL^{pro}, PL^{pro}, and RdRp. Several compounds demonstrated multi-targeting inhibition to at least two vital non-structural proteins (nsps). Vobtusine lactone (1), deoxyvobtusine lactone (6), and deoxyvobtusine (7) exhibited superior target-specific binding while globospiramine (3) was found to be a potential multi-targeting alkaloid with amenable drug-like properties. The study elaborated for the first time, the computational screening of antitubercular compounds against three vital targets of SARS-CoV-2 yielding potential drug-like compounds against COVID-19 infection. A combination of excellent binding scores, dynamic stability, drug-likeness, and pharmacokinetic properties identified vobtusine lactone (1), deoxyvobtusine lactone (6), deoxyvobtusine (7), and the triple targeting globospiramine (3) as promising leads representing new anti-SARS-CoV-2 scaffolds. **(Author's abstract)**

Keywords: Antitubercular natural products, Bisindole alkaloid, Molecular docking, SARS-CoV-2, Chemistry

Inhibitory Activity of Propolis from Philippine Stingless Bees (*Tetragonula biroi* Friese) against Select Microorganisms

Cervancia, Cleofas R. , Fajardo, Jr., Alejandro C. , Montecillo, Andrew D. , Sabino, Noel G. , Sanchez, Nicole Angelique L., Jamora, Renar

The antimicrobial activity of the ethanol extract of propolis (EEP) from the stingless bee, *Tetragonula biroi* Friese, was screened for activity against *Escherichia coli*, *Pseudomonas aeruginosa*, *Bacillus cereus*, *Candida krusei*, *Staphylococcus aureus*, and *Penicillium chrysogenum* using the disk diffusion method and agar-well assay. The highest inhibitory activities of EEP was observed at 30% (w/v) against *Bacillus cereus* (12.78 ± 1.92 mm), followed by *Staphylococcus aureus* (10.22 ± 0.83 mm), *Penicillium chrysogenum* (13.33 ± 2.40 mm), and *Candida krusei* (6.00 ± 0.00 mm) compared to the other concentrations – 10% (v/v) and 20% (v/v) of EEP. The antimicrobial activity of 30% w/v EEP against *P. chrysogenum* and *C. krusei* was comparable to mycostatin at 13.67 ± 0.58 and 6.33 ± 0.58 mm, respectively. The EEP was found to have no effect on *Escherichia coli* and *Pseudomonas aeruginosa*. Considered as a natural product, propolis has the potential to be a substitute for synthetic antimicrobial compounds commonly used in commercial products such as soaps. **(Author's abstract)**

Keywords: Antimicrobial activity, Bees, Bee products, EEP, Propolis, Chemistry

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(Filipiniana Analytics)
NP

Molecular Docking and Dynamics Simulations Study of Selected Phytoconstituents of “Pangi” (*Pangium edule* Reinw) Leaf as Anti-SARS-CoV-2

Tallei, Trina Ekawati , Celik, Ismail , Lombogia, Lady Theresia , Tumilaar, Sefren Geiner , Sailah,

Herbal plants are often used as alternative medicine because they contain active compounds for the treatment of diseases and disorders with minimal side effects, and are easily obtained from the surrounding environment. Some of them have antiviral activity. This study aimed to analyze the potential of phytochemical compounds in the leaf of “pangi” (*Pangium edule* Reinw) as anti-SARS-CoV-2 using molecular docking study. The drug- and lead-likeness properties of the selected compounds were obtained from the Swiss ADME and admetSAR online server tools. Molecular dynamics (MD) simulation of the selected ligand was carried out to validate the stability of the interaction. The results suggested that pangi leaves contain three compounds with remarkable binding affinities with Mpro (main protease) and RBD (receptor binding domain) were (5.beta.)pregnane-3,20.beta.-diol, 14.alpha.,18.alpha.-[4-methyl-3-oxo-(1-oxa-4-azabutane-1,4-diyl)]-, diacetate (PD), ethyl cholate (EC), and bis(3,5,5-trimethylhexyl) phthalate. Because EC will be metabolized in the body into cholic acid (Cho), this compound was then docked and validated using MD simulation. The compound has the best free binding energy (ΔG) with SARS-CoV-2 (-7.1 kcal/mol with Mpro and -6.0 kcal/mol with RBD). Moreover, the compound is bound strongly to the active cavity of Mpro on Thr24, Thr26, His41, and Cys145 residues. The MM-GBSA calculation showed that the interaction of Cho with Mpro was higher than with RBD. According to the RMSD (root mean square deviation), RMSF (root mean square fluctuation), the radius of gyration (Rg), and intermolecular hydrogen bond (H-bond) analysis obtained from 50 ns MD simulations, Cho formed stable interactions with M^{pro} and RBD. The finding of this study indicated that Cho showed good anti-SARS-CoV-2 activity. The potential of the compound to inhibit the virus can serve as a starting point in the process of developing COVID-19 therapeutic natural medicine. **(Author's abstract)**

Keywords: *Cholic acid, COVID-19, Main protease, MM-GBSA, Pangium edule, Receptor-binding domain, Chemistry*

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NP

0127

One-pot Synthesis of Redispersible Polymer-stabilized ZnO Nanocomposites

Payawan, Jr., Leon M. , Legaspi, Enrico Daniel R. , Eda^{Å±ol}, Yasmin D.G. , Buenviaje, Jr., Salvador C., Usman, Ken Aldre

Nanomaterials have gained noteworthy attention in several applications due to their significantly improved properties relative to their bulk counterparts. However, achieving effective redispersibility of nanomaterials in a wide array of solvents, with inhibited particle agglomeration and preserved properties such as large surface area, remains challenging. In this study, a method of imparting both redispersibility and colloidal stability into zinc oxide (ZnO) nanoparticles was done through *in situ* addition of polymer stabilizers such as poly(acrylic acid) (PAA), poly(ethylene glycol) (PEG), and poly(vinylpyrrolidone) (PVP). This method enabled straightforward redispersion of as-synthesized ZnO/polymer powders into colloidal nanoparticle dispersions with smaller hydrodynamic diameter and lower zeta (ζ) potential values relative to bare ZnO. Band gap energies of resultant ZnO/polymer nanoparticles, with precise values about that of pristine ZnO (~ 3.37 eV), also correlated well with their respective efficiencies when used as a photocatalyst. Polymer-stabilization likewise preserved the high surface area of ZnO/polymer particles even in dispersions, resulting in improved photodegradation of a model pollutant [i.e. \sim three-fold increase in tartrazine (TZ) degradation for ZnO/PAA]. It is envisioned that our findings will provide critical insights on the impact of polymer stabilization on processing and prolonging the shelf life of nanoparticles while preserving their unique properties such as catalytic efficiency. **(Author's abstract)**

Keywords: *Dispersions, Photocatalysts, Polyacrylic acid, Polyethylene glycol, Polyvinylpyrrolidone, Zinc oxide, Chemistry*

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NP

0128

Paper-based Device for the Detection and Quantification of Total Polyphenols in Plant-based Beverages for Potential Use in Quality Assurance Purposes

Gregorio, Cynthia Grace C. , Villarino, Casiana Blanca J. , Sarza, Riann Mar

Health benefits arising from polyphenols found in plants have driven a steady increase in the manufacture of polyphenol-rich, plant-based food products. In line with quality assurance and compliance to local and international regulations, the polyphenol content of these products needs to be ascertained by manufacturers. The measurement of the total polyphenol content (TPC) in such products, therefore, should be part of the quality assurance of food manufacturers. This study involved the development of a cheap, user-friendly, and robust paper-based device (PBD)

that can be potentially used by small-to-medium enterprises (SMEs) in determining the TPC of tea-based beverages – specifically, sweet potato leaf extract-based (SPLE) tea beverage products. The PBD relies on colorimetric detection of TPC based on the iron tartrate (IT) spectrophotometric. Validation studies of the PBD yielded good accuracy and precision, with limits of detection (LOD) and quantification (LOQ) of 20.03 and 66.77 ppm gallic acid equivalents (GAE), respectively. The device also has good linearity and sensitivity. Likewise, the quantification of polyphenols using the PBD was not adversely affected by the presence of sugars and ascorbic acid. The PBD stored under refrigerated conditions remained usable for 57 d. The PBD's performance was found to be comparable to its counterpart instrumental method. **(Author's abstract)**

Keywords: Paper-based device, Phenolic acids, Quality assurance, Total polyphenols, Chemistry

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 (Filipiniana Analytics)
 NP

0129

Philippine Medicinal Plants with Potential Immunomodulatory and Anti-SARS-CoV-2 Activities

Tan, Mario A. , Chua, John Ross N. , Macahig, Rene Angelo S. , Villaseñor, Irene M. , de Paz-Silava, Sheriah Laine M. , Gloriani, Nina G. , Guidote, Jr., Armando M. , Dayrit, Fabian M., Sia, Isidr

Coronavirus disease 2019 (COVID-19) continues to devastate the world's health and economy, affecting all aspects of life leading to widespread social disruption. Even as several vaccines have been developed, their availability in developing countries is limited and their efficacy against the variants of SARS-CoV-2 (severe acute respiratory syndrome-coronavirus 2) needs to be continuously assessed. The World Health Organization (WHO) has acknowledged that vaccines alone will not overcome the global challenges of COVID-19. Medicinal plants may provide the needed support. Herein, we identify Philippine medicinal plants that possess phytochemicals with potential anti-SARS-CoV-2 activity and/or immunomodulatory properties that may strengthen one's immune system against COVID-19. These plants were selected from 100 of the best-studied Philippine medicinal plants with antiviral and immunomodulatory properties. The general antiviral and specific anti-SARS-CoV-2 activities and immunomodulatory properties of the phytochemicals that these plants contained were searched. While many compounds assessed individually using *in vitro* and *in silico* techniques suggest potential anti-SARS-CoV-2 or immunomodulatory effects, this review sought to identify the medicinal plants which contain these compounds and which, based on literature, have the best potential application against COVID-19. These plants are *Allium spp.* bulbs (bawang), *Andrographis paniculata* (Burm.f.) Nees leaves (sinta), *Cocos nucifera* L. oil (niyog), *Euphorbia hirta* L. leaves (tawa-tawa), *Euphorbia neriifolia* L. leaves (sorosoro), *Moringa oleifera* Lam. leaves (malunggay), *Ocimum basilicum* L. leaves (balanoy), *Piper nigrum* L. seeds (paminta), *Vitex negundo* L. leaves (lagundi), and *Zingiber officinale* Roscoe rhizome (luya). This review provides a shortlist that can guide research on possible solutions to COVID-19 using Philippine medicinal plants. **(Author's abstract)**

Keywords: Antiviral, COVID-19, Immunomodulatory, Philippine medicinal plants, SARS-CoV-2, Chemistry

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 NP

Physicochemical Properties and Antimicrobial Activity of Acetylated Chicory Fructooligosaccharides

Ignatova-Ivanova, Tsvetelava V. , Ibryamova, Sevginar F. , Ivanov, Ivan G. , Hambarlyiska, Ivanka P. , Todorova, Mina M. , Tumbarski, Yulian D. , Arabadzhiva, Radka D. , Petkova, Nadezh

Inulin acetates attract attention as the novel drug carrier. However, the acetylated derivatives of fructooligosaccharides (FOSs) (a low molecular fraction of inulin) were not evaluated. The study aimed to obtain FOSs acetyl esters and to evaluate their foaming properties, water- and oil-holding capacities (WHC and OHC), as well as their antimicrobial activity. One-pot acetylation of chicory FOS with two different degrees of polymerization (DP = 7–9 and 9–12) was performed. The resulting FOSs esters presented white, bitter, water-insoluble substances. The spectroscopic techniques as ultraviolet (UV), Fourier-transform infrared (FTIR), and nuclear magnetic resonance (NMR) spectroscopy were used for characterization and structural elucidation. The antimicrobial activity of acetylated FOSs (1 mg/mL) was tested against 16 microorganisms (Gram-positive and negative bacteria, yeasts, and fungi). Foams prepared with 0.2% FOSs acetates demonstrated the formation of highly stable foams (50–70%). FOSs acetates showed antifungal activity against *Fusarium oxysporum* and *Aspergillus niger* and inhibited the growth of yeasts *Candida albicans* 8673. The inhibition against Gram-positive (*Bacillus subtilis* 46/H1 and *Bacillus subtilis* ATCC 6633) and negative (*Salmonella abony* and *Escherichia coli* ATCC 8739) bacteria were not observed. However, FOSs acetate with DP 7–9 were active against *E. coli* 3398, *Salmonella typhi* 745, and *Staphylococcus aureus* 745 against – which other acetates with DP = 9–12 were inactive. These results demonstrate the potential applications of FOS acetates as a foaming agent and an antifungal substance in pharmaceutical and cosmetic preparations. (Author's abstract)

Keywords: Acetylation, Antimicrobial activity, Fructooligosaccharides, Physicochemical properties, Chemistry

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(Filipiniana Analytics)
NP

Phytochemical Mining of Potential SARS-CoV-2 Main Protease Inhibitors from *Blumea balsamifera* (L.) DC. Creencia, Evelyn , Cayona

Blumea balsamifera (L.) DC is a medicinal plant widely used against various ailments throughout Asian and African cultures. The reported efficacy of *B. balsamifera* and its phytochemicals against respiratory disorders suggests that it can be a potential therapeutic against the coronavirus disease 2019 (COVID-19), which is also a respiratory disease. This potential was demonstrated through an *in silico* assessment utilizing *B. balsamifera* phytochemicals and targeting the severe acute respiratory syndrome–coronavirus-2 main protease (SARS-CoV-2 M^{pro}), an enzyme that plays an important role in the infection process by SARS-CoV-2. The general strategy implemented was termed phytochemical mining in tandem with virtual screening (PM-VS). Data gathering of *B. balsamifera* phytochemicals reported in the literature was first conducted (PM stage) followed by VS through automated molecular docking of multiple ligands. The present study obtained the most comprehensive phytochemical record and organization of *B. balsamifera* phytochemicals (a total of 331). Surprisingly, 113 of the unique phytochemicals were promising SARS-CoV-2 M^{pro} inhibitors, of which 12 were re-discovered antiviral drugs from the plant. The promising inhibitors also reveal interesting *in silico* drug absorption, distribution, metabolism, excretion, and toxicity (ADMET) properties. Further analysis of the promising phytochemicals and their interactions with SARS-CoV-2 M^{pro} hints at the phenylpropanoid moiety (Ph-C3-) as a potential pharmacophore of the target enzyme. This study illustrated the

utility of PM-VS in the preliminary stages of drug discovery and development; however, further studies (*e.g.* exhaustive VS and definitive “*ex silico*” experiments) are needed to confirm the present finding. **(Author's abstract)**

Keywords: ADMET, *Blumea balsamifera*, Medicinal plants, Phytochemical mining, SARS-CoV-2 Mpro, Virtual screening, Chemistry

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NP

0132

Rapid Profiling of Saponin Extracts from *Stichopus horrens* Sea Cucumbers by Mass Spectrometry

Juinio-Meñez, Marie Antonette, Batocoy, Dessa Camille R., Dumalan, Rafael Junnar P., Torreno, Vincenzo Paolo M., Yu, Eizador

Sea cucumbers produce bioactive compounds known as saponins. Structurally, these triterpene glycosides contain different sugar moieties that are attached to a lanostane-based aglycone backbone. This study aims to rapidly profile the saponins of the Philippine sea cucumber, *Stichopus cf. horrens*, by mass spectrometry (MS). MS and tandem MS (MS/MS) were acquired using a UPLC-QToF (ultra-performance liquid chromatography–quadrupole time-of-flight) mass spectrometer. The aglycone and glycan components of the saponins were determined from the corresponding MS2 spectra. A total of 22 saponins were detected, nine of which were similar to known sea cucumber saponins. Some of these saponins – such as holothurinoside C, holothurinoside H, impatienoside A, and stichloroside A2/B2 – have been shown to be effective as antitumor, anti-cancer, or antifungal compounds. The other 13 saponins we detected appear to be unique as these have not been previously reported. Glycan and potential aglycone components of the new saponins based on MS/MS are proposed. The methods used in this study may be used to rapidly profile saponin compounds in sea cucumbers and quickly identify bioactive compounds or new saponins that may be of interest. **(Author's abstract)**

Keywords: Mass spectrometry, Sea cucumbers, Saponins, Chemistry

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NP

0133

Review on the Feasibility of Clay Utilization in Pigment Dispersion

Penaloza, Jr., David P., Castillo, Jos

In paint formulation, dispersants are vital additives that facilitate the efficient dispersion of organic pigments during paint production. However, because of stricter regulations and scrutiny of common industrial dispersants such as alkylphenol ethoxylates (APEs) due to public health concerns and environmental impact, viable alternatives like green dispersants are greatly being explored for the paint and coating industry. Clays have long been used in various applications due to their versatile surface and rheological properties. Moreover, they have been recently shown to be

efficient as a dispersing material. Various works in the literature revealed their capability in dispersing nanomaterials at low concentrations such as carbon nanomaterials (Hwang *et al.* 2009; Ivanoska-Dacikj *et al.* 2017; Kelessidis 2017; Lan and Lin 2009; Loginov *et al.* 2012; Pai *et al.* 2006; Yaroshchuk *et al.* 2014), metallic nanoparticles (Dong *et al.* 2009), polymers (Lan *et al.* 2010), and pigments (Lan and Lin 2011). This review paper evaluates the feasibility of using clays as a potential new class of green dispersants with emphasis on their application in aqueous pigment dispersions. **(Author's abstract)**

Keywords: *Clay, Colloid, Dispersant, Green chemistry, Organic pigment, Paint, Chemistry*

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NP

0134

Spectroscopic Discrimination and Characterization of Bee Propolis from the Philippines
Symczak, Kevin M. , Brescia, Tyler K. , Angelia, Mark Rickard N. , Alvarez, Paul Lloydson J., Micor, Jose Rene L. , Mojica, Elmer-Rico

Propolis or bee glue is gaining popularity in the market as a potential source of bioactive components that can be used in different health products. In this study, the ethanolic extracts of propolis samples from stingless bee (*Tetragonula biroi* Friese) colonies collected from Los Baños (in Laguna), Tayabas (in Quezon), and San Roque (in Albay) were characterized using various spectroscopic techniques such as absorbance, fluorescence, and infrared. Spectroscopic results showed differences in the chemical composition of the propolis samples. Infrared (IR) spectroscopy showed similarities and differences in terms of the functional groups present in the samples. Lastly, the phenol content of the ethanolic extracts was obtained using the Folin-Ciocalteu assay. Samples from Laguna yielded the highest phenolic content, followed by Albay and Quezon. Differences in chemical composition specifically in phenolic content will have an effect on the biological activities of the propolis extracts. The results of this study can be used as an initial screening for propolis samples for possible use in different health products. **(Author's abstract)**

Keywords: *Flavonoids, Polyphenols, Propolis, Spectroscopic techniques, Tetragonula biroi, Chemistry*

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NP

0135

Undergraduate Experiments on Qualitative Analysis of Color and Surface Modifications and Quantitative Analysis Using the Tauc Plot Method Through Ultraviolet-Visible Relative Specular Reflectance
Lamorena-Lim, Rheo B. , Torrefiel, Janelle Stephanie M. , Antivola, Mona B. , Villena, Ma

The study of the spectroscopy of solid materials is not as extensive compared to that of homogeneous liquid solutions. Optical properties, such as reflectance, transmittance, and absorbance, may be used for the characterization of new materials. Qualitative characterization of colored materials and quantitative determination of

surface modification and band gap analysis through the Tauc plot method were obtained using visible-reflectance spectroscopy. Differentiation of reflectance peaks was observed in the spectra of colored papers and acrylic spray paints. Expected trends of higher reflectance according to the ability of a color to reflect light were also observed. Surface analysis through the reflectance method indicated that spectra of pristine and surface-modified samples showed a significant difference in signals, which is attributed to the roughening and contamination of the surface of the materials. Using the Tauc plot method on the absorbance spectrum data of an electrodeposited zinc oxide film, the calculated BGE was 3.80 eV, with a 15.15% deviation from its literature value of 3.30 eV. In addition, zinc sulfide, which was chemically deposited on glass slides, had an average band gap of 3.0 eV, with an 8.82% error against its literature value of 3.4 eV. These experiments on specular reflectance of solid materials, particularly optical and new materials, may be incorporated in undergraduate laboratory courses. **(Author's abstract)**

Keywords: *Specular relative reflectance, Surface analysis, Color characterization, Bandgap, Tauc Plot, Solid analysis, Chemistry*

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(Filipiniana Analytics)
NP

0136

Utilization of Cogon (*Imperata cylindrica* L.) Silage and Urea-Treated Corn (*Zea mays* L.) Stover as Affected by Supplementation

Mondejar, Hershey P. , Bestil, Lolito C. , Patiga, El

Cogon grass, a weed occasionally used as livestock feed has a limited nutritive value. Improving the utilization of low quality roughages could be by treatment with nitrogen sources, chemical and physical treatment. Thus an experiment was conducted to assess the voluntary intake and digestibility *in vivo* of cogon silage and urea-treated corn stover as affected by varying ratios of concentrate: Ipil-Ipil leaf meal (ILM) supplementation in goats. The experiment was setup in a Randomized Complete Block Design (RCBD) with four (4) blocks based on sex-period combination with a 2x3 factorial treatment design: factor A with two types of base forage (cogon silage, urea-treated corn stover), and factor B with three (3) ratios of concentrate: ILM as supplement (1.25:0; 0.75:0.50 and 0.50: 0.75 %BW, DM basis). Results revealed a comparable voluntary intake and *in vivo* digestibility of cogon grass silage and urea-treated corn stover across three types of supplements, and among supplements across types of basal diet. Interaction between kind of basal diet and type of supplement was not significant. It is, therefore advantageous to mix ILM with concentrate at 0.75%:0.50% BW or 0.50:0.75% BW ratio, DM basis, as supplement to either cogon silage or urea treated corn stover rather than given an all-concentrate supplement at 1.25% BW, DM basis, to save on feed cost. **(Author's abstract)**

Keywords: *In vivo, Urea-treated, Silage, Concentrate, Ipil-ipil supplement, Chemistry*

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2020,
(Filipiniana Analytics)
NP

COMPUTER SCIENCE

0137

Multiple-object Tracking Based on Movement Direction Assumption and Potential Re-appearance Position with Object Flow Visualizations

Ilaio, Joel, Lee, Y

This paper proposes a multiple-object tracking (MOT) approach that adopts the tracking-by-detection strategy, which is composed of two steps: detection and tracking. This study aims to improve the tracking module by integrating a kernelized correlation filter (KCF). The filter is modified to be scale-adaptive to manage the varying size of the target object. Moreover, the tracking module's data linking is performed in two steps, i.e. data association and re-identification (ReID). Here, two novel assumptions – namely, the movement direction assumption and potential re-appearance position – are incorporated. The first assumption considers the target object's expected movement direction, while the second assumption postulates the possible position that a missing object may re-appear in. Using selected videos in 2DMOT2015 and PNNL Parking Lot benchmarking datasets, this study demonstrates that the proposed method outperforms the baseline model. In addition to MOT, this study further introduces a simple yet effective technique called trajectory accumulation to visualize the target objects' flow of movement using the trajectories generated by the proposed tracker. **(Author's abstract)**

Keywords: *Correlation filter, Kalman filter, Kernel density estimation, Local outlier factor, Object tracking, Computer science*

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NP

0138

Smarter Pest Identification Technology (SPIDTECH): A Mobile Application for Digital Identification and Remote Monitoring of Insect Pests and Diseases of Major Crops in the Philippines

Matalog, Raymark P. , Gapasin, Carl Vincent D. , Gutierrez, Reigner D. , Guiam, Angelo C., Ebuenga, Melvi

Correct identification and proper monitoring are vital components of integrated pest and disease management. The Android application – Smarter Pest Identification Technology (SPIDTECH) – was developed for the digital identification and remote monitoring of insect pests and diseases of rice, corn, coffee, cacao, banana, coconut, sugarcane, tomato, and soybean in the Philippines. SPIDTECH has three main features: the digital identification of insect pests and diseases using a smartphone camera; the digital library that contains images, identification signs, life stages, management practices, and other pertinent information about a pest or disease; and the remote monitoring that enables real-time mapping of reports through user-contributed images and GPS points. The application can identify 71 insects and 63 diseases, while the library features a collection of 104 insects and 89 diseases available in English and Filipino. The identification uses a pretrained MobileNetV2, a convolutional neural network design by Google for mobile devices. The models were retrained using the pest and disease image dataset collected specifically for this study and logging 55.7–73.3% accuracy. If connected to the internet, devices send image data from the field that are validated and used for model retraining. SPIDTECH recorded more than 7,400 device downloads from March 2019–July 2021 and received 4.8 out of 5 user review ratings. Based on the user-provided registration data in the same period, it has more than 5,600 registered users from 81 provinces with an average user acquisition rate of 266 new users per month. With the current features deployed, the application received more than 8,000 identification requests for different crops. The application has gathered a significant number of users necessary to evaluate the feasibility of the application in assisting in pest and disease identification and remote monitoring for the major crops in the Philippines. **(Author's abstract)**

Keywords: *Crop protection, Digital library, Machine learning, Pest and disease identification, Remote monitoring, Computer science*

EDUCATION

0139

Challenging Popular Assumptions on Teacher Education *Dayagbil, Filomena T. , Enriqueta R*

The Revised Policies and Standards for the Undergraduate Teacher Education Curriculum, articulated in CHED Memorandum Order No. 30 (CMO 30) in 2004, marks a significant curriculum reform for teacher education in the Philippines. This paper examines the ideas and assumptions behind the reform policies articulated in CMO 30, explores the theoretical basis of these assumptions within the framework of levels of curriculum representation, and validates these assumptions from the perspective of teacher educators and students in two selected teacher education institutions in Cebu City. Using a researcher-made five-point scale, the respondents assessed a set of pre-specified assumptions on the revised teacher education curriculum with regard to the extent to which these assumptions hold in their teaching-learning environments. Results showed that the assumptions that had the highest perception ratings among teacher educators and students revolved around the assessment of entry competence of teacher education students; strengthening the connections between theory and teaching practice through the Experiential Learning Courses; the use of the National Competency- Based Teacher Standards (NCBTS) as basis for teaching practice; and the integration of theoretical principles, concepts and methods in professional education courses. To validate these assumptions, respondents also assessed their teaching-learning environments using a 7-point semantic differential based on bipolar characteristics of conventional and constructivist learning environments in terms of the nature of classes, the role of teachers and students, learning modes, instructional emphasis and assessment of student learning. Results showed that teacher educators perceived their teaching-learning environment as moving towards the constructivist while students perceived their environment as a mix of conventional and constructivist. From the results, implications and challenges for curriculum implementation and research are drawn as basis for recommending concrete actions towards the delivery of teacher education programs based on reform efforts anchored on evidence from research. **(Author's abstract)**

Keywords: *Teacher education, Revised teacher education curriculum, Curriculum reform, Assumptions on teacher education, Education*

A Comparative Analysis of Field Study Courses: Input for the University of Rizal System Pre-Service and In-Service Teacher Education

Binaluyo, Joselito E. , San Juan, Daisy A. , Robles, Lourdes N. , De Leon, Olivia F., Ison, Glen

Teacher Education is known to be an important field for research. Similarly, as one of the most popular and preferred fields, teacher education has been confronted by a lot of issues and concerns affecting and making it a relevant topic for discussions, debates, arguments, and studies. The very crucial roles and contributions of teacher education Institutions as pillars of teacher education, is of great value to a country like the Philippines not only in promoting teacher education but more importantly, in developing quality teachers who promote effective instructional high quality that focuses on student learning outcomes. Basically, teacher education institutions are expected to perform gigantic tasks of uplifting and upgrading, and strengthening the quality of teacher education. This paper aims to make a comparative analysis of field study courses as an input to pre-service and in-service teacher education with an end goal of coming up with a Student Teachers Enhancement Program, or STEP. Through the utilization of the purposive sampling and descriptive-evaluative method of research, this paper reveals the mastery level of the required competencies in the field study courses in the context of the URS experience. It was found out that competencies in the field study courses were very much attained as perceived by the pre-service and in-service teacher educator respondents and as statistically entered, the results revealed that there is no significant difference in the respondents' perception of the mastery level attained. **(Author's abstract)**

Keywords: *Competencies, Field study courses, Pre-service, In-service, Teacher education, Student teacher enhancement program (STEP), Education*

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2010,
(Filipiniana Analytics)
NP

Enhancement of Teacher Competencies through Experiential Learning Courses: Implications to the Pre-Service Teacher Education Curriculum

Lucido, Paz I. , Torno, Beatriz G. , Bilbao, Pur

A survey of seventy-two teacher training institutions and 2,027 prospective teachers across the country was conducted to find out the implementation of the experiential learning courses of the new teacher education curriculum. The findings revealed that all the experiential learning courses were implemented with similarities and differences in the delivery modes within the frame of time to complete the education degree programs. The public schools were made partners as cooperating schools and a laboratory for the field studies, and the teachers acted as resource persons. Both the teacher-training institutions and the cooperating public schools gained advantages as well as underwent difficulties in the implementation. On the other hand, the prospective teachers claimed to have enriched their experiences and enhanced their preparation to become teachers. Along the seven domains of the National Competency-Based Teacher Standards (NCBTS), the prospective teachers revealed that the experiential learning courses had enhanced their competencies most in personal growth and professional development and least in planning, assessing and reporting. The result may help inform curriculum planners and implementers regarding the status of the new teacher education program as a way of providing continuous feedback for curriculum development. **(Author's abstract)**

Keywords: *Experiential learning, Field study courses, Field study students, Resource persons, Cooperating schools, National competency based teacher standards (NCBTS), Education*

ENGINEERING

0142

Air Change and Aerosol Evacuation Rates in a Two-Occupancy Room with Stand Fan for Forced Ventilation

Fernandez, Ken Bryan, Dalisay, Jon Dewitt , Berana, Menan

In order to prevent the spread of COVID-19 through the airborne route for rooms without dedicated ventilation systems, stand fans can be used for forced ventilation through windows and doors. In this work, computational fluid dynamics (CFD) simulations of indoor airflow were performed using a CFD package to assess the effect of a single stand fan in terms of air change rate per hour (ACH) and evacuation rate of aerosols produced by two occupants. Four fan configurations were investigated in a room with one window and one door: (1) air intake near the door, (2) air exhaust near the door, (3) air intake near the window, and (4) air exhaust near the window. Additionally, two aerosol production cases were studied: (a) the occupant near the door solely produces the aerosols and (b) the occupant seated near the window solely produces the aerosols. Results show that all the configurations satisfy the DOLE guidelines for ACH of offices, and the intake configurations yielded about 2-4 times higher air change rates compared to the exhaust configurations. Remarkably, even though configuration 2 has the lowest air change rate per hour, it has the highest aerosol evacuation rate for case A. Although, this is undesirable for actual implementation since the door path is used by occupants going in and out of the room. Still, this study shows that the resulting air flow field and consequent aerosol transport is an important factor besides the air change rate when assessing the potential of spreading the disease. **(Author's abstract)**

Keywords: *Ventilation, Indoor Air Quality, Particle Dispersion, Computational Fluid Dynamics, COVID-19, Engineering*

0143

Assessment of the Potential of Off-Grid microHydro in an Irrigation Canal in Lower Magsaysay, Kuya, Maramag, Bukidnon to Power Streetlights

Gascon, Arman T. , Eduave, Dana Ma

This study is about the assessment of a potential microhydro system in an irrigation canal in Lower Magsaysay, Kuya, Maramag, Bukidnon to power streetlights. The assessment showed that the microhydro have enough potential just to power streetlights. The microhydro system designed utilizes cross flow turbine of 6 kW power output and generator with power rating of 6 kW. The microhydro, based on design specifications, can generate maximum power output of 6 kW, which is enough to power streetlights that can cover longer distance based on the guidelines

set by the Department of Energy on road lighting. The microhydro turbine and generator have an estimated cost of Php 81,129.00 and the street light system at Php 308,844.00. Realization of these systems can greatly help the residents in the area in terms of accessibility, safety and security. **(Author's abstract)**

Keywords: *Micro hydro power plant, Renewable energy, Irrigation canal, Engineering*

CMU Journal of Science, Volume No. 25 Issue No. 1, 51-56
2021,
(Filipiniana Analytics)
NP

0144

Comparative analysis of fuzzy-neural network implementations on an autonomous electric vehicle **, Ramoso, John**

The aim of this research is to implement an optimized hybrid fuzzy-neural (FN) algorithm for an autonomous electric vehicle's stop-and-go decision-making and control. Four (4) different algorithms (purely fuzzy logic (FL), one (1) hidden layer (H1) FN, two (2) hidden layers (H2) FN, and purely neural network (NN)) were deployed in a buggy-type electric vehicle (EV) to compare their performances in real road conditions. The test EV was equipped with a LiDAR Lite sensor which served as the range finder to measure headway distance while an optical flow sensor and the motor's built-in hall sensors were used to measure speed. The EV was also retrofitted with a dsPIC30F4011 microcontroller for processing and control. Both indoor and outdoor road tests were conducted to compare the difference between a controlled environment (well-lit with good road conditions) versus actual road conditions (including physical limitations), respectively. It was observed in the indoor tests that increasing the hidden layers from H1 to H2 made the algorithm more robust and decreased jerking phenomenon when the vehicle was stationary. Results from the outdoor tests also revealed that FN network with H2 (successful in eight (8) out of ten (10) runs) had better control in maintaining proper headway distance and more fluid transition in acceleration and deceleration. Hardware considerations were also outlined focusing on deploying machine learning codes and weights to a microcontroller. The ~56kB initial code size was way above the allowable 48kB program memory of the microcontroller therefore the data type of the weights were changed to shrink the code to ~38kB.

Keywords: *artificial neural networks, autonomous vehicle, fuzzy logic, fuzzy-neural network, LiDAR Lite sensor, stop-and-go decision-making, electric vehicle, prototype, road test, Engineering*

Philippine Engineering Journal, Volume No. 42 Issue No. 2,
2021,
(Filipiniana Analytics)

Comparative Analysis of Fuzzy-Neural Network Implementations on an Autonomous Electric Vehicle

Ramos, Jr., Manuel C. , Ramoso, John Pa

The aim of this research is to implement an optimized hybrid fuzzy-neural (FN) algorithm for an autonomous electric vehicle's stop-and-go decision-making and control. Four (4) different algorithms (purely fuzzy logic (FL), one (1) hidden layer (H1) FN, two (2) hidden layers (H2) FN, and purely neural network (NN)) were deployed in a buggy-type electric vehicle (EV) to compare their performances in real road conditions. The test EV was equipped with a LiDAR Lite sensor which served as the range finder to measure headway distance while an optical flow sensor and the motor's built-in hall sensors were used to measure speed. The EV was also retrofitted with a dsPIC30F4011 microcontroller for processing and control. Both indoor and outdoor road tests were conducted to compare the difference between a controlled environment (well-lit with good road conditions) versus actual road conditions (including physical limitations), respectively. It was observed in the indoor tests that increasing the hidden layers from H1 to H2 made the algorithm more robust and decreased jerking phenomenon when the vehicle was stationary. Results from the outdoor tests also revealed that FN network with H2 (successful in eight (8) out of ten (10) runs) had better control in maintaining proper headway distance and more fluid transition in acceleration and deceleration. Hardware considerations were also outlined focusing on deploying machine learning codes and weights to a microcontroller. The ~56kB initial code size was way above the allowable 48kB program memory of the microcontroller therefore the data type of the weights were changed to shrink the code to ~38kB. **(Author's abstract)**

Keywords: *Artificial Neural Networks, Autonomous Vehicle, Fuzzy Logic, Fuzzy-Neural Network, Engineering*

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2021,
(Filipiniana Analytics)
NP

Crowd Estimation of the Black Nazarene Procession in Manila, Philippines

Ferrer, John Paul Aloveel C. , Ruiz, Alerik Ezekiel C. , Apad, Rex Emmanuel M. , Diamante, Darius Joseph R., Fillone, Alexi

Developments in crowd counting and estimation are currently in demand brought about by the increasing population and corresponding improvements in public safety planning. Various crowd counting methodologies are successful in addressing challenges and limitations, such as occlusions and wide density variations. However, none have tackled the risky dynamic scenario of the annual Black Nazarene Procession in Manila City, Philippines. Extreme densities are reached as participants follow a moving subject. Yearly reported crowd estimates vary greatly as estimation methods used for this event remain undisclosed, undefined, or unpublished. Considering the strengths of both detection-based and regression-based crowd counting methods, a novel pedestrian estimation method is proposed to appropriately provide an accurate pedestrian estimate. Using video graphics, a static grid analysis is performed to systematically capture and evaluate actual participant density. From the recorded pedestrian densities, functions were developed to estimate densities at varying distances ahead and behind the carriage. A pedestrian joining density function was established to account for devotees who merge with the crowd way ahead of the procession. The 2019 event involved a moving carriage faithfully followed by thousands of devotees as it traveled along a 6.94-km route for 21.35 hours. Employing a 95% confidence interval for the density function intercepts and coefficients, 176,086 to 484,215 active pedestrian devotees during the procession were estimated using the developed systematic pedestrian estimation method. The social value of a more accurate crowd estimation method lies in providing

policymakers with reliable crowd estimates that will enable the authorities to deploy the appropriate number of security personnel for crowd management, as well as medical staff for emergency situations during mass gatherings of similar nature to the Black Nazarene Procession. **(Author's abstract)**

Keywords: *Crowd counting, Mass gathering, Microscopic analysis, Pedestrian dynamics, Pedestrian safety, Religious gathering, Engineering*

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2021 June,
(Filipiniana Analytics)
NP

0147

Distribution of Light Intensities of a Solar Bottle Bulb

Redulla, Cherry Dara S. , Bo-ot, Luis Ma

Solar bottle bulbs (SBB) have been proposed as an inexpensive, eco-friendly alternative to electric lighting in dense residential settlements typically found in urban areas. Interestingly, little testing has been done to verify a solar bottle bulb's performance in terms of light quality. Sunlight with which the solar bulbs operate is dependent on local geographical and climatic conditions. This study aims to describe the amount of light output of a solar bottle bulb by plotting and investigating the distribution of light intensities transmitted indoors. This is done by measuring light levels at every one meter for every 15 degree angle from nadir, on two perpendicular planes to produce a polar graph. The polar graph indicates at which points light redistribution is at its highest intensity. Results from the data should provide insight into the effectiveness of the solar bottle bulb in terms of providing the minimum lighting requirements for a given space. **(Author's abstract)**

Keywords: *Solar Bottle Bulb, Distribution, Alternative lighting technology, Polar graph, Engineering*

Muhon: A Journal of Architecture, Landscape Architecture, and the Designed Environment, Volume No. 6 Issue No. , 55-66
2019,
(Filipiniana Analytics)
NP

0148

A Dynamic Threshold-Based Customer Redirection Rule for Minimizing Customer Transfer Costs in Bike-Sharing Systems

Martinez, Iris Ann G. , Lorenzo, Lowell L. , Lorenzo, Simon Anth

This paper produces a new dynamic threshold-based customer redirection rule that minimizes customer extra effort in bike-sharing systems while maintaining a target service level. The proposed rule entails the redirection of both the customer's trip origin and destination following thresholds that are dynamically based on the stations' forecast supply and demand for bikes. A simulation model based on London's Santander Cycles bike-sharing system was used to evaluate the effectiveness of the proposed rule. Results show that the new rule was able to reduce the system average extra effort for customers by as much as 43.35% while maintaining the service level, over 100 replications of the simulation. **(Author's abstract)**

Keywords: *Bike-sharing systems, Customer redirection, Extra effort minimization, Engineering*

Effects and optimization of aggregate shape, size, and paste volume ratio of pervious concrete mixtures

Corpuz, Ma. Patricia Leriezz

Pervious concrete has been widely used in other countries due to its environmental benefits such as water quality improvement and high permeability. However, due to its high void content, this type of concrete has a significantly lower compressive strength compared to conventional impermeable concrete. In the Philippines, the use of pervious concrete is minimal. To achieve its most effective performance, this paper aims to optimize pervious concrete mixtures in terms of permeability and compressive strength by varying aggregate shape, size, and paste volume (PV) to inter-particle void ratio (IPV). The effect of viscosity modifying admixture (VMA) on the permeability and compressive strength was also quantified. The optimized mix consists of single graded 9.5 mm, angular aggregates with 70.90% PV/IPV. This proportion can produce a compressive strength of 17.95 MPa and a permeability of 1.35 mm/s, applicable for low-traffic pavements such as parking lots. Adding VMA increased the compressive strength by 23.74% and decreased permeability by 35.49%.

Keywords: *pervious concrete, permeable concrete, paste volume, strength, void ratio, viscosity modifying admixture, Engineering*

Effects and Optimization of Aggregate Shape, Size, and Paste Volume Ratio of Pervious Concrete Mixtures

Germar, Fernando J. , Corpuz, Ma. Patricia Leriezz J., Monzon, Mary Rosei T. , Orozco, Christian

Pervious concrete has been widely used in other countries due to its environmental benefits such as water quality improvement and high permeability. However, due to its high void content, this type of concrete has a significantly lower compressive strength compared to conventional impermeable concrete. In the Philippines, the use of pervious concrete is minimal. To achieve its most effective performance, this paper aims to optimize pervious concrete mixtures in terms of permeability and compressive strength by varying aggregate shape, size, and paste volume (PV) to inter-particle void ratio (IPV). The effect of viscosity modifying admixture (VMA) on the permeability and compressive strength was also quantified. The optimized mix consists of single graded 9.5 mm, angular aggregates with 70.90% PV/IPV. This proportion can produce a compressive strength of 17.95 MPa and a permeability of 1.35 mm/s, applicable for low-traffic pavements such as parking lots. Adding VMA increased the compressive strength by 23.74% and decreased permeability by 35.49%. **(Author's abstract)**

Keywords: *Pervious concrete, Permeable concrete, Paste volume, Strength, Void ratio, Engineering*

Energy Audit of an Educational Building: College of Engineering

Abay, Ariel E. , Opiso, Earl M., Alfarero, Cleiffor

Educational buildings are the most suitable type of building for the application of energy audit. Such measures can promote sustainability and ensure a comfortable and healthy environment for educational purposes. This study aimed to assess energy efficiency and conservation of the College of Engineering specifically the lighting system of the building. A walkthrough audit was made to acquire preliminary assessment on the building. A luxmeter was used to measure illumination (lux). The study showed that the illumination levels did not meet proper standards. Through data logger and theoretical calculations, it was determined that lighting system consisted 44% of total power consumption. These led to the development of a new lighting system (room E209 selected as a sample) composed of F28T5 lamps which improved lighting levels and saved more energy than the old F40T12 lamps. Through calculations, the new lighting systems showed an annual savings of Php5708 for room E209 alone with payback period of 2 years and 3 months. **(Author's abstract)**

Keywords: *Energy, Energy audit, Energy efficiency, Engineering*

Fault Location with Load Profile Based Variation Compensation

Orillaza, Jordan Rel , Gallano, Russel John , Orpilla, Mich

Accurate and fast location of the fault is essential in distribution system operation to ensure continuity and quality of power supply. Many impedance-based fault location (IBFL) techniques such as Equivalent Impedance Based (EIB) and Load Level Based (LLB) perform load variation compensation but assume a uniform percent load change across all connected loads; such assumptions are hardly applicable in distribution systems where various types of loads are connected. It was observed in this study that their accuracy reduces as the fault current becomes comparable to the load current. This research performs load variation compensation by considering the load profiles of the various types of loads connected in the distribution system. By doing this, loads are better represented in the simulation, which results in better prediction accuracy. The proposed method, Load Profile Based (LPB), is compared to EIB and LLB in simulations conducted in an actual distribution feeder from Cagayan II Electric Cooperative. The results show improved fault location having an average relative error based on line length (RELL) at a high-impedance-fault scenario ($Z_f=100$ ohms) not exceeding 3.22% compared to 48.74% (LLB) and 14.19% (EIB). In these techniques, a phasor measurement unit (PMU) is assumed to provide reference phasor voltage and currents at the root node. We further illustrate that additional PMU improves fault location by improving load variation compensation and faster fault location as PMU provides boundaries and effectively reduces the search space. **(Author's abstract)**

Keywords: *Fault Location, Load Profile Based, Load Variation Compensation, PMU, Engineering*

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2021,
(Filipiniana Analytics)
NP

0153

Financial and Socio-economic Study of Modular Pyrolysis Facilities as Waste-to-Energy Technology: A Case Study in Metropolitan Manila, Philippines

Magdaluyo, Jr., Eduardo , Rollon, Analiza , Ilano, Arturo Benedicto , Manegdeg, Reynald Ferdinand, Cervera, Rinlee B

Industrial, medical, and electronic residual wastes can potentially be an important source of energy with the use of waste-to-energy (WtE) conversion technology. In Metropolitan Manila, Philippines, about 144,000 kg/d of residual wastes were being generated by the hospitals, industrial sectors, and electronic companies. Hence, imploring high potential benefits can be achieved through utilizing these wastes as feedstock for any WtE conversion facility. A technical and financial costing was performed to evaluate the feasibility of putting up a conventional pyrolysis system in Metropolitan Manila. Various modular-type scenarios of a pyrolysis system in the WtE facility were identified based on the geographical attributes of the sectoral residual wastes generators. Results showed that a 10 tons/d pyrolysis plant facility, with Brayton power set-up, can eventually produce 800 kW and generate an annual net income of PHP 83.63 M after a 2-yr breakeven period. In addition, this facility can accommodate at most 11 tons/d of residual wastes for processing. In contrast, a smaller footprint of pyrolysis-Brayton set-up consisting of three tons per day, with 1,000 kg of daily wastes and a power generation of 65 kW, can potentially produce a net income of PHP 18.06 M following a 3-yr breakeven period. The WtE business models of putting up conventional pyrolysis facilities, by presenting both the maximum and minimum scenarios in terms of plant capacity and income when intended for operation and adoption, were computed to be feasible. **(Author's abstract)**

Keywords: *Financial feasibility, Pyrolysis technology, Socio-economic study, Waste-to-energy, Engineering*

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2022 February,
(Filipiniana Analytics)
NP

0154

Health Risk Assessment of Trace Metals in the Vicinity of an Abandoned Mercury Mine in Puerto Princesa City, Philippines

Quierrez, Rico Neil M. , Adil, Jihan H. , Montano, Mariel O. , Paro, Fevi Rose C. , Devanadera, Ma. Catriona E. , Tanciongco, Alexandria M. , Gibaga, Cris Reven L. , Samaniego, Jessie O., Gutierrez, Alaine Claudett

Abandoned mines pose high risks to human health and the environment due to the disturbed and exposed metal-laden soils and sediments. In this study, soils and sediments in an abandoned mercury (Hg) mine in Puerto Princesa City, Philippines were analyzed to assess the potential adverse health effects of the exposure to trace metals associated with the mine wastes. A total of 63 soil and sediment samples were collected in the area and analyzed for Hg concentration using a direct Hg analyzer and inductively coupled plasma-mass spectrometry (ICP-MS) for other

trace metals. Analysis results showed that aside from Hg, there are anomalous concentrations of Ni (nickel), Cr (chromium), and Mn (manganese) in the area brought by the value of the mineralogy of the ores that were mined. The measured trace metal concentrations, together with the United States (US) Environmental Protection Agency's (EPA) exposure parameters and the US Department of Energy's (DOE) toxicity values were used to calculate the dose contacted from different exposure pathways. The result of the health risk assessment showed that Hg was considered as the main contributor of non-carcinogenic risk in the area with a hazard index of > 1 for both children and adults. Inhalation of Hg vapor from the soils and sediments is found to be a significant addition to the health risks in the area. Other trace metals such as Co (cobalt), Fe (iron), Ni (nickel), and Tl (thallium) were calculated with a hazard index greater than 1, which poses a health risk to children due to the ingestion pathway. All carcinogenic trace metals assessed were below the guidance value, indicating no significant carcinogenic health risks for both adults and children in the area. This work serves as an initial step of the country in the assessment of the risks to human health and the environment brought by Hg contaminated areas, as stated in the Minamata Convention on Mercury. **(Author's abstract)**

Keywords: *Abandoned mine, Health risk assessment, Mercury, Trace metals, Mercury-contaminated site, Engineering*

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2022 April,
(Filipiniana Analytics)
NP

0155

Heating Effects in the Structure of Non-metamict Allanite-(La) from Palawan, Philippines

Samson, Vallerie Ann I. , Vasquez, Jr., Magdaleno R. , Lopez, Girlie Eunice P. , Gili, Mon Bryan Z. , Olivares, Ryan U. , Jecong, Julius Federico M. , Dingle, Cheri A

Allanite is one of the most common sources of rare-earth elements (REEs) and contains significant amounts of thorium (Th) and uranium (U). The presence of radioactive Th and U nuclides in the mineral exposes it to long-term radiation. Like other natural minerals containing Th and U, allanite can be used as a natural analog to understand the long-term radiation effects in high-level nuclear waste (HLW) matrices. Allanite group mineral is generally found in the amorphous phase due to structural damage induced by self-irradiation. In this work, crystalline allanite-(La) samples collected in San Vicente, Palawan, Philippines – having a low absorbed dose of $\sim 10^{14}$ α -decays/mg – were heated at 450, 650, and 850 °C to study the response of non-metamict allanite to heating at elevated temperatures, particularly at the early stages of exposure to alpha-particle radiation. An increase in structural order was observed upon heating to 450 and 650 °C, which is exhibited by a decrease in the unit cell volume by 1.6% and a decrease of the full width at half maximum (FWHM) of selected Bragg planes. It was evident that certain Bragg planes respond differently to the annealing temperatures with preferential reorientation. After annealing at 850 °C, however, the loss of OH bonds was observed in the infrared (IR) spectra, and the broadening of Bragg peaks was seen in the x-ray diffraction (XRD) patterns, suggesting an onset of structural degradation. Surface cracks are also seen in the scanning electron microscope (SEM) images. The study shows that the non-metamict allanite-(La) mineral structure responds to heating similarly to that of metamict ones reported in the literature. This study will provide data on the properties of allanite as part of the ongoing studies on radiation damage in silicate matrices. **(Author's abstract)**

Keywords: *Absorbed #945-dose, Allanite, Heating, FTIR, XRD, Engineering*

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2022 February,
(Filipiniana Analytics)
NP

Integrated Weed Estimation and Pest Damage Detection in *Solanum melongena* Plantation via Aerial Vision-based Proximal Sensing

Dadios, Elmer P. , de Ocampo, Anton Lou

The Philippine government's effort to transcend agriculture as an industry requires precision agriculture. Remote- and proximal-sensing technologies help to identify what is needed, when, and where it is needed in the farm. This paper proposes the use of vision-based indicators captured using a low-altitude unmanned aerial vehicle (UAV) to estimate weed and pest damages. Coverage path planning is employed for automated data acquisition via UAV. The gathered data are processed in a ground workstation employing the proposed methods in estimating vegetation fraction, weed presence, and pest damages. The data processing includes techniques on sub-image level classification using a hybrid ResNet-SVM model and normalized triangular greenness index. Sub-image level classification for isolating crops from the rest of the image achieved an F1-score of 97.73% while pest damage detection was performed with an average accuracy of 86.37%. Also, the weed estimate achieved a true error of 5.72%. **(Author's abstract)**

Keywords: *Crop health, Proximal sensing, UAV-based monitoring, Vegetation fraction, Weed estimate, Engineering*

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2021 June,
(Filipiniana Analytics)
NP

Investigating Traffic Noise Levels Using FWHM Traffic Prediction Model In the Streets of Quezon

Bo-ot, Luis Maria Tiansay , Goduco, Mark Abraham Sanguenza , Sebastian, III, Florencio Romario Ty , del Barrio, Cherry Amor

The potential of the Traffic Noise Model version 2.5 (TFNv2.5) in simulating and predicting traffic noise pollution levels on major streets of Quezon City is explored. The TFNv2.5, supported by a scientifically founded and experimentally calibrated acoustic computation methodology, was applied to three (3) sites within Quezon City, chosen due to their key locations and different urban environments, namely: educational, hospital and residential. To identify the traffic noise impact, traffic volume count at these selected sites of the city were obtained from pertinent government data and the results are compared against World Health Organization standards. The study further explores mitigation of unacceptable noise level results through the incorporation of reasonable and feasible measures available in the same software, such as attenuation over/through rows of buildings or dense vegetation, or noise barrier design vis-à-vis realistic possibilities in each case study's unique context. **(Author's abstract)**

Keywords: *Traffic, Noise, Prediction, Software, FHWA, Quezon City, Engineering*

Muhon: A Journal of Architecture, Landscape Architecture, and the Designed Environment, Volume No. 8 Issue No. , 51-60
2021,
(Filipiniana Analytics)
NP

Modelling student dropout using AdaBoost and survival analysis

, , Sagun, Mikayla Al

The average graduation rate of UPD COE freshmen admitted between 2009 and 2013 is 66.89%. The UPD COE graduation rate is quite low compared to other schools, indicating that it is important to investigate the dropout rates of students as well. Existing studies made use of several different models in order to predict student dropout. These studies made use of both pre-enrollment data and data on student performance per semester. Out of the different models used, the AdaBoost model and the Cox models consistently performed well. For this study, the AdaBoost model and time-varying Cox model were used to predict whether a student drops out, predict when a student will dropout, and analyze the features that lead to student dropout. Hazard ratios from the Cox model allow us to know whether the features increase or decrease risk of dropout. Pre-enrollment data and post-enrollment data was used to analyze student dropout. Higher number of semesters of absence without leave increase the risk while high school GWA and getting accepted in the student's first or second choice degree program decrease the risk of dropout. These features were found to be significant factors that affect dropout risk for both 4-Year and 5-Year programs. Of the two models, the AdaBoost model performed better at predicting student dropout and drop time. The results of the models can be used to help identify at-risk students as early as possible and guide them with regards to their specific needs.

Keywords: *AdaBoost, machine learning, student out, student retention, survival analysis, Cox model, student assessment, Engineering*

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2021,
(Filipiniana Analytics)

Modelling Student Dropout using AdaBoost and Survival Analysis

Ong, Darry P. , Soriano, Patricia Dolores M. , Pedrasa, Jhoanna Rhodette I. , Sagun, Mikayla Ale

The average graduation rate of UPD COE freshmen admitted between 2009 and 2013 is 66.89%. The UPD COE graduation rate is quite low compared to other schools, indicating that it is important to investigate the dropout rates of students as well. Existing studies made use of several different models in order to predict student dropout. These studies made use of both pre-enrollment data and data on student performance per semester. Out of the different models used, the AdaBoost model and the Cox models consistently performed well. For this study, the AdaBoost model and time-varying Cox model were used to predict whether a student drops out, predict when a student will dropout, and analyze the features that lead to student dropout. Hazard ratios from the Cox model allow us to know whether the features increase or decrease risk of dropout. Pre-enrollment data and post-enrollment data was used to analyze student dropout. Higher number of semesters of absence without leave increase the risk while high school GWA and getting accepted in the student's first or second choice degree program decrease the risk of dropout. These features were found to be significant factors that affect dropout risk for both 4-Year and 5-Year programs. Of the two models, the AdaBoost model performed better at predicting student dropout and drop time. The results of the models can be used to help identify at-risk students as early as possible and guide them with regards to their specific needs. **(Author's abstract)**

Keywords: *Adaboost, Machine learning, Student out, Student retention, Survival analysis, Engineering*

**Performance Evaluation of Low-cost Storage Structures for Onions (*Allium cepa* L.)
Storage in Bahir Dar, Amhara Region, Ethiopia**
Fanta, Solomon Workneh , Satheesh, Neela , Eriballo, Selam Ge

The effect of fully ventilated storage structure, netted bags, mud-coated structure (local practice in the region), and heap storage on quality and shelf-life of onion cv. Bombay red was studied at Bahir Dar Institute of Technology in Ethiopia. The experiment was conducted in a single factor with four levels (four storage structures) with three replications. Manually harvested and cured onions were stored in different storage structures and different quality and shelf-life properties were studied for 90 d. Analysis of variance (ANOVA) and correlation was conducted by SAS 9.2 version. The lowest sprouting % (1.03), rotting % (1.81), and mold incidence % (2.73) of the onions were recorded in the onions stored in fully ventilated storage structures for 90 d. The highest marketable bulb % was observed in the fully ventilated storage structure by the 90th day of storage. On the basis of this study, the fully ventilated structure was recommended to store the onions in the studied location. **(Author's abstract)**

Keywords: *Fully ventilated storage, Netted bags, Physiological weight loss, Relative humidity, Sprouting loss, Engineering*

**Recycled Polyethylene Terephthalate as Reinforcement Additive of Asphalt Mixture for
Pavement Application**
Aguila, Mae Joanne B. , Calibo, Jezreel An S. , Caday, John Howelle B. , Barron, Jessa Mae G. , Florece, Allona Eunice A. , Soriano, Vernadette J. , Arizala, Carl Vincent D. , Marquez, Kevinilo P. , Marquez, Kevinilo P., Razal, Ramon A. , Migo, Veronica

This study explores the effect of incorporating recycled polyethylene terephthalate (PET) into asphalt pavement mixtures. The performance characteristics were observed to determine if the mechanical properties of the resulting mixture had significantly improved. The PET-asphalt mixtures were prepared using the dry method and were then evaluated based on the Marshall flow and stability tests, as well as its volumetric properties – such as air voids, voids filled with asphalt (VFA), voids in mineral aggregates (VMA), bulk specific gravity (BSG), and maximum specific gravity (MSG). Results show that the optimum PET content in the mixture is 15% by weight of asphalt binder at 5% binder composition of the overall asphalt pavement mixture. The stability was observed to increase by 14.2% compared with the conventional mix and each sample passed the standards set by the Asphalt Institute. Based on the results, it can be concluded that at certain amounts, the addition of PET improves the Marshall properties of the pavement. **(Author's abstract)**

Keywords: *Asphalt, Dry method, Plastic waste disposal, Polyethylene terephthalate, Engineering*

Short-term forecasting model for solar PV power output using LS-SVM

Gallano, Russe

The use of renewable energy resources is becoming more prevalent nowadays, especially in distribution systems and microgrids. However, the variability of renewable energy output poses a challenge on the stability and resilience of the power system, particularly in balancing the supply with the load. An output forecast model is useful in this balancing, esp. in scheduling the supply power.

Solar photovoltaic (PV) systems, commonly used as a distributed generator (DG), has a variable output that depends on external factors, such as temperature, irradiance, cloud cover, and so on. The lack of data about these external factors may hinder the accurate modelling and forecasting of solar PV output. This study attempts to develop a short-term forecast model of the output power of solar PV DGs using only historical solar PV output data. Least-Squares Support Vector Machine (LS-SVM) is used to establish the forecasting model and shows promising accuracy, even when used to forecast fluctuations in solar output.

Keywords: *forecasting model, LS-VSM, short-term forecast, solar power model, solar PV, renewable energy, Engineering*

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Gallano, Russel J

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Keywords: *Forecasting model, LS-SVM, Short term forecast, Solar power model, Solar PV, Engineering*

Statistical Analysis of Crop Water Stress in Rainfed Rice (*Oryza sativa* L.) Using Spectral and Non-spectral Indices

Eusebio, Marck Ferdie V. , Pinca, Yaminah Mochica M. , Luyun, Jr., Roger A. , Saludes, Ronaldo B. , Visitacion, Gla

The use of vegetation indices derived from wavelengths known to be sensitive to plant water status is a fast, reliable, and non-destructive method of identifying the spatial and temporal distribution of crop water requirements. A pot experiment was conducted in a screenhouse to assess the potential of vegetation indices in detecting water stress in rainfed rice during the reproductive growth phase. Rainfed lowland (PSB Rc14) and upland (UPL Ri7) rice varieties were subjected to non-water stress [2.0 irrigation water (IW) per cumulative pan evaporation (CPE)], mild water stress (1.5 IW/CPE), and severe water stress (1.0 IW/CPE) treatments during the reproductive growth stage. Leaf reflectance measurements were taken using a portable field spectrometer (Jazz Spectral Sensing Suite, Ocean Optics, Inc.) with a spectral range of 650–1050 nm and 0.36 nm bandwidth. Vegetation indices – namely, water index (WI), normalized water index-1 (NWI-1), normalized water index-2 (NWI-2), normalized water index-3 (NWI-3), and normalized water index-4 (NWI-4) – were then calculated from the leaf spectral reflectance measurements and correlated with leaf relative water content (RWC), crop water stress index, and grain yield. The leaf reflectance in the NIR region (700–1050 nm) of both rice varieties under severe water stress conditions (1.0 IW/CPE) was lower compared to those under mild water stress (1.5 IW/CPE) and non-water stress treatments (2.0 IW/CPE). Significant differences in the vegetation indices were detected at the flowering stage when the onset of water stress was also identified by the crop water stress index (CWSI). NWI-2 had the strongest correlation with grain yield of PSB Rc14 ($r = -0.7815$), whereas WI and NWI-1 correlated well with grain yield for UPL Ri7 ($r = -0.876$). These results suggest the potential of using hyperspectral vegetation indices as indicators of water stress during the flowering stage of rice. **(Author's abstract)**

Keywords: *Hyperspectral leaf reflectance, Rainfed rice, Vegetation index, Water stress, Engineering*

Stochastic Finite-Fault Modelling of Mw7.2 2013 Bohol Earthquake with Improvements via Low-Frequency Scaling Focusing on Time- and Frequency-domain Characteristics

Zarco, Mark Albert H. , Azul, Krist

The deleterious effects of strong ground motions of earthquakes on structures are dependent on many factors which include the source, path, site, and as well as dynamic characteristics of the structure. Simulations of the strong motions corresponding to the October 15, 2013, Bohol earthquake were performed using a stochastic finite-fault modeling method while exploring the effect of low-frequency scaling. The simulated motion was then compared to

the actual recorded ground motions using the peak ground acceleration, arias intensity, cumulative acceleration plots, Fourier amplitude spectrum, predominant frequencies, and goodness-of-fit values. Base simulations showed great similarity in overall envelope shape and PGA value. However, it was shown that simulations needed modification in the low-frequency range to better match the actual recorded motions. Improvement in the agreement between the simulated and recorded motions was achieved in both frequency-domain and time-domain characteristics, as well as goodness-of-fit values, after low-frequency scaling was applied. Although low-frequency scaling resulted in an accelerogram whose certain characteristics are closer to that of the recorded ground motions, it also resulted in an overestimated PGA value. **(Author's abstract)**

Keywords: *Earthquake Simulation, October 15 2013 Bohol Earthquake, Stochastic Finite Fault Model, Engineering*

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NP

0166

Swift Automated System for Distinguishing Blue-White Colonies Post Bacterial Transformation on Agar Plates Using Computer Vision Techniques

Nayak, Sneha , Goveas, Louella Concepta , Rao, Abhis

The manual selection of transformed bacterial colonies from non-transformed ones grown on agar plate post-blue-white screening – despite chromogenic difference – is cumbersome, owing to their small size and large cell number. The present study offers a lucrative solution to this problem by the design of an automated system that is not only fast and less laborious but also low priced and user-friendly. The image masking technique was used to distinguish plated transformed colonies. This method uses computer vision techniques to detect the number of blue and white colonies post bacterial transformation on agar plates and calculate the transformation efficiency. To assess the proposed model with the manual counting method, we have validated the model by comparing the manual counting of colonies with the automated system count. Hence, a model was developed that would be an added advantage to biotechnologists as it would minimize the time required for counting and help in productive research. **(Author's abstract)**

Keywords: *Bacterial colony, Bacterial transformation, Blue-white screening, Computer vision, Image masking, Engineering*

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2021 October,
(Filipiniana Analytics)
NP

Thermodynamic performance evaluation of internal heat exchanger in a compressor-driven ejector heat pump system

Garcia, John C

This study provides a theoretical analysis of the effect of an internal heat exchanger (IHX) on an ejector heat pump system. An internal heat exchanger is placed between the intermediate-pressure and high-pressure sides of the system. The performance of the systems with and without IHX is evaluated using the coefficient of performance and exergy efficiency. The results show that the ejector heat pump system with IHX has a higher heating capacity, coefficient of performance, and exergy efficiency. The introduction of IHX also increases the reliability of the compressor by ensuring that only vapor refrigerant enters the component. The performance of five refrigerants, namely R32, R290, R407c, and R410a, are compared. Among the refrigerants observed, R134a has the highest coefficient of performance (7.17), while R32 has the highest exergy efficiency (68.73%). The effects of evaporating and condensing temperatures to the system with IHX are also investigated. It is found out that the evaporating temperature has a significant effect on both the coefficient of performance and exergy efficiency.

Keywords: *ejector, heat pump, COP, exergy analysis, Engineering*

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Thermodynamic Performance Evaluation of Internal Heat Exchanger in a Compressor-Driven Ejector Heat Pump System

Berana, Menandro S. , Garcia, John Ca

This study provides a theoretical analysis of the effect of internal heat exchanger (IHX) on an ejector heat pump system. An internal heat exchanger is placed between the intermediate-pressure and high-pressure sides of the system. The performance of the systems with and without IHX are evaluated using coefficient of performance and exergy efficiency. The results show that the ejector heat pump system with IHX has higher heating capacity, coefficient of performance, and exergy efficiency. The introduction of IHX also increases the reliability of the compressor by ensuring that only vapor refrigerant enters the component. The performance of five refrigerants, namely R32, R290, R407c, and R410a, are compared. Among the refrigerants observed, R134a has the highest coefficient of performance (7.17), while R32 has the highest exergy efficiency (68.73%). The effects of evaporating and condensing temperatures to the system with IHX are also investigated. It is found out that the evaporating temperature has a significant effect on both the coefficient of performance and exergy efficiency. **(Author's abstract)**

Keywords: *Ejector, Heat pump, COP, Exergy analysis, Engineering*

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2021,
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NP

Unconfined Compressive Strength of Stabilized Clay Using Rice Hull Ash – Derived Geopolymer

Estrellado, Keren B. , Torio Kaimo, Lestelle V. , Elamparo, Felix Nathaniel M. , Alcantara, Matthew Tra

Rice hull ash (RHA) is an industrial by-product that has pozzolanic properties and is rich in silica making it suitable as an aluminosilicate precursor for geopolymers. Geopolymers are the product of geopolymerization from the dissolution of aluminosilicate materials by an alkali activator. The effectiveness of geopolymers as admixture in concrete has been proven in several studies. This research determined the effects of RHA-based geopolymers on the unconfined compressive strength (UCS) and the corresponding stress-strain behavior of lean clay. Clay-only specimens were prepared as control. Samples with 5%, 10%, and 15% geopolymer content by weight were prepared and were cured for 7 and 28 days. In terms of UCS, the curing period did not have a significant effect regardless of the geopolymer content. The curing period also did not have significant effects on the stress-strain behavior of the geopolymerized samples. The addition of geopolymer in the soil sample increased the UCS of the soil. The higher the geopolymer content, the higher the UCS of the sample. There was a 547% increase in the UCS of the plain soil to the sample with 15% geopolymer content with a mean value of 418.5 kPa. Post-peak behavior of samples with higher geopolymer content exhibited pronounced strain softening. **(Author's abstract)**

Keywords: Soil stabilization, Geopolymerization, Unconfined compressive strength, Engineering

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Utilization of Spiked Pepper (*Piper aduncum* L.) as Feedstock for Gasification

Detras, Monet Concepcion M. , Demafelis, Rex B. , Pampolina, Nelson M. , Bambase, Jr., Manolito E. , Rantael, Jr., Rogelio O., Belonio, Alexi

The massive spread and growth of invasive alien plant species (IAPS) such as *Piper aduncum* L. (PA) endanger the natural ecosystem. Utilizing their woody biomass as feedstock through gasification to produce renewable energy can reduce risk and provide better incentives to rural communities. Heating value (HV), fixed carbon (FC), volatile combustible matter (VCM), and ash content were used to compare PA with five other tree species – namely, *Calliandra calothyrsus* L. (CC), *Gliricidium sepium* L. (GS), *Broussonetia papyrifera* L. (BP), *Eucalyptus marginata* L. (EM), and *Eucalyptus urophylla* L. (EU) – as fuel for gasification. The effects of particle size (p_s), air volumetric flow rate (v_{air}), and carbonization and their interactions to cold gas efficiency (CGE), producer gas flow rate (v_{syngas}), and specific gasification rate (SGR) were also studied. The economics and environmental impact of spiked pepper as feedstock were evaluated by hypothetically putting up a 100 kWe gasification plant in the Upper Bauyan Watershed serving 138 households. With an electrical efficiency of 17.1%, the plant would need 990 tons of PA. Feedstock supply would be adequate even after 20 yr of operation since biomass growth rate would be faster than consumption rate. The computed carbon dioxide (CO_2) emissions annually for harvesting was 9.72 tons (shelterwood method) – 781.11 tons for gasification and electrical production against direct combustion, which theoretically emits 1,729.73 tons annually. Financial analysis indicated a profitable investment with a positive net present value of PHP 6,240,257.08 or USD 122,358 (USD 1 = PHP 51), IRR of 12%, payback period of 6.97 yr, and levelized cost of electricity (LCOE) of PHP 8.90 (USD 0.17). Overall, the study indicates the economic feasibility and ecological soundness of utilizing PA as feedstock provided that silvicultural management is applied in replanting indigenous trees in eradicated lands. This method can also be effective in restoring the landscape of affected watersheds. **(Author's abstract)**

Keywords: Biomass gasification, Invasive alien species, *Piper aduncum* L., Spiked pepper, Top-lit updraft gasifier, Engineering

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0171

Validation of a Customized Local Traffic Simulator (LocalSim)
Palmiano, Hilario Sean O. , Taguian, Jebus Edrei C. , Eden, Mel Fran

Traffic management offices in the Philippines commonly rely on experimentation or the trial-and-error implementation of traffic management schemes to solve the growing traffic problem. This method is unreliable, time-consuming, costly, and inconvenient to road users who are often not aware of the sudden changes in traffic rules, regulations, and road configuration. One possible way to test the effectiveness of proposed traffic schemes is by implementing them *in silico* or by computer simulation. There are traffic simulation software programs available in the market, but they are either too expensive for massive use of the different local government units (LGUs) and/or too general such that they are unable to replicate some features of Filipino driving behavior. It is under this backdrop how LocalSim was conceptualized: A traffic simulation software customized to the needs of the different LGUs with driving models designed to capture Filipino driving behavior. This study presents the model validation performed, which proves that LocalSim can generate simulation results that are acceptable representations of the real-world scenario. The study area is the EDSA–Quezon Ave Intersection where the *in situ* or on-site traffic behavior was measured using the selected measure of performance (MOP) and evaluated with Theil's indicator.
(Author's abstract)

Keywords: Driver behavior, Microscopic, Modeling, Simulation, Engineering

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2021 October,
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0172

Waste Profile and Waste-to-Energy Conversion Potential of Medical, Hazardous Industrial, and Electronic Residual Wastes in Metro Manila, Philippines
Macapinlac, Emma , Clemente, Eligia , de Sales-Papa, Louernie , Ballesteros, Jr., Florencio , Magdaluyo, Jr., Eduardo , Rollon, Analiza , Manegdeg, Ferdinand, Ibanez, Roderaid , Cervera, Rinlee B

Waste disposal is an important issue that needs to be addressed, not only for health and environmental reasons but also for its social and economic impacts. Three important waste streams that contribute to the growing amount of wastes generated come from medical, industrial, and electronic residual wastes. These residual wastes are usually just being dumped or disposed of in sanitary landfills. Apart from finding solutions to these environmental waste problems, these wastes can be a possible source of energy that can support our energy sustainability. In this study, three different waste streams, medical, industrial, and electronic wastes in Metro Manila – the capital region in the Philippines – were profiled and investigated for their potential as waste-to-energy (WTE) feeds. The daily

generation, types of wastes, and heating values were studied. The total generated daily waste for medical wastes, hazardous industrial wastes, and residual electronic wastes that have a potential for WTE was about 143,834 kg/d or about 52,500 tons/yr. Its total energy potential was about 4,727 GJ/d. These large amounts of residual WTE feeds can potentially support daily energy needs, as well as mitigate problems associated with the typical disposal of these hazardous and residual wastes. **(Author's abstract)**

Keywords: *Electronic waste, Industrial waste, Medical waste, Waste disposal, Waste-to-energy, Engineering*

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ENVIRONMENTAL SCIENCE

0173

Assessing the Utilization of Young-age Falcata [*Falcataria moluccana* (Miq.) Barneby & J.W. Grimes] for Veneer Production

Gilbero, Dennis M. , Lantican, Carl Anthony A. , Bondad, Elvina O. , Alipon, Marina A., Jimenez, Jr., Juanit

This paper presents the mechanical properties, veneer recovery including the cost benefits, of 3-, 5-, and 7-yr-old falcata [*Falcataria moluccana* (Miq.) Barneby & J. W. Grimes] for veneer production. Mechanical properties covered modulus of rupture (MOR), stress at the proportional limit, and modulus of elasticity (MOE) in static bending; compression parallel-and perpendicular-to-grain; shear; and hardness and toughness. The study was conducted to evaluate the effects of age on these properties and the cost-benefits of converting the species at different ages, and to recommend the optimum age and price for the utilization of the species for veneer production. The experimental materials consisted of six plus-size trees each per age from superior seeds of known origin in Caraga, Philippines. Standard procedures for testing the strength properties of timber (ASTM D143-14) were followed. Veneering was conducted using a spindleless lathe with a fixed setting for each designated veneer thickness output. Gross veneer recovery was 52% for both 3- and 5-yr-olds and 55% for the 7-yr-old. Net recovery, on the other hand, was 46% for the 3- and 5-yr-olds while 49% for the 7-yr-old. Utilizing falcata trees as young as 3-yr-old can generate positive cash flows for veneering plants, making it a worthwhile investment. However, from the perspective of falcata farmers and plantation owners, selling at 3-yr-old would be unfavorable considering the low selling price. **(Author's abstract)**

Keywords: *Cost-benefits, Mechanical properties, Veneer recovery, Young-age falcata [*Falcataria moluccana* (Miq.) Barneby J.W. Grimes], Environmental science*

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Carbon Dioxide Emissions and the Macroeconomy: Evidence from the ASEAN Region

Palanca-Tan, Rosalina , Buenavista, Mari

This paper examined the effects of income, trade, and foreign direct investments (FDI) on carbon dioxide (CO₂) emissions in the Association of Southeast Asian Nations (ASEAN) member countries for the period of 1970–2011 using the panel corrected standard errors (PCSE) estimation method. The results of the study were consistent with the environmental Kuznet's curve (EKC) hypothesis – CO₂ emissions increase as *per capita* GDP increases up to a certain income threshold, beyond which further increase in income is accompanied by lower emissions. However, the threshold *per capita* GDP (estimated to be USD 20,017) is way above the income levels of the ASEAN countries (with the exception of Brunei and Singapore). This suggests that most of the ASEAN region will still be in the upward-sloping portion of the EKC for several more years, and this necessitates an economic growth strategy that includes a stringent program to curb CO₂ emissions. Nonetheless, both trade and FDIs do not significantly contribute to CO₂ emissions in the ASEAN region, auguring well for the trade- and FDI-oriented development strategies adopted by most ASEAN member countries. Since low-carbon technologies and production methods are owned by high-income investing countries, trade and FDI can also be encouraged to facilitate and hasten the transfer of low-carbon technologies to the fast-developing countries of the ASEAN region. **(Author's abstract)**

Keywords: *Carbon dioxide emissions, Environmental Kuznets curve, Panel corrected standard errors, Pollution haven hypothesis, Trade openness, Environmental science*

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2021 June,

(Filipiniana Analytics)

NP

Characterization of Open Water Explosions from Confiscated Explosives in the Philippines – Possible Implications to Local Marine Mammals

Aragones, Lemnuel V. , Tapang, Giovanni A. , Hernandez, Daniella T. , Voloria, Arc

Underwater noise poses serious threats to marine mammals, which rely on underwater sound primarily for communication, orientation and foraging. In this study, underwater noise from dynamite fishing was analyzed to infer possible effects on local marine mammals, particularly cetaceans. Simulated explosions were performed on 9 July 2018 using confiscated explosives from illegal fishers in San Fernando, La Union. The acoustic properties of blasts from single pulse explosions were characterized using sound recordings captured by a hydrophone. Dominant frequencies from the sound recordings showed that the noise generated by the explosions can be perceived by marine mammals sensitive to the auditory bandwidth of 7 Hz to 180 kHz. Blast charge weights were estimated to determine sound pressure levels generated by the explosions at varying distances from the source. These results imply that marine mammals within 150 m of the explosion will experience debilitating injuries (e.g., acoustic trauma, disorientation) even from a single pulse. By characterizing the acoustic properties of these local explosives, its potential impacts to local marine mammals and other marine organisms can be elucidated. These acoustic calculations can be further enhanced by considering backscattered waves and determining the actual chemical composition of these explosives. **(Author's abstract)**

Keywords: *Marine mammals, Cetaceans, Underwater noise, Underwater explosion, Dynamite fishing, Hyhone, Environmental science*

0176

Development, Validation, and Application of a Three-way Cleanup Method for GC/MS Measurement of PCBs in Stranded Cetaceans in Philippine Waters

Kwan, Charita S. , Aragon, Lemnuel V. , Bondoc, Jo

Polychlorinated biphenyls (PCBs) are a group of synthetic organic chemicals that enrich the food chain via biomagnification where the highest levels have been detected in cetaceans. While several studies have reported cetaceans as sentinels of environmental pollution, information on the contamination status of PCBs in cetaceans found stranded along Philippine coasts has been very limited over the past decades. An important contributory factor to this paucity is the challenging analytical method for the analysis of PCBs in lipid-rich biological tissues due to lipid interferences that can affect gas chromatographic systems especially column efficiency and lifetime. Thus, a modified method consisting of a series of three cleanup steps – involving isolation column chromatography, gel permeation chromatography (GPC), and solid-phase extraction (SPE) using silica gel following Soxhlet extraction, plus macro- and micro-concentration prior to gas chromatographic/mass spectrometric analyses – was used. Recovery of added analytes corresponding to appropriate concentration ranges and repeatability of data values were excellent as values obtained were within the established performance criteria of 40–120% recovery, including a 106% mean recovery for the QC material (FAPAS T05100QC – Oily Fish) and < 30% RSD for an analyte concentration of 1 µg kg⁻¹. Thus, the modified cleanup technique in conjunction with GC/MS detection is proven suitable for its intended use. Thirty-eight (38) congeners (PCBs-8, -12, -19, -18, -33, -38, -35, -37, -52, -44, -57, -74, -79, -78, -81, -77, -104, -99, -123, -118, -114, -126, -155, -153, -162, -167, -156, -157, -169, -188, -189, -202, -195, -194, -205, -208, -206, and -209) were detected in cetacean blubber (n = 15) ranging from 21.7 ng g⁻¹ lipid weight (in an adult female dwarf sperm whale (*Kogia sima*) found in Camarines Sur) to 1460 ng g⁻¹ lipid weight (in an adult male rough-toothed dolphin (*Steno bredanensis*) found in Zambales. **(Author's abstract)**

Keywords: *Cleanup techniques, Philippines, Polychlorinated biphenyls, Stranded cetacean, Environmental science*

0177

First Evidence of Marine Litter Associated with COVID-19 in Davao Gulf, Mindanao, Philippines

Abreo, Neil Angelo S., Kobayashi, Vladi

The COVID-19 pandemic, apart from its health and economic impacts, has become a new contributor to marine litter. Pollution by personal protective equipment (PPE) in the environment has been recorded in different parts of the world. However, no such data is available from the Philippines. We present the first findings of a marine litter survey using an aerial drone on a beach in Davao Gulf Mindanao, Philippines, showing the first quantification of marine litter associated with COVID-19. Marine litter density was recorded at 0.7 items/m², with plastics making up most of the identified litter. Disposable face masks made up 2% of the total litter, having a density of 0.014

items/m². The presence of discarded PPE is a source of concern. Given that the use of PPE will continue, the number of PPE in the marine environment is expected to increase in the future. This study highlights the need to greatly improve the solid waste management of areas straddling Davao Gulf, especially in dealing with wastes that are associated with COVID-19. **(Author's abstract)**

Keywords: *COVID-19, Drone, Marine litter, Plastics, Pollution, Environmental science*

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NP

0178

Freshwater and Land Mollusk Diversity Patterns Along Dakil River at the University of the Philippines Laguna Land Grant (UPLLG), Paete, Laguna, Luzon Island, Philippines
de Chavez, Emmanuel Ryan C. , Parcon, Julius A. , Perez, Kinsley

Prior to this study, there had been no malacofaunal study in the University of the Philippines Laguna Land Grant (UPLLG). To address this, a diversity survey of its freshwater and land mollusks was conducted. A total of 25 quadrats (15 m²) on upstream and downstream stations along Dakil River and its tributaries for freshwater mollusks and 12 quadrats (100 m²) for land snails were set randomly to correlate their diversity patterns with environmental variables. From 115 individuals of freshwater mollusks, seven species (six gastropods, one bivalve) belonging to six families (Ampullariidae, Corbiculidae, Lymnaeidae, Neritinae, Thiaridae, and Viviparidae) were identified. On the other hand, seven species belonging to three families (Ariophantidae, Camaenidae, and Chronidae) were identified among 28 land snail individuals. Malacofaunal survey revealed that the area along Dakil River has low diversity in both freshwater mollusk ($H' = 1.40$) and land snail ($H' = 1.19$). Generalized linear mixed models (GLMM) revealed river velocity was the most significant predictor for species richness of freshwater mollusks, and abundance was highly affected by temperature and inversely affected by canopy cover. Furthermore, altitude was the most significant predictor for species richness of land snails and canopy cover for abundance. Understanding the molluscan diversity could help determine the environment and ecological conditions of the watershed for its effective management and conservation. **(Author's abstract)**

Keywords: *Diversity, Freshwater mollusks, Land snails, Dakil River, Species richness, Abundance, Environmental science*

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(Filipiniana Analytics)
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0179

Growth Patterns and AMS-¹⁴C Age Dates of Fossil Corals from Northwest Pacific
Matsuzaki, Hiroyuki , Bautista, VII, Angel T. , Yamazaki, Atsuko , Watanabe, Tsuyoshi , Garas, Ke

This study aims to evaluate the controlling factor/s of coral growth in the northwest Pacific during the Holocene. Here, we present newly acquired growth data and radiocarbon age dates of fossil *Porites* corals collected from Holocene uplifted marine terraces in Kikaijima, southern Japan and northwest Luzon, Philippines. Carbonate

mineral identification using X-ray diffraction (XRD) and scanning electron microscope (SEM) was conducted to screen for any diagenetic alteration in the fossil corals. We used accelerator mass spectrometer (AMS) – ^{14}C dating to determine the absolute age dates of the fossil corals. Well-preserved fossil corals yielded radiocarbon age dates of 3235 ± 20 and 5712 ± 24 cal. yr BP for Kikaijima and 6285 ± 79 , 6144 ± 77 , 4336 ± 21 , 4277 ± 19 , 4200 ± 20 , and 2972 ± 70 cal. yr BP for northwest Luzon. X-ray imaging of a 5-mm thick coral slab was utilized to measure growth variables. Linear extension rate, skeletal density, and calcification rate of Kikaijima corals are 3.77–8.72 mm/yr, 1.71–1.87 g/cm³, and 0.70–1.56 g/cm²yr, respectively. Linear extension rate, skeletal density, and calcification rate from northwest Luzon corals are 10.17–17.6 mm/yr, 0.66–1.67 g/cm³, and 0.91–2.81 g/cm²yr, respectively. Average linear extension rate from both sites was significantly and positively related to average calcification rate ($r = 0.72$, $p = 0.019$, $n = 10$). Skeletal density and linear extension rate measured from both sites were inversely related with each other ($r = -0.56$, $p = 0.09$, $n = 10$). Our data suggest that the variations in linear extension rates of fossil corals were influenced by the sea surface temperature (SST) difference between the study sites. However, data from modern corals are still needed to establish the local linear extension rate-SST relationship and to quantitatively evaluate how coral growth changes with respect to SST. Geomorphological, sedimentological, and geochronological studies of Holocene uplifted marine terraces should be conducted to provide the timing of emergence and coral reef development during Holocene. **(Author's abstract)**

Keywords: *ossil corals, Growth pattern, Japan, Philippines, Radiocarbon, Environmental science*

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NP

0180

Growth, Survival, and Behavior of Early Juvenile Sandfish *Holothuria scabra* (Jaeger, 1883) in Response to Feed Types and Salinity Levels under Laboratory Conditions
Uy, Wilfredo H. , Bacosa, Hernando P. , Espadero, Anabelle Dece A. , Sornito, Marnelle B. , Magcanta, Maria

Aquaculture of the tropical sea cucumber *Holothuria scabra* or sandfish is still at a developing stage, especially in the Philippines. In Mindanao, early juveniles of sandfish were successfully produced at the Mindanao State University at Naawan (MSUN) sandfish hatchery for 5 yr now. However, on-site growing of these early juveniles in ocean nurseries often suffered very low survival rates. Two separate laboratory experiments were conducted for 60 d to test for the effects of feed types (*Navicula* sp., powdered *Sargassum*, and *Sargassum* extract) and salinity levels [ambient seawater at 32–35 (as control), 20, 25, and 40 ppt] on the growth, survival, and behavior of 7-wk-old early juvenile sandfish (2–15 mm in length). Juveniles fed with *Sargassum* extract significantly produced the highest increase in width and length, followed by powdered *Sargassum* and *Navicula* sp. with a survival rate of at least 71%. The highest growth rate (GR) and survival were observed with ambient salinity, followed by 40, 25, and 20 ppt. Unusual pale coloration, sluggish movement, and destroyed integument in some parts of the body were observed in some juveniles exposed to lower salinity indication of an unhealthy individual. Overall, *Sargassum* extract is an ideal feed for sea cucumber juveniles. Low salinity is stressful to early juvenile sandfish and that growth and behavior were adversely affected. **(Author's abstract)**

Keywords: *Biological factor, Environmental factor, Hatchery-reared juveniles, Laboratory experiments, Sandfish, Environmental science*

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Non-linear Tree Height (h-d) Model Development and Forest Resource Productivity Assessment of Diguyo Limestone Forest within Northern Sierra Madre Natural Park

Baoanan, Zenaida G. , van Weerd, Merlijn , Lumbres, Roscinto Ian C. , Doyog, N

Forest resource monitoring of different forest types is of great importance in sustainable forest management and climate change mitigation. Monitoring the productivity of forest resources could be achieved by modeling the basic tree parameters necessary for forest growth and yield. This study was conducted to develop a height-diameter at breast height (h-d) model necessary for tree height (h) estimation since h measurement is difficult in the field, especially in dense forests, and to estimate the forest productivity of the Diguyo limestone forest within the Northern Sierra Madre Natural Park (NSMNP). The diameter at breast height (d) and h of 124 trees were measured in seven 400-m² plots as the basis for the model development. The h-d model was developed using different non-linear models such as the Chapman-Richards (CR), exponential (EX), Korf/Lundqvist (KL), modified logistic (ML), Schnute (SC), and Weibull (WE) models. The models were evaluated using the adjusted coefficient of determination (R² adjusted), Akaike information criterion (AIC), Bayesian information criterion (BIC), mean absolute error (MAE), root mean square error (RMSE), percentage root mean squared error (PRMSE), and root mean squared percentage error (RMSPE). The performance of the species-specific allometric models and the generic models were compared for the biomass productivity of the limestone forest. Results showed that the CR h-d model performed best with MAE, RMSE, PRMSE, RMSPE, R² adjusted, AIC, and BIC values of 1.47 m, 1.74 m, 19.31%, 28.71%, 0.79, 32.46, and 36.00, respectively. The highest average predicted tree biomass and carbon stock of the Diguyo limestone forest was 112.52 ± 97.65 t/ha and 50.64 ± 43.94 tC/ha, respectively, which is lower than other karst forests in Asia. The low forest resource productivity is due to the physical condition of the forest aggravated by natural and anthropogenic disturbances, thereby needing immediate attention to achieve forest sustainability.

(Author's abstract)

Keywords: *h-d model, Forest productivity, Diguyo limestone forest, NSMNP, Environmental science*

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Rapid Riparian Assessment of Selected Critical Rivers in Misamis Oriental, Philippines

Puno, Rena Christina C. , Puno, George R. , Opiso, Einstine M. , Amper, Rose Angel

Due to threats of agricultural expansion and urbanization, riparian areas of rivers are on the brink of deterioration impacting their ecological functions such as the attenuation of flood disasters. In the urbanizing cities and municipalities of El Salvador, Gingoog and Jasaan in Misamis Oriental in southern Philippines, rivers are considered critical due to its high risk to flooding occurrence. In order to implement appropriate river management practices in sustaining its ecological services, understanding the rivers' riparian status is necessary. Hence, this study was conducted to evaluate the current status of Molugan, Solana and Odiongan rivers riparian condition. Using a check list as a guide, abiotic and biotic components of the upstream, midstream and downstream sites of the rivers were rated and evaluated. Other factors such as land use and land cover pattern, population density, stream order and slope were also taken to account in the assessment. Results showed that all rivers are still in the sub-optimal conditions implied with minimal disturbance and deterioration. However of the three rivers, Odiongan was with the least ideal general riparian habitat condition which may be attributed to the river's larger size and accessibility to disturbance. Regardless of the good results, conscious regulation for the expansion of agricultural cultivation especially in the upstream areas of the watersheds is still recommended. In addition, appropriate land use zoning

must be implemented giving emphasis on the establishment of appropriate riparian vegetation buffer widths and integrating natural conservation strategies. **(Author's abstract)**

Keywords: *Abiotic component, Biotic component, Land cover/land use, Riparian, Rivers, Environmental science*

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NP

0183

Rooting Induction of a Mature *Pterocarpus indicus* Willd. Using Stem Cuttings Derived from Stump Epicormic Shoots

Carandang, Wilfredo M. , Reyes, Jr., Tomas D. , Piñon, Albert A., Carandang, Vid

Shoots arising from the stump of a mature tree of *Pterocarpus indicus* Willd. were used to evaluate the within-tree variation in rooting induction. Collected rejuvenated stem cuttings were separated into three different positions (base, middle, and top) and treated with various indole butyric acid (IBA) concentrations (0, 500, and 1000 ppm). Cuttings were planted in an improvised rooting chamber for rooting induction. Results of the analysis of variance achieved non-significant effects ($P > 0.05$) due to IBA treatment in all rooting parameters evaluated after 33 d. In contrast, a highly significant increase in the number of roots (0.93, $P = < 0.001$) was detected in terms of cutting position, particularly at the middle part. Similarly, apart from callus formation ($P > 0.05$), significant increase in percent rooting (46.83%, $P = 0.0012$) and number of secondary roots (0.93, $P = 0.0011$) were obtained from the same position. Meanwhile, non-significant effects were also recorded in terms of IBA and cutting position interaction, except from callus formation ($P = 0.036$). Means separated by DMRT revealed that the interaction effect between middle position and IBA500 ppm (0.13) and those between top position and IBA1000 ppm (0.58) were significantly different. This study has proven the presence of within-stem variation; hence, rooting responses vary in cuttings collected from epicormic shoots arising from the stump of physiologically mature *P. indicus*. **(Author's abstract)**

Keywords: *Cutting position, Epicormic shoot, Pterocarpus indicus, Rooting, Stump, Environmental science*

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0184

Rubiaceae Flora of Northern Sierra Madre Natural Park, Isabela, Luzon, Philippines: Species Richness, Distribution, and Conservation Status

Alejandro, Grecebio Jonathan D. , Biag, Rac

The Northern Sierra Madre Natural Park (NSMNP) in Isabela, Philippines holds the record of being the widest remaining tropical rainforest on the island of Luzon. However, this park remains underexplored in terms of its flora. A few botanical studies have been conducted but were particularly focused on the general floristic diversity of the area. No botanical studies have been done yet concentrated on a particular plant family. Species conservation and

protection could be more resounding if attention is given to a particular group of plants like the very diverse Rubiaceae family. Hence, an initial checklist of Rubiaceae species in NSMNP is provided with accounts in their richness, distribution, and conservation status. The botanical exploration was conducted in April–August 2019 in NSMNP, specifically in the coastal areas – namely, Palanan, Divilacan, and Maconacon – and a non-coastal zone, Cabagan. In total, 52 Rubiaceae species were recorded belonging to 23 genera and representing 15 tribes of the family. The number of species constitutes about 9.72% of the total number of species in the country. The most specious among the tribes belong to Psychotrieae (9), followed by Spermacoceae (8), Naucleae and Urophylleae (6), and Coffeae (5). Of these species, 31 are Philippine endemic, while two are considered narrow endemic to the province. As regards their conservation status based on the International Union of Conservation of Nature (IUCN) list of threatened species, one was assessed as critically endangered (CR) and another one as endangered (EN). Further, two more species were recognized as highly threatened (HT), being CR species, and two other species were assessed as vulnerable (VU) based on the Updated National List of Threatened Philippine Plants and Their Categories found in the Department of Environment and Natural Resources (DENR) Administrative Order No. 2017-11. **(Author's abstract)**

Keywords: *Angiosperms, Biodiversity, Botanical survey, Conservation, NSMNP, Environmental science*

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0185

Unsaturated Soil Hydraulic Conductivity (K_h) and Soil Resistance under Different Land Uses of a Small Upstream Watershed in Mt. Banahaw de Lucban, Philippines

Galang, Marco A. , Garcia, Ron

Soil hydraulic conductivity influences hydrologic processes and the ability of watersheds to provide ecosystem services. Like most soil properties, however, it is highly spatially variable at different scales due to biophysical and anthropogenic factors. To quantify spatial variability, the study assessed the influence of land use/land cover (LULC) on soil hydraulic conductivity and compaction, as reflected by soil resistance in a small upstream watershed. Compaction was measured using a soil compaction tester and the unsaturated soil hydraulic conductivity (K_h) was estimated in the field using the inverse auger hole method. Measurements were made across six LULC: agriculture (Agri), coconut with agricultural crops (Coco + Agri), coconut with pasture (Coco + Grass), coconut with forest (Coco + Forest), reforestation area (Refo), and forest (Forest). Measurements were taken at 0–30 cm and 0–50 cm soil depths. Results showed that soil hydraulic conductivity and resistance significantly differed across LULC and soil depths. Soil resistance averages 0.83 MPa for all LULC at 0–30 cm depth, which was significantly lower ($p = 1.184 \times 10^{-4}$) than 0–50 cm depth. Coco + forest recorded the highest soil resistance (1.01 MPa at 0–30 cm and 1.82 MPa at 0–50 cm), while Coco + Agri has the lowest resistance. Pairwise comparison of means also revealed that Forest at 0–30 cm depth had significantly higher ($p < 0.01$) K_h at 1.18 cm min^{-1} compared with other LULC across depths. K_h at 0–30 cm depth averages 0.57 cm min^{-1} for all LULC, which is significantly higher ($p = 3.229 \times 10^{-2}$) than 0–50 cm depth. This indicated a decreasing hydraulic conductivity with increasing soil depth. This implies that strategies for promoting groundwater recharge and sustaining freshwater supply for lowland communities, in general, should be founded on LULC decisions, especially in upstream watersheds. **(Author's abstract)**

Keywords: *Hydrologic behavior, Percolation, Soil strength, Subwatershed, Environmental science*

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Chemical and Antioxidant Activity Changes in Philippine Green Mussel (*Perna viridis*) during Fermentation at Varying Salt Concentrations

Sefil, Ariel S., Endoma, Jr., Leonilo F., Peralta, Ernestina M., Palmos, Grac

Green mussel (*Perna viridis*) is an extensively cultured bivalve species in the Philippines and a cheap source of valuable nutrients such as essential amino acids and minerals. Experimental samples were prepared by mixing salt to varying mussel meat ratios (1:3, 1:5, 1:7, and 1:9) which were assessed for changes in pH, degree of hydrolysis, and antioxidant activities during fermentation for 30 d. The pH levels in treatments 1:3, 1:5, and 1:7 decreased to low-acid levels ($< \text{pH } 4.6$) as fermentation progressed. Meanwhile, treatment 1:9 did not significantly change from its initial pH level with a slight decrease noted during 15 d but significantly increased at slightly neutral pH level (at 7.22) on 30 d. Formaldehyde nitrogen (formol-N) and the simultaneous formation of ammonia-N significantly increased ($p < 0.05$) with prolonged fermentation time but were more pronounced in 1:7 and 1:9 treatments. The gradual increase in pH and formol-N in treatments 1:3 and 1:5 could be due to the high salt content at $23.63 \pm 0.29\%$, and $19.48 \pm 0.88\%$, respectively, which could have slowed down proteolytic enzyme activity. However, continuous increase in ammonia-N in treatment 1:9 significantly reduced ($p < 0.05$) amino-N content which lowers the nutritional quality of fermented products. The development of antioxidant activities such as 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging activity, ferric reducing antioxidant power (FRAP), and total phenol content (TPC) as gallic acid equivalent (GAE) was highest in treatments 1:7 and 1:9. These findings could be attributed to the increasing degree of protein breakdown producing substances and reaction products with increased bioactivity. This is also supported by the significant positive linear correlation between formol-N and antioxidant system assays (DPPH, FRAP, and TPC) ($p < 0.01$). (Author's abstract)

Keywords: Amino nitrogen, Antioxidant activities, Fermentation, *Perna viridis*, Formol, Fisheries

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Determining Shell Shape Differences in the Horse Mussels *Modiolus philippinarum* (Hanley 1843) and *Modiolus modulaides* (Röding 1798) by Morphometric Analysis

Uba, Kaent Imman

In the present study, shell morphological variations of the horse mussel species *Modiolus philippinarum* and *Modiolus modulaides* have been explored by the means of linear morphometrics for size and landmark-based geometric morphometrics for shape. Linear morphometrics revealed significant differences in shell length [$t(298) = -6.29, p = 1.08 \times 10^{-9}$], shell height [$t(298) = 10.60, p = 1.74 \times 10^{-22}$], shell width [$t(298) = 2.13, p = 0.034$], PAMS or posterior adductor muscle scar length [$t(298) = 2.16, p = 0.032$], hinge length [$t(298) = 2.26, p = 0.025$], umbo length [$t(298) = -5.54, p = 6.73 \times 10^{-8}$], and anterior length [$t(298) = -5.59, p = 5.16 \times 10^{-8}$] between species. However, upon the use of these morphometric characters to develop an index that will easily discriminate the species, only the relationships of shell length vs. shell width and hinge length were significant (ANCOVA, width/length $F = 18.45, p = 0.0001$; hinge/length $F = 7.76, p = 0.005$) but an invariably high overlap between species was observed resulting in a 23.3% misclassification rate. Contrastingly, the analysis of shape variables

through landmark-based geometric morphometrics revealed significant differences in shell shape between the two species [MANOVA, Wilk's $\lambda = 0.01$, $F(24,335) = 941.4$, $p = 3.47 \times 10^{-291}$] with a 0.0% misclassification rate. Generally, *M. modulaides* were found to have an elongated shell while *M. philippinarum* was compressed and convex. Also, visualization through thin-plate spline expansion factor plots revealed that variability in shell shape between the species occurred mostly in the posterior and ventral region of the shell and was attributed to the species ecology. The findings of the present study encourage the use of geometric morphometric methods in species delineation, especially when ecotypes or sibling species are present. **(Author's abstract)**

Keywords: *Horse mussels, Morphometrics, Relative warp analysis, Thin-plate spline, Fisheries*

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0188

Early Life Stages of Fishes in Lake Taal, Philippines: Assessment and Implications for Biodiversity Management and Conservation

Tordecilla, Benjie D. , Nochete, Charmane B. , Merilles, Ma. Lourdes D., Mutia, Maria Theres

Lake Taal is the third largest lake in the Philippines and its fisheries provide livelihood to thousands of locals in its coastal areas. This study was conducted to recommend possible strategies and measures to conserve and protect the population of fishes, especially of the early life stages (ELS). The composition, abundance, and distribution of ELS and the environmental factors affecting these were investigated through monthly ichthyoplankton surveys and monitoring of water parameters, phytoplankton, and zooplankton abundances in 12 equidistant stations from January 2015 to December 2018. A total of 26,345 fish eggs and 9,140 fish larvae were collected, of which 88.9% of the fish larvae were morphologically identified into eight families, while the rest were unidentified. Families Terapontidae (44.5%) and Gobiidae (37.0%) numerically dominated the identified larvae catch. Distribution of the egg, yolk sac, and pre-flexion stages (ELS) significantly varied across stations. Three stations on the northern basin of the lake showed the highest fish egg abundance (731.82, 246.47, and 381.28 ind 100m⁻³) while stations on the west, northwest, and eastern bay of the lake showed the highest abundance of fish larvae (153.76, 121.28, and 94.64 ind 100m⁻³). The temporal distribution of ELS was highly associated with zooplankton, green algae, and salinity while spatial distribution was highly associated with the majority of the water parameters and chlorophyll a. Seasonal and annual distribution of ELS showed significant variation, which reveals possible spawning patterns of the identified fish larvae and the influence of varying environmental conditions to the distribution of ELS. Based on these, the identified possible spawning and larval foraging grounds are recommended as protected zones. Reduction of nutrient inputs to minimize changes in the lake trophic condition is also recommended. **(Author's abstract)**

Keywords: *Fish eggs, Fish larvae, Fish sanctuary, Ichthyoplankton, Spawning, Water quality, Fisheries*

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(Filipiniana Analytics)
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Fish Abundance and Physico-chemical Properties of Matingao River and Marbel River, Mount Apo Natural Park, Mindanao, Philippines

Leaño, Emmanuel P. , Salolog, Mary Cor S. , Tubongbanua, Jr., Romeo M. , Opiso, Einstine M. , Cudal, Maricris G. , Quimpang, Victoria T., Amoroso, Victor

Mount Apo Natural Park (MANP) is an important forest reserve in most part of Region XI and XII because of its watershed importance. However, the MANP may also be threatened by habitat modification that may alter most of its water resource. Thus, this study was conducted to assess the abundance of freshwater fish and analyze the physico-chemical properties like water temperature, pH, turbidity, dissolved oxygen (DO), total dissolved solids (TDS), electric conductivity (EC), oxidation-reduction potential (ORP) of the two major rivers of MANP. A total of six freshwater fishes consisting of four native and two introduced species were collected and identified in the two sampling stations. The native *Barbodes binotatus* (Valenciennes 1842) was found to be the most abundant in all the years the survey was conducted. The data on physico-chemical properties showed fluctuations in all year (2012-13 and 2015). High turbidity rate in Marbel River and high water temperature recorded in upper station of Matingao River could have influenced the collection and abundance of freshwater fishes. Shannon diversity index in Marbel River and Matingao River are very low with values of 0.69 (2012-2013); 0.68 (2015) and 0.70 (2012-2013); 0.70 (2015) for the two rivers, respectively. This could be attributed to anthropogenic activities, characteristics and physico-chemical properties of the river. **(Author's abstract)**

Keywords: *Fresh water fish, Introduced, Native, Turbidity, Water quality, Fisheries*

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2019,
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NP

***In Vitro* Egg Release and Fertilization of *Sargassum polycystum* C.Agardh, 1824 in Response to Different Environmental Conditions**

Leopardas, Venus E. , Cabactulan, Frederick B. , Calala, Lovella R. , Magcanta, Maria Lyn M., Bacosa, Hernando P. , Uy, Wilfred

The brown seaweed *Sargassum* spp., locally known as “samò,” is subject to increasing overexploitation in the natural environment; thus, culturing the species for mass production is necessary. Understanding the required environmental factors is essential in the successful culture and mass production of this species. This study aims to determine the egg release and fertilization of *Sargassum polycystum* in response to the different environmental conditions that may influence its reproduction. Fertile thallus of *S. polycystum* was collected at Naawan, Misamis Oriental, Philippines in March 2018. Reproductive receptacles were excised and placed in Petri dishes and were exposed to varying environmental conditions under laboratory conditions. The experiments were conducted in triplicate Petri dishes per treatment. Percent (%) egg release and percent fertilization were observed for about 2 wk. Results showed that percent egg release and percent fertilization did not differ significantly across temperature ranges (20–30°C) and desiccation time (5–60 min). Receptacles treated with nutrients resulted in only ~ 45% egg release with a daily decrease of 10% towards the addition of AGP fertilizer. The highest % egg release (80%) was observed in the control treatment (no fertilizer). Percent egg release in receptacles subjected to 20–45 PSU showed no significant difference. This study suggests that the optimum condition for the release of eggs and subsequent fertilization can be achieved under ambient temperature, with no direct exposure to sunlight, no addition of fertilizer, and within the ambient salinity of 30–32 PSU. **(Author's abstract)**

Keywords: Brown seaweed, Desiccation, Reproductive receptacles, Salinity, Temperature, Fisheries

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0191

**Influence of Nisin and Lysozyme on the Shelf Life of Hot-smoked Rainbow Trout Fillets
(*Oncorhynchus mykiss*) during Storage at 4 °C**
FÄ±cÄ±cÄ±lar, Bilge Bilgin, GenÄŖcelep, Huse

Hot-smoked rainbow trout (*Oncorhynchus mykiss*) fillets with vacuum packaging are an important export source and the manufacturers recommend a shelf life of 21 d at 4 °C. This time is very short in terms of the shelf life of packaged foods. In this study, nisin and lysozyme (0.5 and 1% w/v, respectively) were used in order to prolong the shelf life of hot-smoked rainbow trout by adding them to the brine (8–10 °C, 10 h). Five treatment groups were formed, including the control group. Samples (105) were hot-smoked at 72 °C and vacuum-packaged. The effect of nisin and lysozyme (0.5 and 1% w/v) on the chemical [pH, total volatile basic nitrogen (TVB-N), peroxide, thiobarbituric acid reactive substances (TBARS), free fatty acids (FFAs)], microbiological [total number of aerobic mesophilic bacteria (TMAB), number of lactic acid bacteria (LAB), total number of coliform bacteria (TCB), total number of psychrophilic bacteria (TPB)], and sensorial properties were investigated during storage at 4 °C for 42 d. TVB-N, TBARS, and FFA values were evaluated. The most favorable results among the treatment groups for the chemical analysis were observed in groups treated with nisin (1 and 0.5%, respectively) followed by lysozyme-treated groups (1 and 0.5%, respectively), and the control group. Nisin and lysozyme showed the most important effect microbiologically and extended the shelf life of the samples from 21 d to 42 d at 4-°C storage. The sensory analyses suggested that nisin and lysozyme treatments did not have a negative impact on the organoleptic properties of samples. Natural antimicrobials (nisin and lysozyme) reduced the TMAB, TCB, and TPB. As a result, it was determined that nisin and lysozyme can be used to increase the quality characteristics and shelf life of hot-smoked rainbow trout fillets instead of synthetic antioxidants and additives. (**Author's abstract**)

Keywords: Lysozyme, Nisin, Rainbow trout, Shelf life, Smoking, Fisheries

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NP

0192

Molecular and Morphological Identifications of *Anisakis* Dujardin, 1845 (Nematoda: Anisakidae) from a Rare Deraniyagala's Beaked Whale (*Mesoplodon hotaula* Deraniyagala, 1963) and Blainville's Beaked Whale (*Mesoplodon densi*)
Yoshinaga, Tomoyoshi , Aguila, Roselyn D. , Santos, Mudjekeewis D. , Blatchley, Darrell D. , Quiazon, Karl M

Beaked whales are among the definitive host of the parasitic worm *Anisakis* Dujardin, 1845. In this study, molecular [using ribosomal internal transcribed spacer (*ITS*) region and mitochondrial DNA cytochrome c oxidase subunit 2 gene (mtDNA *COX2*)] and morphological (light microscopy and scanning electron microscopy) identifications of

Anisakis from a rare Deraniyagala's beaked whale *Mesoplodon hotaula* Deraniyagala, 1963 and Blainville's beaked whale *Mesoplodon densirostris* Blainville, 1817 stranded in Davao Gulf, Southern Philippines are presented. Results conclusively revealed that the worm samples were *A. zippicharum*, representing an additional geographical record for the species along the West Pacific region and a first record examined from the rare Deraniyagala's beaked whale, representing a new host record for the species. Interestingly, both molecular and morphological data further revealed that the worms collected from Deraniyagala's beaked whale consisted of two subgroups under the *A. zippicharum* clade suggesting possible cryptic species, one of which is closely related to the Atlantic species while the other could be a local variant specific to the West Pacific. **(Author's abstract)**

Keywords: *Anisakis*, ITS region, *Mesoplodon hotaula*, *Mesoplodon densirostris*, Morphology, mtDNA COX2 gene, Western Pacific region, Fisheries

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NP

0193

Optimization and Functional Properties of a Protease from a Fish Gut Isolate *Pseudomonas* sp. PD14 Grown on Fish Processing Wastes Substrate
Simora, Rhoda Mae C. , Armada, Ci

Extracellular protease production from *Pseudomonas* sp. PD14 isolated from the gut of rabbitfish, *Siganus guttatus*, was investigated using fish processing wastes as nitrogen source. Three types of fish processing by-products – namely, heads, bones, and viscera – from yellowstripe scad (*Selaroides* sp.) and Japanese halfbeak (*Hyporhamphus sajori*), as well as trimmings and viscera from squid (*Loligo* sp.) were used. Among the fish waste preparations tested, Japanese halfbeak viscera (HV) flour (1.0%) supported the maximum protease production of 365.0 U/mg protein. Effects of media components on protease production in the optimized concentration of HV flour revealed that the protease enzyme can be optimally produced using maltose (0.50%) as a carbon source, at pH 8.0, and incubated for 48 h at 40 °C. Partial characterization of the crude enzyme supernatant showed that the optimum pH and temperature were 8.0 and 50 °C, respectively. Furthermore, the crude protease exhibited thermostability retaining 50% activity at 60 °C and fairly stable up to pH 11.0. Considering the high costs of industrial enzyme production, the use of fish processing wastes for protease production offers a promising future for enzyme biotechnology. **(Author's abstract)**

Keywords: Fish processing wastes, Gut bacteria, Protease, *Pseudomonas* sp., *Siganus guttatus*, Fisheries

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NP

Physico-Chemical Properties of the Fish Pond Water in CMU, Bukidnon, Philippines
Baltazar, Gloria Jes

Good water quality is a key component of sustainable aquaculture production. The present study reports the water physico-chemical properties of selected fish ponds in Central Mindanao University, Bukidnon, Philippines. The values of the parameters ranged from pH 8.36-8.64, 26.73-27.61 °C temperature, 203-211 µS/cm electrical conductivity, 98-128 NTU turbidity, 13.04-13.78 mg/L dissolved oxygen, 0.095-0.104 g/L total dissolved solids, 73.2-81.9 mg CaCO₃/L total alkalinity, 91.0-101.9 mg CaCO₃/L total hardness, 11.18-27.86 mg/L sulfate, 0.44-1.08 mg/L chloride, 24.61-50.52 mg/L phosphate, <0.001 mg/L cadmium, <0.01 mg/L lead, and <0.001 mg/L mercury. These findings conformed to the water quality guidelines for aquaculture production except for turbidity and phosphate content. Chloride concentrations were also remarkably low. It is recommended to conduct regular monitoring of the physico-chemical parameters of the pond water, and undertake corrective measures to reduce turbidity and phosphate to an acceptable level and increase the chloride to a level specifically suitable for catfish production. **(Author's abstract)**

Keywords: *Fish pond, Physico-chemical parameters, CMU, Fisheries*

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 2019,
 (Filipiniana Analytics)
 NP

Using CITES Appendix III to Protect Native Species Found in International Trade: the Case of the Philippines
Sy, Emerson Y. , Shepherd, Chris R. , Heinrich,

CITES, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, is an international agreement among currently 183 Parties. It is based on the use of three Appendices, in which species are listed according to their need for regulation in international trade. The vast majority of all CITES species are listed in Appendix I and II. Appendix III works differently from the other two Appendices and is seldom used. If implemented correctly, the use of Appendix III could greatly contribute to positive conservation outcomes. Here, we use the Philippines as a case study to showcase the potential benefits of Appendix III listings for the conservation of nationally protected, native wildlife species. We provide an overview of wildlife trade involving the Philippines and relevant national legislation. We proceed by presenting the requirements of an Appendix III listing, under which circumstances it can succeed in assisting to protect native species, and the direct benefits to the Philippines as well as other countries striving to protect native wildlife from international illegal exploitation. **(Author's abstract)**

Keywords: *Conservation, Conservation policy, Wildlife trade, Wildlife trafficking, Fisheries*

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 (Filipiniana Analytics)
 NP

Association of Omentin rs2274907 Gene Polymorphism and Its Protein on the Risk of Obesity and Metabolic Disorder in Thai Children

Kwanbunjan, Karunee , Prangthip, Pattaneeya , Sirikulchayanonta, Chutima , Karuwanarint, Piyaporn , Suriyaprom, Kanjana , Tungtrongchitr, Anchalee , Pheungruang, Banchamaphon, Tungtrongchitr, Rung

Omentin is an adipocytokine that expresses in white adipose tissues. It is a marker for preventing the development of pro-inflammatory states related to diseases like obesity. This study aimed to examine the concentrations of omentin and anthropometric-biochemical parameters in obese children and healthy controls. Also, to search for the associations of omentin rs2274907 gene polymorphism with omentin levels and obesity among Thai children. A total of 293 children, 178 obese cases and 115 healthy controls, were recruited for this study. The omentin level was measured using the enzyme-linked immunosorbent assay (ELISA), and genotyping was performed using the polymerase chain reaction–restriction fragment length polymorphism (PCR-RFLP) method. Serum omentin levels were significantly lower in the obese group than in the control group (13.9 and 25.0 ng/mL, respectively, $p < 0.001$). The omentin levels had significant negative correlation with body weight, body mass index (BMI) percentile, waist circumference, triglycerides ($r = -0.276, -0.275, -0.259, -0.242, p < 0.001$), and had positive correlation with high-density lipoprotein cholesterol (HDL-C) levels ($r = 0.210, p < 0.001$). There was a significant association between obesity and serum omentin levels ($p < 0.05$). However, the omentin rs2274907 gene polymorphism showed no significant relationship with the omentin levels and obesity among Thai children. These findings in Thai children suggest that omentin level, but not omentin rs2274907 gene polymorphism, may influence susceptibility to obesity. **(Author's abstract)**

Keywords: Gene polymorphism, ITLN1, Obese children, Obesity, Omentin, Thai, Food science and technology

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Food security amid the COVID-19 pandemic: research and development priorities for Higher Education Institutions in the Philippines and Southeast Asia

Gregorio, Glenn B., Ancog, Rico

Food security has long been a major development priority of all countries and will remain to be in the future. This has become all the more important in this time of COVID19 pandemic. It is achieved when there is the availability of and adequate access to sufficient, safe, and nutritious food at all times for individuals to maintain a healthy and active life. The United Nations has identified four pillars of food security: food availability, food access, food utilization and food stability. Through the years, all our efforts are expected to contribute to the pillars of food security, and a country's ability to consolidate its resources towards defining and achieving their aspired food security targets across relevant scales has become a major hallmark of development success. **(Author's abstract)**

Keywords: Covid 19, Food security, Food science and technology

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 2019,

Halal-HACCP Food Safety Competency Development for the 2019 SEA Games
Madriaga, Hannah P. , Azanza, Maria Patri

Knowledge-practice competency building was developed and evaluated through the use of the Centers for Disease Control and Prevention (CDC) training of trainers (TOT) framework utilizing subject matter experts (SMEs) as master trainers to create a pool of trained trainers who then implement the needed training of industry (TOI). The efficacy of the tested framework indicated that the results of the TOT and TOI competency self-evaluations, before and immediately after the respective training, improved from deficient to basic competency ratings of participants. The walk-through audit conducted by the trained trainers attested to their capability to identify compliance indicators for *Halal*, HACCP, and its prerequisite programs during the audit in the provision and service of food in games and accommodation sites of the 2019 SEA Games. The learnings established in the building of knowledge-practice competency during the 2019 SEA Games were recommended to be a useful case study in the formulation of a best practice for general sports event management that requires the implementation of the *Halal*-Hazard Analysis Critical Control Point Food Safety System (HHACCP FSS). **(Author's abstract)**

Keywords: 2019 SEA Games, Competency assessment, HACCP, Halal, Sports event, Training of trainers, Food science and technology

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Impact of Processing Stages and Additives on the Structural Quality of Cornstarch Bihon-Type Noodles

Jim, Jamielou T. , Katigbak, Samantha Kathryn V. , Alejandro, Celina Bianca S. , Azanza, Maria Patri

The study evaluated the structural changes in cornstarch-based *bihon*-type noodles formulated with xanthan gum (XG), rice flour (RF), palm olein (PO), and salt as adjunct ingredients at different processing stages that included: pre-gelatinization of starch binder, dough formation, manual extrusion, cooking by boiling, cold-shocking, and drying. Scanning electron microscopy (SEM), light microscopy, and differential scanning calorimetry (DSC) were utilized to monitor the structural changes. SEM results showed denser, flakier binder of the cornstarch xanthan gum rice flour noodle (CSXRFN) compared to cornstarch noodle (CSN) and cornstarch xanthan gum noodle (CSXN). The formation of spherulites as dense, hard, and brittle structures in dried noodles was also documented in SEM. Light microscopy indicated that CSN was less dense in structure and more prone to breakage, forming a hollow center in its dried noodle form, which was not established in noodles with XG and RF. DSC results showed endothermic thermograms. The DSC results of cooked samples were explained based on rehydration uptake mechanisms of the cooked samples and not gelatinization. **(Author's abstract)**

Keywords: Bihon, Cornstarch, Starch noodle, Rice flour, Xanthan gum, Food science and technology

Physicochemical, Nutritional Composition, Cooking, and Functional Properties of Newly Introduced Low Land Rice Varieties Grown in Ethiopia

Abera, Bayuh Belay, Tadesse, Eskindir E., Abera, Agimassie Agazie, Neela Sat

In Ethiopia, the cultivation of lowland rice varieties is recently introduced. However, the physicochemical and functional characteristics of these varieties are not reported. Therefore, this study was conducted to determine the physicochemical properties, proximate and mineral compositions, and cooking and functional properties of the six rice varieties (Demozie, Ediget, FOFIFA, Gumara, Hiber, and X-jigna) cultivated in two locations (Fogera and Pawe). Grain length, length-breadth (L/B) ratio, and thousand kernel weights (TKW) were within the ranges 5.16–7.19 mm, 1.81–2.6 mm, and 22.13–29.43 g, respectively. FOFIFA from Pawe was characterized by the highest values for grain length (7.19 mm) and TKW (29.43 g). The crude protein, ash, and fiber contents were within the ranges of 5.56–1.02, 0.47–1.58, and 2.16–3.66%, respectively. Varieties from Pawe contained significantly higher protein compared with Fogera. X-jigna from Pawe had the highest amylose content (26.57%) and alkaline spread value (ASV, 7.1), as well as the lowest for gelatinization temperature (64.33 °C) compared to others. The minimum cooking time ranged from 7.67 min for Hiber to 48.0 min for Gumara – both from Pawe. Gruel solid loss, water uptake ratio, and kernel elongation varied at 1.16–2.55, 1.34–1.46, and 1.04–1.17%. The calcium, zinc, iron, magnesium, and manganese contents were within the ranges of 0.60–19.60, 1.49–3.56, 1.21–9.26, 63.18–120.88, and 1.42–4.02 mg/ 100 g, respectively. Water absorption (WAI) and water solubility (WSI) indices were within the ranges of 6.03–6.20 g/g and 2.49–3.61 g/g, respectively. Gumara and Fogera had the highest (13.91) a* (redness) color value compared to others. All of the quality characteristics considered in this investigation were markedly influenced ($p < 0.01$) by the variety and growing location. It could be concluded that the use of different rice varieties cultivated at different locations yielded products with significantly different rice quality attributes.

(Author's abstract)

Keywords: *Food science and technology, Cooking properties, Functional properties, Mineral composition, Physicochemical properties, Proximate composition*

Place of Food Safety Education in the Philippine K to 12 Curriculum

Gabriel, Alonzo A., Chua, Consuelo T., Limon, M

Cases of school-aged children affected by foodborne diseases (FBD) are frequently reported, and this increasing rate of affected children is attributed to malpractices in food preparation and production. These malpractices are not only committed by the said population but are also done by businesses affiliated to schools and those by the school personnel. Thus, the study investigated the place of food safety education (FSED) topics in the present K to 12 Curriculum of the country. It explored the multiple dimensions of the 2016 curriculum guides (CGs) that contain

topics on food handling and preparation. A qualitative design was used in the situational analysis, which utilized various data collection and analysis techniques through participant interview, focus group discussion (FGD), and analyses of documents to provide information about where FSED as a topic is being integrated into the Intermediate (4–6), Junior (7–10), and Senior (11–12) High School subjects. Three food safety experts (FSEs) were purposively selected for the study. All of the FSEs are female and have experience working in the academe and industry. They reviewed and examined the CGs consisting of 600 pages for a period of 5 mo using an evaluation tool. As revealed, out of the 2,426 topic bodies in the assessed CGs, there are only 490 food safety (FS) topics, which only account for 20.20% of the total topics for all the subjects identified to have revealed traces of FS concepts and practices. Also, the CGs have no detailed specifications on the sub-topics to be discussed, FSED is not provided with an adequate learning space in the Philippine curriculum; rather, it is treated in a separate, scattered, and disconnected manner, positioning it at the margins of the curriculum. Therefore, the curriculum should provide a dedicated space focusing on FSED. This way, the identified weaknesses by the research in terms of conceptualization and implementation of FS-related topics could be satisfactorily addressed. **(Author's abstract)**

Keywords: Curriculum evaluation, Curriculum guide, Food safety, K to 12 Curriculum, Philippines, Food science and technology

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NP

0202

Risk Profiling of 3-MCPD (3-monochloropropane-1,2-diol) in Soy Sauce to the Adult Filipino Consuming Population

Villarino, Casiana Blanca J. , Mahoney, Deon , Bautista, Karina Angela D. , Bulagao, Bebviet Franz R. , Rustia, Abigail S. , Barrios, Erniel B. , Capanzana, Mar

Soy sauce is one of the commonly consumed food items in the Philippines because of its vast applications as a regular sauce and a condiment in various food dishes. One method used to produce soy sauce is chemical hydrolysis that involves acid hydrolysis of vegetable protein under high temperatures, which may generate a chemical by-product called 3-monochloropropane-1,2-diol (3-MCPD). Exposure to 3-MCPD may potentially cause adverse health effects to humans such as kidney, liver, and reproductive organ failure, as well as infertility and carcinogenicity. Thus, this study aimed to establish a profile on the potential risk associated with the consumption of soy sauce with 3-MCPD in the Philippines. This study included risk profile conceptualization, literature review, and identification of uncertainties and variabilities to formulate assumptions, which were then used in the dietary exposure (DE) assessment and estimation of risk of the adult Filipino consuming population to 3-MCPD in soy sauce. Analysis showed that the soy sauce samples ($n = 19$) collected from identified supermarkets and wet markets in the Philippines contained 3-MCPD levels below the maximum level (ML) of 0.4 mg/kg set by the 2019 edition of the Codex General Standards for Contaminants and Toxins in Food and Feed. With these generated data on the hazard levels, the high consumer (97.5th) percentile soy sauce consumption data from the Philippine Department of Science and Technology–Food and Nutrition Research Institute (DOST-FNRI), and the assumed body weight of an adult Asian, the DE of the adult Filipino consuming population to 3-MCPD in soy sauce was estimated to be 0.0327–0.1636 $\mu\text{g/kg}$ body weight (bw)/d, which was lower than 4 $\mu\text{g/kg}$ bw – the latest provisional maximum tolerable daily intake (PMTDI) set by the Joint FAO/WHO Expert Committee on Food Additives (JECFA) in 2016. Based on these findings, the consumption of soy sauce showed no appreciable risk to the health of the Filipino consuming population. **(Author's abstract)**

Keywords: Food science and technology, 3-MCPD, Philippines, Risk profile, Soy sauce

Risk Profiling of Fumonisin in Corn (*Zea mays* L.) to the Filipino Consuming Population

Villarino, Casiana Blanca J. , Barrios, Erniel B. , Mahoney, Deon , Bautista, Karina Angela D. , Guiriba, Danisha NiÁ±a S. , Rustia, Abigail S., Capanzana, Mari

The *Fusarium* fungus is known to produce fumonisin, a naturally occurring mycotoxin associated with chronic adverse health effects in animal liver and kidney, which is commonly found in corn (*Zea mays* L.), one of the major agricultural crops and staple foods in the Philippines. The objective of this study was to develop a profile of the potential risks associated with the consumption of corn contaminated with fumonisins B₁ (FB₁) and B₂ (FB₂). This study involved the determination of data gaps in the risk profiling process; identification, and characterization of fumonisin; estimation of the dietary exposure (DE) and risk based on identified uncertainties, variabilities, and assumptions; and determination of available risk management options for fumonisin in corn. Fumonisin levels of corn samples (n = 77) were all below the 4000 µg/kg maximum level (ML) set in the 2019 edition of the Codex General Standard for Contaminants and Toxins in Foods (Codex GSCTFF) for raw corn grains. At the 97.5th percentile consumption of corn [yellow, white, green (or sweet) corn; edible portions (corn kernels)], the calculated DE estimates of the Filipino adult (20–59 yr old) exceeded the provisional maximum tolerable daily intake (PMTDI) of 2 µg/kg bw (body weight)/d by 420.17% (maximum FB₁), 194.30% (maximum FB₂), and 189.81% (overall FB₁ mean). Considering the assumptions made and the gathered data in this study, the estimated DE to fumonisin in corn showed an appreciable risk to health. The current ML of fumonisin in corn and corn products adopted from Codex GSCTFF may be in need to be revisited to ensure the protection of the adult Filipino consuming population.

(Author's abstract)

Keywords: Corn, Fumonisin, Philippines, Risk profile, Food science and technology

Risk Profiling of Methylmercury in the Consumption of Dried Tamban (*Sardinella lemuru*) by the Filipino Consuming Population

Ledda, Wendy E. , Barrios, Erniel B. , Villarino, Casiana Blanca J. , Bautista, Karina Angela D. , Salem, Andrea Mae T. , de Guzman, Vea Clarissa L. , Rustia, Abigail S., Capanzana, Mario V. , Mahoney,

Methylmercury (MeHg) is one of the most toxic forms of mercury (Hg) produced via methylation of its inorganic form from natural and anthropogenic sources. Fish that feed on phytoplankton, such as sardines, serve as the entry points of MeHg in the aquatic food web. Dietary exposure (DE) to MeHg leads to varying health risks such as ataxia, neurodevelopmental delays, and blindness in newborns and infants. The study aimed to develop a risk profile on the potential risk associated with the consumption of Philippine dried *tamban* (*Sardinella lemuru*) through 1) conceptualization of the risk profile, 2) review of related literature, 3) formulation of assumptions (i.e. identification of variabilities and establishment of uncertainties or data gaps), 4) exposure pathway assessment, and 5) risk

characterization. The risk of MeHg was estimated using the total mercury (THg) concentrations in dried *tamban* samples collected from the major fishing grounds of sardines in the Philippines, consumption data of the adult Filipino consuming population, and the assumed average body weights of Asian adults. The estimated DEs ranged from 0.000043–0.008724 µg/kg bw (bodyweight)/wk, which is equivalent to about 0.003–0.545% of the provisional tolerable weekly intake (PTWI) of 1.6 µg/kg bw for MeHg established by the Joint FAO/WHO Expert Committee on Food Additives (JECFA) in 2007. Our findings imply that dried *tamban* does not pose a major health risk to the adult Filipino consuming population. However, it is also essential to note that aside from dried *tamban*, there are other potential sources of MeHg in the diet such as other fish and seafood. **(Author's abstract)**

Keywords: *Bali sardinella (Sardinella lemuru), Methylmercury, Philippines, Risk profile, Food science and technology*

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NP

FORESTRY

0205

Awareness and Knowledge on Forest Certification in the Philippines: Foresters' Perspectives
Nicmic, Jean C. , Capinpin, Hanna Leen L. , Villanueva, Ma. Magdalena B. , Bugayong, Leonida A. , Casin, Ma. Cynthia S. , Palacpac, Aresna B. , Dolom, Priscila C. , Tolentino, Noel L., Donoso, Leonit

Executive Order (EO) 23 provides for the strict implementation of a national forest certification (FC) system to steer the forestry sector into a sustainable path. Furthermore, EO 318 on sustainable forest management (SFM) also requires an FC system for the country to transition from a traditional forest management system to sustainable forestry. Foresters have a significant role in SFM. While they are expected to have a better understanding of FC, there is a need to determine their readiness for the proposed implementation of FC in the Philippines. A survey was made using a structured questionnaire to determine how attuned foresters are to current developments in FC. The respondents are generally aware and have heard about FC since they are all foresters by profession. However, their level of knowledge differs on specific aspects of FC. Knowledge scores of the respondents indicate a low level of knowledge, specifically on the aspect of what is being certified. Likewise, there is a low level of knowledge on who can certify since the respondents commonly think that the Department of Environment and Natural Resources (DENR) can certify or be a certifier. The respondents have moderate knowledge of what FC is and who can be certified. High knowledge scores were obtained on the processes involved in FC. The results show a positive perception among foresters towards FC, particularly on its contribution towards economics and market, socio-economic improvement, and policy. Despite this, gaps in knowledge and perceptions of foresters still need to be addressed. Recommendations include the development of information and education campaign (IEC) materials and programs, as well as curricular offerings on FC. **(Author's abstract)**

Keywords: *Awareness, Forest certification, Knowledge, Perception, Forestry*

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NP

Determination of Carrying Capacity Estimates of Ecotourism Attractions in the Quezon Protected Landscape, the Philippines

Dida, Jan Joseph V. , Tiburan, Jr., Cristino L. , Malabrigo, Jr., Pastor L. , Galang, Marco A. , Andrada, II, Rogelio T. , Eduarte, Ger

Protected areas (PAs) are becoming extremely important ecotourism destinations. These areas are at risk from uninformed and unregulated visitors who can cause pollution (air, noise, water, etc.) and alteration of the natural ecosystem processes. An effective ecotourism planning and management approach should consider and define an optimum threshold level for the use of ecotourism attractions while maintaining a sound biophysical and social environment. Although carrying capacity is important in regulating visitor influx, the application and practice of this concept are not currently being observed in Malabayabas Forest, Pinagbanderahan Peak, and Pinagbanderahan Trail, which are the main ecotourism destinations of the Quezon Protected Landscape (QPL) in Atimonan, Quezon Province, the Philippines. This paper focuses on the carrying capacity estimates of these attractions considering site-specific physical, biological/ecological, and social factors. Data on visitation characteristics were collected through a questionnaire-based survey administered to 82 respondents in the months of August and December 2015. The real carrying capacity (RCC) estimates were found to be 289, 25, and 951 visitors for Malabayabas Forest, Pinagbanderahan Peak, and Pinagbanderahan Trail, respectively. The results demonstrated that actual visitations in these attractions are still below the carrying capacity estimates. However, there is still a risk for congestion and overcrowding, particularly during high visitation periods; without these thresholds, the influx of visitors poses serious pressure on the natural resources as well as ecological balance, which may lead to subsequent degradation of the PA. The study results can be used as an input in crafting a responsive visitor management program for QPL. Likewise, it can serve as a model in the determination of carrying capacity for other ecotourism sites in the country.

(Author's abstract)

Keywords: *Protected area, Resource management, Tourism management, Visitor management, Forestry*

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Domestication of “Deguai” (Saurauia bontocensis Merr.) at La Trinidad, Benguet, Philippines

Yabes, Milbrenne D. , Esteban, Marjie B. , Ngiwas, Sano L. , Bao-idang, Conrado C. , Tacloy, J

“Deguai” (*Saurauia bontocensis* Merr.) is an indigenous wild fruit-bearing tree in the Cordillera Administrative Region (CAR), Philippines. Due to rampant and continuing conversion of its habitat into agricultural and other uses, its population has become low, and its distribution has narrowed considerably. Thus, conserving and domesticating this endemic species by establishing propagation techniques and mini-tree plantations is timely and crucial. Results showed that deguai could be readily raised by sowing fresh seeds in heat-sterilized loam soil without pre-germination treatments. It took 22 d from sowing to start and 48 d to end the germination, with a mean germination percentage of 39.60. Moreover, transplanted seedlings in various media combinations showed significant growth differences in root collar diameter (RCD) and length of primary and secondary roots but not on their height and number of secondary roots. Compost in combination with either topsoil or sand significantly emerged as the most suitable media for the growth of the studied seedlings. Stem cuttings grew best untreated rather than applying rooting hormones such as alpha-naphthalene acetic acid (ANAA) and Hormex. This result was manifested in the significantly high survival rate, numerous developed buds, and longest newly developed shoots of untreated

cuttings. Stem cutting section treatment significantly affected the number of developed buds only, where base cuttings had the most. The mini-tree plantation established using rooted stem cuttings was successful with a high survival rate of 89.26% after 5 yr from field planting and with four deguai trees bearing fruits for the first time after 7 yr from field planting. The nursery-grown seedlings planted in the mini-tree plantation have exhibited a 99% survival rate nine months after outplanting. Thus, deguai can be domesticated in the new habitat for fruit production, improvement of the environment, and biodiversity conservation. Monitoring of the trees continues, and a study toward generating a fruit production-enhancing technique for the species is readied for implementation. **(Author's abstract)**

Keywords: Deguai, Rooting hormones, *Saurauia bontocensis* Merr., Stem cuttings, Tree domestication, Wild fruit trees, Forestry

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NP

0208

***Influence of Leaf Number, Rooting Trait, and Cutting Size in Vegetative Propagation of
Aquilaria cumingiana [Decne] Ridl.***

Reyes Jr., Tomas D. , Tolentino, Jr., Enrique L. , Piñon, Alb

A low-cost technique of propagation study to determine the influence of leaf number and relationship among rooting trait and cutting size was carried out on cuttings from seedlings of *Aquilaria cumingiana*. The highest percentage of rooting was detected in cuttings with two leaves (83.62%) and lowest in cuttings with the greatest (3) number of leaves (50%). Comparison of the means revealed a significant increase in percent rooting, number of roots, and length of the longest root on cuttings with two leaves. Correlation analysis among root traits revealed significant ($P < 0.0001$) low to high positive relationships ($r^2 = 0.26-0.91$). The strongest association was recorded between the average root length and the length of the longest root ($r^2 = 0.91$, $P < 0.0001$). All relationships between the rooting trait and the cutting size displayed weak and non-significant ($r^2 = 0.04-0.17$, $P > 0.05$) – suggesting that aside from amount, variation in distribution and transport of naturally occurring endogenous auxin might probably affect the rooting. This study generated an economical and practical protocol to vegetatively mass-produce this premium species. Further studies are recommended, particularly with regards to auxin quantification to identify and quantify the specific naturally occurring endogenous auxin that is affecting the rooting of *A. cumingiana*. **(Author's abstract)**

Keywords: Agarwood, *Aquilaria cumingiana*, Auxin, Correlation, Forestry

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NP

Kandelia candel (L.) Druce, a True Native Species in the Philippines
Malabrigo, Laarni D. , Eduarte, Gerald T. , Malabrigo, Jr., Pastor L., Coracero, Ericso

Kandelia candel (L.) Druce is a true mangrove species under the family Rhizophoraceae. It is distributed throughout southeast Asia to south China, the Ryukyu Island and southern Japan, Taiwan, and Hong Kong. In the Philippines, its only known area of occurrence is the province of Aurora, the central easternmost coast of Luzon island. However, there has been a long-standing debate on the presence of natural populations of Kandelia candel in the Philippines. Adding to the confusion, a number of molecular studies reported that the Kandelia populations from north of the South China Sea (SCS) are a genetically different species – Kandelia obovata – making the genus non-monotypic. Some mangrove biologists hypothesized that Kandelia populations in Aurora might have been introduced to the province by some fishermen from Taiwan. On the other hand, some papers suggest that Kandelia populations in the Philippines were shaped by the founders from the populations in Southern SCS. A recent population inventory conducted by the authors, complemented by taxonomic characterization, strongly suggests that Kandelia candel is native in the province of Aurora, Philippines. (Author's abstract)

Keywords: *Kandelia candel, Kandelia obovata, Rhizophoraceae, Forestry*

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 (Filipiniana Analytics)
 NP

Monitoring of Land Use and Land Cover Changes in Mt. Pulag National Park Using Landsat and Sentinel Imageries
Baoanan, Zenaida G. , Lumbres, Roscinto Ian C. , Doyog, N

The degree of land use and land cover (LULC) conversion of Mt. Pulag National Park (MPNP), Benguet Province, Philippines, from 1990–2020 was assessed to provide valuable information for land resource management strategies. The increasing demand for vegetable farming threatens the park with further degradation. The magnitude of changes in the LULC of MPNP was determined using Landsat 5 for 1990–2010 and Sentinel-2 for 2020. The FLAASH (Fast Line-of-sight Atmospheric Analysis of Hypercubes) algorithm was performed to enhance the reflectance of the satellite images before data analysis. The maximum likelihood classification (MLC) was used to classify the MPNP into five LULC changes: agricultural lands, barren lands, built-up areas, forest lands, and grasslands with areal percentage cover of 15.88, 0.26, 1.34, 80.51, and 2.01%, respectively, in 2020, and overall accuracy of 90.58%. The LULC percentage of change from 1990–2020 showed that agricultural areas increased by 8.96%, barren lands decreased by 2.14%, built-up areas increased by 1.02%, forest lands decreased by 8.35%, and grasslands increased by 0.51%. The results showed that the increasing area of human-induced LULC class such as the agriculture lands and built-up areas is the primary cause of forest land loss. However, the barren lands undergoing natural regeneration contribute to the gain of the forest area. Therefore, the LULC conversion pattern serves as a warning that the park will continue to lose a significant portion of the forest due to land conversion if no intervention is done. (Author's abstract)

Keywords: *LULC, MLC, MPNP, Optical data, Remote sensing, Forestry*

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 (Filipiniana Analytics)

Physical and Mechanical Properties of Stems and Branches of Falcata [Falcataria moluccana (Miq.) Barneby & J.W. Grimes] Grown in Caraga, Philippines
Carandang, Wilfredo M. , Razal, Ramon A. , Marasigan, Oliver S., Alipon, Marin

The physical and mechanical properties of branch wood from falcata [*Falcataria moluccana* (Miq.) Barneby & J.W. Grimes] grown in Caraga Region, Philippines were determined to assess suitability for end-uses such as core veneer and as material for light construction and handles and boxes as the stem wood. Tests done to compare the properties with the stem wood showed significant differences in relative density (average values of 0.284 for the stem wood and 0.255 for the branch wood) and shrinkage properties in all directions. Axial position significantly influenced variation in moisture content ($p = 0.0024$) for stem and branch wood, as well as relative density ($p = < 0.0001$) plus percent tangential ($p = < 0.0001$) and radial ($p = 0.0014$) shrinkage. For the mechanical properties, the stem wood end hardness was significantly higher by 28.8% at green condition ($p = 0.0003$) and by 13.36% at 12% MC ($p = 0.0133$) than the branch wood. The compression perpendicular to the grain at 12% MC of the stem wood was also higher by 16.10% ($p = 0.0166$). However, for the other mechanical properties studied, the differences were not significant. The bottom portion of the stem and branch wood exhibited the highest mechanical properties, which can be attributed to the higher relative density at this portion ($p = 0.0001$). Based on the results that showed insignificant differences in most of the properties between the wood types of *F. moluccana*, the branch wood can possibly be used for similar applications as the stem wood such as for light construction, non-structural veneer, and plywood; for tool handles, boxes, and other household items; and for pulp and paper. The utilization of the branch wood of *F. moluccana*, therefore, can augment the raw materials supply for the local wood industry. **(Author's abstract)**

Keywords: Branch wood, *Falcataria moluccana*, Mechanical properties, Physical properties, Stem wood, Forestry

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2022 April,

(Filipiniana Analytics)

NP

GEOLOGY

Investigation of Gamma-ray Shielding Features of Several Clay Materials Using the EPICS2017 Library
Hila, Frederick C. , Gili, Mon Br

In this study, the investigation of the Electron-Photon Interaction Cross Sections 2017 (EPICS2017) library on the radiation shielding properties of several clay materials is presented. The EPICS2017 library was interpolated in the recommended interpolation law through the EpiXS program. Calculations were made for the mass attenuation coefficients (MACs), mean free paths (MFPs), half-value layers (HVLs), tenth-value layers (TVLs), and effective atomic numbers (Z_{eff}) of the materials, in photon energies ranging between 1 keV and 100 GeV. The results from EPICS2017 were compared with values from experimental and theoretical methods used in characterizing the photon shielding properties. Experimental MACs agreed well with the EPICS2017 evaluations with percent deviations ranging from 0.1–5.3%. The theoretical MAC values derived using EPDL97 and XCOM-NIST strongly

agreed with EPICS2017, with percent deviations ranging from 0.0–0.7% for the discrete gamma-ray energies between 609–1764 keV. Overall, ball clay and kaolin clay demonstrated the most desirable radiation shielding characteristics. From these findings, the EPICS2017 library was demonstrated as an important alternative in future photon shielding research of general construction and building materials. The EpiXS is a versatile tool to compute the radiation shielding parameters mentioned, specifically in using EPICS2017 as a photoatomic library. **(Author's abstract)**

Keywords: *Clays, EpiXS, Gamma-radiation, Photon attenuation, Shielding, Geology*

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(Filipiniana Analytics)
NP

HEALTH AND WELLNESS

0213

Classical music: A therapy for reducing stress during latent phase of labor among primigravida women

Patindol, Guia Murrie S. , Macadangdang, Lester John B. , Galdo, Mary Louizel R. , Leguin, Bismark L. , Danis, Mary Grace M. , Dellosa, Mary Jane L. , Gaspar, Charity Le

This study tests the effectiveness of music therapy in decreasing stress levels experienced by primigravida women during the latent phase of labor. This study was conducted at Family Care and Maternity Clinic in New Pandan Street, Panabo City. Twenty-three primigravida women served as volunteer respondents. Data was gathered through a validated survey questionnaire that uses the Likert Scale. T-test statistical analysis was conducted to measure if there was a significant difference on the stress levels of primigravida women before and after receiving music therapy. Results showed that physical, psychological and socio-cultural factors have the greatest effect on the stress levels among primigravida women. Results proved that classical music is an effective counter for the anxiety of women ongoing labor. Statistical analysis results showed the calculated t , 2.75, to be higher than tabular t , 2.15, hence there is a significant difference on the level of stress among women in the stage of labor and delivery before and after receiving music therapy. These results illustrated that exposure to music was a good mechanism in coping up with nervousness and stress among the surveyed primagravida women. **(Author's abstract)**

Keywords: *Music therapy, Stress, Primigravida women, Latent phase of labor, Philippines, Health and wellness*

Optima, Volume No. 1 Issue No. 1, 73-79
2013,
(Filipiniana Analytics)
NP

Nutrition and Health Status of Indigenous Peoples (IPs) in the Philippines: Results of the 2013 National Nutrition Survey and 2015 Updating Survey

Ducay, Apple Joy D. , Acuin, Cecilia Cristina S. , Austria, Rovea Ernazelle G. , Duante, Charmaine A., Capanzana, Mari

In the Philippines, there is little documentation about the population size of indigenous peoples (IPs) and more so on their health and nutrition status. This study aimed to address the gap in knowledge on the IPs' nutrition and health status in the Philippines. Analysis of secondary data collected in the 8th National Nutrition Survey (NNS) 2013 and the 2015 Updating Survey of the Nutritional Status of Filipino Children and Other Population Groups conducted by the Department of Science and Technology–Food and Nutrition Research Institute (DOST-FNRI) was done. Face-to-face interviews, anthropometric measurements, blood extraction, urine collection, and blood pressure measurements were utilized as data collection methods. Findings illustrate that majority of the IPs belonged to the poorest and poor quintile, had low educational attainment, and were rural residents. The pervasive problem of undernutrition in the form of stunting and underweight was the most pronounced problem among children and adolescents. Overnutrition was prevalent among adults. Micronutrient deficiencies also exist in the form of anemia and iodine deficiency. There is also evidence of inadequate dietary consumption among the IPs. As evidenced by the results – compared with the non-IP individuals and households – the IP population was poorer, had a significantly higher prevalence of undernutrition and iodine deficiency, and had lower adequacy of energy and other nutrient intakes. On the other hand, the selected risk factors for non-communicable diseases such as hypertension, abdominal obesity, smoking, and alcohol consumption were more pronounced among non-IPs compared to the IPs. IPs remain a marginalized sector of society, making them highly vulnerable to the same persistent nutritional and health problems non-IPs experience. Therefore, culturally sensitive and appropriate interventions should be formulated to improve IPs' nutrition and health status in the country. **(Author's abstract)**

Keywords: *Health, Indigenous peoples, Nutrition, Philippines, Health and wellness*

Philippine Journal of Science, Volume No. 151 Issue No. 1, 513-531
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 (Filipiniana Analytics)
 NP

Prevalence of Dog Bites and Risk Factors Among Residents of Maramag, Bukidnon

Leonoa, Hannah Charmaign S. , Dargantes, Alan P. , Daguro, Ted Aries A. , Obedencio, Jr., J

Around 2,000 cases of animal bites are reported every year in animal bite centers in Maramag, Bukidnon. The study aimed to determine the prevalence and risk factors associated with dog bite victims in selected barangays of Maramag, Bukidnon, Philippines. A face-to-face interview was carried out using a pre-tested questionnaire among 402 residents in Maramag, Bukidnon, to determine the prevalence and risk factors of dog bite victims of the municipality. Ten barangays were grouped into the rural and urban type of community. The results showed that the apparent prevalence of dog bite victims among residents of Maramag, Bukidnon was 23.6% (95/402). The urban barangays had a prevalence of 26.2% compared to rural barangays with 21%. The gender of victims, civil status, educational attainment, and dog-ownership are the risk factors that are statistically significant in dog bites. The study revealed that dog bite victims of Maramag, Bukidnon are prevalent with 23.6%, and this result does not depend on the type of community. Furthermore, the study shows that being male, single, have low educational attainment, and dog-ownership increases the risks of being bitten by dogs. **(Author's abstract)**

Keywords: *Dog bite, Prevalence, Risk factors, Health and wellness*

Survey on Health and Safety Concerns of Laboratory Animal Workers in the Philippines

Agapito, Josephine D. , Bibay, Jan Irv

Occupational health and safety are important aspects of the workplace. This study was carried out to identify the common occupational health and safety concerns of laboratory animal workers (LAWs) in the Philippines. Specifically, it aims to describe the frequency of encounters with the different health and safety concerns plus the encounters based on the workers' demographic profiles, animal contact, and the frequency of personal protective equipment (PPE) usage at work. An online survey questionnaire was developed and confidentially administered to the respondents via email through the Philippine Association for Laboratory Animal Science (PALAS). A total of 44 responses met the research inclusion criteria. The three most common health and safety concerns encountered by LAWs at work were animal-related injuries (34/44, 77.3%), sharp-related injuries (30/44, 68.2%), and allergy from animals (23/44, 52.3%). These were consistent regardless of the workers' age, gender, job title, years of work experience with laboratory animals, animal contact, and frequency of PPE usage at work. A high rate of experiencing animal-related injuries was observed even with the frequent use of available PPE. With this, the study revealed that LAWs in the Philippines are exposed to different health and safety concerns present at work. Moreover, the study showed the need to evaluate further the current practices and ensure implementation of additional safety measures to lessen the occurrence of these concerns and protect the health and safety of the workers. **(Author's abstract)**

Keywords: *Animals, Disease, Injuries, Occupational health, Safety, Health and wellness*

INFORMATION AND COMMUNICATIONS TECHNOLOGY

Assessment of Iodate in Food-grade Salt Based on a Smartphone Colorimetric Platform

Sevilla, III, Fortunato B. , Galiga, Henl

The regular monitoring of iodized salt available in the household and marketplace is necessary for the effective implementation of the national program of salt iodization to control iodine deficiency and its associated diseases. This study describes a colorimetric measurement of iodate in table salt using a smartphone equipped with applications for color analysis and direct readout of iodate levels. The method involved the measurement of the blue component of the colored solution under controlled lighting conditions. The parameters for colorimetric reactions were optimized using a univariate approach – including KI concentration, pH, type and volume of acid, and order of addition of reagents. The effect of NaCl and sample size on the B signal was also investigated. Under optimum conditions, a linear response was observed from 10 to 175 mg iodate per kg of salt ($r = 0.9959$) with a coefficient of

variation of 1.9% over this range and a detection limit of 2.7 mg kg⁻¹ salt. The method was applied for real samples, and the results agreed well with the reference method at the 95% confidence level. The simplicity of operation, compactness, and wide availability of smartphones offer a convenient colorimetric platform for the iodate assessment in table salt. **(Author's abstract)**

Keywords: *Information and Communications Technology*

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LIBRARY AND INFORMATION SCIENCE

0218

Clinical librarian service in the Philippines: experience in a critical care setting of a tertiary hospital

Santos, Mark Anth

Considered as the earliest form of embedded librarianship, a clinical librarian service/program involves the provision of information directly at the point of care. Being at the place where patient care is being delivered, the clinical librarian can provide specialized and timely information to health care professionals. Numerous studies on the potential, benefits, and effectiveness of clinical librarianship have been published. However, its practice and implementation in most hospitals around the world, especially in the Philippines, is not yet prevalent. This case study describes the experiences of a clinical librarian in a critical care unit of a private tertiary hospital in Quezon City from 2013 up to 2018. Roles and activities performed by the clinical librarian in the neurocritical care unit are presented. Recommendations on establishing a clinical librarian service, particularly in the Philippines, are discussed.

Keywords: *clinical librarianship, embedded librarianship, clinical librarian service, informationist, tertiary hospital, Philippines, Library and information science*

Journal of Philippine Librarianship, Volume No. Issue No. ,
2018,
(*Filipiniana Analytics*)

0219

Community readiness assessment for a community-based collecting and archiving project for contemporary komiks

Boquiren, Alain And

This study assessed the willingness and readiness of the local komiks community in the National Capital Region to collaborate in a community-based archiving initiative. The author also identified concerns of this community regarding the preservation of their works, namely: the protection of their rights as content creators, the protection of their works from piracy, and the sustainability of the preservation effort. A project plan based on the findings was

developed to help komiks community members and archive practitioners collaborate on a collecting and archiving project, which can be used as a starting point for a komiks preservation practice.

Keywords: archiving, collecting project, comic books, community-based, komiks, Library and Information Studies, Philippine comics, preservation, National Capital Region, Library and information science

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2018,
(Filipiniana Analytics)

0220

Marist School integrated information literacy program (MASINFORM Program): integration of information literacy skills and library lessons in a school's curriculum

Evangelista-Abrigo, Dia

The paper aims to design an integrated information literacy program and to assess its effect on the information literacy skills of Marist School Grade 1-6 pupils. The research design of this study employed a mixed method approach, descriptive for the development phase and quasi-experiment for the assessment stage. The study found out that an essential factor in designing an integrated information literacy program is the strong collaboration of teachers and librarians. It also revealed that Grade 1-6 pupils information literacy skills improved after attending sessions on information literacy.

Keywords: information literacy skills, school library, integrated information literacy program, descriptive experiment, quasi-experiment, grade school pupils, Library and information science

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2021,
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MARINE SCIENCE

0221

Initial Findings Suggest Box Jellyfish Encounters along Shallow Philippine Coastlines are Predictable

Metillo, Ephrime B. , Ang, Julia Louise , de los Santos, Jr., Berlin , Verdadero, Francis Xavier D. , Licuanan, Wilfr

Jellyfish stings account for numerous deaths in the Philippines. Despite this, there is little scientific information on the identity, distribution, seasonality, and ecology of the box jellyfish species involved. We present initial findings of three months (April–June 2021) of monitoring the abundance of and envenomations by box jellyfishes in eastern and western Luzon. Emergent patterns suggest encounters between box jellyfish and people are more likely to occur in beach areas within a few kilometers from rivers when tidal ranges are large, particularly around the flood phase of high tide. Encounters are also more likely on coasts where the monsoon winds blow onshore during the warmer

months, bringing these animals closer to beach areas. They then stay longer in the shallows when the seas are calm. Beachgoers are, thus, advised to plan their destinations and activities carefully and wear protective clothing when venturing into shallow coastal areas. **(Author's abstract)**

Keywords: Box jellyfish, Chironex, Deaths, Envenomations, Measurement trap, Marine science

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2021 December,
(Filipiniana Analytics)
NP

0222

Length-Weight Relationship and Condition Factor of the Silver Rasbora (*Rasbora argyrotaenia*) from Sungai Batang River, South Kalimantan, Indonesia

This study describes the growth pattern, condition factor, length at first capture, length at first maturity, and selection factor (SF) of silver rasbora (*Rasbora argyrotaenia*) in Sungai Batang River, Indonesia. This species is commercially exploited and highly vulnerable to overfishing. The fish samples were purchased periodically once every 2 wk from the gillnet fishermen. A total of 255 specimens consisting of 121 males and 134 females [79.43–85.56 mm total length (TL) and 4.22–5.21 g body weight (W)] were investigated procedurally. Males showed a negative allometric growth ($b = 2.71$), while females exhibited isometric growth ($b = 3.02$). Males had TL, W, BD (body depth), and the mean ratio of W/TL that are significantly higher than those of females. The highest catch fell between 80–89 mm TL (39.67–43.28%) and weighted between 4–6 g (57.02–65.67%). The condition factor values of males and females were 0.80 ± 0.23 and 0.82 ± 0.20 , thus indicating that the fish were in good condition. The estimated length at first capture and SF were 80–76 mm TL and 3.99–4.20, thus indicating that the used 0.75-in mesh size of gill net was acceptable for fishing practices. However, empirically, the length at first capture was smaller than the length at first maturity (male = 87.53 mm; female = 84.57 mm), leading to growth overfishing. The output of this study could be useful for baseline information in formulating a sustainable fisheries management strategy since many aspects related to *Rasbora* fishery have not been fully studied. **(Author's abstract)**

Keywords: Condition factor, Growth pattern, Gillnet, *Rasbora argyrotaenia*, Selection factor, Sungai Batang River, Marine science

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(Filipiniana Analytics)
NP

0223

Measuring Up to the Challenge: Enhancing the Capacity of ARAICoBeH System by Enabling Coral Colony Size Measurement ***Yáñez, Aletta T. , Cadelina, Patrick Lawre***

The health of many coral reefs around the globe is being threatened by a variety of local and global stressors, which makes it even more important to assess and monitor them. While the coral cover is one of the easiest and used quantifiers of reef health, the addition of coral colony sizes provides deeper insights into reef recruitment potential,

fecundity, and possible environmental conditions for survivability. The use of the ARAICoBeH (A Rapid Assessment Instrument for Coastal Benthic Habitats) System can already provide similar coral cover and composition results as common methods in coral reef monitoring yet are faster and cheaper. The capacity of the ARAICoBeH System was expanded to coral measurements by adding paired lasers, and results were compared with tape measurement and photoquadrat methods. The time and cost to conduct this study were also compared for the three methods. The results illustrate that the ARAICoBeH System with paired laser attachment was able to provide digital reference points that can be used as a scale to accurately measure coral colonies. Colony sizes across different coral lifeforms derived from the system correlated well overall with the two commonly used methods. The colony size distributions from ARAICoBeH more closely resembled the distribution from the photoquadrat data than from the tape measure method. While the varying resolution of images from the ARAICoBeH System took longer to process, the overall time and cost to conduct this study were faster and cheaper, respectively. From these findings, the addition of paired lasers proved to enhance the capability of the ARAICoBeH System as a viable, low-cost, and rapid coral reef assessment method. **(Author's abstract)**

Keywords: *Benthic habitats, Colony size distribution, Coral assessment, Rapid assessment, Marine science*

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0224

Prograding Shoreline, Emerging Gravel Bars, and Mangrove Recolonization in 40 Years on a Mixed Siliciclastic-Carbonate Coast in Southwestern Luzon, Philippines
Ramos, Riovie D. , Soria, Janneli Lea A., Doctor, Ma. Angelique A. , Siringan, Fernando

Changes in shoreline positions provide a historical record for identifying causal mechanisms and adaptive responses of coastlines to a wide spectrum of sea-level change that arises either from natural or anthropogenic disturbances. This paper presents a case study of coastal change during a period of the steady rise in sea level that is coupled with frequent storm events. Observations from multiple sources including field survey, topographic map, and series of satellite images were combined and analyzed to determine shoreline changes along the western coast of Calatagan, Batangas from 1979–2018. The Digital Shoreline Analysis System (DSAS) extension tool of ArcGIS was used to estimate magnitudes of shoreline changes, either erosion or accretion. Surface sediment samples were acquired in March and April 2010 to assess the predominant grain size and composition. Historical shoreline positions show that the western coast of Calatagan exhibits discrete erosion, but predominantly coastal accretion trend over a period of nearly 40 years. Both land progradation and the emergence of sand-gravel bars after 1992 occurred in a period of rising sea level across the South China Sea basin, including the West Philippine Sea. Land progradation is attributed to an increase in sediment input to the coast from agricultural activities in unconsolidated volcanic terrain. Notably, overlapping events of storms between 1993–1995 and the 1994 tsunami in the Verde Island Passage (VIP) may have emplaced and reworked a large amount of reef front material onto the reef flat forming emergent bars. Newly accreted lands and emergent bars were subsequently colonized by *Avicennia* and *Sonneratia* mangroves. This study highlights that in certain areas, local factors such as increased sediment supply from agricultural activities, storms, and possibly tsunami can modulate shoreline changes in response to modern-day sea-level rise. **(Author's abstract)**

Keywords: *Fringing reef, Sea-level rise, Sediment supply, Storm, Tsunami, Marine science*

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2021 October,
(Filipiniana Analytics)
NP

Using Social Media Platforms to Study the Ecology and Exploitation of Mud Lobsters in the Philippines

Salva, Peithe Ma , Dong, Cheng-Di , Peña, Candelaria C. , Albarico, Pinky Jee B. , Albarico, Frank Paolo

Mud lobsters are burrowing crustaceans that are widely distributed in the Indo-Pacific region, including the Philippines. However, they are somehow neglected in scientific studies in the country. The increasing risks brought by this pandemic further impede field surveys as mobilization is highly regulated. Hence, the use of social media platforms was explored to study the ecology and exploitation of mud lobsters in the Philippines. This study used content analysis of YouTube videos. Key terms were searched to identify contents such as 'Philippines,' 'mud lobsters,' and local terms like '*bulaso*,' '*uson*,' and '*wrong*.' A total of 30 videos were analyzed. Videos were posted from 2015–2021 from at least 10 provinces. Results reinforce the already known wide distribution of mud lobsters in mangrove forests, fishponds, and rice fields beside mangroves. Still, there were notable mud lobster behaviors observed such as 1) surfacing during the rainy season, 2) the timing of which disturbed burrow is repaired, and 3) conspecific repulsion – all of which were not previously documented. Empty burrows were also found inhabited by the terrestrial crab *Cardisoma carnifex*. Mud lobsters were commonly caught using bamboo traps, but some had developed unique fishing techniques such as mound disturbance and the *tali-tali* method. Alarmingly, this study also found the use of toxic chemicals for illegal fishing activity. This study provides evidence on the potential use of social media to study aquatic organisms. Additional knowledge on mud lobster ecology and baseline information on some aspects of its fishery in the Philippines was observed. Social media can be useful for surveillance and ecological studies but could not be used as an alternative method for in-depth biological and taxonomic studies, where actual specimens are necessary. **(Author's abstract)**

Keywords: Behavior, Fishing methods, Illegal fishing, Thalassinidae, YouTube videos, Marine science

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 2021 December,
 (Filipiniana Analytics)
 NP

Vibrio and Heterotrophic Marine Bacteria Composition and Abundance in Nutrient-enriched Kappaphycus striatus

Luhan, Maria Rovilla J. , Santander de Leon, Sheila Mae S. , Nuna, Sharon N. , Tahiluddin, Alba

Inorganic nutrient application in *Kappaphycus* seaweed farming has been a practice in the southern Philippines for the past years. To investigate the inorganic nutrient's influence on the number and assemblage of *Vibrio* and heterotrophic marine bacteria and on the presence of ice-ice disease-inducing bacteria in *Kappaphycus striatus*, a field experiment was conducted using ammonium phosphate (16-20-0) fertilizer at high concentration (HC, 8.82 g L⁻¹), low concentration (LC, 0.01 g L⁻¹), and control (C, 0.00 g L⁻¹). *Vibrio* (VCs) and heterotrophic marine bacterial counts (HMBCs) were found similar among treatments. Based on 16S rRNA gene sequencing, isolates from source *K. striatus*, nutrient-enriched *K. striatus* (HC, LC, and C), farm seawater, and fertilizer solutions were identified as *Vibrio alginolyticus* (three strains), *V. parahaemolyticus*, *V. brasiliensis*, *V. harveyi*, *Gilvimirinus chinensis*, and species related to *Bacillus* sp. ST7, *Psychrobacter* sp. ST8, *Enterococcus* sp. ST5, *Oceanobacillus* sp. ST9, and *Paracoccus* sp. ST10. *Bacillus* sp. ST7 and *Oceanobacillus* sp. ST9 were unique and only present in HC

and LC. The agarolytic activity of *G. chinensis*, isolated from all samples, suggests that it is an ice-ice disease-causing bacterium. The microbial community dynamics of farmed *K. striatus*, when enriched with inorganic nutrients, may pave way in addressing the occurrence of ice-ice disease. **(Author's abstract)**

Keywords: *Heterotrophic marine bacteria, Ice-ice disease, Inorganic nutrient enrichment, Kappaphycus striatus, Vibrio, Marine science*

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2021 December,
(*Filipiniana Analytics*)
NP

MATHEMATICS

0227

Assessment of Filipino Higher Education Students' Readiness for e-Learning During a Pandemic:: A Rasch Technique Application

Mendoza, Jared Jorim O. , Ebal, Lara Paul A. , Comia, Liza N. , Talento, Mara Sherlin DP. , Grajo, Joyce DL. , Reyes, James Rol

This paper investigated the level of e-learning readiness of Filipino higher education students in the midst of the Coronavirus Disease 2019 (COVID-19) pandemic. Although e-learning is not new in the Philippines, its enforced adoption nationwide as a measure to keep education going must be studied, given the general uncertainty in student readiness. Using Rasch analysis – specifically, the Andrich rating scale model (ARSM) for item response theory – results showed that student readiness for e-learning is a multidimensional metric that is consistent with many claims. Filipino students are ready in terms of computer/internet self-efficacy; however, they are not ready in terms of learner control. The differential item functioning (DIF) analysis showed that gender significantly differentiates e-learning readiness under learner control and self-directed learning. Meanwhile, program classifications have significant differences in responses under computer/internet self-efficacy and online communication self-efficacy. This paper reveals the importance of determining student readiness for e-learning in the midst of a difficult situation – a pandemic. **(Author's abstract)**

Keywords: *Andrich rating scale model, COVID-19, Differential item functioning, Item response theory, Online learning readiness scale, Remote learning, Mathematics*

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2021 June,
(*Filipiniana Analytics*)
NP

Block-level Optical Character Recognition System for Automatic Transliterations of Baybayin Texts Using Support Vector Machine

Mendoza, Renier G. , Pino, Rodney B., Sambayan, Rachell

Baybayin is a Tagalog-language writing system primarily used in the northern Philippines during the pre-Hispanic period. In 2018, the House of Representatives approved House Bill 1022 or the “National Writing System Act,” which declares the Baybayin script as the Philippines’ national writing system. Thus, documents, signages, books, etc. may soon have Baybayin texts. However, the Latin alphabet is still the primary script used in the country. Hence, it is possible that Latin and Baybayin scripts may be found on the same text. In this paper, we present an optical character recognition (OCR) system that identifies Baybayin scripts from Latin in a text image. The preprocessing method applies the conversion of the input image to binary data and calculating the respective bounding box of each word found from the text, where we utilize a modified δ - means algorithm and MATLAB ocr function, respectively. The classification then involves isolating each word and further segmenting each character’s components. With the aid of a support vector machine (SVM) character classifier, we determine the word’s script by the highest number of characters classified into either Baybayin or Latin. To the best of our knowledge, this is the first system that discriminates, at the block level, the Baybayin script from Latin. The proposed algorithm yields a 93.64% recognition accuracy tested in a novel dataset. The accompanying code of the proposed algorithm and the dataset are made publicly available to make the results of the study reproducible.

(Author's abstract)

Keywords: Baybayin and Latin word script identification, Baybayin word transliteration, Support vector machine, Optical character recognition, Mathematics

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 2022 February,
 (Filipiniana Analytics)
 NP

Difference Sets from Unions of Cyclotomic Classes of Orders 12, 20, and 24

Balmaceda, Jose Maria P., Estrella, Benedict

Let δ be a prime of the form $\delta = \delta' N + \delta''$ for integers $\delta' \geq \delta''$ and $\delta' \mu > \delta''$. For $\delta < 10^5$, we show that difference sets in the additive group of the field \mathbb{F}_δ are obtained from unions of cyclotomic classes of orders $\delta' \mu = 12, 20$, and 24 and determine all such unions using a computer search. We then determine if the difference sets are equivalent to known cyclotomic or modified cyclotomic quadratic, quartic, sextic, or octic difference sets or their complements. This fills the gaps in the literature on the existence of difference sets from unions of cyclotomic classes for the specified orders. In addition, we extend Baumert and Fredricksen’s 1967 work on the construction of all inequivalent $(127, 63, 31)$ -difference sets from unions of 18th- cyclotomic classes of $GF(127)$ by constructing six inequivalent $(127, 63, 32)$ -difference sets with zero added from unions of cyclotomic classes of order $\delta' \mu = 18$. **(Author's abstract)**

Keywords: Difference set, Cyclotomic class, Cyclotomic number, Unions, Mathematics

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 2021 December,
 (Filipiniana Analytics)
 NP

Factors Associated with Career Track Choice of Senior High School Students

De Lara, Mark Lexter D. , Martinez, Marisol P. , Gestiada, Geleena A. , Lopez-Relente, Marie Joy F. , Nazareno, Allen L., Roxas-Villanueva, Ranzivelle Mari

Selecting a career track is crucial and must be thought of carefully because of its long-term impact on an individual's future career. With the implementation of the K to 12 program in the Philippines, students need to choose from four career tracks before entering senior high school (SHS). Knowing the factors that may influence students' career track choices can be helpful in the development of strategies that may help them make intelligent decisions. In this study, data from 3,813 Grade 11 students were analyzed to determine the variables associated with career track choice and the extent of influence of factors using descriptive, correlation, and correspondence analyses. Results showed that the intended course in college is strongly associated with SHS track/strand choice. Personal preference and parent's influence are shown to be important factors. Socio-demographic variables such as sex, age, birth order, number of siblings, and monthly family income have a moderate association with the SHS track/strand choice. Likewise, parents' highest educational attainment, the course taken in college, current occupation, and the student's academic performance in several subjects (e.g. Filipino, English, Math, and Science) have a moderate linear relationship with SHS track/strand choice. **(Author's abstract)**

Keywords: *Career choice, Career influences, Education, Senior high school, Mathematics*

Philippine Journal of Science, Volume No. 150 Issue No. 5, 1043-1060
 2021 October,
 (Filipiniana Analytics)
 NP

Impact of Subsidies on Market Competition in the Philippine Agriculture and Manufacturing Sectors

Barnedo, Emmanuel DC., Inocencio, Arlen

Subsidies have been historically used to support firms and industries deemed important to the economy. One of the justifications for using subsidies is to address market failures. When markets do not exist or there are fewer and dominant players, government support can play a critical role in directly providing incentives that can encourage new players to join the market, which in turn may or may not disadvantage other firms. This study examines the impact of subsidies on market competition in the Philippine agriculture and manufacturing sectors. We apply measures of market concentration and power; complement these with panel econometric regression analyses using the 2010–2015 Philippine Statistics Authority (PSA) data on business and industry. We show that there may be highly concentrated agriculture and manufacturing subsectors which are subsidized despite likely exhibiting non-competitive nature. And through “forward orthogonal deviations” (FOD) generalized method of moments (GMM) approach, results show that highly concentrated subsectors may not sufficiently exhibit non-competitive behavior. Our findings also indicate that subsidies appear to have lagged effects in both sectors. Government support given to the government-owned and controlled corporations (GOCCs) leads to market power in the agriculture sector. **(Author's abstract)**

Keywords: *Competition, Generalized method of moments, Government-owned and -controlled corporation, Market concentration, Market power, Subsidy, Mathematics*

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 2021 October,

Negative Probability Current in a Freely Falling Quantum Particle
Villanueva, Anthony Al

A quantum particle (represented by a Gaussian wave packet) under uniform gravity, projected upward (the conventional positive direction) along the vertical degree of freedom x , may have a negative probability current on a set of points q . This imposes the condition that the position and momentum observables of the state are negatively correlated. We calculate the effect of the negative correlation on the individual contributions to the probability current by the positive and negative momentum amplitudes of the state using an integral representation of the probability current. Negative position-momentum correlation causes a transient attenuation of all contributions to the probability flow, and wave packet spreading is temporarily mitigated. **(Author's abstract)**

Keywords: *Ballistic particle, Position-momentum correlation, Probability current, Quantum mechanics, Mathematics*

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NP

Pricing a Combined Life and Health Insurance with Level Premiums and Varying Benefits
Cuaresma, Diane Carmeliza N. , Mamplata, Jonathan B. , Kabiri, Azra

The growing interest in insurance poses a threat to insurance companies. As the number of individuals seeking insurance coverage increases, the number of individuals adversely selecting the insurer also increases, which can lead to the insurance product being unprofitable. Thus, this study explores designing an insurance product – a combined life insurance and health insurance product that will reflect the actual claims of an individual to his/her policy – that will hopefully help prevent unprofitability of the insurance product. This is done by applying incentives and penalization, or the bonus-malus system, to the insurance benefit while leaving the premium constant. Assuming that premiums for life insurance and health insurance are constant, transition and pricing models are derived. Considering two forms of combination of life and health insurance: a combined life and hospitalization income insurance and a combined life and medical insurance, we illustrate the derived model assuming Makeham distribution for life insurance claims and Poisson distribution and gamma distribution for the hospitalization income insurance and medical insurance claims, respectively. The proposed design gives a new framework for combining life and health insurance, as well as a methodology for combining other types of insurances. **(Author's abstract)**

Keywords: *Bonus-malus system, Gamma process, Poisson process, Mathematics*

Philippine Journal of Science, Volume No. 150 Issue No. 4, 691-702
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NP

Rasch Analysis of the University Student Depression Inventory (USDI) Using the Polytomous Partial Credit Model

Quimbo, Maria Ana T. , Maligalig, Dalisay S. , Balbuena, Sher

The University Student Depression Inventory (USDI; Khawaja and Bryden 2006) is a 30-item scale that is used to measure depressive symptoms among university students. Its psychometric properties have been widely investigated under the classical test theory (CTT). This study explored the application of the polytomous Rasch partial credit model (PCM) in evaluating the USDI using response data from a sample of Filipino university students ($n = 441$). Using sequential tests under the Rasch measurement framework, model fitting was performed through item- and person-fit analyses to detect and address possible sources of measurement noise, followed by tests of local independence and differential item functioning (DIF). Results revealed that the original scale contained five misfitting items (6, 7, 10, 12, 20); hence, the deletion of such items was proposed to provide a new but psychometrically sound measure of student depression. Further analysis of the data detected person misfits whose responses were removed in subsequent analyses of local independence and DIF. One pair of locally dependent items (25, 26) and three gender-biased items (1, 3, 8) were detected, which necessitates further item review for possible idiosyncratic meanings. This study showed that Rasch analysis of self-reported questionnaires like the USDI can complement factor analytic approaches, especially in the detection of multiple sources of measurement errors that may undermine the quality of survey data. **(Author's abstract)**

Keywords: *Item response, Measurement error, Misfit evaluation, Student depression, Validation, Mathematics*

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 (Filipiniana Analytics)
 NP

Solving Faculty-Course Allocation Problem Using Integer Programming Model

Gavina, Maica Krizna A. , Villegas, Kyla Kiela S. , Torres, Moni

One of the most challenging tasks performed by the department chair every semester is the assignment of faculty members to courses. This task, when done manually, is tedious to accomplish because of the numerous faculty-course combinations, the policies to be considered, faculty retirements, faculty resignations, and the hiring of faculty members. Satisfying the needs of employees has been increasingly significant in the scheduling decisions of different companies. In this study, a binary integer programming model that considers the preferences of faculty members was proposed to solve the faculty-course allocation problem. Constraints that permit the faculty members to perform other duties aside from instruction were included in the model. The model was applied to the faculty-course assignment of a department. Schedules that considered both policies in educational institutions and the preferences of faculty members were obtained. **(Author's abstract)**

Keywords: *Mathematics, Assignment, Binary integer programming model, Faculty members to courses allocation, Preferences of faculty members*

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 NP

Technology Integration Traditions, Transitions and Best Practices in Philippine Higher STEAM Education

Masangcay, Dennis B. , Ayuste, Thaddeus Owen D. , Avilla, Ruel A. , Butron, Benilda R. , Morales, Marie Paz E., Laureano, Rosell

The literature's focus on technology integration (henceforth as TI) in the country has been noteworthy and extensive in the use of ICT in the teaching and learning (TL) process. However, studies on TI's aspects such as accessibility, teacher training, tools and equipment, and digital literacy remain underexplored. Through a five-instrument classroom observation protocol, this study explores the traditions, transitions, and best practices in TI of 85 tertiary teachers of STEAM (science, technology, engineering, agri-fisheries, mathematics) disciplines in the Philippines. The findings indicated that TI practices are clustered as conventional, web/ software-based, and electronic/computer-based. For instance, the majority of the teachers prefer conventional technology and practice a low level of engagement to web and learning applications in the context of pedagogy and content/discipline, and learners. Specifically, the transition to advocating higher engagement to technology and blending such to pedagogy and content are evident in science, mathematics, engineering, and technology. The analysis also revealed that TI practices, which exhibit fusion of the technological pedagogical content knowledge (TPCK) system also matched the Philippine Professional Standards for Teachers (PPST) domains specific to pedagogy and content, assessment and reporting, and diversity of learners and learning environment. The study further showed that the best practices of TI in terms of eight teacher technological characters emphasize their sustainability literacy skills such as future thinking, values thinking, systemic thinking, and strategic thinking. Correspondingly, Philippine universities and colleges may explore professional development programs for STEAM teachers in preparation for 4IR (fourth industrial revolution). **(Author's abstract)**

Keywords: Education 4.0, Learning continuity, Philippine STEAM education, Technology, Technology integration, Mathematics

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On the Propagation of Chaos for Recombination Models

Ong, Lu

We consider binary interactions in an N-particle system. In particular, we use probability distributions known as recombination models to describe these interactions. Chaos propagates when the stochastic independence of two random particles in a particle system persists in time, as the number of particles tends to infinity. The concept of propagation of chaos was first introduced by Kac in connection with the Boltzmann equation, while modeling binary collisions in a gas. We obtain a development of Kac's program in the framework of recombination models. Specifically, our aim is to prove the relevant propagation of chaos phenomenon for our particle system. We first show that the solution for the master equation of our time-continuous process converges. Then, we use this solution together with the concepts of marginal measure and chaos to prove our desired result. Our main theorem for this study says that if a sequence of measures on our defined particle system is chaotic, then the resulting sequence of measures that had undergone the recombination process is also chaotic. This implies that the study of one particle after recombination gives information on the behavior of a group of particles in our particle system. **(Author's abstract)**

Keywords: Particle system, Recombination, Master equation, Propagation of chaos, Mathematics

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NP

0238

Towards a Robust Intellectual Property and Technology Commercialization Platform at the University of the Philippines Los Baños (UPLB): The Case of DOST-PCAARRD-funded Research Projects

Aviso, Aldrex L. , Jalbuena, Jalyza Mae , Junsay, Michael Viccil B. , Cabrera, Emil John C., Baticados, Glenn N. , Batayo, Daniel

An intellectual property (IP) audit was conducted among 212 research projects funded by the Department of Science and Technology–Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development (DOST-PCAARRD) and implemented by the University of the Philippines Los Baños (UPLB) from 2010–2015. A total of 71 (33%) have the IP component only, while 17 (8%) have both IP and technology commercialization (TC) elements. Of the 17 research projects, 12 (71%) have undergone the technology readiness level (TRL) and are included in the 19 technologies funded by DOST-PCAARRD currently being prioritized by Technology Transfer and Business Development Office (TTBDO) for IP rights (IPRs) protection and TC. Of these technologies, six have ongoing licensing agreements with the private sector, and another three are groomed for a spin-off. All nine have undergone fairness opinion board (FOB) examination, while the remaining 10 are in various stages of IP protection and commercialization. A notable surge in patent application occurred in the first three quarters of 2017 when 14 applications representing 33% of the total patent applications in the last 16 years were filed in the IP Office of the Philippines. As of 2012, with financial support from local and foreign funding, UPLB has produced more than 200 technologies ranging from agriculture and biotechnology to machinery and postharvest technology plus other allied fields. Included in the list are Sinta papaya, BIO-N, Mykovam, virgin coconut oil, and *Trichoderma*. Some of which have reached the international market earning substantial income for the university and its inventors and breeders principally through royalties ranging from 3–10 % of the licensee's gross sales. Additional seven technologies funded by other government funding agencies ripe for commercialization are open to manufacturers, distributors, and research service agreements. **(Author's abstract)**

Keywords: Intellectual property, Intellectual property audit, Technology readiness level, Technology commercialization, Mathematics

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NP

Acceptability of Information Technology Systems Developed for Distant Philippine Communities among Local Health Providers
Caballes, Al

Introduction. The National Telehealth Service Program (NTSP) has developed Information Technology (IT) systems aimed at improving health services primarily in isolated Philippine communities. These included two electronic health records modalities (Community Health Information Tracking System, or CHITS, and Real-time Regular Routine Reporting for Health, or R4Health), a referral system (Telemedicine), and a remote diagnostic device (RxBox).

Objectives. This study was undertaken to describe the utilization and cost patterns as well as the perceptions of the local health personnel regarding the use of the various NTSP systems. The implications of the end-user perceptions on the acceptability and expanded use of the IT interventions were inferred, from which corresponding policy recommendations were made.

Methods. Twelve NTSP sites, including far-flung and economically depressed communities, where the systems were concurrently available over a defined six month period, were selected. The frequency of respective system transactions for these sites was collected from NTSP files. Interviews and focus group discussions were conducted at the communities, involving physicians, nurses, midwives, and other health workers. Associated costs, and perceptions related to the adoption, operation, and sustained use of the IT systems were elucidated.

Results. Telemedicine, though the least costly modality, was the least utilized of the systems. While both R4Health and CHITS facilitated health data management, CHITS provided more locally-relevant information. The RxBox system, due to its clinical diagnostic device component, was widely accepted and also increased health center consultations, especially among pregnant patients. Technical malfunctions, as well as system failures following natural calamities, were recurrent problems.

Conclusions. The RxBox system, with its bundled health records and specialist consultation functions, is highly accepted by health providers and other community stakeholders. The technology can be expected to be similarly well-regarded in other settings. The stand-alone IT modalities that do not directly or significantly benefit the actual implementers are not as sustainable. **(Author's abstract)**

Keywords: *Electronic medical records, Information technology, Telemedicine, Medicine*

Active Aging Health Determinants among Working and Retired Filipino Older Persons Living in an Urban Academic Campus

Pellejo, Hannah M. , Garcia, Angely P. , Ogena, Nimfa B. , Giron, Maria Stella T. , de la Vega, Shelley Ann F., Fabito, Sarah Jane S. , Medina, III, Vicent

Objectives. This study aims to describe the demographic profile and determine the proportion and Active Aging health determinants of staff, faculty, and retired employees who are 55 years of age and older.

Methods. Mixed qualitative and quantitative methods, community-based, and participatory. Participants were working and retired faculty and staff, age 55 years and over, living within an urban campus of a University. The University Ethics Review Board approved the protocol. Focus group discussions (FGDs) led to the development of a pretested survey instrument. Additional health data were obtained using a validated Comprehensive Geriatric Assessment (CGA) tool. Trained and certified health professionals conducted the CGA. A Senior Geriatrician adjudicated the final diagnoses. Progress reports and validation workshops were conducted with study participants, content experts, and stakeholders. CSPRo, SPSS, and STATA were used to generate and analyze disaggregated data.

Results. Two hundred thirty-one (n=231) agreed to participate. The matched dataset was used in data analysis, representing a total of n=192 completed both surveys and CGA interview. Of the top 10 Geriatrician diagnoses, the highest-ranking non-communicable disease was hypertension and the top sensory diagnosis was presbyopia. Three of the self-assessed conditions were vision-related. They had better oral health than the recent national report. Most were highly independent and functional. The majority rated their QOL as good. Most had access to health insurance and a University Health Service.

Conclusion. Non-communicable diseases and visual disorders were the most common medical problems among working and retired university workers 55 years and older, living within the campus. To reduce NCDs, maintain functional independence and achieve a better quality of life especially among the retired, programs for older persons are recommended. These include access to medication, improved health financing, and senior wellness programs during and after employment. The results of the study will help understand and create a Framework for Active Aging that is relevant to this academic community. **(Author's abstract)**

Keywords: *Active Aging, Filipinos, Retired, QOL, Geriatric Assessments, University, Medicine*

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NP

Acupuncture as an Adjunct to Standard Therapy for Pruritus in Patients with Atopic Dermatitis: A Patient- and Assessor-blinded, Randomized, Placebo-controlled Trial ***Abalos-Babaran, Shahara , Tan-Gatue, Philip Nino , Gatmaitan-Dumlao, Jolene Kristine G. , Caro-Chang, Leah M. , Abad-Constantino, Rona Maria R., Dofitas, Bele***

Background. Pruritus can impair quality of life in patients with atopic dermatitis. There is evidence that acupuncture reduces pruritus and disease severity, and improves quality of life.

Objectives. This study aimed to determine the efficacy of acupuncture in reducing pruritus intensity, disease severity, and medication use, and improving quality of life.

Methods. This was a patient- and assessor-blinded, randomized, placebo-controlled trial. Patients diagnosed with atopic dermatitis underwent twice-weekly acupuncture for 12 weeks, with an 8-week follow-up period. Baseline and weekly assessment were done using standard data collection forms and validated assessment tools.

Results. Thirty patients were randomized and 28 patients were eligible for the efficacy analysis. There were no significant differences in the baseline demographic and clinical characteristics between the True Acupuncture group (TA) (n=16) and Sham Acupuncture group (SA) (n=12). Both groups showed reduction in mean itch intensity (visual analogue scale, VAS) ($p=0.024$) but TA showed greater reduction ($p=0.009$) that was sustained after end of treatment. There was also a reduction in medication use in both groups. The comparable efficacy of SA to TA is attributed to similar peripheral receptive fields and stimulation of cutaneous C-fibers which depletes the neurotransmitters mediating pruritus and results in tachyphylaxis. Mild adverse events, such as petechiae and erythema, were noted in both groups and resolved spontaneously.

Conclusion. Acupuncture is a promising adjunct treatment in atopic dermatitis with significant reduction in pruritus, disease severity and medication use and a trend towards improved quality of life. Studies with larger sample size and comparison to acupuncture points farther from the true acupuncture points are recommended.

Trial Registration. Food and Drug Administration Philippine Health Research Registry ID PHRR171012-001696 (Author's abstract)

Keywords: *Acupuncture, Pruritus, Atopic dermatitis, Treatment adjunct, Medicine*

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(*Filipiniana Analytics*)
NP

0242

Does Adopting a Multidisciplinary Approach in the Management of Acute Hip Fractures in Orthopedic Geriatric Patients Lead to Better Outcomes?: A Preliminary Report of the University of the Philippines - Philippine General Hospital (UP-PGH) Orthogeriatric Bing-Agsaoay, Dorothy Dy Ching , Mangubat, Antonio Alan S. , Sandoval, Mark Anthony S. , Tabu, Irewin A. , Paula Veronica S.J.

Objectives. This study is a retrospective cohort that aims to describe the profile of orthopedic geriatric patients aged 60 years old and above with acute hip fractures occurring within one month of admission in the Philippine General Hospital managed by a multidisciplinary team approach.

Methods. Data collection from the database was done to gather information regarding the patient profile, time to surgery, causes for delay in consultation, length of hospital stay, and follow-up rate, since this model was implemented.

Results. Overall, we saw a decrease in the time from admission to surgery and a decrease in the length of hospital stay, when compared to previous data. Follow-up rates and compliance to maintenance medication are at 96% and 72% respectively.

Conclusion. The implementation of a multidisciplinary approach and fracture liaison service presents us with favorable results in addressing hip fractures and osteoporosis. (Author's abstract)

Keywords: *Orthopedics, Multidisciplinary Research, Osteoporosis, Osteoporotic Fractures, Geriatrics, Medicine*

0243

***Anti-angiogenic property of turmeric plant (*Curcuma longa* Linn) in the duck embryo
Resgonia, Kriska Jaye I. , Mabalot, Ruth Louise Y. , Gresones, Maverick John F. , Galay, Liesel Melody R. ,
Berdigar, Elsie M. , Aya-ay, Ador***

Angiogenesis is the formation of new blood vessels which involves the migration, growth, and differentiation of endothelial cells and is controlled by chemical signals in the body. It plays a critical role in the anti-angiogenic property of turmeric leaf and rhizome extract. It utilized an experimental-control group which used Simvastatin, a known angiogenic inhibitor as the positive control and distilled water as the negative control. The study utilized chorioallantoic membrane assay employing the use of freshly laid duck eggs pre-incubated for 24 hours. Different concentrations of turmeric leaf and rhizome extracts were dispensed to the chorioallantoic membrane. The eggs were incubated for 7 days. After the incubation period, the eggs were cracked open and the embryos were placed in the petri dish. The major blood vessels were counted and the embryo structures were noted. Results showed that the turmeric leaf and rhizome extract exhibited anti-angiogenesis which is comparable to the positive control ($p > .05$) for both the turmeric leaf and rhizome extracts. **(Author's abstract)**

Keywords: *Angiogenesis, Angiogenesis inhibitor, Curcuma longa Linn, Endothelial cells, Cancer, Chorioallantoic membrane assays, One Way ANOVA, Philippines, Medicine*

0244

***The Application of the ADDIE Model and the Training Cycle in the Development,
Implementation and Evaluation of Training Program on Data Use for
Decision-making among End-users of Electronic Health Information System in
Geographically Isolated and D
Bermudez, Amiel Nazer C. , Antonio, Carl Abelardo T. , Ongkeko, Jr., Arturo M. , Guevarra, Jonathan P. ,
Fernandez“Marcelo, Porti***

Objective. This paper describes the process utilized in developing a training program on data use for decisionmaking tailored for real-time monitoring of maternal and child health indicators through Community Health Information Tracking System (rCHITS) end-users in selected areas in the Philippines.

Methods. Guided by the ADDIE (Analysis, Design, Development, Implementation and Evaluation) model and the training cycle, existing records and reports lodged with the National Telehealth Center (NTHC) pertaining to rCHITS were reviewed, supplemented by interviews with the technical staff of the NTHC and discussion with healthcare workers. Training design was developed, training modules and materials were prepared, critiqued, revised and finalized. The training was implemented and evaluated using an evaluation tool designed for this specific capability-building endeavor.

Results. A tailored training program on data use for decision-making was designed for rCHITS end-users in select areas in the Philippines. The process of developing the training program was guided by the ADDIE Model and the Training Cycle. Training was delivered to a total of 128 public health workers. Majority of the participants gave high evaluation on the clarity and relevance of objectives, discussion of topics, methods of delivery, and time devoted in addressing issues (range 3.5-3.8 out of highest possible score of 4).

Conclusion. This paper demonstrates the utility of the ADDIE Model and the Training Cycle in developing a training program aimed at enhancing the capability of the field personnel in utilizing the data generated from rCHITS in decision-making. Training participants must also be monitored and evaluated in their workplace setting in order to determine if the concepts and principles covered during the training program are put into practice.
(Author's abstract)

Keywords: *ADDIE Model, Training cycle, Data use, Decision-making, End-users, rCHITS, Philippines, Medicine*

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(Filipiniana Analytics)
NP

0245

Appropriate Use of Coronary Angiogram among Service Patients at the UP-Philippine General Hospital in the Year 2019

Agustin, Charlene F. , Tiongson, Marc Denver A. , Ramiro, Valerie R. , Cheng, Paula Victoria Catherine Y. , Evangelista, Lauren Kay M. , Aherrera, Jaime Alfonso M. , AA±onuevo, John C., Punzalan, Felix Eduardo

Rationale. Coronary artery disease (CAD) is the leading cause of death worldwide and coronary angiography (CA) remains the gold standard for its diagnosis. However, proper patient selection for CA is important to avoid unnecessary risks and expense. The American College of Cardiology (ACC), with other major organizations, developed Appropriate Use Criteria (AUC) for CA. AUC assist clinicians in decision making on whether to use the tests according to indications and objectively assess if these tests are appropriately utilized. This is the first study to determine the appropriateness of CA performed and the clinical and angiographic profile among adult service patients in UP-PGH.

Objectives. To determine (1) the indications for CA and its appropriateness based on 2012 AUC for Diagnostic Catheterization by the ACC, (2) the clinical profile of patients who underwent CA among adult service patients at UP-PGH and (3) the angiographic profile of these patients.

Methods. This cross-sectional study included all CA studies performed on adult service patients from January to December 2019. Demographic and clinical profiles, non-invasive tests, and angiographic findings were collected. The primary outcome determined was the appropriateness of the indications for each CA performed based on AUC scores. Descriptive analysis using frequencies and mean values with standard deviations were used.

Results. Among the 515 patients included, majority were males, above 50 years of age, with normal eGFR, presented initially with chest pain, and with a presenting diagnosis of chronic coronary syndrome. Majority of these patients had obstructive CAD (75%), with left anterior descending artery as the most frequently involved vessel. Non-obstructive CAD was found in 11% while normal coronaries were noted in 14% of these patients. Our findings showed that 99.8% of the CA performed were appropriate, of which majority (54%) had an AUC score of A9. STEMI or a suspicion of STEMI, with an A9 score, was the most frequently encountered indication at 33% of the time.

Conclusion. Majority (99%) of the CA studies performed in the PGH cardiac catheterization laboratory for the year 2019 were executed based on highly appropriate indications (AUC scores A7 to A9) and followed Class I and II

recommendations from guidelines. The allocation of resources is deemed to be well-utilized based on the data generated from this study. **(Author's abstract)**

Keywords: *Appropriate use criteria, Coronary angiography, Cardiac catheterization, Medicine*

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NP

0246

An Assessment of Epidemiologic Burden of Hospitalization for Bronchial Asthma in Acute Exacerbation among Adult Patients Admitted in a Tertiary Hospital in the Philippines: A Pilot Study

Zamora, Mithi Kalayaan S., Fernandez, Lenora

Objective. This pilot study aimed to determine the epidemiologic burden of hospitalization for bronchial asthma in acute exacerbation.

Methods. We used a descriptive cross-sectional study to describe the demographic profile, comorbidities and level of control of patients admitted for bronchial asthma in acute exacerbation admitted to the Philippine General Hospital from May 1 to October 31 2019. The study computed for the admission rate and compared the average cost of hospitalization (diagnostics, therapeutics and room) using direct costing to the total reimbursable cost from PhilHealth. Associations between patient characteristics (age, type of admission) and hospitalization cost were also determined.

Results. We enrolled 45 patients in the study. The admission rate was 8/month. The mean cost of admission was significantly higher than the reimbursable amount from PhilHealth (Php 20,074.63 versus Php 9000) ($p = 0.004$). Cost of hospitalization was significantly higher in pay patients versus charity ($p = 0.001$ for diagnostics, $p = 0.005$ for treatment and $p = 0.001$ for room cost), in patients with poorly controlled asthma ($p = 0.020$ for diagnostics and $p = 0.014$ for room cost) and those with frequent short-acting beta-agonist (SABA) use ($p = 0.001$).

Conclusion. Asthma remains an economic burden for the Filipino patient. Persistent SABA use, perceived asthma control of patients and increased expenses associated with an asthma exacerbation admission lead to significant out-of-pocket expenditure. **(Author's abstract)**

Keywords: *Bronchial asthma, Exacerbation, Direct costing, Medicine*

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NP

Benefits of Short-term Modified Stepping Exercise on Blood Pressure and Physical Performance in Female Elderly with Hypertension: A Pilot Study
Janyacharoen, Taweesak , Ruksapukdee, Wanida , Sawanyawisuth, Kittisak , Nakmareong, Saowanee , Donpunha, Wanida , Sarinukul,

This study aimed to investigate the effects of continuous bench stepping on a 20-cm bench box in female elderly with hypertension. The participants were recruited in a rural area in Chum-Phae District, Khon Kaen, Thailand. Twenty (20) participants who passed the eligibility criteria were randomly assigned to the control (CG) and experimental (EG) groups. The EG performed modified stepping exercises (continuously stepping up and down within 60 min/session with 3 sessions/wk for 4 wk at moderate intensity), while the CG received lifestyle modification without specific training. The primary outcome was blood pressure level [systolic (SBP) and diastolic (DBP)]. The secondary outcomes consisted of exercise tolerance, balance ability, and lower leg muscle strength, which were assessed by a 6-min walk test (6MWT), timed up and go test (TUGT), and five-time sit to stand test (FTSTS), respectively. After 4 wk of training, there were significant interactions between group and time in terms of SBP, DBP, 6MWT, and FTSTS (all $p < 0.01$ except for 6MWT with $p < 0.05$). Nonetheless, the paired t-test indicated that the EG showed significant improvement in all outcomes from baseline (all $p < 0.01$ except for 6MWT with $p < 0.05$). In contrast, the CG showed non-significant improvement in all outcomes. In conclusion, the short-term modified stepping exercise might be appropriate for blood pressure control in adjuvant with antihypertensive medications, and it can also improve physical performance in female elderly with hypertension. **(Author's abstract)**

Keywords: *Elderly, Functional training, Hypertension, Physical performance, Medicine*

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 2021 February,
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 NP

Bullous Mastocytosis in a Filipino Infant: A Case Study
Ramirez-Quizon, Mae N. , Gervacio, Mia Katrina R. , Barit, Jay-V James G. , Abalos-Babaran, Shahara , Ke, Bly

Introduction. Mastocytosis is a disease defined by the proliferation of mast cells in organs, most commonly the skin. It may affect any age group but is usually found in children in the first year of life. We present a case of diffuse cutaneous mastocytosis manifesting in the rare bullous form.

Case. A 4-month-old Filipino male presented with multiple bullae on the head, trunk, and extremities after applying chamomile oil. Biopsy of the skin demonstrated numerous mast cells, confirming the diagnosis of bullous mastocytosis. The patient was treated with oral antihistamines and corticosteroids, which was followed by a good response.

Conclusion. Diagnosis of diffuse cutaneous mastocytosis may be challenging due to its rarity. Proper management requires preventive measures, symptomatic treatment, as well as communication of prognosis with the stakeholders. **(Author's abstract)**

Keywords: *Bullous mastocytosis, Cutaneous mastocytosis, Diffuse cutaneous mastocytosis, Medicine*

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 2021,

Characteristics and Factors Associated with Mortality of 200 COVID-19 Patients at a Philippine COVID-19 Tertiary Referral Center

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Objectives. To describe the clinical profile and factors associated with mortality among the first 200 patients confirmed to have COVID-19 infection admitted in the University of the Philippines – Philippine General Hospital (UP-PGH).

Methodology. We conducted a review of adult patients with confirmed COVID-19 infection admitted to the UPPGH, a designated COVID-19 referral center. Demographic, clinical data and clinical outcomes were extracted from medical records. Frequencies and distributions of various clinical characteristics were described, and factors associated with mortality were investigated.

Results. Of the 200 patients in our cohort, most were male (55.5%), and the median age was 56 years old. Underlying comorbid illnesses were present in 67.5% of patients, which included hypertension (49.5%), diabetes mellitus (26.5%), and other cardiovascular diseases (20.5%). The most frequent presenting symptoms were cough (69.0%), fever (58.5%), or shortness of breath (53.0%). Most patients presented with mild (n=41, 20.5%) to moderate illness (n=99, 49.5%) and only 60 were considered severely (n=32, 16.0%) or critically ill (n=28, 14.0%). Many (61%) received empiric antibiotics, while 44.5% received either repurposed drugs or investigational therapies for COVID-19. Bacterial co-infection was documented in 11%, with *Klebsiella pneumoniae* commonly isolated. In-hospital mortality was 17.5%, which was highest for critical COVID-19 (71.4%). Mortality was observed to be higher among patients aged 60 and above, requiring oxygen, ventilatory support, and ICU admission, and those who developed acute kidney injury, acute stroke, sepsis, and nosocomial pneumonia.

Conclusion. Our study confirmed that COVID-19 affects older individuals and those with underlying comorbid conditions. Empiric antimicrobial treatment was given for most patients, despite documentation of bacterial infection in only 11%. *K. pneumoniae* was commonly isolated, reflecting local epidemiology. The mortality rate during this early period of the pandemic was high and comparable with other institutions. Factors associated with mortality were related to critical COVID-19 and were similar to other studies. **(Author's abstract)**

Keywords: COVID-19, Philippines, Epidemiology, Mortality, Medicine

Characteristics and Outcomes of COVID-19 Patients Admitted in the Medical ICU of a Tertiary Public Hospital in the Philippines during the First Two Months of being a COVID-19 Referral Center

Octaviano, Aprille Anne O., Perez, Blessie Marie B. , Benedicto, Jubert

Introduction. The University of the Philippines-Philippine General Hospital (UP-PGH) began its operations as a COVID-19 referral center on March 30, 2020. Local studies reporting characteristics of patients in the intensive care units (ICUs) are lacking.

Objectives. 1) To describe the baseline characteristics and outcomes of the initial cohort of COVID-19 patients in the medical ICU. 2) To report the initial situation and strategies in the ICU during the first two months of being a COVID-19 referral center.

Methods. We conducted a review of records of all patients with confirmed COVID-19 admitted to the medical ICU of UP-PGH between April 1 to May 31, 2020. Patient demographics, comorbidities, APACHE-II score, signs and symptoms, laboratory and radiologic results, respiratory and vasopressor support, and outcomes were collected.

Results. Out of 35 patients with confirmed COVID-19, majority were above 60 years old (63%). Hypertension was the most frequent comorbidity (77%). Fever was the most common symptom (51%). The mean duration of symptoms prior admission was 9 ± 7 days. Anemia and leukocytosis with neutrophilia was common. Lactate dehydrogenase (LDH) and high-sensitivity C-reactive protein (HSCRP) were elevated in most patients. Majority of patients (66%) had moderate level of hypoxemia on admission. Bilateral pneumonia on chest radiograph was found in 34 patients. Hydroxychloroquine and chloroquine were the most commonly used drugs. A total of 24 patients (69%) required invasive mechanical ventilation while 15 (43%) needed pressor support. Twenty-two expired (63%) while thirteen (37%) patients were discharged from the medical ICU.

Conclusion. The clinical characteristics in our set of patients are consistent with other studies on critically ill patients. Mortality in the medical ICU was high. **(Author's abstract)**

Keywords: *Coronavirus, COVID-19, ICU, Philippines, Medicine*

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Characterization of Purified Coconut Oil Bodies as an Encapsulating Agent for Doxorubicin and Paclitaxel

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Introduction. Doxorubicin (DOX) and paclitaxel (PTX) are both widely used anticancer drugs with a broad spectrum of antitumor activity, commonly against breast, ovarian, and lung cancers. Currently, these drugs are commercially available in liposomal formulations for their use in chemotherapy. This study generally proposed coconut oil bodies (COB) obtained from *Cocos nucifera* L. as an alternative carrier for DOX and PTX rather than the currently used liposome.

Objectives. This study aimed to compare standard liposome and coconut oil bodies as drug carriers in terms of their microencapsulation efficiencies, lipid profiles, in vitro drug release and stability, as well as their cholesterol levels.

Methods. Coconut oil bodies (COB) were isolated and purified from *Cocos nucifera* L. by modified sucrose gradient method followed by microencapsulation of standard drugs (doxorubicin and paclitaxel) through selfassembly and freeze-thaw method. The two standard drugs were encapsulated using COB and standard liposome. Encapsulation efficiency of both materials were determined. Lipid profiles of both encapsulating materials were analyzed by Fourier-transform infrared spectroscopy, gas chromatography-flame ionization detector, and cholesterol level determination. In vitro drug release and pH stability of both encapsulated drugs were analyzed.

Results. Doxorubicin (DOX) and paclitaxel (PTX) were successfully incorporated in COB. Lauric acid was mainly abundant in COB and was able to lower cholesterol levels (5 mg/dL). COB incorporated with DOX and PTX showed stability at acidic and neutral pH. Drug release profile showed a rapid outburst within 3 hours compared to liposome encapsulated DOX and PTX.

Conclusion. Our study showed the encouraging potentials of using COB as wall materials that will make them attractive candidates for the formulation of pharmaceuticals for optimized drug delivery of cancer chemotherapeutics DOX and PTX. **(Author's abstract)**

Keywords: *Coconut oil bodies, Liposome, Microencapsulation, Doxorubicin, Cocos nucifera L, Medicine*

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0252

Classification of Childhood Glaucoma in Patients of a Government Tertiary Hospital in Manila, Philippines using the Childhood Glaucoma Research Network System

Vincent, Nilo , Babaran, Martin Jos

Background. Childhood glaucoma is a rare multifactorial disease with limited information regarding the demographics and characteristics in the Filipino setting. It can be categorized via the Childhood Glaucoma Research Network Classification scheme.

Objective. Determine the clinical classification of patients diagnosed with childhood glaucoma in the ophthalmology service of a government tertiary hospital in Manila, Philippines.

Methods. Medical records of all patients ≤ 16 years-old referred to Glaucoma Section of Philippine General Hospital from January 2015 to December 2017 were reviewed retrospectively and classified.

Results. One-hundred four (104) eyes in 77 children were classified. Glaucoma associated with acquired conditions was the most prevalent in 44.2% of the patients with trauma consisting of 19.5% of all patients. Primary childhood glaucoma consisted of 15.6% and juvenile open-angle glaucoma was diagnosed in 5.2%. Glaucoma following cataract surgery was noted in 7.8% of patients. Trabeculectomy was the primary surgical intervention in 22.2% of eyes, with 78.9% of eyes reaching an IOP control of <21 mmHg on final follow-up.

Conclusion. Glaucoma associated with acquired conditions was the most common childhood glaucoma in the patient population. Trabeculectomy was the most common surgery done. Trauma was the most prevalent cause of glaucoma from acquired conditions. **(Author's abstract)**

Keywords: *Childhood glaucoma, Classification, Pediatric glaucoma, Prevalence of childhood glaucoma, Medicine*

Clinical and Radiologic Outcomes of Minimally Invasive Surgery Transforaminal Lumbar Interbody Fusion with Computer Navigation

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Objective. The main objective of this study was to evaluate clinical and radiographic outcomes of computer minimally invasive transforaminal lumbar interbody fusion (CNMIS TLIF).

Methods. Blood loss, operating time, complications, and hospital stay were identified through chart review. Numeric rating scale (NRS) scores for pain were taken during recent follow-ups, and these were compared to the preoperative scores. Three different examiners assessed the pre-operative lumbosacral spine radiographs. At a 2-years follow-up, the patients were evaluated with NRS and the radiographs reassessed by three other examiners.

Results. Seventy-four patients with a mean age of 54 years underwent CNMIS TLIF. Average blood loss was 300mL, operative time was 4.5 hours, and the average length of hospital stay was 8.5 days. A total of four complications were noted in our study. There was an improvement of mean local lordosis and regional lordosis. The paired-sample t-test showed that the anterior, middle, and posterior disc heights at the cage level were significantly increased compared to the pre-operative values.

Conclusion. CNMIS TLIF is a safe and efficient method to achieve spinal fusion. There was a significant improvement in clinical outcomes in terms of pain relief. Radiologic parameters such as local lordosis, regional lordosis, and anterior, middle, and posterior disc heights showed significant improvements at 2-years follow-up.
(Author's abstract)

Keywords: *Computer Navigated Minimally Invasive Surgery, Transforaminal Lumbar Interbody Fusion, Computer Navigated Spine Surgery, Medicine*

Clinical Profile and Outcome of Adult COVID-19- related Consults at the University of the Philippines- Philippine General Hospital Emergency Department

Magsino, Ronald Allan A. , Tabuñara, Scarlett

Background. Scarcity of early local clinical data of COVID-19 proved to be a major challenge as its course rapidly evolved over time. The information gathered from this study can be used in improving awareness and understanding

a novel disease particularly in detecting demographic trends, vulnerable clinical profiles and potential clusters in order to be abreast on how the virus behaves in the local setting.

Objectives. 1) To describe the clinical profile of COVID-19 adult consults at the University of the Philippines-Philippine General Hospital (UP-PGH) during the early months of the outbreak 2) To determine their association with the COVID-19 results and final outcome

Methods. A retrospective medical record review was done on COVID-19-related consults of patients aged 19 years and above from 01 January to 30 June 2020 at the emergency department (ED). Statistical analyses were done using Chi-squared and Fisher's exact test using STATA V15.1 with 95% level of significance ($p < 0.05$).

Results. The median age of the 901 COVID-19-related consults at the ED was 46 years; 55.49% were males mostly belonging to the age group below 60 years. Almost all were Filipinos (99.44%), majority residing in the city of Manila (64.93%) and only 2.22% had a history of travel outside the country. The most common chief complaint was fever (32.47%) followed by cough (27.58%) and shortness of breath (25.75%). Most had their onset of symptoms from 1-7 days (79.80%) before ED arrival and 86.07% ($n=210$) were COVID-positive after performing the confirmatory test. Patients with confirmed COVID-19 mostly resided in cities of the National Capital Region ($p=0.046$), either presented with fever or asymptomatic but with exposure to COVID patients (Fisher's Exact test; $p < 0.001$) and onset of symptoms was 4-5 days ($p=0.007$). Those identified with poor prognosis were those aged 60 years and older ($p < 0.001$), with complaint of shortness of breath (Fisher's exact test; $p < 0.001$) and with delayed symptom presentation of 6 days or more ($p=0.037$).

Conclusion. The COVID-19-related consults at UP-PGH during the first 6 months of the pandemic were mostly males, Filipinos, belonging to the less than 60 years age group (median age=46 years), residing in the city of Manila and no history of travel outside the country. The most common presenting complaint was fever and onset of symptoms was typically 1-7 days before ED arrival. The positive RT-PCR result was significantly associated to patients residing in Metro Manila, either presenting with fever or no symptoms but with exposure to COVID patients, and with onset of symptoms of 4-5 days. Older age (60 years old and above), shortness of breath and delayed symptom presentation of 6 days or more were also found to have significant association with poor prognosis. As not much is known of the behavior and course of COVID-19 particularly at the local setting, it is therefore crucial to be aware of emerging trends to respond adequately and achieve optimal outcomes. (*Author's abstract*)

Keywords: COVID-19, Epidemiology, Emergency department, UP-PGH, Medicine

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0255

The Clinical Profile, Wound Dressings, and Clinical Outcomes of In-patients with Pressure Ulcers at a Tertiary Hospital in the Philippines: A Seven-year Retrospective Study
Obbas, Sarah Faye V. , Abalos-Babaran, Shahara , Barit, Jay-V James G., Dofitas, Bele

Objectives. Currently, there are no local studies examining wound dressing usage among pressure ulcers in Filipino patients. The study aims to provide preliminary Philippine data among in-patients with pressure ulcers: their demographic characteristics, wound characteristics, wound dressing usage, and associated outcomes per wound dressing.

Methods. A retrospective chart review of patients admitted at the Philippine General Hospital from 2011 to 2017 with a diagnosis of pressure ulcer was conducted.

Results. Eighty-five records were retrieved; 56% were female and 44% male, with a mean age of 47.67 ± 23.03 years. The mean number of ulcers per patient was 1.65 ± 1.37 , mostly in Stages 2 and 3, and 90.6% were in the sacral area. Seventy-three (85.9%) had utilized at least one form of the wound dressing, mostly plain gauze (83.5%), usually with silver sulfadiazine or Dakin's solution. Only a smaller subset used silver-impregnated dressings (10.55%) and hydrocolloid dressings (5.9%). Comparing advanced versus basic dressings for improved wound outcomes, the crude odds ratio was 3.81 (1.62 - 8.99; p-value 0.003), which on stratification accounting for bed turning, became 8.92 (1.66 - 47.97; p-value 0.009) for those bed turned and 3.05 (1.01-9.20; p-value 0.075) for those not bed turned.

Conclusion. Filipino in-patients with pressure ulcers were similar to those in the literature in terms of the mean number of ulcers and site of involvement. Basic gauze dressings, combined with topical agents, constitute the majority of wound dressing practice. Use of an advanced wound dressing showed a trend favoring improved outcomes, enhanced by pressure redistribution through bed repositioning. **(Author's abstract)**

Keywords: *Pressure ulcer, Wound dressing, Retrospective studies, Medicine*

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0256

Comparative Evaluation of Completeness of Traditional Narrative versus Electronic Synoptic Operative Reports for Ovarian, Peritoneal and Fallopian Tube Cancer Surgery in a Tertiary Government Hospital

Toral, Jean Anne B., SeA±eris, Aub

Objective. This study aimed to compare the completeness and ease of use of narrative reports (NR) submitted by residents compared to electronic synoptic reports (SR) by gynecologic oncology fellows for patients who underwent ovarian, fallopian, and peritoneal cancer surgery.

Methods. We conducted a cross-sectional study in the Department of Obstetrics-Gynecology of the Philippine General Hospital from August to November 2019. We assessed the NRs and electronic SRs for completeness of data using quality indicators.

Results. The average percentage of completeness of quality indicators is 77.1% (35.7/65). Eight indicators were absent in all NRs. Reporting of residual lesions was low (29.1%). The mean time to accomplish SRs (10.4 minutes) was significantly shorter than the mean time to accomplish NRs (21.9 minutes) (p value = 0.0001). SRs were assessed to be superior to NRs in several areas of surgery for quality, completeness and timeliness.

Conclusion. This study showed that the NRs should be improved and periodic audit must be done to maintain quality assurance. The use of SR appears to be favorable and superior in terms of time required to accomplish. **(Author's abstract)**

Keywords: *Operative record, Synoptic report, Narrative report, Medicine*

Comparison of Two Circuit Class Therapy Programs on Walking Capacity, Gait Velocity and Stair Ambulation among Patients with Chronic Stroke: A Parallel Pretest-Posttest Pilot Study

Elmi, Karen D. , Alfonso, Marianne Grace T. , Alfonso, Charles S. , Aguila, Maria Eliza R. , Mendoza, Kristofferson G., Gorgon, Edward Jame

Objective. Circuit class therapy is a cost-efficient model of treatment that can be beneficial in a setting with limited resources. Current literature has conflicting results regarding which is a more effective approach to stroke rehabilitation: focusing on functional training or on improving impairments. This pilot study provides preliminary information comparing the effects of a task-oriented versus an impairment-focused circuit class therapy on walking ability among patients with chronic stroke.

Method. Eighteen participants with a single episode of chronic stroke and limited mobility were randomized into task-oriented circuit class (task group) (n=9) and impairment-focused circuit class (impairment group) (n=9). Both groups underwent intervention thrice a week for four weeks. Blind examination was done using the Ten Meter Walk Test for comfortable gait velocity (CGV) and fast gait velocity (FGV), Time Up and Down Stairs (TUDS), and Six Minute Walk Test (6MWT).

Results. All participants completed the treatment sessions without adverse effects. After four weeks of treatment, the task group showed statistically significant within-group change in CGV (0.12 ± 0.08 , $p=0.003$) and FGV (0.25 ± 0.22 , $p=0.007$). The impairment group only showed statistically significant improvement in 6MWT (25.80 ± 31.2 , $p=0.038$). There were no statistically significant changes between the groups in all outcome measures.

Conclusions. The preliminary data from this pilot study suggest either program can improve walking-related outcomes and may not be different, although this needs to be confirmed using an appropriately-powered trial.
(Author's abstract)

Keywords: *Chronic stroke, Circuit-based exercise, Task-oriented training, Impairment-focused treatment, Walking capacity, Gait velocity, Stair ambulation, Medicine*

Complementary and Alternative Medicine Use and Quality of Life among Filipino Adult Psoriasis Vulgaris Patients Seen in a Tertiary Center: A Cross-sectional Study
Nacianceno, Patricia A. , Frez, Ma. Lorna F. , Camaclang-Balmores, Marie Len A., Barit, Jay-V Jame

Objective. To determine the prevalence of complementary and alternative medicine (CAM) use and its association with quality of life (QOL) among Filipino adult psoriasis vulgaris patients.

Methods. A cross-sectional study was conducted in an outpatient dermatology department of a tertiary hospital, using a semi-structured, interview-guided questionnaire, and a self-administered QOL questionnaire, the dermatology life quality index (DLQI).

Results. A total of 135 Filipino adult patients with psoriasis vulgaris were included. The prevalence of CAM use was 47%, with most CAM users being female and single. Completion of tertiary education was found significantly associated with CAM use ($p < 0.05$). A greater body surface area involvement and longer disease duration were more common among CAM users but these were not statistically significant. Special diet (56.3%) was the most commonly used type of CAM, followed by herbal medicine (46.9%), bath therapy (18.9%) and faith healing (12.5%).

Major sources of CAM information were families (43.8%), internet/social media (28.1%) and health professionals (25%). Around 40% of the participants used CAM out of curiosity. The mean DLQI score of the respondents was 11.3 (± 7.3) corresponding to poor quality of life. CAM use was significantly associated with negative impact on physical symptoms and feelings, daily activities, and work and school ($P = 0.044$; $P = 0.019$; $P = 0.047$). After adjusting for confounding variables, patients with poor QOL were twice more likely to use CAM but this was not statistically significant (odds ratio [OR], 1.76; 95% confidence interval [CI], 0.78-3.95; $P = 0.17$).

Conclusions. The use of CAM is prevalent among Filipino adult patients with psoriasis vulgaris. The significant association between CAM use and a poor quality of life may reflect the unmet physical and psychosocial needs of patients. A patient-perspective approach should acknowledge the reasons for CAM use, which could guide the physicians in imparting available scientific evidence, or the lack thereof, for the use of CAM to these patients.
(Author's abstract)

Keywords: *Alternative medicine, Complementary medicine, Filipinos, Psoriasis, Quality of life, Medicine*

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Computational Modeling and Simulation of Linear Accelerator Performance for General Radiotherapy

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In radiation therapy, Monte Carlo method was a standard procedure for absorbed dose calculations; yet it was often frustrating due to long computation requirements and complex programming. Monte Carlo method was soon revitalized since the introduction of Geant4 framework purely written in C++ object-oriented language. This study utilized opensource Geant4 codes for modeling and simulation purposes. These codes were executed to simulate the performance of an Elekta Compact linear accelerator based on available manufacturer's specifications. A 6-MV photon beam spectrum was modeled by transporting 2 billion 6-MeV primary electrons to hit a tungsten target from a 0.5 mm gun filament radius with spatial energy of 0.127 MeV and angular distribution of $\pm 30^\circ$. Depth-doses were computed at 1.04 to 30 cm along the central axis of a voxelized water phantom. Validity of simulated data was

verified by comparison with experimental measurement. There was close agreement between simulated and measured beam data. Normalization errors were equal to 4.6% for 10 x 10 cm²; and 3.9% for 15 x 15 cm² field sizes. Computing efficiency has improved when using condensed-history technique. Therefore, the Geant4 framework can create model and simulate complex geometries of a linear accelerator facility with improved reliability, accuracy, and efficiency. **(Author's abstract)**

Keywords: *Linear accelerator, Depth-dose, Geant4, Monte Carlo, Medicine*

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0260

The correlations of cholesterol, glucose and uric acid levels in saliva, urine and serum samples

Bais, Dionell G. , Ababa, Charmaine E. , Durano, Lourivy P. , Sarabia, Ace Ronald C., Cal, Klariz Antoni U. , Villegas, Rochell

Blood testing is one of the most common tests performed in a clinical laboratory. The venipuncture method, if not done properly, might lead to any of the known complications like hematoma, needle phobia, anxiety and fainting. This led the researchers to embark on the study using other body fluids specifically, saliva and urine, as substitute of blood for the determination of cholesterol, glucose and uric acid levels in the body. The study was done by obtaining blood, urine, and saliva samples from fifteen patients with pathologic conditions, namely: Hypercholesterolemia, Diabetes Mellitus, and Gouty Arthritis. Following standard protocol for spectrophotometry, urine and saliva samples were tested for cholesterol, glucose, and uric acid. The tests were done three times with no specific time interval. The mean values obtained from saliva and urine was compared to that in the blood. The correlation between the results from saliva and blood, and urine and blood were determined with the use of Spearman – rho coefficient. The study showed that there is no significant relationship between the levels of cholesterol, glucose and uric acid in saliva and urine with that in the blood. However, the results revealed a significant relationship between the level of glucose in saliva and blood. **(Author's abstract)**

Keywords: *Clinical chemistry, Glucose, Uric acid, Cholesterol, Saliva, Urine, Spectrophotometry, Spearman-rho coefficient, Philippines, Medicine*

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0261

Decoded: A Case Report on Dedifferentiated Liposarcoma on the Gluteal Area
Yuga, Ann Camille Q. , Cubillan, Eileen Liesl A. , Villena, Juan Paolo Da

Dedifferentiated liposarcoma is a soft tissue sarcoma of adipocytic lineage. Histopathology and immunohistochemistry are essential for diagnosis. A 51-year-old Filipino woman presented with a rapidly enlarging left gluteal tumor. Histopathology revealed a multilobulated tumor having prominent myxoid stroma with numerous

stellate-shaped, atypical cells bearing atypical mitotic figures. Other lobules were composed of sheets of pleomorphic cells, with atypical mitotic figures. The tumor stained positively with alcian blue, vimentin, MDM2 and p16 stains. Other immunohistochemical (IHC) studies done (pancytokeratin, CK7, CK 20, CD 34, CEA, desmin, EMA, SMA, S100) showed negative results. After a 2 cm wide excision of the sarcoma, patient was free from local tumor recurrence for 2 months, after which she was lost to follow-up. We report this case and a brief review of the current literature on dedifferentiated liposarcoma. **(Author's abstract)**

Keywords: Dedifferentiated liposarcoma, Immunohistochemistry, MDM2, p16, Medicine

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0262

Dermoscopic Patterns in Relation to the Clinicopathologic Manifestations of Leprosy
Siripunvarapon, Arunee H. , Dofitas, Belen L. , Camaclang-Balmores, Marie Len A. , Obbus, Sarah Faye V. ,
Gervasio, Mia Katr

Objectives. Leprosy is a chronic granulomatous infection caused by the obligate intracellular organism *Mycobacterium leprae*. Current diagnostic tests for confirmation and treatment monitoring such as slit skin smear and biopsy are invasive and require time for processing, reading, and interpretation. Dermoscopy is a technique that allows the visualization of structures not readily seen by the naked eye. It can be performed at the point of care, providing a non-invasive link between clinical and histopathologic examination. This study aimed to determine the dermoscopic findings and associated clinicopathologic findings of the different forms of leprosy.

Methods. A cross-sectional study was conducted. All new and follow-up patients aged 19 years old and above clinically diagnosed with leprosy were invited to participate in the study during the three-month investigation period. Clinical and dermoscopic photographs of representative skin lesions were taken, and a review of slit skin smear and histopathology results was done. Data analysis was performed using Stata SE version 13. The association between dermoscopic findings and the following parameters: anatomic location, Ridley-Jopling classification, WHO classification, treatment duration, and average bacteriologic index were analyzed using Fisher's exact test. The level of significance was set at 5%.

Results. A total of 57 lesions were included. Linear vessels ($p=0.031$), structureless areas ($p=0.008$), and globules ($p=0.002$) were found to be significantly associated with the anatomic location. Decreased hair was found to be significantly associated with treatment duration ($p=0.038$). No significant associations were found between dermoscopic findings and Ridley-Jopling classification, WHO classification, and ABI. Eight biopsies taken at the time of dermoscopy were reviewed, with all sites showing structureless or globular areas corresponding to the presence of granulomas on histopathology (100%). No other notable associations were observed.

Conclusion. Dermoscopy is a potentially useful tool to aid in the diagnosis and treatment monitoring of leprosy. Limitations of this study include the small sample size, the preponderance of subjects in the lepromatous pole, and assessments by a single trained dermoscopist. A longer study duration including a larger number of newly diagnosed leprosy patients is recommended. **(Author's abstract)**

Keywords: Leprosy, Hansens disease, Dermoscopy, Medicine

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A Descriptive Analysis of the Hip and Knee Joint Replacement Procedures of the University of the Philippines - Philippine General Hospital (UP-PGH) from 2012 to 2018

Azores, Gregorio Marcelo S. , Delgado, Giorgio D. , Dumlao, Jose Carl

Objective. Hip and knee joint replacement procedures are an effective therapeutic intervention in treating severe joint disorders. Its use has been increasingly performed worldwide, including the Philippines, with its techniques constantly evolving and the science behind it improving. This study aims to describe the demographics, clinical profiles, and outcomes of arthroplasty patients by the Arthroplasty Service, Department of Orthopedics, University of the Philippines – Philippine General Hospital (UP-PGH).

Methods. The study is a descriptive and retrospective review of patients who underwent joint replacement procedures, both primary and revision arthroplasty, from January 2012 to December 2018. Patient demographics and clinical data of patients who underwent total joint arthroplasty at the UP-PGH were collected and evaluated.

Result. Data from 279 patients with 306 primary joint replacement procedures were analyzed. There were 195 total hip arthroplasty procedures (THAs) and 111 total knee arthroplasty procedures (TKAs) done. The mean age for THA patients was 55.6 years old, with more females (68.2%) with the left hip being more commonly affected (54.9%). The most common indication for THA was an untreated femoral neck fracture (23.1%) followed by avascular necrosis (20.5%). Cementless fixation was the most commonly used technique (61.5%). Meanwhile, the mean age for TKA was 64.5 years old, with the majority having degenerative osteoarthritis, and using cemented TKA fixation for all knees. A total of 37 revision arthroplasty cases were performed, with 34 in the hip and three in the knee, with infection being the most common overall indication (53%).

Conclusion. The demographics, clinical profiles, and outcomes of the UP-PGH Arthroplasty Service are comparable to other centers internationally, and further emphasizes the satisfactory outcomes of these procedures. Meanwhile, suggested explanations for the subtle differences are discussed in this study. **(Author's abstract)**

Keywords: *Descriptive analysis, Clinical profile, Outcomes, Total hip arthroplasty, Total knee arthroplasty, Revision arthroplasty, Medicine*

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Determining the Implementation Status of Benefits Under Magna Carta of Public Health Workers (RA 7305) in the Philippines

Te, Danielle Marie Irish T. , Cayabyab, Hanna Thea F. , Carpio, Louella Patri

Background. The Republic Act 7305 or the Magna Carta of Public Health Workers was enacted in 1992 to address health workers' welfare. However, the implementation of this act was reportedly inconsistent among local government units (LGUs).

Objectives. This study was conducted to determine the implementation status of provisions under the law among LGUs.

Methods. This is a descriptive case study employing mixed methods. The quantitative data were derived from LGU

scorecards, and the qualitative data were obtained from focus group discussions and key informant interviews of mayors, municipal health officers, and budget officers.

Results. A total of 1,557 LGU scorecards with 2017 data showed that more than half (52.0%) of LGUs do not provide the full benefits of hazard pay, subsistence allowance, and laundry allowance. Disaggregation by income class showed that the provision of benefits is higher among LGUs with higher income classes (56.10%) compared to LGUs of lower-income classes (38.73%), and this translates to a correlation of income class with the provision of benefits ($\chi^2=59.0$, $p<0.001$). Factors influencing the provision of benefits include the political will of the mayor, the active role of municipal health staff to lobby for their rights, the limited resources of the LGU, the personnel services budget ceiling, the lack of enforcement of the law, and the limiting specifications of the law.

Conclusion. This study demonstrated that the Magna Carta benefits for public health workers in municipalities and cities are inadequately implemented. Local governments must enforce public health workers' rights and benefits, but the national government should aid and ensure its unvarying implementation. **(Author's abstract)**

Keywords: *Public health workers, Workers' rights, Health policy, Medicine*

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0265

Development of Ethical and Operational Guidelines for the Delivery of Surgical Care in a COVID-19 Referral Hospital

Viray, Brent G. , Villanueva, Maureen P. , Siahetong, Samantha G. , Lapitan, Marie Carmela M. , Lukban, Claudine B. , Caballes, Al

Introduction. The COVID-19 pandemic has not only resulted in a public health crisis but has also strained hospital services. The provision of surgical care should therefore also be guided by ethical, and whenever applicable, also legal, principles.

Methods. An integrative approach that covers clinical and ethical dimensions, as well as spans the spectrum of surgical care, is therefore necessary. This action research involved three key steps: 1) identification of ethical dilemmas related to the provision of surgical care during the COVID-19 pandemic; 2) preparation of clinical scenarios that highlight these dilemmas; and 3) determination of the appropriate options for the said scenarios, based on the best available evidence as well as most applicable ethical principles.

Results. Ethical theories included utilitarianism, human rights, and communitarianism. Ethical principles included non-maleficence, justice, autonomy, and beneficence. Values considered were duty, reciprocity, human life, efficiency, fairness, fidelity, ownership, social value, and fair innings. Also incorporated were informed consent, allocation principles, resource allocation, and triage. In terms of operational issues and surgical technical concerns, the following were considered: phased standards of care, categorization of interventions, prioritization, surgical approaches, infection control, diagnostics, patient welfare, staff welfare, operations protocols, surgical training, and communication. Key points derived from the ethical and technical considerations of surgical care delivery during the COVID-19 pandemic are presented.

Conclusion. This action research involving a review of the literature and stakeholder engagement has provided a concise ethical and technical resource for surgical administrators, practitioners, and trainees. **(Author's abstract)**

Keywords: *COVID-19, Pandemic, Surgical care, Ethics, Guidelines, Medicine*

Development of microbial culture medium using golden apple snail (*Pomacea canaliculata*) meat extract and latundan (*Musa sapientum*) pulp powder as nutrient source

Romanillos, Sheila Mae A. , Cabacha, Marjorie A. , Derecho, Rich Adrian E. , Barluado, Mary J

The use of culture media for growing microorganism is an important phase in diagnostic microbiology since it provides medical technologist a presumptive clue of the type of organism present and helps eliminate unnecessary biochemical tests for identification. Culture media are composed of nutritional and growth factors needed for the cultivation of bacteria. Most commercially prepared culture media are costly, and the price is added into the laboratory fees paid by patients. This study determined the potential of golden apple snail (*Pomacea canaliculata*) and latundan (*Musa sapientum*) as nutrient source for culture media. Quantitative nutritional analysis of latundan and golden apple snail using atomic absorption spectrophotometry showed high concentrations of carbohydrates and proteins, and trace amounts of nitrogen, magnesium, zinc, iron, phosphorous and calcium. Extracts of latundan and golden apple snail were formulated into experimental media with distilled water and plain agar as solidifying agent. The capacity of the formulated culture media to sustain growth of *Staphylococcus aureus*, *Escherichia coli* and *Aspergillus niger* was evaluated and compared using nutrient agar and Saboraud's dextrose agar which are the positive controls. Results showed that the experimental media sustained growth of *E. coli* and *A. niger* from 24 to 72 hours but not on *S. aureus*. **(Author's abstract)**

Keywords: *Diagnostic microbiology, Culture media, Pomacea canaliculata, Musa sapientum, Atomic absorption spectrophotometry, Philippines, Medicine*

The Development of the Philippine General Hospital as a Referral Center in the COVID-19 Pandemic: A Qualitative Study

Molina, Joseph R. , Reyes, Zaldy R. , Alba, Michelle V. , Toral, Jean A

Background. The University of the Philippines-Philippine General Hospital (UP-PGH) was designated as a COVID Referral Center for one cluster in Metro Manila during the pandemic. We reviewed and described how UP-PGH prepared for this endeavor. This can serve as reference for similar events in the future.

Methods. We conducted a qualitative cross-sectional study with 20 key informant interviews and 5 focus group discussions involving 32 hospital front liners. All proceedings were transcribed and analyzed manually following the conceptual framework. Minutes of meetings, memoranda, and other official materials and communications were also reviewed.

Results. The salient points of both internal (operations, structure, staff, supplies, and continuation of regular services) and external aspects (relation with other hospitals, the local government, the national health authority, and the general public) were enumerated and elaborated. Both best practices and areas needing improvement were identified.

Conclusion and Recommendations. The UP-PGH tried its best to prepare and respond to the COVID-19 pandemic by protecting its hospital personnel and delivering evidence-based and quality care to patients. The response was not a perfect one and there were certain aspects for improvement. **(Author's abstract)**

Keywords: COVID referral center, Pandemic, Qualitative study, Medicine

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NP

0268

Diagnostic Yield of Bronchoscopic Techniques in Evaluating Primary Lung Cancer: The Philippine General Hospital (PGH) Experience

Angeles, Roland Reuben B. , Masalunga, Marvin C. , Encinas-Latoy, Michelle Anne M., Tojino, Anna Katrin

Objectives. To determine the overall diagnostic yield of bronchoscopy-guided sampling methods in detecting lung cancer at the University of the Philippines, Philippine General Hospital. The diagnostic yield, equivalent to sensitivity, is defined as the number of bronchoscopic sampling or biopsy procedures with a diagnosis of malignancy divided by the total number of confirmed malignant cases.

Methods. This is a cross-sectional, retrospective sensitivity study involving bronchoscopy procedures from January 2014 to December 2018. Surgical Pathology and Cytology Reports of eligible cases were accessed through the institutional Laboratory Information System. Sensitive patient information was omitted, and each case was assigned a unique code. The overall diagnostic yield/sensitivity of bronchoscopy and the diagnostic yield/sensitivity of each technique were calculated.

Results. A total of 100 patients satisfied the inclusion and exclusion criteria. Primary lung malignancies are more common in males and the elderly. The most common primary lung cancer is adenocarcinoma (33%). Bronchoscopy, regardless of whether single or multiple techniques were used, has a diagnostic yield of 86% (CI: 77.6-92.1%). Of the individual techniques, those that obtain solid tissues (endobronchial and transbronchial biopsies; 88.2% [CI: 78.1-94.8%] and 80.0% [CI: 28.4-99.5%], respectively) have higher yields compared to techniques that obtain cytologic samples (bronchial washing and brushing; 54.2% [43.7-64.4%] and 70.1% [58.6-80%], respectively).

Conclusion. Bronchoscopy, as a diagnostic procedure for pulmonary malignancies, has relatively high sensitivity and may be used for lesions located centrally and can be inspected visually. A multidisciplinary approach to patient selection for bronchoscopy helps improve the utility of the various bronchoscopic techniques. **(Author's abstract)**

Keywords: Lung Neoplasms, Bronchoscopy, Cytodiagnosis, Surgical Pathology, Medicine

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Effect of information support on the level of acceptability on use of technology in the different nursing areas among nursing students

Pantalan, Sheena Mariam S. , Guinsatao, Maricar D. , Birondo, Charmaine P. , Bartolay, Geovie N. , Gaspar, Charity Leene S. , San Juan, Mila Gr

The advent of technology, especially in smart phones and its applications has greatly influenced the quality of health care. Moreover, presently these are used by health care professionals in effectively delivering quality health services. Smart phones, are cellular telephones with built-in applications and internet access that can be used to assist health care workers in delivering health care education and drug dosage calculation. It has applications that can be utilized in managing chronic diseases, diet, exercise, and as a lifestyle reference. This study employed the quasi-experimental research design in gathering data and assessment of relationships. Results of the study showed that there is no significant difference in the level of acceptability on the use of technology in different nursing areas before and after informational support. The results revealed that the level of acceptability on use of technology in the nursing area is already high. Furthermore, the level of acceptability on the use of technology is independent of age, year level and socio economic status. From the findings of the study, the researchers recommended further improvement of informational support to increase level of acceptability, and measure level of acceptability on broader inclusion of areas such as nurse-related software and applications. **(Author's abstract)**

Keywords: *Nursing, Healthcare practitioners, Technology, Informational support, Nurse-related software, Quasi-experimental research design, T-test, ANOVA, Philippines, Medicine*

Optima, Volume No. 2 Issue No. 1, 64-74
 2015,
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 NP

Effect of Patient Education Intervention on Medication Adherence and Blood Pressure of Hypertensive Filipino Patients: Systematic Review and Meta-analysis

Sakulbumrungsil, Rungpetch C. , Gutierrez, Margar

Control of blood pressure because of poor adherence is a problem in the Philippines despite the implementation of medicine access programs. Patient education is utilized to address this problem; however, there is no published literature to evaluate this using a pooled data analysis. The objective of the study is to examine the effect of educational interventions on adherence and blood pressure. Eight databases were used to search for articles published from 2000–2020. Inclusion criteria specified the population as Filipino, 18 yr old and above, clinically diagnosed hypertension, and receiving treatment. Out of 1,514 articles, 10 articles were quality-assessed using the Cochrane risk of bias tool, systematically reviewed, and analyzed using a random-effects model. Patient education is estimated to increase the standardized self-reported adherence to 0.869 ($p < 0.05$, $I^2 = 94.98\%$) and the proportion of adherent patients to 77.4% ($p < 0.001$, $I^2 = 78.92\%$). The mean decrease in systolic blood pressure is estimated to be -14.568 ($p < 0.001$, $I^2 = 0\%$) for studies with control group and -12.907 ($p < 0.001$, $I^2 = 83.56\%$) for quasi-experimental studies. For diastolic blood pressure, the estimated mean decrease is -5.412 ($p < 0.001$, $I^2 = 0\%$) for studies with control group and -5.592 ($p < 0.001$, $I^2 = 58.6\%$) for quasi-experimental studies. Findings should be interpreted with caution because of the heterogeneity, low- to moderate-quality of evidence, and methodological limitations. Despite this, the result suggests that educational interventions should be incorporated in the existing programs for further research using longitudinal study design using objective measures for medication adherence. **(Author's abstract)**

Keywords: Health education, Hypertension, Medication adherence, Patient compliance, Pharmacy, Philippines, Medicine

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NP

0271

The effectiveness of normal saline solution with sodium hypochlorite versus hydrogen peroxide as a diabetic foot wound cleanser

Medidas, Mon Juleous C. , Omas-as, Ariane B. , Lasaca, Oswald M. , Corbita, Marinell E. , Cabuntalan, Amerah M. , Cabrales, Rodolfo M. , Ampang, Iriss Ann F., Viduya, Rea Therese

Diabetes mellitus is a chronic disease that can be severely complicated when the patient incur foot ulcer. In fact, development of vascular complications including failure of wound healing process has increased disease mortality over the years. There are different brands of antimicrobial cleansing agents dispensed in Davao City, many are expensive. The most common wound cleanser is Hydrogen Peroxide. This study aimed to perform a microbiological assay of Normal Saline Solution combined with Zonrox as a possible diabetic foot wound cleanser compared with Hydrogen Peroxide as positive control. The study utilized microbiological disk diffusion technique to determine the sensitivity of diabetic wound bacterial isolate by measuring the zones of inhibition (mm). The isolates were swabbed out of the wounds of three diabetic patients and cultured aseptically. Based on the reference sensitivity value of ≥ 16 mm zone of inhibition, all bacterial isolates were found to be sensitive to both the experimental and control agents. Interestingly, using ANOVA, there is a significant difference ($p < 0.05$) in the zones of inhibition (mm) between Hydrogen Peroxide and Normal Saline Solution combined with Zonrox in favor for the experimental agent. Hence, the Normal Saline Solution combined with Zonrox exhibited greater zones of inhibition, and may be further tested as an alternative diabetic foot wound cleanser. **(Author's abstract)**

Keywords: Diabetes mellitus, Foot wound isolate, Sodium hypochlorite, Normal saline solution, Hydrogen peroxide, Philippines, Medicine

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2013,
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0272

Efficiency of the Respiratory Training Prototype for Application in Hemodialysis Patients: A Preliminary Study

Namdang, Phuwarin , Hanmanop, Somrudee , Pongpanit, Karan , Buekban, Chatchai , Charususin, Noppawan , Thanawattano, Chusak , Yuenyongchaiwat, Kornanong, Traitanon, O

Muscle wasting and activity limitations have been reported in patients undergoing hemodialysis, and these ultimately lead to poor quality of life. We aimed to develop a respiratory training device and determine its effectiveness in improving cardiorespiratory performance and dyspnea scores in patients undergoing hemodialysis. Twenty-five (25) patients aged ≥ 35 yr who underwent hemodialysis thrice a week were recruited in this quasi-

experimental study. A respiratory training device was developed, and its effectiveness was examined. Participants performed a total of 45 inspirations (three sets of 15 inspirations) at 40% of the maximal inspiratory pressure (MIP) thrice a week. Respiratory muscle strength, 6-min walk distance, and dyspnea score were assessed before and after the 8-wk intervention program. Paired t-tests were used to compare pre- and post-intervention values. Of the 25 patients enrolled, 22 (88%) completed the 8-wk program. Significant improvements in inspiratory muscle strength ($\Delta 14.23 \pm 3.41$ cmH₂O), 6-min walk distance ($\Delta 20.09 \pm 9.10$ m), and rate of dyspnea ($\Delta 0.50 \pm 0.16$ scores) were observed after the 8-wk intervention. An 8-wk training program using a respiratory device prototype can effectively improve cardiorespiratory performance in terms of increase in inspiratory muscle strength, improved functional capacity, and dyspnea relief in patients undergoing hemodialysis. **(Author's abstract)**

Keywords: *Cardiorespiratory performance, Hemodialysis, Rehabilitation, Respiratory muscle training, Respiratory training device, Medicine*

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0273

Eggshells as Alternative Shielding Material Against Diagnostic X-rays

Alipio, M

With the advancement in diagnostic imaging, providing shielding against X-rays has become a significant concern. While Lead has been extensively used as the shielding material, it is costly and toxic to humans and the surrounding environment. This study aims to evaluate the feasibility of eggshells as alternative shielding material against diagnostic X-rays. To this end, the eggshells were collected, ground, sieved and mixed with cement and water with an increasing amount. Radiographic analysis was utilized to measure the performance of the shields. The results showed that increasing the number of eggshells increased its shielding performance; however, more shielding is required at higher X-ray energies. Nevertheless, the performance of the standard Lead shield and the shield with the highest number of eggshells yielded a comparable result. The eggshells can be used as alternative shielding material against diagnostic X-rays. **(Author's abstract)**

Keywords: *Diagnostic X-rays, Eggshells, Lead alternative, Shielding, Medicine*

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2019,
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0274

Endoscopy in a COVID-19 Referral National University Hospital: A Single-center Experience and Recommendations

Daez, Ma. Lourdes O. , de Lusong, Mark Anthony A. , Yasay, Eric B. , Torres, John M

Rationale. COVID-19 pandemic disease, can be transmitted during gastrointestinal procedures, via aerosolized droplets, and via fecal shedding. Both international and local endoscopy societies have issued strategies to alleviate

the risk to endoscopy personnel. However, several barriers against the implementation of these recommendations exist thus individual center's policies are employed whenever applicable.

Objectives. This narrative study aims to describe the current experience and set-up in the endoscopy unit of a COVID referral center, discuss the stratification of patients for endoscopy, the operational management of the personnel and endoscopy unit in line with the adapted local and international guidelines and offer endoscopists a quick reference guide to adapt endoscopy practice during the pandemic in a resource-limited setting

Methodology. This paper reviews and consolidates current endoscopy guidelines and describes the single-center experience of Philippine General Hospital.

Results. In resource-limited settings, with uncertainties of prolonged COVID-19 impact to healthcare, modification of practice, adherence to strategies and recommendations, empowerment of workforce, establishing the sustainability of resources, training, and service to patients, are essential components to combat current dilemma brought about by this pandemic.

Conclusion. Integration of current local and international guidelines encompass all aspects of endoscopy practice during the pandemic. The recommendations cited are aimed to guide other resource-limited endoscopy units for potential changes and guidance in the overall practice. **(Author's abstract)**

Keywords: Endoscopy, COVID-19, Single-center experience, Medicine

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0275

Facilitators and Barriers to the Implementation of Selected Local Tuberculosis Control Programs in the Province of Laguna, Philippines

Geocaniga-Gaviola, Donna Mae , Lota, Rosario Clarissa Marie M. , Cengca, Ma. Rhenea Anne M. , Ortega, Dorothy Jean N. , Manalo, Jorel A. , Cavinta, Lolita L. , Roxas, Evalyn A. , Medina, Paolo Victor N. , Guevarra, Jonathan P. , Antonio, Carl Abelardo T., Garfin, Anna Marie Celin

This paper aimed to determine the facilitating and hindering factors in the implementation of local tuberculosis (TB) control programs in two purposively selected localities in the Province of Laguna, Philippines. Transcripts of semi-structured interviews with six policymakers and program implementers at the regional, provincial, and city/municipal levels were qualitatively analyzed in accordance with the method of Miles and co-authors and validated through triangulation and informant/stakeholder feedback. Identified facilitating factors include 1) allocation and mobilization of human, material, and financial resources to support the implementation of program activities; 2) supervision and monitoring of program implementation; 3) formation and mobilization of partnerships with the other government agencies and the private sector; and 4) streamlining and improvement of existing processes and technologies. Hindering factors were: 1) mismatch in demand and supply for program-related resources; 2) variation in the diagnostic and treatment strategies employed by providers; 3) focus on service provision and reduced attention to activities focused on more upstream factors; and 4) external program drivers. In a decentralized healthcare setting such as the Philippines, local governments play an important role in implementing health programs designed to achieve national and even global health goals. Program managers and implementers will need to design strategies to leverage the identified facilitating factors and mitigate the effects, if not totally prevent the emergence, of hindering factors to implementation of the local TB prevention and control program. **(Author's abstract)**

Keywords: Tuberculosis, Health services, Implementation research, Philippines, Medicine

Factors Associated with Survival from In-Hospital Cardiac Arrest in the Service Wards and Intensive Care Units of a Tertiary Hospital

Punzalan, Felix Eduardo R. , Magno, Jose Donato A. , Manalili, Sheryll Anne R. , Pangan,

Background. Despite the recent advances in advanced cardiac life support (ACLS), there has been no significant improvement in survival among patients who undergo cardiac arrest. To date, there are no local guidelines on the requirements or standards of in-hospital cardiac arrest teams in the Philippines. In addition, there are still no studies on the outcomes of cardiac arrests among adult patients in a tertiary hospital in the Philippines.

Objectives. The objective of this study is to investigate patient-, event-, and hospital-related factors associated with survival among adult patients who underwent in-hospital cardiac arrest in the service wards and intensive care units of a tertiary hospital.

Methods. This is a prospective cross-sectional study conducted over three months in 2018. Patient-, event- and hospital-related data were collected from each patient with a cardiac arrest event who was referred to the cardiac arrest teams based on the modified Utstein form of reporting cardiac arrests. Survival to discharge from cardiac arrest was the main outcome.

Results. The study included 119 patients, 47.9% male, with a mean age of 50.1 years (SD 16.7). Survival rate was 6.7%. The mean response time did not differ between survival group (1.46 minutes) and mortality group (1.82 minutes) (p value = 0.26). The presence of a shockable initial rhythm (3.6% vs 3/8; p value = 0.01), shorter lag time to initiation of electrical therapy (6.0 vs 9.3 ± 5.6 min; p value = 0.02), shorter time to establishment of an airway (2.75 ± 1.6 vs. 6.98 ± 5.2 min; p value = 0.01), and shorter duration of resuscitation (7 ± 4.6 vs. 13.0 ± 7.9 min; p value = 0.01) were significantly associated with survival. The presence of underlying illnesses is associated with higher mortality. The most common hospital-related problems identified were the need to cover long distances, delay in the call, and the lack of elevators.

Conclusion. The survival rate of patients who underwent cardiac arrest and resuscitation by a cardiac arrest team is low. The initial presenting rhythm, lag time to initiation of electrical therapy, time to establishment of airway, duration of resuscitation, as well as the underlying disease can significantly affect survival. Streamlining the resources of the hospital to address these matters can have an impact on survival. **(Author's abstract)**

Keywords: *Cardiac arrest, Survival, Advanced cardiac life support, Medicine*

Five Osteosarcoma of the Lower Extremity Treated by Rotationplasty: University of the Philippines - Philippine General Hospital Experience
Quintos, Albert Jerome D. , Dimayuga, Cesar D. , Hermida, Phillip Aristo

Functional and oncologic results of the initial series of children with osteosarcoma treated with rotationplasty at the University of the Philippines - Philippine General Hospital from 2014 to 2015 are reported. Five children (mean 13.2 years) with Enneking IIB osteosarcoma of the lower extremity underwent neoadjuvant chemotherapy, tumor resection with wide margins, and rotationplasty – four Winkelmann Type AI and one Type AII. The four Type-A cases were fixed using an intramedullary nail and the Type A2 case with a plate. Two cases had >90% tumor necrosis. Adjuvant chemotherapy was started 10 to 21 days following surgery. Functional results for the AI rotationplasty showed a good range of motion of the ankle (neo-knee) with preserved muscle strength. The patient with AII rotationplasty had a fair range of motion of the ankle with some muscle weakness. All had radiographic evidence of healing at an average of 12 weeks. The oncologic outcome showed two with local recurrences at five months from surgery; three died of disease at 7, 20, and 38 months; while two are alive without evidence of disease at 72 and 84 months. Three patients were able to fit with a prosthesis with good utility, ambulation status, and satisfaction. **(Author's abstract)**

Keywords: Osteosarcoma, Rotationplasty, Van Nes, Medicine

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 NP

Genetic Diversity of Mycobacterium tuberculosis Isolates from a Rural Community in the Philippines

Aldaba, Josephine , Lopez, Anna Lena , Miyabayashi, Akiko , Maeda, Shinji , Keicho, Naoto , Kato, Seiya , Rivera, Pilarita , Ang, Concepcion , Montoya, Jaime , Poblete, Jonnel, Sylim, Patrick , Geraldino, Xenia , Salonga, Aida , Ama, C

Background: Despite the high tuberculosis (TB) burden in the Philippines, data on genetic diversity and transmission dynamics of *M. tuberculosis* remains sparse. This study aims to determine the prevalent genotype of *M. tuberculosis* isolates obtained from a rural community and the factors associated with genotype and clustering.

Methods: 125 culture-positive isolates from symptomatic Filipino patients aged 15 and above from San Juan, Batangas were genotyped using combined spoligotyping and 15-loci MIRU-VNTR. Clustering rate was used as an index for recent transmission.

Results: EAI2_Manila was the most prevalent genotype (121/125, 96.8%) followed by Beijing (2/125, 1.6%), EAI5 (1/125, 0.8%), and LAM2 (1/125, 0.8%). Genotype was statistically associated with sex ($p = 0.025$) and polyresistance to RMP + SM ($p = 0.032$). The clustering rate was 26.4%. The majority of the clustered isolates were from male patients (40/48, 83.3%), 15–49 yr old (36/48, 75.0%), smear-positive cases (41/48, 85.4%), and with low bacillary load (44/48, 91.7%). Clustered isolates were associated with age groups ($p = 0.01$) and smear positivity ($p = 0.037$). No association was observed between clustered isolates and drug resistance.

Conclusion: This study provides important baseline data on the predominance of EAI2_Manila strain in a rural community in the Philippines using classical genotyping techniques. The recent transmission was observed among

isolates obtained from younger patients and smear-positive samples. Larger community-based prospective studies in the Philippines are recommended using techniques with higher discriminatory power like whole-genome sequencing to further evaluate the EAI2_Manila genotype. **(Author's abstract)**

Keywords: *Genotyping, Tuberculosis, Philippines, Medicine*

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NP

0279

Harlequin Ichthyosis in a Filipino Newborn: Management Pearls in a Resource-limited Setting

Frez, Ma. Lorna F. , Jao-Tan, Cindy , Tababa, Erin Jane L. , Gatmaitan-Dumlao, Jolene Krist

Introduction. Harlequin ichthyosis (HI) is a rare type of autosomal recessive congenital ichthyosis. There are approximately 200 documented cases worldwide, with less than five published reports in the Philippines. Despite its rarity, current literature suggests a better prognosis for these patients.

Case description. We describe a preterm male newborn who presented at birth enclosed in a thick hyperkeratotic armor-like scale plates with areas of fissures, with associated ectropion, conjunctiva dehiscence, and eclabium. The thickened encasement also covered the hands and feet, causing severe contractures. A diagnosis of harlequin ichthyosis was given based on the clinical features. The patient was managed through a multidisciplinary approach, including referral to the tele-ichthyosis platform of a US-based foundation for patients with ichthyosis. Thermoregulation, nutrition, and hydration were carefully managed. Bland emollients were applied generously following normal saline soaks to improve barrier protection. Acitretin was administered on day 2 of life to facilitate the desquamation of the thickened encasement. A marked decrease in erythema and the thickness of the hyperkeratotic skin, and reduced conjunctival dehiscence were noted after one week of therapy. However, the constrictions on the hands and feet showed bluish discoloration and signs of necrosis. Linear band excision was performed to release the constrictors. Despite aggressive management, the patient succumbed to sepsis on day 12 of life.

Conclusion. Improved prognosis amongst HI patients is correlated with optimal quality of care regardless of resource limitations. A multidisciplinary approach and early administration of retinoids cannot be overemphasized. Linear band excision within the first week of life is suggested for constrictions on the extremities that do not improve with retinoids to avoid necrosis and autoamputation. **(Author's abstract)**

Keywords: *Harlequin ichthyosis, Acitretin, Tele-ichthyosis, Medicine*

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NP

Hip Fracture Detection Using Artificial Intelligence: A Pilot Study

Gonzales, Lauro T. , Dumlao, III, Patricio E. , Grozman, Samuel Arse

Background. Hip fractures are commonly missed on the first radiograph in up to 30% of patients. The delay in diagnosis leads to significant gaps in management and consequent morbidities. Thus, a computer-aided hip fracture recognition through the Artificial Neural Network deep learning model, which allows the program to learn and gain experience with more images processed, has been created.

The study aimed to determine the accuracy and sensitivity of the artificial neural network model in detecting fractures of the hip and explored the feasibility of its use as a diagnostic screening tool.

Materials and Methods. A sample size of 45 participants/samples per treatment group was computed using a confidence level of 90%, and prevalence of 0.05 for a pilot study. The program was tested by processing digital pictures of radiographs of patients with known hip fractures that included femoral neck, intertrochanteric, subtrochanteric, and proximal femur fractures taken from the database of adult patients, who have undergone surgery for a hip fracture at the Philippine General Hospital from 2016-17. The 90 (45 fractured, 45 normal) manually selected proximal femur images were run on 10 models. The models were based on AlexNet and VGG-16, which are the representative convoluted neural networks designed for image analysis.

Results and Conclusion. The program had an accuracy of 70%, specificity of 42.2% and sensitivity of 97.8%. This study is proof of concept that a deep learning model fracture detection software shows potential in hip fracture detection. Further training is necessary to make this promising innovation clinically useful. **(Author's abstract)**

Keywords: *Artificial intelligence, Hip fractures, Machine learning, Medicine*

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 NP

Hospitalization Expenditure of COVID-19 Patients at the University of the Philippines-Philippine General Hospital (UP-PGH) with PhilHealth Coverage

Dominado, Tamara Michelle P. , TabuÃ±ar, Scarlett

Objective. This research aimed to determine the in-patient expenditure of COVID-19 adult patients and their out-of-pocket (OOP) payments at the University of the Philippines-Philippine General Hospital (UP-PGH) after the new PhilHealth case rate coverage was instituted last 15 April 2020. It also intended to present the preliminary data on the expenses incurred by COVID patients during the initial phase of the pandemic in the country.

Methods. This study was a retrospective chart review of admitted COVID-19 patients aged 19 years old and above from 15 April to 14 August 2020 at UP-PGH that availed of PhilHealth COVID-19 case rate benefits package (C19C1-C4). Data were analyzed to extract overall expenses, out-of-pocket (OOP) charges, cost centers utilization, and other hospitalization expenditure sources.

Results. Of the 691 COVID-19 patients included during the study period, 55.72% were male, mostly belonging to the 61-70 age range with a median age of 58. The average in-hospital stay was 14.20 days, and 76.99% were under charity services, with the moderate (42.84%) and mild (25.33%) pneumonia cases accounting for 68.17% of the admissions. Total hospital expenses clustered around Php51,000 to 200,000 (~USD 1,041 to 4,156), most spending

between Php101,000 to 150,000 (~USD 2,078 to 3,118). The top three cost centers and expenditure sources were pharmacies, personal protective equipment (PPE) usage, and laboratory. The average OOP payment for patients less than 60 years old was higher, ranging from Php 25,899 to Php 44,428.63 (USD 538 to USD 924.44) compared to patients older than 60 (Php4,005.60 to Php 32,920.20 ~ USD 83.35 to 684.98). The most OOP charges were for the age group 19-30, amounting to Php 44,428.63 (USD 924.44).

Conclusion. Preliminary findings of this study gave an actual representation of the expenses of COVID-19 patients, which can guide future utilization of the national health insurance during unexpected pandemics. Early price regulation of new therapeutic interventions, diagnostic tests, and medical supplies, e.g., PPEs, disinfectants, air filters, are measures that can be implemented. **(Author's abstract)**

Keywords: COVID-19, Health insurance, Out-of-pocket expenses, PhilHealth, UP-PGH, Medicine

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0282

Immunohistochemical Expression of CK19, AR, PHLDA1, CD10 and Ki67 in the Differentiation between Trichoepithelioma and Basal Cell Carcinoma: A Systematic Review ***Gatmaitan-Dumlao, Jolene Kristine G. , Cubillan, Eileen Li***

Background. Basal cell carcinoma (BCC) and trichoepithelioma (TE) are follicular adnexal neoplasms that arise from the follicular germ but with divergent biological behavior. The gold standard in the differentiation is through histopathological examination using hematoxylin and eosin (H and E) stain. There are cases, however, when the distinction is not straightforward.

Objective. To assess the association and diagnostic accuracy of the immunohistochemical (IHC) expressions of CD10, Ki67, CK19, androgen receptor (AR), and PHLDA1 in distinguishing between basal cell carcinoma and trichoepithelioma.

Methods. We conducted a comprehensive search on cross-sectional studies on human tissue from 2000 to 2020 in MEDLINE (PubMed), CENTRAL and EMBASE for comparative studies and reference lists. The data were summarized and analyzed using Microsoft Excel and RevMan. We used Chi-square test for independence, summary receiver operator curves (sROC), and diagnostic odds ratio (OR).

Results. We included 15 articles containing 686 BCC and 367 TE in the systematic review. The pooled staining of biomarkers showed a significant difference in the staining of CK19 ($p<0.05$) and AR ($p<0.0001$), and PHLDA1 ($p<0.0001$). Diagnostic odds ratio was used to confirm these associations. AR was found to have the highest odds in the diagnosis of BCC (OR 27.92, 95% CI 10.69, 72.86). The pattern of staining of CD10 is significant ($p<0.001$) with staining of both tumor and stroma (OR 8.09, 95% CI 4.57, 13.53) and staining of tumor alone (OR 8.15, 95% CI 4.56, 14.35) ($p<0.001$) in the diagnosis of BCC. CD10 stromal staining, on the other hand, is significantly associated with the diagnosis of TE (OR 7.26, 95% CI 5.06, 10.44) ($p<0.0001$). There is no significant association between Ki67 staining (OR 1.22, 95% CI 0.48, 3.09) ($p=0.67$) and the diagnosis of BCC. The forest plot and sROC showed that AR had high specificity across all included studies in the diagnosis of basal cell carcinoma, while PHLDA1 demonstrated high specificity and high sensitivity in diagnosing trichoepithelioma.

Conclusion. The biomarkers AR and PHLDA1 are useful as an initial panel to distinguish between BCC and TE, given that both showed high sensitivity as well as significant association with BCC and TE respectively. CD10 and CK19 may also be used with AR and PHLDA1 for further confirmation. **(Author's abstract)**

Keywords: Basal cell carcinoma, Trichoepithelioma, Immunohistochemistry, Diagnostic accuracy, Diagnostic markers, CK19, Ki67, Androgen receptors (AR), CD10, PHLDA1, Medicine

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0283

The Impact of the Implementation of a Surgical Antibiotic Use Guideline in the Practice of Antibiotic Use in the Department of Surgery, Philippine General Hospital

Berba, Regina P. , Saguil, Esther A. , Buckley, Brian S. , Lapitan, Marie Carmela M., Alejandria, Marissa M. , Fernandez, Zoe Caitli

Objective. This study aimed to assess compliance with current best practice guidelines on the use of antibiotics in the Department of Surgery in the Philippine General Hospital and to determine the impact of the dissemination of an institution-based guideline on compliance and on patient outcomes.

Methods. Two antibiotic use surveys were performed 4 weeks before and 4 weeks after the implementation and dissemination of the PGH Surgical Antibiotic Use Guidelines in the Department of Surgery. The medical records of eligible patients were reviewed regarding patient and case characteristics, details on the administration of antibiotics and the collection of specimen for culture studies. Data relating to the occurrence of surgical site infection within 30 days of the operation was extracted. Compliance with antibiotic use guidelines was assessed for each case. The compliance rates in the pre- and post-intervention periods were compared.

Results. The study included a total of 477 patients, 213 in the pre-implementation and 264 in the postimplementation period. Compared with the pre-intervention period, rates of compliance with guidelines improved for all parameters in the post-implementation period except for correct dosing. The greatest improvement was seen in the selection of the recommended drug, and proper duration. There was modest improvement in the timing of the preoperative drug administration. There was poor compliance with recommendations for appropriate specimen collection for culture studies, with marked improvement in collection in the pediatric group postintervention. Overall, the in-hospital SSI rate was reduced from 6.8% to 1.1%, while there was little change in the 30-day SSI rate, post-intervention.

Conclusion. A simple intervention to raise awareness of institutional guidelines on antibiotic use in the surgical setting lead to a modest improvement on overall compliance, although rates of total compliance with all relevant guidance on antibiotic use, choice, dose, timing and duration remained low. The impact on surgical site infection rates based on such compliance was modest. **(Author's abstract)**

Keywords: Antibiotics, Surgery, Compliance, Medicine

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An Integrative Review of Home Visiting Programs for Mothers and Infants from Birth to 12 Months in Developed and Underdeveloped Countries

Tejero, Lourdes Marie S. , De Torres, Ryan Q. , Ngaya-an, Floreliz V., Fowler, Cath

Objectives. To investigate home visiting for mothers and young infants, age birth-to-12 months, program goals, interventions used, home visitor characteristics and qualifications, and the program content and outcomes.

Methods. Electronic databases PubMed, CINAHL, ScienceDirect, and Sagepub were used. Eleven studies investigating home visiting from 2011-to-2016 were included. Studies were included if they: 1) were a primary study; 2) commenced during the antepartum or early postpartum period for mothers and finished before or when the infant was 12 months old; 3) and provided a description of home visiting program in terms of goal, type of home visitor, content, length, and outcomes. Data extraction included goals, activities, home visitor characteristics and qualifications, and outcomes. A descriptive approach was used to synthesize data.

Results. Home visiting impacted birth preparedness, newborn care practices, breastfeeding practices, and home environment necessary for maternal wellness and child health and development.

Conclusion. Home visits in developed and underdeveloped countries create positive outcomes for mothers and infants. It is important to understand the process in order to make it more effective. **(Author's abstract)**

Keywords: *Home visit, Home visitation program, Maternal and infant health, Medicine*

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 NP

Interim In vitro Dose-Response Curve for the Dicentric Biodosimeter Assay from a Philippine Radiotherapy Facility using a Linear Accelerator

Inocencio, Elrick T. , Co, Henri Cartier S. , Padilla, Carmencita D. , De Guzman, Antonio Carlo D., Salonga, Edsel Alla

Background. Accidental radiation exposure can occur anytime. Biodosimeters help in quantifying the absorbed dose of individuals who are not equipped with personal dosimeters during radiation exposure. The dicentric assay can quantify radiation damage by correlating radiation dose exposure with the frequency of dicentric chromosomes in the peripheral lymphocytes extracted from exposed individuals.

Objective. The study aims to present the interim results of the reference dose-response curve for a Philippine radiotherapy facility constructed using a 6MV linear accelerator (ClinacX, Varian).

Methods. Samples of peripheral blood from healthy volunteers were irradiated in a customized water phantom of doses 0.10 to 5.0 Gray using a linear accelerator. The irradiated samples were cultured and analyzed following the International Atomic Energy Agency Cytogenetic Dosimetry Protocol (2011) with modifications. Linearquadratic model curve fitting and further statistical analysis were done using CABAS (Chromosome Aberration Calculation Software Version 2.0) and Dose Estimate (Version 5.2). Interim results of the samples were used to generate these curves.

Results. The dose-response curve generated from the preliminary results were comparable to published doseresponse curves from international cytogenetic laboratories.

Conclusion. The generated dose-response calibration curve will be useful for medical triage of the public and radiologic staff accidentally exposed to radiation during medical procedures or in the event of nuclear accidents. (Author's abstract)

Keywords: *Biodosimeter, Dicentric assay, Radiation, Cytogenetic dose-response curve, Medicine*

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0286

Interobserver and Intraobserver Reliability of the Enneking Classification in Plain Radiographic Staging of Benign Bone Tumors of the Extremities in Patients Seen at the Philippine General Hospital
Wang, Edward H.M. , Alpuerto, II, Bernard

Objective. To determine the interobserver and intraobserver reliabilities of the Enneking Classification system in staging benign bone tumors.

Methods. Photographs of traditional plain radiographs of 65 histologically benign tumors from the PGH Department of Orthopedics Tumor Registry were used in the study. Nine Orthopedic surgeons (three consultants, one fellow, and five senior residents) staged the tumors using the Enneking Classification based on radiographic tumor-host margins. The photographs were sent to the surgeons twice (batch 1 and 2), three months apart, for staging. The Fleiss and Cohen kappa statistics were used to determine interobserver and intraobserver reliabilities, respectively. This is a pilot study.

Results. There was only fair interobserver reliability of the Enneking Classification staging with Fleiss kappa of 0.38 and 0.26 for batches 1 and 2, respectively. Also, there was only moderate intraobserver reliability (Cohen kappa 0.48) for the staging. Moreover, there was also a relatively low intraobserver percent agreement (67%) among raters. In both reliabilities, the consultants/fellow group consistently showed better interobserver and intraobserver reliabilities compared to the residents.

Conclusion. The Enneking Classification in staging benign bone tumors had relatively low interobserver and intraobserver reliabilities. There was also a tendency of experienced orthopedic tumor consultants and senior residents to stage the same radiograph differently upon repeat testing. (Author's abstract)

Keywords: *Enneking, Tumors, Reliability, Interobserver, Intraobserver, Medicine*

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Isolation of colony forming bacteria in different water refilling stations in Davao City
Ortiz, Kate Licca T. , Soriano, Jazmine P. , Muyco, Renyll Joy S. , Gepolio, Queenie Dianne M. , DaÃ±o, Mary Angela M. , Alcantara, Nestle John E. , Catalan, Marx P. , Parantar, Klara Pelissa C. , Ypanto, Rico Ja

Safe drinking water is essential to humans and other lifeforms even though it provides no calories or organic nutrients. Although access to safe drinking water has improved in almost every part of the world, approximately one billion people still lack access to safe water and over 2.5 billion lack access to adequate sanitation. Today most households are using purified water purchased from water purification and refilling stations because of their promise of clean, and microbefree drinking water. This study aimed to detect and identify possible microbial contamination in water from water refilling stations in Davao City. A quantitative and descriptive design was used to determine the presence of microbial contamination and evaluate the microbial load of the water samples using standard laboratory procedures such as water bacteriology and heterotrophic plate count. Results of the heterotrophic plate count showed that the microbial load was less than the standard countable range (30-300cfu/ml) to be considered non-potable. For the determination of total coliforms, all the test tubes yielded negative results. These results indicated that the water refilling stations in Davao City provided clean and potable drinking water to consumers. **(Author's abstract)**

Keywords: *Medicine*

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Knowledge, Attitude, and Practice on the Basic Life Support among Medical Interns of the Philippine General Hospital

Llanes, Elmer Jasper B. , Francisco, Mark David G. , Velasco, Jr., Roge

Objective. This study aimed to assess the knowledge, attitude, and practice on the Basic Life Support (BLS) among the Philippine General Hospital medical interns, compare the scores between trained and untrained interns, and determine the proportion of respondents with updated BLS training.

Methods. This was a cross-sectional study using a thirty-five item questionnaire on the knowledge, attitude, and practice of medical interns at the Philippine General Hospital on the BLS.

Results. A total of 262 interns were included in the study. Although the mean knowledge scores of untrained and trained medical interns did not differ significantly (7.00 vs. 7.30, $p=0.1637$), more than 20% committed mistakes on questions on the following: jaw-thrust, rescue breaths, defibrillation, and CPR check. Generally, interns followed the BLS guidelines in their practice and had a positive attitude towards BLS. However, only 37% of trained participants had training within the past two years.

Conclusion. Most medical interns have a fair knowledge on BLS regardless of training status and adhere to them in practice. Since the training duration did not affect their knowledge scores, initial training in medical school and continuous exposure in the wards may have provided adequate BLS reinforcement. Recertification may not be needed during their formative years in medical school. **(Author's abstract)**

Keywords: *Basic life support, Interns, KAP, Medicine*

Knowledge, Attitude and Practices of Adults on Cholesterol Management in CALABARZON Region

Sulabo, April Shayne L. , Africa, Leila S. , Barrion, Aimee Sheree A. , Tria, Diorella Ma

Background and Objectives. High levels of total cholesterol, according to the Food and Nutrition Research Institute, are among the top significant contributing factor for cardiovascular diseases (CVDs). The awareness of cholesterol at the community level is critical in potential prevention and preparedness. This paper aimed to assess the level of knowledge, attitude, and practices (KAP) of adults on cholesterol management to determine their risk to CVD.

Methods. The study targeted employed populations (20 to 55 years old) who were undiagnosed with hypercholesterolemia and other severe chronic diseases. The participants were categorized based on their work mobility: (a) sedentary; and (b) active. KAP scores were predefined as high, moderate, low, and very low risk.

Results. Results showed that 52% of the participants had excellent overall knowledge, attitude, and practice (KAP) scores, thus had the lowest risk of developing hypercholesterolemia. However, 28% resulted in having the highest risk among the population.

Conclusion. The results of this study showed the level of good KAP among employed adults to be relatively high. Despite the gaps in KAP measurement, respondents showed interest in cholesterol-lowering interventions. Further studies are therefore necessary to fill the findings with a more concrete resolution. **(Author's abstract)**

Keywords: *Knowledge, Attitudes, Practices questionnaire, Cholesterol, Cardiovascular diseases, Public health, Crosssectional study, Medicine*

Knowledge, Attitudes and Practices of Health Care Providers in the Philippine General Hospital towards In-Patient Hypoglycemia and its Management

Isnani, Sarah-Laida J., Macalalad-Josue, Anna , Jimeno, Cecilia

Objectives. To determine the knowledge, attitudes and practices (KAP) of health care providers at the Philippine General Hospital towards hypoglycemia among non-critically ill patients using a validated, self-administered survey tool.

Methods. This study covered two phases out of a three-phased project: (1) development and validation of a 43- item KAP survey tool and (2) assessment of KAP among nurses and residents using the tool. Phases 1 and 2 are analytic

cross-sectional studies. Data for the KAP survey was collected using the developed tool and focused group discussions (FGDs). Results of this study will be the framework for Phase 3, which is the development of an in-patient hypoglycemia protocol.

Results. The validated KAP survey tool yielded a low overall mean score of 12.56 ± 2.11 in the knowledge domain although high scores (4.88 ± 1) were noted for knowledge on management of hypoglycemia. In terms of attitude, majority (99.31%) of respondents believed that fewer hypoglycemia events correlates to better clinical outcomes and are willing to adopt a nurse-driven protocol. Most respondents (52.8%) employed correct practices in hypoglycemia management. The FGDs identified the perceived facilitators and barriers to hypoglycemia management.

Conclusion. There is a gap in knowledge and practices in managing hypoglycemia among health care providers which needs to be addressed further with education and training. Nevertheless, health care providers have a positive attitude towards having a standard hypoglycemia protocol that will contribute greatly to its implementation in the clinical area. **(Author's abstract)**

Keywords: Survey, Hypoglycemia, KAP, Hypoglycemia protocol, Medicine

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0291

Larvicidal potential of rambutan (*Nephelium lappaceum* L.) leaf extract against household mosquito larvae

Nullar, Cressa Mae C. , Mondano, Alvin T. , Cosido, Sharmaine G. , Demanarig, Carlo Hereco Mari H. , Durano, Lourivy P. , Muaña, Cherrie G. , Baula, Ferlien Mae G., Morales, Vina

Mosquito borne diseases are detrimental to human health; thus, researchers are constantly conducting studies on how to reduce the number of mosquito borne pathogen. The study was conducted to verify the larvicidal effect of rambutan (*Nephelium lappaceum* L.) leaf extract against larvae of household mosquito. Qualitative screening of tannin and saponin was done by phytochemical testing. Ethanol extraction and rotary evaporation were performed to obtain the extract. An experimental set-up/larvicidal assay was conducted to determine the effectiveness of the extract as larvicidal agent. The approximate effective concentration of rambutan leaf extract against mosquito larvae obtained from the study was 0.005 showing a death of 84%. To measure the standard toxicity of Rambutan leaf extract against mosquito larvae, the LC_{90} was computed using the probit y analysis. In this test, the toxicity of the experimental plant extract was computed allowing 90% death of the test larva population. The bioassay analyses of rambutan leaf extract as larvicidal agent has mean death percentage of 91.33. The study concluded that the ethanolic leaf extract of rambutan can be used as a mean of terminating the growth and development of the larvae of household mosquito and control the increase of population of this biological vector. **(Author's abstract)**

Keywords: Clinical laboratory analysis, Larvicidal effect, *Nephelium lappaceum* L., Tannin, Saponin, Phytochemical testing, Rotary evaporation, LC_{90} , Bioassay analyses, Philippines, Medicine

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Lead levels in the blood specimens of painters in Davao City determined using atomic absorption spectrometry

Munar, Ruben Jr. M. , Labarinto, Febritz Marie D. , Duenas, Bernadette O. , Alinsugay, Janica J. , Ahig, Kristine Jeal A. , Aya-ay, Ador

Lead is known as an environmental toxicant present in air and is most commonly used in car batteries, ammunition, and paints. It causes variety of serious health problems. Lead poisoning can build up slowly and occurs from repeated exposure to small amounts. Health problems get more severe as the level of lead in the blood gets higher. The Occupational Safety and Health Administration (OSHA) set the exposure limit of inorganic lead at 0.05ppm. This study determined the lead levels in the blood specimen from selected painters in Davao City. Twenty four painters were randomly selected from different groups or organizations. Criteria for the selection of respondents include history of smoking cigarettes and number of years serving as painters in establishments. Blood samples from the respondents were collected using a syringe, digested, and tested using flame atomic absorption spectrometry. The results obtained showed no significant difference in the lead levels of the painters between smokers and non-smokers ($p > 0.05$). Furthermore, there is no significant difference in the lead median lead level of painters of 7.581ppm is significantly higher than the tolerable limit set by OSHA which is 0.05 ppm ($p < 0.05$). **(Author's abstract)**

Keywords: Toxicology, Lead, Painters, Flame atomic absorption spectrophotometry, Philippines, Medicine

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Level of knowledge and clinical experience on basic nursing skills among UIC nursing students in hospitals: A basis for curriculum review

Alfornon, Fretzelee , San Juan, Mila Grace C., Gaspar, Charity Leene S. , Velos, Jessa Pearl

This investigation regarding the level of knowledge and clinical experience on basic nursing skills among nursing students of University of the Immaculate Conception (UIC) undergoing clinical training in hospitals, evaluated theory-practice gap among nursing students as basis for theoretical input in schools and enhancement of skills during hospital exposures. Furthermore, it determined how nursing students apply theoretical inputs in clinical exposures. Quantitative descriptive-correlation research design and standardized questionnaire were employed to gather information from nursing students undergoing clinical training in affiliated hospitals. Two sets of respondents include twenty five students from old nursing curriculum and thirteen from new curriculum. Results showed significant relationship between level of knowledge and clinical experience among UIC nursing students. It revealed that nursing students from old curriculum were highly knowledgeable compared to students in new curriculum. However, students in old and new curriculums were shown to have highly satisfactory clinical experience in actual clinical setting. Theory practice gap was evident, as supported by weak correlations of level of knowledge and clinical experience of old and new curriculums. In this, factors are to be investigated that would influence the outcome of this study. Hence, curriculum change in nursing program satisfied minimum requirements essential to student nurses' clinical experience. **(Author's abstract)**

Keywords: Nursing students, Clinical exposure, Knowledge, Clinical experience, Basic nursing skills, Curriculum review, Philippines, Medicine

Level of satisfaction on delivered nursing care and level of functioning among geriatric patients in a local geriatric facility

Trangia, Helen Grace L. , Mondejar, January Faith Real D. , Delos Santos, Nova Lee D. , Gaspar, Charity Leene S. , San Juan, Mila Gr

Due to increasing geriatric patients, quality care must be provided by healthcare professionals to satisfy their needs in the level of functioning. Researchers determined the levels of functioning and satisfaction on nursing care among geriatrics and assessed the significance of their relationship through a descriptive correlation study. Respondents were fifteen geriatric residents of a facility in research locale. Validated questionnaires and perception assessment forms were utilized in gathering data on demographic profile, physical functioning, personal care skills, interpersonal relationship and social acceptability. Demographic profiling of respondents revealed that majority were 61- 73 years old, married, female, college graduate and of high-income. Physical functioning was problematic. Furthermore, physical assistance with personal care was needed and the interpersonal relationship of geriatric patients was typical of the person. On social acceptability, data revealed that they were not abusive to themselves or to others. Level of satisfaction on nursing care in meeting physiological, psychological and social needs were moderately satisfactory. The study also revealed no significant relationship between their level of functioning and satisfaction on nursing care. Also, there was no significant difference in their level of functioning and satisfaction when grouped according to gender and civil status. However, there is a significant difference in level of functioning and satisfaction when respondents were grouped according to age. **(Author's abstract)**

Keywords: Nursing, Geriatric patients, Level of satisfaction, Nursing care, Level of functioning, Descriptive-correlation, One-way ANOVA, Pearson-r, Philippines, Medicine

Levels of cadmium, copper and lead in blood samples from banana plantation workers in Tagum City

Sereñ±o, Quennie Rose T. , Rotersos, Gen Lace D. , Amacna, Vincent Billy D. , Abarilla, Marie Kerstien C. , Aya-ay, Adorico M., Toledo, Anna Louella

The trace elements cadmium, copper, and lead have caused major human health problems in several parts of the world. Concerns over such incidents have prompted numerous investigations into the metabolism and toxic effects of these three toxic and harmful trace elements. Cadmium, copper and lead are usually used for industrial purposes and they are the major ingredients in certain products such as paints, fertilizers and cigarettes. Banana plantation farmers are usually exposed to different chemicals which make them highly susceptible to exposure of these harmful heavy metal elements. A prospective descriptive-quantitative design was utilized in the determination of the levels of cadmium, copper and lead in blood samples from banana plantation workers in Cuambagan, Tagum City. Thirty-

five farmers aged between 19-46 years old were randomly selected. Blood samples were collected and tested using flame atomic absorption spectrophotometer. Results of the study showed that the banana plantation workers with the age range of 42-48 years old have the highest mean level of cadmium (0.33ppm) and copper (0.79ppm). Lead levels were high in age-group 31-36 years old with the highest mean level of 6.51ppm. These values were considerably high and have exceeded the tolerable level established by the Occupational Safety and Health Hazard. **(Author's abstract)**

Keywords: Toxicology, Trace elements, Banana plantations, Farmers, Flame atomic absorption spectrophotometry, Philippines, Medicine

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0296

Limb Deformity Correction Using the Ortho SUV Frame ***Dungca, Daniel V. , dela Cruz, Ruel A. , Javier, Juan***

Background and Objective. Limb deformity in terms of length discrepancy, angular and rotational deformities are amenable to correction using the Ilizarov method. The corrections can be achieved using the Ortho SUV Frame (OSF), a computer assisted six axes external fixator. Previous studies have reported easier and more accurate deformity correction. In this study, we report on our initial experience and treatment outcomes in using this system.

Materials and Methods. This study is a case series of patients where the Ilizarov circular frame was applied and which the deformity correction was carried out using the OSF. Success and accuracy in correction, length of time to correct, number of revisions needed and complications were gathered from a review of medical records.

Results. Thirty limbs in twenty nine cases were included in this report. Seventy seven percent (23/30) of the deformities were due to previous trauma. The rest were due to Blounts, infection and tumor. Correction in eighty seven percent (26/30) were achieved using the turning schedule provided by the Ortho SUV application software. Three cases required surgical removal of soft tissue interposition before further correction using the software was achieved. One case with posterior translation underwent closed manipulation. In the end all planned deformity corrections were achieved. Complications included pin tract swelling and erythema in 13% and all resolved either with oral antibiotics alone or combined with surgical release of pin sites under local anesthesia.

Conclusion. The Ortho SUV is an effective tool to carry out deformity corrections using the Ilizarov method. **(Author's abstract)**

Keywords: Limb deformity, Ortho SUV, Ilizarov method, Six axes external fixator, Medicine

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***Maternal and Neonatal Outcomes of Pregnant Women with Clinically Confirmed COVID-19
Admitted at the Philippine General Hospital***

Bravo, Sybil Lizanne R. , Villanueva-Uy, Esterlita , Amosco, Melissa D. , Octavio, Ma. Bernadette R. , Clemente, Mary Jud

Objectives. *The effect of COVID-19 infection in pregnant women and her neonate is not well-understood, with no clear evidence for vertical transmission. This study aims to determine the maternal and neonatal clinical characteristics and the dyad's outcomes among those infected with COVID-19 infection.*

Methods. *An ambispective cross-sectional study involving pregnant women with confirmed COVID-19 infection was conducted at the Philippine General Hospital from April to August 2020. Two hundred nine obstetric patients were included, 14 of whom consented to specimen collection to determine vertical transmission.*

Results. *The majority of pregnant women with COVID-19 infection and their neonates had good outcomes. Labor, delivery, and the immediate postpartum course were generally uneventful. The all-cause maternal morbidity rate was high at 75.6 per 100 cases during the five-month study period. COVID-19 related morbidities included the development of Guillain-Barré Syndrome. The in-hospital all-cause maternal mortality rate was 1.91 per 100 cases. The causes of maternal death were acute respiratory failure, septic shock, and congenital heart disease (atrial septal defect with Eisenmengerization). The in-hospital, all-cause neonatal mortality rate was 1.04 per 100 neonates of cases. The lone mother and infant deaths were in a postmortem rt-PCR swab negative mother with an rt-PCR swab positive live neonate who eventually succumbed after nine days of life. All 14 dyads with collected specimens that included amniotic fluid, placental tissue, umbilical cord, and neonate nasopharyngeal swab tested negative for SARS-CoV-2 rt-PCR.*

Conclusion. *The prognosis for COVID-19 infected pregnant patients was generally good, with most of the patients discharged improved. Almost all of the neonates born to COVID-19-infected mothers were stable-term infants. There was no evidence for vertical transmission, as shown by negative rt-PCR results for all the additional specimens obtained.*

In general, the prognosis for COVID-19 infected dyads was good. The majority of the mothers were discharged well with their term infants. All possible maternal sources of COVID-19 infection to the neonate tested negative. This study provided no evidence for vertical transmission. (Author's abstract)

Keywords: *COVID-19, Maternal outcome, Neonatal outcome, Pregnant COVID, Medicine*

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Maternal Diabetes: A Potential Risk Factor of Congenital Hearing Loss

Reyes-Quintos, Maria Rina T. , Carlos-Hiceta, Ang

Objective. *The purpose of this study is to identify the incidence rate of 'refer' result in neonates born to diabetic mothers and to determine the association of maternal diabetes and the initial 'refer' result.*

Methods. *This was a retrospective cross-sectional study which included neonates who had hearing screening test*

using transient-evoked otoacoustic emissions test (TEOAE) on both ears at the Philippine General Hospital Ear unit during three weeks. We obtained the demographic characteristics, presence/absence of maternal diabetes, and OAE results.

Results. Among the 150 neonates, ten were born to diabetic mothers, with an age range of 2-8 days old. Forty percent of neonates of diabetic mothers had an initial 'refer' result compared with 7.9% of nondiabetic mothers' neonates. After logistic regression analysis, there is a significant association between maternal diabetes and initial 'refer' result in OAE with a p-value <0.05. If the mother is diagnosed with diabetes (gestational/pre-gestational), the odds of having an initial 'refer' result in the hearing screening is 2x higher. The odds can range from 2-43 times.

Conclusion. The incidence rate of an initial 'refer' result in neonates of diabetic mothers is 40%. There is a significant association between maternal diabetes and the initial 'refer' result in the OAE test. **(Author's abstract)**

Keywords: *Maternal diabetes, Neonates of diabetic mothers, Risk factor, Hearing loss, Newborn hearing screening, Medicine*

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0299

Obstructive Sleep Apnea High-Risk Prevalence, Symptoms and Sleepiness among Patients with Uncontrolled Type 2 Diabetes Mellitus Seen at the Out-Patient Department of Philippine General Hospital

Jorge, II, Manuel Peter Paul C. , Alibutod, Nina R. , De Leon, Maria Lowe

Objectives. We determined the prevalence of patients at risk for obstructive sleep apnea (OSA) with uncontrolled type 2 diabetes mellitus (T2DM) at the out-patient department (OPD) of the University of the Philippines-Philippine General Hospital (UP-PGH) from December 1, 2018 - February 28, 2019. We described the demographic characteristics of patients with uncontrolled T2DM and compared them with high and low OSA risk, its association, and correlation with the quality of sleep.

Methods. This is a prospective cross-sectional study among uncontrolled T2DM. The questionnaires were Berlin Questionnaire (screen OSA-HR) and Epworth Sleepiness Score (level of sleepiness). Clinicodemographic profile and significant laboratory data were obtained. Descriptive statistics utilized. Chi-square test was used to compare categorical variables between patients with high vs low OSA risk and to determine if an association exists between OSA-HR and sleep quality.

Results. A total of 240 participants, 88 males and 151 females, were included in the study. The overall prevalence of OSA-HR among patients with uncontrolled type 2DM is 58.33%. The majority of the OSA-HR patients (105/140) was 46 years old and above. There is a significant association of tonsillar grade, Mallampati score, BMI, HbA1c, hypercholesterolemia, and Epworth sleepiness on OSA High risk. There is also a substantial association with age, BMI, Mallampati score, tonsillar grade, hypertension, asthma, HbA1c, and hypercholesterolemia on the level of sleepiness of OSA-HR.

Conclusion. There is a high prevalence of high OSA-risk among patients with uncontrolled DM. Factors associated with high OSA-risk among uncontrolled diabetes mellitus include HbA1c, dyslipidemia, BMI, Mallampati score, tonsillar grade, and Epworth score. **(Author's abstract)**

Keywords: *OSA, T2DM, Filipino, Medicine*

Ocular Findings among Filipino Patients with Leprosy in a Tertiary Hospital: A Cross-sectional Survey

Dofitas, Belen L. , Dy-Liacco, Jacinto U. , Barit, Jay-V James G. , San Juan, Mark Anthony D. , Ramirez,

Background. Leprosy, a chronic granulomatous disease affecting mainly the skin and peripheral nerves, has widely recognized ocular complications. It is a significant cause of visual impairment in countries where it is still prevalent, including the Philippines.

Methods. This was a cross-sectional study that determined the clinical profile and distribution of ocular pathology among Filipino patients with leprosy seen at a tertiary institution in the Philippines.

Results. A total of 67 patients consented to be included in the study and were evaluated by an ophthalmologist. Thirty-seven out of the 67 patients diagnosed with leprosy had reported ocular findings. The average age was 41.2 ± 13.1 years and the majority of patients were men (78%). Thirty-six patients were multibacillary cases, 10 (27%) had a lepra reaction, and 24 (65%) were undergoing multi-drug therapy. Three patients had varying degrees of visual acuity impairment (one was visually impaired with visual acuity [VA] 6/24-6/60, one with VA 3/60-5/60, and one with VA <3/60). Steroid-induced cataracts occurred in four patients (6%) with concurrent or previous systemic corticosteroid treatment for lepra reactions. Univariate logistic regression and Fisher's exact test of patient-, disease-, and treatment-related variables on ocular morbidity revealed non-significant values for all variables except for age with an odds ratio of 1.1 (95% CI, 1.04, 1.16) ($p = 0.001$).

Conclusions. No ocular morbidities directly caused by leprosy were seen, and treatment-related ocular findings (steroid-induced cataracts) were the only morbidities documented. There is an age-related risk for developing ocular morbidity in patients with leprosy. **(Author's abstract)**

Keywords: *Cataract, Cross-sectional studies, Eye diseases, Leprosy, Medicine*

Operating Room Efficiency for General Anesthesia Cases in the Department of Ophthalmology in a Public Tertiary Hospital

Umali, Maria Isabel N., Castillo, Teresita

Objective. To determine operating room efficiency for elective ophthalmologic surgeries requiring general anesthesia in a public tertiary institution based on standard efficiency parameters.

Methods. Prospective observational cross-sectional study of randomly selected elective cases requiring general

anesthesia from April 2019 to June 2019 in the Department of Ophthalmology of the Philippine General Hospital. A single third-party observer recorded operating room milestones from which efficiency parameters were determined and compared with local and international guidelines and efficiency benchmarks.

Results. A total of fifty cases from the Retina, Plastic, Orbit, Glaucoma, and Motility services were observed. None started on the specified start time of 6:30 a.m., with surgeries starting an average of 52 ± 11.90 minutes after. Across subspecialties, median surgical preparation time was statistically significant (χ^2 : 12.01, p: 0.02), with the Retina and Orbit services having the most extended duration. Across age groups, pediatric cases had lower mean anesthesia preparation times (t: 2.15, df: 48, p: 0.04) and median trans-out lag times (χ^2 : 4.56, p: 0.03) than adults. Overall, more than 60% of cases reached targets for induction and surgical lag time. Turnaround for adult and pediatric patients was 75 ± 22.77 minutes and 71 ± 14.91 minutes, respectively. Benchmarking analysis showed that the first case on time, entry lag, and exit lag were below the 50th percentile while the room turnover time was above the 95th percentile.

Conclusion. Ensuring efficiency requires a multidisciplinary team approach. This research can guide administrators in determining interventions to increase operating room efficiency. **(Author's abstract)**

Keywords: *Operating room, Efficiency, Ophthalmology, Medicine*

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NP

0302

Outcomes of Corrective Surgery in Children with Foot Deformities Using Quantitative Gait Analysis

Visperas, Joana Francesca B., Sumpaico, Carlo Emmanuel J., Eusebio, Ilian Dominiq

Objective. This study aimed to quantitatively define outcomes of corrective surgery in children with various foot deformities.

Methods. We used a retrospective, nonrandomized design. All pediatric patients who underwent pre and postoperative gait analysis and corrective surgery were included. Outcome measures included quantitative gait analysis with temporospatial and kinematic parameters, the Gait Deviation Index, Gillette FAQ, and Hoffer's criteria.

Results. Five patients with neurogenic and idiopathic deformities underwent corrective surgery at the Philippine General Hospital from 2015 to 2017. Comparison of gait pre and postoperatively show promising outcomes, with improvement in GDI and FAQ levels, despite some of the patients' need for braces.

Conclusions. Quantitative gait analysis is a suitable method for evaluating surgical outcomes for foot deformity correction. It can be used in combination with functional outcome measures and clinical examination to give an overall picture of a patient's walking ability. **(Author's abstract)**

Keywords: *Gait analysis, Foot deformity, Clubfoot, Gait deviation index, Medicine*

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NP

Patient and Caregiver Preparedness for Discharge from the Internal Medicine Wards of the University of the Philippines – Philippine General Hospital

Palileo-Villanueva, Lia Aileen , Velasquez, Jhoanna Rose H. , Catedral, Lance Isidore G. , Leones, Louis Mer

Background. Preparedness before discharge correlates with good clinical outcomes.

Objective. The study described the perception, attitudes, and perceived preparedness of patients and caregivers for discharge from the Internal Medicine wards of the University of the Philippines-Philippine General Hospital (UP-PGH).

Methods. A cross-sectional survey among 142 patients about to be discharged from the Internal Medicine wards of the Philippine General Hospital and/or their caregivers from May to June 2017 was done using a validated Filipino version of B-PREPARED, an 11-item self-administered questionnaire that measures patient preparedness for home. The questionnaire has three domains: self-care information, equipment/services, and confidence. The highest possible B-PREPARED score is 22 with higher scores indicating better discharge preparedness. Mean B-PREPARED scores were calculated. Post-hoc linear regression analysis between the scores and characteristics was performed.

Results. The Filipino translation of the B-PREPARED questionnaire had good internal consistency (Cronbach's alpha 0.8). One hundred forty-two patients and caregivers participated. The mean B-PREPARED score was 14.57 ± 4.34 , with a median of 15. The lowest scores were for information on available community services (1.20 ± 0.76), arranged equipment (0.83 ± 0.88), information on side effects of medications (1.19 ± 0.85), and additional information sought (0.61 ± 0.92). There was no significant correlation between preparedness and age, employment status, educational attainment, diagnosis, length of hospitalization, the number of admissions one year prior, or whether the respondent was a patient or caregiver.

Conclusion. The Filipino translation of the B-PREPARED questionnaire had good internal consistency. Although most participants reported being confident and prepared for discharge, most felt they did not receive sufficient information on side effects and available community services, and assistance in arranging for the necessary equipment for home care. **(Author's abstract)**

Keywords: Discharge planning, Patient satisfaction, Health care surveys, Medicine

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Patient Flow, Health Delivery Processes, and Areas for Improvement in the UP Health Service (UPHS) during May to June 2020 of the COVID-19 Pandemic

Villarante, Katrina Lenora , Anuran, Geannagail O. , Mejia-Samonte, Marishiel , Laviña, Shiela Marie S., Limpoco, Anna Gui

Background. Workplace or employees' clinics play a vital role in disease outbreaks as there could be an influx of sick personnel. Processes and patient flows during pandemics should be documented to identify good practices and sources of operational inefficiencies.

Objective. To describe the patient flow, health delivery processes, and areas for improvement at the UPHS during the early phase of the COVID-19 pandemic from May to June 2020.

Methods. This was a cross-sectional study involving patient flow analysis of processes at the employees' clinic of the University of the Philippines-Philippine General Hospital. The study was divided into two major components: clinic process time measurement and process flow mapping. Data collection involved time elements and narrative descriptions of good practices and problems in the process flow.

Results. The UPHS staff attended to 1,514 employees' visits during the 15 working days from May to June 2020. The total UPHS service time from arrival to end of consultation of an employee with a COVID-19-related concern was an average of 1 hour 3 minutes (SD±39 minutes) with a mean total waiting time of 46 minutes (SD±37 minutes). Good practices identified were personnel flexibility in doing other tasks, good communication, and infection control measures. Areas for improvement included symptom screening, implementation of physical distancing, and disinfection practices.

Conclusion. The process flows in the UPHS clinic consisted of COVID-19 related consultations, non-COVID-19 related concerns, and swabbing services. Good communication, staff flexibility, infection control measures, and leadership were identified as good practices. Occasional lapses in symptom screening at triage, physical distancing among employees in queuing lines, and inconsistent disinfection practices were the areas for improvement. (Author's abstract)

Keywords: Patient flows, Health care delivery, COVID-19, Medicine

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0305

Pectoralis Major Tendon as Landmark for Proximal Humerus Surgery: A Cadaveric Study on the Adult Filipino Population

Rubio, Donnel Alexis T., Dizon, Patrick M., Yu, Daniel William

Objective. It is common to get lost during a comminuted proximal humerus surgery, and the pectoralis major insertion is always a constant. Therefore, this study aimed to do a cadaveric study on the Filipino population to assess the distance from the pectoralis major tendon to the top of the humeral head (PMT) as a reference during proximal humerus surgery.

Methods. This study dissected the shoulders of cadavers. The distance from the pectoralis major tendon insertion to the top of the humeral head (PMT) was measured using a caliper. This PMT distance was also correlated to the cadaver's height and sex.

Results. This study dissected 110 shoulders (55 cadavers | 24 females, 31 males). The median PMT was 5.40 cm for males and 4.90 cm for females, with a combined value of 5.40 cm overall. There was a direct and moderate correlation between the PMT with overall height. Height and PMT of both the left and right shoulder were significantly longer among males compared to females. The study showed that for every centimeter increase in the height of males, there was a corresponding 0.02 cm increase in the PMT, adding the constant factor of 1.83. A corresponding 0.04 cm increase in the PMT for females added the constant factor of -0.81.

Conclusion. The pectoralis major tendon insertion is a consistent landmark that can accurately restore humeral length when reconstructing complex proximal humerus fractures where landmarks are otherwise lost because of comminution. (Author's abstract)

Keywords: Pectoralis major tendon, Proximal humerus fracture, Humeral length, Medicine

Physicians' Perceptions on the Role of Telemedicine in Cancer Care During and Post-COVID-19 Pandemic

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Objectives. This study aims to determine perceptions of physicians in our institution on the role of telemedicine in cancer care during the COVID-19 pandemic and to assess its perceived benefits and barriers.

Methods. This is a cross-sectional study of physicians involved in cancer care in a tertiary referral hospital in the Philippines. We administered a 21-item online survey questionnaire between August to October 2020.

Results. We received and analyzed 84 physician responses. Ninety-six percent of physicians currently use telemedicine, an increase from 59% pre-pandemic. Eighty-nine percent use telemedicine for follow-up virtual consults, while 75% use telemedicine for case discussions in multidisciplinary meetings. The mean number of monthly patient consults conducted through telemedicine increased to 29.5 (SD: 24.8) from a pre-pandemic mean of 7.7 (SD: 18.7). Eighty-four percent of respondents perceived its main benefit as an infection control measure. The other perceived benefits of telemedicine include convenience (78%), accessibility to cancer care (72%), cost-effectiveness (68%), and time efficiency (44%). A quarter of the respondents believed that telemedicine has the potential to improve cancer outcomes. Ninety-two percent of the respondents expressed that they will use telemedicine occasionally in their practice.

Conclusion. Telemedicine was perceived by Filipino physicians in a tertiary hospital as an acceptable solution for the provision of cancer care during and after the COVID-19 pandemic. Tele-oncology should be further investigated to maximize patient and physician satisfaction and improve cancer outcomes. Data from this study can be used to improve oncology practice and service delivery to suitable patients during and after the COVID-19 pandemic.
(Author's abstract)

Keywords: *Cancer, COVID-19 pandemic, Telemedicine, Tele-oncology, Medicine*

Physiological Aspects of Cordillera Weaving in the Philippines
Pagaduan, Jeffrey C. , Salvador-Amores, Analyn , Inovero, Jenni

This novel study examined the physiological aspects of weaving among 20 female weavers from the Cordillera Region of Northern Luzon, Philippines. Demographic profile and anthropometric measures were gathered, heart rate (HR) and posture were continuously monitored while the weavers performed a 30-min weaving task. Data were

analyzed using mean \pm standard deviation and Pearson's correlation coefficient to identify any relationship. Analysis was conducted using a commercial statistical package (SPSS version 25, IBM, Chicago, IL) with alpha set at 0.05 level. Data revealed that the weavers' blood pressure is at the prehypertension stage, body fat percentage relative to age is average, BMI value is classified as overweight, and WHR value showed that they are at risk from metabolic disorders. Results also showed that the occupational demands of weaving presented low cardiovascular workload and increased task difficulty resulted to more forward lean among weavers. Additionally, there was a linear relationship between HR and posture. These findings suggest the potential for increased risk for musculoskeletal injuries with weaving. **(Author's abstract)**

Keywords: *Cordillera, Physiology, Posture, Weaving, Medicine*

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0308

Present Tense: A Peculiar Case of Pemphigus Vulgaris Presenting with Tense Blisters during the COVID-19 Pandemic

Ramirez-Quizon, Mae N. , Salazar-Paras, Dianne Kather

Pemphigus vulgaris is an autoimmune bullous dermatosis presenting with flaccid blisters and erosions. The morphology of pemphigus reflects the more superficial intraepidermal level of split seen histologically in contrast with pemphigoid, where the level of split is deep below the epidermis. This is a case of a 58-year-old male clinically presenting with arcuate tense bullae, which are more characteristic of the pemphigoid group of disorders, which revealed an intraepidermal split and tombstoning pattern of the basal epidermis on histopathology. Direct immunofluorescence revealed intercellular IgG and C3 distribution. Although this patient presented clinically with tense bullae, the histopathology and direct immunofluorescence results were consistent with pemphigus vulgaris. **(Author's abstract)**

Keywords: *Pemphigus vulgaris, Tense blisters, Direct immunofluorescence, Medicine*

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0309

Prevalence and Risk Factors of Smoking and Vaping among Nursing Students in a Private University in Manila, Philippines

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Nursing students trained to be health advocates have engaged in cigarette and electronic cigarette (EC) use. Our study aimed to determine the prevalence of cigarette and EC use among nursing students and examine how EC vaping and cigarette smoking are associated with various risk factors. This cross-sectional survey of smoking and vaping was administered to 249 nursing students in a private university in Manila, Philippines. An online-based self-assessment questionnaire (SAQ) that includes socio-demographic information, cigarette and EC usage, Perceived Stress Scale (PSS), and other risk factors was administered using on-campus and online recruitment strategies. Generalized linear models were fitted to estimate the effect of stress and other risk factors on smoking and vaping. Approximately one out of eight were exclusive vapers, one out of 25 were exclusive smokers, and one out of five were both smokers and vapers. The prevalence of smoking/vaping was 47% higher [adjusted prevalence ratio (aPR): 1.47, 95% confidence interval (95% CI): 1.04–2.07, p -value = 0.028] among students with high-stress levels than students with low to moderate stress levels. In addition, students who were sophomores (aPR: 1.69, 95% CI: 1.12–2.53, p -value = 0.012), juniors (aPR: 3.22, 95% CI: 1.91–5.42, p -value < 0.001), and seniors (aPR: 1.53, 95% CI: 0.76–3.08, p -value = 0.230) had a higher prevalence of smoking/vaping compared to freshmen students. Having a positive attitude towards vaping health impacts and a smoker/vaper peer was also associated with a higher prevalence of smoking/vaping. Therefore, effective health communication strategies and policies in universities and the community are recommended to reinforce existing smoking and vaping control efforts. **(Author's abstract)**

Keywords: *E-cigarette, Mental health, Nursing student, Perceived stress, Philippines, Smoking and vaping, Medicine*

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0310

Prevalence of Urinary Tract Infection among Female Commercial Sex Workers in Boulevard Trading, Davao City

Batistil, Rigil-Kent Joseph F. , Balbas, Siv Milliscent E. , Avee Joy B. Dayaganon,, Salcedo, Keziah Amor D. , Solitana, Jett Hastle

The risk of urinary tract infections (UTI) is increased among female commercial sex workers. This is because the female external reproductive anatomy makes women more prone to UTI during sexual intercourse. During sexual activity, bacteria in the vaginal area are sometimes massaged into the urethra. Hence, this study aimed to find out the prevalence of UTI among female commercial sex workers. Samples of vaginal swabs from 20 subjects were subjected to different tests such as chemical examination (Dipstick Method), microscopic examination, culture techniques and biochemical tests in order to assess the given sample's clinical significance to the study. Results of the tests showed that out of 20 samples, 16 tested positive for UTI while only four tested negative. The most common microorganisms present in the urine samples were *Trichomonas vaginalis*, *Staphylococcus aureus*, *Staphylococcus saprophyticus* and *Escherichia coli*. Based on the data, the prevalence rate of UTI among the examined female commercial sex workers is 80%, thus there is a high prevalence of UTI among these group people. **(Author's abstract)**

Keywords: *Medical Laboratory Science, Commercial Sex Workers, Urinary Tract Infection (UTI), Laboratory diagnosis, Philippines, Medicine*

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2013,
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Primary Anetoderma and Acquired Cutis Laxa Associated with Glomerulonephritis in a 37-year-old Filipino Male: A Case Report
Cubillan, Eileen Liesl A. , Cua, Val Constant

A 37-year-old Filipino man presented with a 9-month history of sagging skin progressing cephalocaudally from the chin and neck to the axillae, side of the trunk, and pelvic area. This was followed by a 2-month history of increasing serum creatinine levels associated with periorbital and bipedal edema, generalized weakness, decreased appetite, vomiting, and headache. Subsequently, skin-colored, non-tender sac-like plaques appeared on the abdomen, inguinal, and intergluteal areas. Histopathology of the latter lesions showed increased spaces between collagen bundles in the dermis. Staining with Verhoeff-van Gieson revealed focal sparse elastic fibers in the papillary dermis compared to that of the reticular dermis consistent with anetoderma. Further work-up revealed normal ANA titer and low serum C3. Kidney biopsy showed IgG deposition in the glomerular mesangium, giving a diagnosis of rapid progressive glomerulonephritis. On subsequent follow-up, the sac-like plaques became lax and presented as generalized wrinkling of the skin, raising the question whether cutis laxa and anetoderma are occurring in a spectrum instead as distinct entities. Based on the current review of literature, this is the first reported case of primary anetoderma co-occurring with cutis laxa in a patient with glomerulonephritis. Deposition of immunoglobulins along the elastic fibers could have activated the complement system, mediating the destruction of the elastic fibers, resulting to cutis laxa and anetoderma. This case also considers the possibility of anetoderma and type I acquired cutis laxa occurring either in a spectrum or as distinct diseases in a single patient. Further investigations may identify an ultrastructural pattern that can help differentiate the two entities. (Author's abstract)

Keywords: *Anetoderma, Cutis laxa, Glomerulonephritis, Medicine*

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Promotional Strategies to Increase Iron–Folic Acid Supplementation Compliance among Pregnant Women in the Philippines
Silao, Catherine Lynn Tipton , Liang, Fu-Wen , Felipe-Dimog, Eva, Wang, Hsiu-

Anemia in pregnancy is a risk factor for maternal and neonatal mortality and morbidity. Iron deficiency anemia (IDA), the most common type of anemia in pregnancy, adversely affects the well-being of both the mother and the child. Iron–folic acid supplementation (IFAS), a cost-effective public health intervention of IDA in pregnancy recommended by the World Health Organization (WHO), is implemented globally with the Philippines included. However, only 19% of Filipino pregnant women take the recommended number of 180 IFAS tablets. This is considered a factor in the prevalence of anemia in pregnancy. Very low IFAS uptake was due to the behaviors and practices of both pregnant women and healthcare providers. Limited awareness on the impact of anemia in pregnancy and the significance of IFAS, late and less frequent antenatal care (ANC) visits, experience of side effects and unpleasant taste of the supplement, and not receiving or purchasing supplements were the identified factors to low IFAS compliance. Among healthcare providers, a low level of IFAS compliance was found to be related to the late reporting of pregnant women to the antenatal facility, and inability to motivate and provide appropriate

counseling regarding the supplementation's use and significance. Behaviors and practices of pregnant mothers toward IFAS compliance appear to be a result of healthcare providers' inadequate healthcare services. Therefore, healthcare providers need to improve their ANC program and revisit their approaches on existing health and nutrition promotion programs, health education and counseling techniques, follow-up and monitoring strategies, and ANC visits promotion efforts. These efforts were found effective in well-informed and empowered pregnant women to IFAS compliance and other significant ANC access. Improved IFAS compliance will eventually contribute to lower the prevalence of anemia in pregnancy for better maternal and neonatal outcomes. **(Author's abstract)**

Keywords: *Anemia, Anemia in pregnancy, Antenatal care, Iron-folic acid supplementation, Promotion strategies, Medicine*

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0313

Pulmonary Manifestations and Management of COVID-19 Pediatric Patients Admitted in a Tertiary Government Hospital

Bautista, Kevin L. , Lozada, Maria Cristina H. , Alborote, Wri

Background. Coronavirus Disease 2019 (COVID-19) presents with respiratory signs and symptoms in children. Presently, there are no local studies on the pulmonary manifestations and management of COVID-19 among children.

Objective. Our study aimed to identify and describe the presenting respiratory signs and symptoms, oxygenation status, radiologic findings, blood gas analysis, and pulmonary interventions among children admitted for COVID-19. We also analyzed the clinical and radiologic variables associated with mortality.

Methodology. This is a retrospective study using data obtained from a review of medical records from April 1, 2020, to June 30, 2020, at a tertiary government institution in the Philippines. All pediatric patients (0-18 years) hospitalized for probable or confirmed COVID-19 during the said time period were included in this study. Univariate and multivariate logistic regression was applied to determine factors affecting mortality.

Results. A total of 25 pediatric patients with a mean age of 7 years old (age range: 11 days to 18 years) were admitted for COVID-19. Cough (44%) and dyspnea (24%) were the most common presenting respiratory symptoms, while tachypnea (68%), crackles (36%), and peripheral oxygen desaturation (36%) were the most common respiratory signs. Indeterminate findings for COVID-19 such as multifocal or diffuse ground-glass opacities and/or consolidations were the most common radiographic abnormalities. Invasive ventilatory support was administered to 6 cases of severe COVID-19 and 4 critical cases. There were no variables that correlated significantly with mortality.

Conclusion. Respiratory signs and symptoms were prominent in our cohort of children admitted due to COVID-19. Mechanical ventilation was required in more severe cases. Larger prospective studies may help identify variables that significantly correlate with poor outcomes among children with COVID-19. **(Author's abstract)**

Keywords: *COVID-19, Children, Pulmonary manifestations, Management, Medicine*

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***Randomized Controlled Trial on Combined Percutaneous Release and Steroid Injection
Versus Percutaneous Release Alone for Trigger Finger in Adults***
del Rosa, Tammy L. , Sison, Jerome Da

Introduction. Trigger finger is one of the most common causes of hand pain and disability. Surgical treatment consists of release of the A-1 pulley by open or percutaneous techniques. Many authors have noted that percutaneous release is convenient and cost-effective with a low complication rate. Only few studies have published results on combination of percutaneous release and steroid injection.

Objective. To compare the differences of outcomes in adults with trigger finger treated with combination of percutaneous release and corticosteroid injection to those treated with percutaneous release alone

Methods. We included all patients older than 18 years old in the UP-PGH Department of Orthopedics with a diagnosis of trigger finger who have consented to participate in this study. They were randomized into two treatment groups. One group was treated with percutaneous release only and the other group was treated with combined percutaneous release and corticosteroid injection. Outcomes measured were total active motion (TAM), postoperative pain, time to return-to-work, patient satisfaction, and complications.

Results. Post-procedure, both groups showed significant improvement in motion of the fingers ($p = 0.034$) and pain relief ($p = 0.001$). TAM scores of the combination group were better compared to the control at all time intervals ($p = 0.03, 0.008, 0.004, 0.019$) and better pain VAS scores in the 1st week ($p = 0.009$). Patients who received the combination treatment showed a trend toward better patient satisfaction, shorter duration of post-release pain and earlier return-to-work.

Conclusion. The addition of corticosteroid injections to percutaneous release of trigger finger significantly improves TAM and pain VAS scores. **(Author's abstract)**

Keywords: *Percutaneous release, Tendon entrapment, Trigger finger, Steroid injections, Medicine*

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NP

***Recalibrated Scales: The Use of Low-dose Isotretinoin in a Case of Epidermolytic Ichthyosis-
NPS1 in a Filipino Child***

Dayrit-Castro, Carmela Augusta F. , Faner, Monette R. , Abalos-Babaran, Shahara , Dy, Erickah Mary Ther

Epidermolytic Ichthyosis (EI) is a rare non-syndromic keratinopathic ichthyosis without definitive treatment. This is a case of EI in a 5-year-old Filipino female who presented with hyperkeratotic scales sparing the palms and soles. Histopathology revealed epidermolytic hyperkeratosis. A trial of treatment with isotretinoin 0.3 mg/kg/day, together with keratolytic agents, urea lotion and lactic acid lotion, resulted in a marked decrease in the thickness of the scales and odor. Interestingly, rebound effects were noted at 0.6 mg/kg/day. Taking into account that EI presents with more skin fragility compared to non-EHK ichthyosis, the authors surmise that there may be a smaller treatment window for patients with EI, which is notably lower than recommended for ichthyosis in general. **(Author's abstract)**

Keywords: *Epidermolytic hyperkeratosis, Isotretinoin, Medicine*

Reliability of the Penny and Beit CURE Radiologic Classifications of Pediatric Patients with Chronic Hematogenous Osteomyelitis in the Philippine General Hospital

Javier, Juanito S. , Araneta, Karla Ter

Objective. This study aimed to evaluate the inter- and intraobserver reliability of the Penny and Beit CURE radiologic classifications of pediatric patients with Chronic Hematogenous Osteomyelitis (CHOM) in the Philippine General Hospital (PGH).

Methods. Thirty-four pre-operative radiographs of PGH pediatric patients with CHOM were classified by seven orthopedic surgeons using both Penny and Beit CURE Classification systems. Two sets of radiographs were sent to the surgeons twice, four weeks apart, to classify. The Fleiss and Cohen κ statistics were used to determine inter- and intraobserver reliabilities, respectively.

Results. The Penny Classification had a slight to fair interobserver reliability (Fleiss $\kappa = 0.17$ and 0.24) and a fair intraobserver reliability (Cohen $\kappa = 0.35$) with a 49.58% average intraobserver agreement. The interobserver reliability when including all Beit CURE classification subtypes was fair ($\kappa = 0.28$ and 0.31). This improved to moderate ($\kappa = 0.41$ and 0.54) when using only the four main types of the Beit CURE classification with a 77.31% intraobserver agreement.

Conclusion. The Beit CURE classification for pediatric CHOM had higher inter- and intraobserver agreement rates than the Penny classification. Further improvement in reliability can be made by combining B2 and B3 subtypes under the Beit CURE classification. **(Author's abstract)**

Keywords: *Chronic hematogenous osteomyelitis, Beit CURE, Penny classification, Medicine*

Restoration of Elbow Flexion for Upper Trunk Brachial Plexus Injuries: Evaluation of Nerve Transfers and Modified Steindler Flexorplasty

Estrella, Emmanuel P. , Montales, Tristram D. , Handog, Precious Gr

Introduction. In patients with delayed presentation between 6 to 12 months, surgical treatment guidelines are not well defined in brachial plexus injury. Still, several authors have agreed that functional outcomes in patients treated within six months from the date of injury have the best results. Nerve transfers are still considered one of the treatment options in the said subset of patients even after six months. In contrast, a primary Steindler flexorplasty, or

proximal advancement of the flexor-pronator group, is an ideal technique for elbow flexion with an elapsed time from injury >6 to 9 months.

Objective. The purpose of this investigation was to compare the clinical outcomes of nerve transfers versus modified Steindler flexorplasty for the restoration of elbow flexion in upper type brachial plexus injuries (BPI).

Methods. A retrospective review of 28 patients who underwent nerve transfers (NT) and 12 patients who underwent modified Steindler flexorplasty (MSF) was done to determine the outcome of treatments. The manual muscle testing using the Medical Research Council scaling system, Visual Analog Scale for pain, active range of motion, and Disabilities of the Arm, Shoulder and Hand form scores were taken as dependent variables.

Results. The NT group had a median age of 27.5 years, with 26 men, a median surgical delay of 5.6 months, and a median follow-up of 33 months. Twenty out of 28 patients (71%) had \geq M3 with a median range of 117.6° elbow flexion motion. Median postoperative DASH (n=16) and VAS scores were 29.2 and 3, respectively. For the MSF patients, the median age was 27 years, including ten men, the median surgical delay was 12 months, and the median follow-up was 18.4 months. All the 12 patients had \geq M3, with a median range of motion of 106°. The median postoperative DASH score (n=5) and VAS score were 28.3 and 0, respectively. In the NT group, 73.3% (11/15) achieved \geq M3 elbow flexion if the operation was done in <6 months.

Conclusion. Nerve transfers and the modified Steindler procedure are still excellent options for successful elbow flexion reanimation in patients with brachial plexus injuries. Our results also showed that those with surgical delays of less than six months had the highest rate of achieving \geq M3 elbow flexion strength in the nerve transfer group. (Author's abstract)

Keywords: *Brachial plexus injuries, Nerve transfers, Steindler, Elbow flexion, Medicine*

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NP

0318

Results of Ponseti Casting for Clubfoot in a Tertiary Public Hospital ***Sumpaico, Carlo Emmanuel J. , Eusebio, Ilian Domi***

Introduction. Congenital talipes equinovarus (CTEV), also called clubfoot, is one of the most common orthopedic congenital anomalies. However, there is no formal study of the condition here in the Philippines, and data is sparse regarding the epidemiology, treatment, and outcomes in similar third-world countries.

Methods. Retrospective review of data of clubfoot patients seen at the Philippine General Hospital (PGH) Clubfoot Clinic from 2006 up to the present.

Results. Records from 75 patients treated at the PGH Clubfoot Clinic from 2010-2016 were reviewed. Idiopathic clubfoot comprised 76% of the patients, while syndromic clubfoot comprised 24%. A good outcome of the Ponseti method was seen in 82% and 88% of the idiopathic and syndromic clubfoot patients, respectively. Idiopathic clubfoot cases that had good outcomes required an average of 11.84 casts to tenotomy or bracing, which was not statistically significant compared to 9.55 average sessions for syndromic clubfoot (p=0.21). The initial Pirani scores for both cases were not significantly different (p=0.95). Idiopathic cases with poor outcomes needed less casting sessions (4.45) because the decision to operate was made early. Age was not found to significantly affect the outcome of treatment for idiopathic clubfoot (p=0.20) and syndromic clubfoot (p=0.64).

Conclusion. Ponseti casting was found to be effective in treating both idiopathic and syndromic clubfoot patients. The number of sessions did not differ significantly between the two. (Author's abstract)

Keywords: Clubfoot, Congenital Talipes Equinovarus, Pediatric Orthopedics, Serial Casting, Ponseti Casting Method, Pirani Scoring, Medicine

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0319

rs17465637 Variant of MIA3 May Be Associated with Coronary Artery Disease among Filipinos

Abrahan, IV, Lauro L. , Aherrera, Jaime Alfonso M. , Santos, Lourdes Ella G. , Punzalan, Felix Eduardo R. , Ona, Deborah Ignacia D. , Magno, Jose Donato A. , Llanes, Elmer Jasper B. , Tiongco, II3, Richard Henry P. , Reganit, Paul Ferdinand M. , Bejarin, Adrian John P. , Nevado, Jr., Jose B. , Sy, Rody G. , Aman, Aimee Yvonne Criselle L., Agustin, Charlene F. , Cutiongco“de la Paz, Eva Mari

Genetics is an important component in the development of coronary artery disease (CAD); however, studies on the Filipino population are lacking. This study aimed to determine the association of polymorphisms with the development of CAD among Filipinos. This is an age- and sex-matched case-control association study involving 122 adult Filipinos with CAD and 230 control participants without CAD. DNA from blood samples were genotyped for candidate single nucleotide polymorphisms (SNPs) using Illumina GoldenGate Genotyping (GGT) assay. Candidate variants and clinical data were correlated with the occurrence of CAD using chi-square and logistic regression analysis. Of the candidate variants analyzed, only rs17465637 in *MIA3* (adjusted OR 2.38; $p = 0.024$) was found to have a nominal association with the development of CAD among Filipinos after adjusting for hypertension, type 2 diabetes mellitus (T2DM), and smoking status. This finding may potentially allow earlier identification of Filipino patients at risk for CAD. Validation of these findings in a larger cohort is recommended. (**Author's abstract**)

Keywords: Coronary artery disease, Filipinos, *MIA3*, Polymorphism, rs17465637, Medicine

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0320

Saluyot (Corchorus olitorius L.) Leaves as Acoustic Gel for Ultrasound Imaging
Tan, Lovelyn A. , Questo, Danielle Loise R. , Subang, Danielle Marie I. , Alipio, M

Ultrasound is aided with acoustic gel to provide an accurate medical diagnosis; however, this product is costly and, thus, may hinder the diagnostic value of the procedure. This research is focused on the evaluation of radiographic image quality parameters of sonograms scanned using Saluyot leaves and commercial acoustic gels. Twelve participants were purposively chosen and subjected to an Ultrasound scan using the acoustic gels. Recorded sonograms were evaluated using the standard radiographic image quality parameters. Results revealed that sonograms obtained using Saluyot leaves were more acceptable, more visible, more detailed, and less distorted compared to commercial acoustic gel. Statistical analysis showed that there is no significant difference in the level

of acceptability and distortion of the sonograms obtained using the Saluyot leaves and commercial acoustic gels. However, there is a significant difference in the visibility and amount of recorded detail of the sonograms using the two gels. **(Author's abstract)**

Keywords: *Health, Saluyot leaves, Acoustic gel, Medicine*

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0321

Setup Reproducibility of Supine Position in Radiotherapy of Rectal Cancer Patients ***Alipio, M***

Setup reproducibility is crucial in the delivery of dose in radiotherapy as it determines the accuracy and treatment success of the procedure. Previous studies reported supine as an alternative to prone; however, the comparison was not straightforward as several factors were overlooked. This retrospective study attempted to determine the setup reproducibility as measured by displacement of bony landmarks in the lateral, longitudinal, and vertical axes of supine position relative to the standard prone position. Sixteen rectal cancer patients were positioned in supine (N=6) and prone (N=10) as per radiation oncologists and medical physicists in 2018. On each daily fraction, the displacement of the bony landmark in the three axes was calculated by the medical physicists and radiation therapists, and a total of 61 measurements were recorded. Results revealed that both supine and prone positions demonstrated an unacceptable reproducibility value. The setup reproducibility did not significantly differ in both positions. Based on the results of the study, the supine position, as reported by previous studies to exhibit superior setup reproducibility than prone position, is still unacceptable in radiotherapy of rectal cancer patients. **(Author's abstract)**

Keywords: *Prone, Radiotherapy, Rectal cancer, Retrospective, Setup reproducibility, Medicine*

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0322

Spot the Difference: A Case of Hailey-Hailey Disease in a 64-year-old Filipino Female ***Ramirez-Quizon, Mae N. , Villena, Juan Paolo David S. , Rosete, Raisa Cel***

Hailey-Hailey disease (HHD) is an uncommon acantholytic disorder of the skin. This is a case of a 64-year-old Filipino female with a chronic history of painful and malodorous intertriginous plaques. Histopathologic evaluation showed overlapping features of pemphigus vulgaris and Hailey-Hailey disease. A negative direct immunofluorescence test clinched the diagnosis of Hailey-Hailey disease. The patient was advised regarding preventive measures and treated with topical antibiotics and corticosteroids with improvement of her lesions. **(Author's abstract)**

Keywords: *Hailey-Hailey Disease, Chronic Benign Familial Pemphigus, Direct Immunofluorescence, Medicine*

Telemedicine Services in the University of the Philippines Health Service during the COVID-19 Pandemic: A Two-week Process Documentation and Analysis

Laviña, Shiela Marie S. , Babsa-ay, Jonathan D. , Engada, Kashmir Mae B. , Gabuyo, Karoline V. , Villa, Theresa A. , Mejia-Samonte, Marishiel D. , Villarante, Katrina Lenora , Anuran, Geannag

Background. Telemedicine provides access to health care services during pandemics. It can be utilized to screen asymptomatic persons, follow up close contacts of confirmed cases, monitor individuals with symptoms, conduct specialty consultations, and offer health services to patients during pandemics.

Objective. To describe the telemedicine processes, good practices, and areas for improvement in the University of the Philippines Health Service (UPHS) during the COVID-19 pandemic.

Methods. This was a cross-sectional study to document telemedicine processes in UPHS. All teleconsultations of employees and students of Philippine General Hospital (PGH) and UP Manila (UPM) during the two-week study period in October 2020 were included. Quantitative data was collected from different modes of patient entry into the UPHS telemedicine services: email, Online Consultation Request and Appointment (OCRA) System, and phone hotlines. Qualitative information was gathered as narrative descriptions of observations in the clinic's service delivery areas. A focus group discussion was also conducted to illustrate the different steps of the pathway used for telemedicine.

Results. The telemedicine services of UPHS consisted of virtual triage, COVID-19/non-COVID-19 consultation, and telemonitoring. The UPHS virtual triage received patient concerns through OCRA or the hotline numbers. On the other hand, the COVID-19 teleconsultation service provided care to employees and students who contacted the clinic regarding symptoms or exposure via email. The non-COVID-19 service had teleconsultation for patients with other medical concerns. Coordination among staff and presence of a consultant were identified as good practices, while the areas for improvement include the lack of written protocols in issuing fit-to-work clearance for difficult cases and the optional use of OCRA for UPHS consult.

Conclusion. Telemedicine services at the UPHS included tele-triaging, teleconsultations, and telemonitoring with use of phone calls, short messaging service (SMS), emails, and OCRA. Timely coordination, on-site duty consultants, and use of technology were identified as good practices. Lack of protocols and inconsistent OCRA use are areas for improvement. **(Author's abstract)**

Keywords: *Employees' clinic, Pandemic, Telemedicine, Medicine*

Ten-year Review of Patients with Resected Esophagogastric Junction Adenocarcinoma in the Philippine General Hospital

Buckley, Brian , Dela Peña, Arturo S. , Macalindong, Shi

Objective. To describe the clinicopathologic profile, management, and outcomes of patients with esophagogastric junction (EGJ) adenocarcinoma in the local setting.

Methods. Data was obtained from patients who had curative surgery for EGJ adenocarcinoma from 2004–2013 in the Philippine General Hospital. We used student's T-tests, analysis of variance, chi-squared and Fisher's exact tests for comparisons and Cohen's kappa index for correlation. A P value of less than or equal to 0.05 was considered significant.

Results. We included 88 patients (81.2% male) with mean age of 55.2 years. Eight percent were clinical Siewert type I; 23.9% were type II; 15.9% were type III; and majority (52.3%) were unknown type. Surgical approach and resection differed across the Siewert types ($P < 0.000$). Thoracoabdominal approach (72.7%) and distal esophagectomy with total gastrectomy (77.3%) were the most common procedures. Many had at least pathologic T3 (80.6%), N2 (54.5%), and stage III (68.2%) disease. Neoadjuvant and adjuvant chemotherapy was given in 1.2% (1/82) and 48.6% (18/37), respectively. In-hospital morbidity was 40%; mortality was 4.5%; 1-year disease-free survival rate was 69.4%; and overall survival rate was 76.5%. Correlation was fair between preoperative and pathologic Siewert type ($P = 0.003$) and poor between clinical and pathologic stage ($P = 0.115$). Patients with recurrence had higher pathologic lymph nodes ($P = 0.029$) and more advanced stage ($P = 0.022$).

Conclusion. EGJ adenocarcinomas were locally advanced and had poor outcomes. Surgery should be individualized and multimodality approach considered. **(Author's abstract)**

Keywords: *Esophagogastric junction, Gastroesophageal junction, Adenocarcinoma, Medicine*

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 NP

Timelines of Philhealth Z Benefit Package for Standard Risk Coronary Artery Bypass Graft (CABG) Surgery at the University of the Philippines- Philippine General Hospital

Reganit, Paul Ferdinand M. , Sison, Eric Oliver D. , Duena, Miriam R. , Chua, II, Enrique Malarin , Tomas, Arnolfo B. , Tiongson, Marc Denver A. , Gonzales, Eddieson M. , Bayani, II, Dioscoro DC. , Dela Cruz, Angelica V., Punzalan, Felix Eduard

Objective. The study evaluates the clinical profile of patients who underwent coronary artery bypass graft surgery (CABG) under the Philippine Health Insurance Corporation (Philhealth) Z Benefit Package (PZBP), as well as time intervals between PZBP screening, approval, and timing of surgery.

Methods. A review of medical records was done to collect data on time intervals between the screening process and Philhealth approval in CABG patients under PZBP. The clinical profile and surgical outcomes of patients were also evaluated.

Results. Sixty-three patients were included from March 2017 to December 2018. Most patients were under 61- 70

years old. Hypertension was the most commonly observed comorbidity. Time intervals were analyzed including identification for surgery to eligibility screening (2–217 days, median 25 days), Philhealth approval (8–266 days, median 20 days), and surgery (9–403 days, median 33 days). Postoperative atrial fibrillation was seen in 22.58%. The most commonly observed complication prolonging hospitalization was pneumonia.

Conclusion. This is the first local study which evaluated the timelines of PZBP. Results may be use as basis of follow up study in the future for identification of an acceptable timeline intervals. Several modifiable factors affecting time intervals were identified for further improvement of healthcare services. The leading cause of increase length in hospitalization were HAP and AF. **(Author's abstract)**

Keywords: *Coronary artery disease, Coronary bypass graft surgery, National health insurance, Z package, Medicine*

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0326

A Time-Motion Study on the Operating Room Processes among Pregnant COVID-19 Patients Undergoing Cesarean Section in a Tertiary Government Hospital
Bandola, Maria Angela R. , dela Cruz-Tabanda, Ma. Ev

Objective. This study aims to determine time and motion in the operating room in emergent, urgent and scheduled cesarean section surgeries among pregnant COVID-19 patients.

Methodology. A time and motion performance evaluation study was done by computing the following parameters: pre-induction time, pre-incision time, opening time, closing time, for both decision-to-delivery interval (DDI) and overall operative time.

Results. During the study period, emergent DDI average was 2 hours and 38 minutes, emergent overall operative time was 1 hour and 31minutes, urgent DDI average was 3 hours and 51 minutes, and urgent overall operative time of 1 hour and 57 minutes. However, in both urgent and emergent cases, the recommended DDI of 30 minutes, and the average duration of 44.3 minutes for CS were not feasible.

Conclusion. The COVID-19 pandemic has negatively affected the provision of surgical obstetric care and OR utilization. Due to the new safety protocol for healthcare workers and patients, there was a significant delay in DDI and overall operative time. The causes were preparation, anesthesia factors or obstetrician factors. Identifying modifiable obstacles may improve the DDI, overall operative time, and the quality of maternal and child birth care during this pandemic. **(Author's abstract)**

Keywords: *Cesarean section, COVID-19, Decision-to-delivery Interval (DDI), Time and motion study, Medicine*

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Traversing the Spectrum of Non-Langerhans Cell Histiocytosis: A Case of Rosai-Dorfman Disease with Features of Necrobiotic Xanthogranuloma

Cubillan, Eileen A. , Frez, Ma. Lorna F. , Cua, Val Constantine S. , Obbus, Sarah Faye V. , David, Kevin Jer V. , Chen, Erika Belinda T. , Ke, Bly

Introduction. Non-Langerhans cell histiocytoses (non-LCH) are a group of rare diseases with varied clinical manifestations and overlapping features seen among the subtypes. Here, we present a case of Rosai-Dorfman disease with features of necrobiotic xanthogranuloma.

Case. A 45-year-old female presented with a 10-year history of an enlarging neck mass with normal overlying skin accompanied by dysphagia and multiple asymptomatic pink to yellowish-brown papules, nodules, and plaques on the face, trunk and extremities. Biopsies of a skin nodule and plaque revealed granulomatous dermal infiltrates (lymphocytes, foamy histiocytes, and Touton giant cells), emperipolesis and areas of necrosis. CD1A and Fite-Faraco staining showed negative results while CD68 and S100 positively stained the tissues of interest. Histopathology of the neck mass paralleled these findings in addition to being negative for lymphoid markers. Patient had monoclonal gammopathy and thyromegaly with enlarged cervical lymph nodes on further tests and imaging. Intralesional and systemic steroids were given which led to flattening of skin lesions and improvement in dysphagia, respectively.

Conclusion. Diagnosis and classification of a particular type of non-LCH may be difficult due to similarities across its subtypes. Hence, it is our belief that these diseases may occur on a spectrum. Treatment involves a multidisciplinary approach for the best possible care. **(Author's abstract)**

Keywords: *Histiocytosis, Non-Langerhans cell histiocytosis, Rosai-Dorfman disease, Necrobiotic xanthogranuloma, Case report, Medicine*

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Treatment of Osteosarcoma Patients in the Philippine General Hospital during the COVID-19 Outbreak

Wang, Edward , Rubio, Donnel Alexis , Quintos, Albert Jerome , Fajardo, Pamela , Estanislao, Jochrys , Dimayuga, Cesar Cipriano , Dacanay, Emileo , Yu, Hazel Valerie , Gaston, Czar Louie, Alcasabas, Ana Patr

Objectives. The ongoing Coronavirus disease 2019 (COVID-19) pandemic has disrupted healthcare systems worldwide. This study aimed to document the effect of COVID-19 on osteosarcoma treatment pathways in the Philippine General Hospital (PGH) and determine if there were any delays.

Method. A retrospective review of osteosarcoma patients treated at the PGH from January 1, 2019 – January 1, 2020 (pre-COVID-19) was compared to those treated during the COVID-19 pandemic from March 1, 2020 – September 1, 2020. Rates of diagnosed osteosarcoma, admission for chemotherapy, admission for surgery, treatment abandonment, metastatic disease on presentation, 1-year mortality, and amputation were calculated and compared between the two groups.

Results. From March to September 2020, 11 newly diagnosed osteosarcoma patients sought consult at the PGH. Only one patient sought consult during the initial 3-4 months of the study, suggesting that patients delayed seeking

healthcare during the period of enhanced community quarantine. Patients seen during the pandemic had a higher rate of metastatic disease on presentation, reflecting the delay in diagnosis. Due to COVID-19 restrictions early in the pandemic, osteosarcoma patients were coordinated and referred to outside hospitals for intravenous chemotherapy and surgery. Normalization of services (hospital admissions, limb salvage surgeries) were seen at the later stages of the study, corresponding to the loosening of the quarantine.

Conclusions. Osteosarcoma patients experienced delays in seeking consult, diagnosis, and treatment at the PGH due to the COVID-19 pandemic. Early indicators suggest worse outcomes for these patients due to the delays. Strategies employed during the pandemic, such as networking of care and telemedicine, may help in future outbreaks. **(Author's abstract)**

Keywords: *Osteosarcoma, Coronavirus, COVID-19, Pandemic, Medicine*

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0329

Trichotillomania Masked by Diffuse Alopecia Areata: A Case Report
Silva, Claudine Y. , Lizarondo, Felix Paolo J. , Cua, Val Constant

An 11-year-old girl previously treated for tinea capitis presented a 3-month history of continuous decrease in hair density on the vertex, frontal, and parieto-temporal areas of the scalp. Hair pull test was negative. Trichoscopic findings showed black dots, micro-exclamation point hairs, regrowing vellus hair, and zigzag hairs. Histopathology showed CD3+ peribulbar lymphocytic infiltrates and occasional eosinophils around the anagen hair follicle consistent with a non-scarring alopecia. A diagnosis of diffuse alopecia areata was made. Patient was given methylprednisolone (0.5 mg/kg/day) for 2 weeks and noted marked increase in hair density except on focal areas of the scalp. Patient eventually admitted to occasional hair pulling. Trichoscopy revealed trichoptilosis, V-sign, tulip hairs, and multiple broken hairs of varying length while a second biopsy showed trichomalacia and pigment casts consistent with trichotillomania. In this case, where co-existence of alopecia areata and trichotillomania is considered to be uncommon, trichoscopy proved to be an important tool in differentiating hair disorders with similar presentation. Knowing key features of hair diseases can help elucidate the diagnosis when presented with an atypical case. **(Author's abstract)**

Keywords: *Alopecia areata, Trichotillomania, Trichoscopy, Medicine*

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Using Video Recording in Evaluating Skills of Medical Students in the Performance of the Orthopedic Examination

Ruanto, Mark Anthony R. , Bernardo, Peter B. , Bautista, Jose

Objective. The study aims to assess the similarity between the results of the evaluation of students during an Objective Structured Clinical Examination (OSCE) and a video recording of the same OSCE (VOSCE).

Methods. All Orthopedic surgeon preceptors in the actual OSCE were recruited to the study. Video recordings of the students taking the OSCE were collected and later reviewed and re-evaluated by the same preceptor after at least four weeks. The grades of actual OSCE and VOSCE were collected and analyzed using Cohen's kappa coefficient.

Results. High variability of intra-rater reliability was observed in different preceptors and station (slight agreement to perfect agreement). Overall intra-rater reliability between actual and video OSCE showed moderate agreement with Cohen's kappa coefficient equal to 0.43 (n=219).

Conclusion. Video OSCE is a reliable tool in assessing student clinical skills and knowledge in the musculoskeletal examination. Some factors have been suggested to further improve reliability. **(Author's abstract)**

Keywords: *Video-recording, Skills evaluation, OSCE, Medicine*

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Utility of Ipsilateral Medial Fibular Transport Using the Ilizarov Frame in the Treatment for Non-elderly Patients Sustaining Massive Tibial Bone Defects as a Sequela of Trauma and Infection: A Systematic Review

Balce, Gracia Cielo E. , Dumlao, III, Patri

Introduction and Objectives. Segmental tibial bone loss from tumor, trauma, or infection is a debilitating, limb-threatening scenario where treatment principles involve aggressive resection of infected tissues usually leading to large defects requiring reconstruction. A systematic review was conducted to determine the best available evidence related to the ipsilateral medial fibular transport using the Ilizarov frame in the management of these massive tibial bone defects.

Methods. Multiple medical online database search for articles containing the keywords: ipsilateral medial fibular transport, medial fibula transport, medialization of the fibula using the Ilizarov fixator, ring external fixator, vascularized free fibula, vascularized fibula transfer, and other related MeSH terms was done. Data was summarized to describe the mean age, bone defect, external fixator time, external fixator index, and bone and functional results using the ASAMI criteria.

Results. Eight studies with a total of 43 patients with massive tibial bone defects treated by fibular transport using the Ilizarov methods were identified. The mean age was 25.27 years (6.5-44.4) with a mean bone defect of 13.57 cm (9.52-17). The mean length of follow-up was 37.67 months (18-70.2). The bone union rate was 100%. Mean external fixation time was 9.59 months (8.31-10.88) and external fixation index was 0.61 months/cm (0.52-0.70). The majority of patients have an excellent bone (84%) and functional (52%) results. The average rate of complication was determined at 0.74/patient (95% CI, 0.60-0.89). The most common complications include pin-tract

infection (37%), residual loss of motion/stiffness of knee and ankle (35%), and pain on the transport site (21%).

Conclusion. Ipsilateral medial fibular transport using the Ilizarov frame provides a viable alternative treatment option for the treatment of massive tibial bone defects. **(Author's abstract)**

Keywords: *Tibial bone defect (S82), Ilizarov technique (E04), External fixation devices (E07), Medicine*

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0332

Are Vaccines Effective and Safe for the Prevention of COVID-19 Infections? A Living Systematic Review

Alejandria, Marissa M. , Sanchez-Tolosa, Maria Teresa , Besa, John Jefferson V. , Dans, Leonila F. , Lapitan, Marie Carm

Introduction. In the attempt to control the spread of the disease and the pandemic, numerous COVID-19 vaccines are in development. A review of the evidence on their efficacy and safety are critical.

Methods. A search for trials was done using the COVID-19 Living Overview of Evidence (L·OVE) platform. We also searched for relevant authorization documents and trial reports for COVID-19 vaccines of the US-Food and Drug Authority (US-FDA), the European Medicines Agency (EMA), the United Kingdom Medicines and Health Products Regulatory Agency (MHRA), and the WHO website. We included studies that fulfilled the following inclusion criteria: population – humans; intervention – COVID-19 vaccines; comparison – control or placebo; outcomes – efficacy and adverse events; methods – phase 3 randomized trials. Two reviewers independently screened the reports, assessed the methodological quality, and extracted the data on the trial characteristics and results on vaccine efficacy and safety. The date of last search was March 11, 2021.

Results. Interim results of trials investigating five vaccines were identified and included in the review. All five vaccines demonstrated satisfactory vaccine efficacy (VE) against symptomatic COVID-19 infection among adults in the short term with moderate certainty of evidence: BNT162b2, VE 95% (95% CI 90.3, 97.6); mRNA-1273, VE 93.6% (95% CI 88.6, 96.5); ChAdOx1, VE 66.7% (95% CI 57.4, 74.0), Gam-COVID-Vac, VE 91.1% (95% CI 83.6, 95.1); and Ad26.CoV2.S, VE 67.2% (95% CI 59.3, 73.7). Data on the efficacy against severe COVID-19 infection and asymptomatic COVID-19 infection are still inconclusive, except for Ad26.CoV2.S, which demonstrated good efficacy in preventing moderate and/or severe COVID-19 infection and acceptable protection against asymptomatic COVID-19 infection 28 days after vaccination (moderate certainty of evidence). Efficacy data on preventing death from COVID-19 infection are still inconclusive. Very limited phase 3 trial data is available to inform vaccine efficacy against the different variants of SARS-CoV-2. Vaccination with these five vaccines was associated with higher adverse reactions compared to control. These adverse events, due to reactions to the vaccines, were mild to moderate and of short duration. Available evidence on vaccine efficacy and safety is limited, mainly due to the short follow up and the small sample size of specific populations.

Conclusion. BNT162b2, mRNA-1273, ChAdOx1, Gam-COVID-Vac and Ad26.CoV.S vaccines demonstrated satisfactory vaccine efficacy against symptomatic COVID-19 infection among adults in the short term with moderate certainty of evidence. Data on the efficacy against severe COVID-19 infection, asymptomatic COVID-19 infection, and death from COVID-19 infection are still inconclusive. Long-term efficacy and safety data, and data on the efficacy against variant strains of SARS-CoV-2 are still lacking. **(Author's abstract)**

Keywords: *COVID-19, SARS-CoV-2, Vaccines, phase 3, Randomized controlled trials, Systematic review, Medicine*

Validation of Snort-spit Saliva in Detecting COVID-19 Using RT-PCR and Rapid Antigen Detection Test

Berba, Regina P. , Velasco, John Mark S. , Lopa, Ramon Antonio B. , Salud, Jacob Ephraim D. , Lacuata, Jan Alexis C. , Tan, Daniel I. , Dungog, Cecile C. , Diwa, Michele H. , Ang, Mark Anthony C. , Sarmiento, Abigail D. , Carrillo, Ryner Jose D., Chiong, Charlott

Objective. To determine the diagnostic accuracy of self-collected snorted and spit saliva in detecting COVID-19 using RT-PCR (ssRT-PCR) and lateral flow antigen test (ssLFA) versus nasopharyngeal swab RT-PCR (npRT-PCR).

Methods. One hundred ninety-seven symptomatic subjects for COVID-19 testing in a tertiary hospital underwent snort-spit saliva self-collection for RT-PCR and antigen testing and nasopharyngeal swab for RT-PCR as reference. Positivity rates, agreement, sensitivity, specificity, and likelihood ratios were estimated.

Results. Estimated prevalence of COVID-19 using npRT-PCR was 9% (exact 95% CI of 5.5% - 14.1%). A higher positivity rate of 13% in the ssRT-PCR assay suggested possible higher viral RNA in the snort-spit samples. There was 92.9% agreement between ssRT-PCR and npRT-PCR (exact 95% CI of 88.4% to 96.1%; Cohen's Kappa of 0.6435). If npRT-PCR will be assumed as reference standard, the estimated Sensitivity was 83.3% (exact 95% CI of 60.8% to 94.2%), Specificity 93.9% (exact 95% CI of 89.3% to 96.5%), Positive predictive value of 57.7% (exact 95% CI of 38.9% to 74.5%), Negative predictive value of 98.2% (exact 95% CI of 95% to 99.4%), positive likelihood ratio of 3.65 (95% CI of 7.37 to 24.9), negative likelihood ratio of 0.178 (95% CI of 0.063 to 0.499). There was 84.84% agreement (95% exact CI of 79.1% to 89.5%; Cohen's Kappa of 0.2356) between ssLFAvs npRT-PCR, sensitivity of 38.9% (exact 95% CI of 20.3% to 61.4%), specificity of 89.4% (exact 95% CI of 84.1% to 93.1%), PPV of 26.9% (95% CI of 13.7% to 46.1%), NPV of 93.6% (exact 95% CI of 88.8% to 96.4%), LR+ of 3.67 (95% CI of 1.79 - 7.51), LR – of 0.68 (95% CI of 0.47 - 0.99).

Conclusion. Our data showed that snort-spit saliva RT-PCR testing had acceptable diagnostic performance characteristics and can potentially be used as an alternative to the standard nasopharyngeal/oropharyngeal swab RT-PCR test for COVID-19 in certain situations. However, our data also showed that snort-spit saliva antigen testing using lateral flow assay did not offer acceptable performance. **(Author's abstract)**

Keywords: SARS-CoV-2, Reverse transcription polymerase chain reaction, Saliva, Medicine

Variant rs6596140 of Follistatin-like 4 Gene (FSTL4) May Be Associated with Poor Response to Angiotensin Receptor Blockers (ARBs) among Filipinos

Bejarin, Adrian John P. , Aman, Aimee Yvonne Criselle L. , Agustin, Charlene F. , Abrahan, IV, Lauro L. , Herrera, Jaime Alfonso M. , Tiongco, II, Richard Henry P. , Santos, Lourdes Ella G. , Reganit, Paul Ferdinand M. , Punzalan, Felix Eduardo R. , Magno, Jose Donato A. , Llanes, Elmer Jasper B. , Ramos, John Daniel A. , Nevado, Jr., Jose B. , Ona, Deborah Ignacia D., Cutiongco de la Paz, Eva Maria C. , Sy, Rod

Constituting one of the most commonly used antihypertensive drug families are the angiotensin receptor blockers (ARBs). The aim of this study was to identify the variants associated with response to ARBs that may potentially be used as markers for designing a tailor-fit treatment strategy for hypertension. An unmatched case-control study was done among adult hypertensive Filipino patients maintained on ARBs. Genotypic analysis of blood DNA was conducted. Logistic regression analyses were performed to determine association of clinical and genetic variables with ARB response. A total of 69 poor responders and 126 normal responders were included in the study. After performing univariate logistic regression, five single nucleotide polymorphisms showed association with poor response to ARBs. The genetic variant rs6596140 remained significant (dominant model; OR 2.36, $p = 0.009$) after adjusting for female sex and age. Variant rs6596140 was found to be associated with poor response to ARBs among Filipinos. Prior to clinical application, verification is recommended prior to clinical application. As the function of this variant is presently unknown, an investigation to elucidate its role in ARB response in hypertension is also recommended. **(Author's abstract)**

Keywords: *Angiotensin receptor blockers, Filipinos, FSTL4, Genetic polymorphism, Hypertension, rs6596140, Medicine*

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 NP

Virgin Coconut Oil Attenuates Deficits in Rats Undergoing Transient Cerebral Ischemia

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Background and Objectives. Neuroprotection agents may help improve the outcomes of large vessel ischemic stroke. This study aims to explore the role of Virgin Coconut Oil (VCO), with its well-documented anti-oxidant properties, in neuroprotection after transient occlusion of the extracranial internal carotid artery in a rat model of stroke.

Methods. Twenty-three Sprague-Dawley rats were randomized into two groups: 1) control group ($n=11$) given distilled water, and 2) treatment group ($n=12$) given virgin coconut oil at 5.15 ml/kg body weight for seven days. Subsequently, the rats underwent transient right extracranial internal carotid artery occlusion (EICA) for 5 minutes using non-traumatic aneurysm clips. At 4 and 24 hours after EICA, the animals were examined for neurologic deficits by an observer blinded to treatment groups, then sacrificed. Eight brain specimens (4 from each group) were subjected to histopathologic examination (H & E staining) while the rest of the specimens were processed using triphenyltetrazolium chloride (TTC) staining to determine infarct size and area of hemispheric edema.

Results. VCO treatment significantly improved the severity of neurologic deficit (1.42 ± 2.31) compared to the

control distilled water group (4.09 ± 2.59) 24 hours after EICAO. Whereas, infarct size and percent hemispheric edema did not significantly differ between the two groups.

Conclusion. Prophylactic treatment of VCO is protective against EICAO-induced neurologic deficits in a rat model. VCO shows great potential as a neuroprotective agent for large vessel ischemic stroke. However, more studies are necessary to elucidate the neuroprotective mechanisms of VCO therapy in ischemic stroke. **(Author's abstract)**

Keywords: *Virgin coconut oil, Stroke, Neuroprotection, Anti-oxidant, Ischemia, Medicine*

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NP

NUTRITION

0336

Allele-specific Differences of FTO and MC4R Genes in the Energy and Nutrient Intakes and Eating Behavior of Filipino Adolescents in Selected Areas in Metro Manila, Philippines

Tongco, Angelique Q. , Magtibay, Edward Vincent J. , Agarrado, Rod Erick L. , Goloso-Gubat, Maria Julia , Udarbe, Mildred A. , Nacis, Jacus S., TaÁ±ada, Maria Cristina

The fat mass and obesity-associated (*FTO*) and melanocortin-4-receptor (*MC4R*) genes were associated with obesity risk through their effect on eating behavior and nutrient intake. This study aimed to assess whether energy and nutrient intake and eating behavior were different between risk and non-risk allele carriers of *FTO* rs9939609, *FTO* rs1421085, and *MC4R* rs17782313. The polymorphisms were genotyped in 280 adolescents from Taguig City and Pateros in Metro Manila, Philippines. Energy and macronutrient intake were assessed by a five-day food diary, and a Filipino-translated Three-Factor Eating Questionnaire (TFEQ-R18) was used to capture the eating behavior of the study participants. Except for fat intake, adolescents carrying the risk C allele of *FTO* rs1421085 were found to have a significantly higher mean intake of energy, protein, and carbohydrates ($P < 0.05$) than their non-risk T allele counterparts. When grouped according to alleles of *FTO* rs9939609, *FTO* rs1421085, and *MC4R* rs17782313, no significant differences were observed in the eating behavior of the participants. The rs1421085 variant of the *FTO* gene might play a role in nutrient intake, but none of the obesity-related genetic polymorphisms that were examined posed differences in eating behavior. **(Author's abstract)**

Keywords: *Adolescents, Eating behavior, FTO, MC4R, Nutrigenomics, Nutrition*

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NP

Antioxidant, Anti-obesity, and Lipid- lowering Properties of Philippine “Duhat” (Syzgium cumini L. Skeel) Freeze-dried Fruit Flesh

Cena-Navarro, Rohani , Castillo-Israel, Katherine Ann T. , Gaban, Prince Joseph V. , Gapasin, Roxanne P. , Maniwang, Jonna Rose C. , Sunico, Dianne Jane A. , Atienza, Liezl M. , Mercado, Carmela Jhoy G., Estacio, Maria Amelit

Philippine indigenous berries are known as rich sources of antioxidants that may promote health and prevent the occurrence of diseases. Thus, the study investigated the nutritional, antioxidant, anti-obesity, and lipid-lowering properties of freeze-dried “duhat” (FDD) (*Syzgium cumini* L. Skeel) fruit using proximate analysis, *in vitro* antioxidant assays, and *in vivo* efficacy using obese diet-induced ICR mice, respectively. Mice were randomly allocated to five groups fed with various diets *ad libitum* for nine weeks as follows: Group 1 with normal diet (ND) and served as the control, Group 2 with high-fat diet (HFD) that served as the negative control, Group 3 with HFD + 10% w/w FDD powder, Group 4 with HFD + 20% w/w FDD powder, and Group 5 with HFD + 30% w/w FDD powder. Proximate composition of FDD fruit flesh includes $20.16 \pm 0.75\%$ moisture content, $2.64 \pm 0.06\%$ total crude fiber, $4.50 \pm 0.21\%$ crude fat, $7.10 \pm 0.20\%$ crude protein, and $62.22 \pm 1.11\%$ carbohydrate. It is a rich source of antioxidants with a total flavonoid content (TFC) of 0.02 mg QE/g FDD , total phenolic content (TPC) of $12.52 \pm 0.02 \text{ mg GAE/ g FDD}$, and anti-oxidant activity of 96.07 ± 0.86 . Results of the *in vivo* study showed significant reduction in blood TG by 50% at 30% FDD supplementation (w/w) and by 30% at 20% FDD supplementation (w/w) ($p < 0.05$). Also, a significant increase of up to 45% in HDL-C in the 30% FDD-supplemented group was noted compared to the baseline mean (Week 0) at Weeks 3 and 6 of supplementation ($p < 0.05$). Meanwhile, no significant findings were noted in the blood total cholesterol (TC) levels. The improvement in lipid profile could be attributed to the nutritional and bioactive compounds found in Philippine duhat. Taken collectively, this study yielded interesting findings that can be further investigated at the cellular and molecular levels. **(Author's abstract)**

Keywords: *Anti-obesity, Antioxidant, ICR mouse, Lipid-lowering properties, Philippine duhat, Nutrition*

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Assessment of Socioeconomic and Climate Change-related Factors to Meeting Recommended Energy Intake (REI) of Filipino Households

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This study aimed to determine the sociodemographic, socioeconomic, and climate change-related factors associated with meeting recommended energy intake (REI) among Filipino households. This paper utilized data from selected components of the 2013 National Nutrition Survey (NNS) and 2015 Updating Survey of the Department of Science and Technology – Food and Nutrition Research Institute (DOST-FNRI), typhoon/flood occurrence from online reports of the National Disaster Risk Reduction and Management Council (NDRRMC) and drought data for the first quarter (Q1) of 2015 from the Philippine Rice Information System (PRiSM) of the International Rice Research Institute (IRRI). Multiple logistic regression using the backward elimination method was done and post-estimation tests were applied to the final model. Filipino households with more than three members were food insecure and were poor were less likely to meet the REI. On the other hand, households engaged in agricultural work, having a member working abroad, residing in rural areas, and shorter time lag exposure to typhoons/floods were more likely to meet REI. Filipino households in Mindanao, meanwhile, were less likely to meet REI if they had more than three members and were food insecure and more likely to meet REI if they were engaged in agricultural work. The study

provides a snapshot of a seemingly minute but significant facet of the health and nutrition situation in the Philippines, which is meeting the REI at the household level in relation to exposure to extreme weather events such as typhoons, floods, and drought brought about by climate change. The results of the study may provide vital inputs to climate change adaptation programs of the government for vulnerable population groups, particularly among farming- and fishing-dependent households who will likely absorb the long-term impact of the extreme weather events to their livelihoods. **(Author's abstract)**

Keywords: Drought, Floods, Households, Philippines, Recommended energy intake, Typhoons, Nutrition

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0339

Determinants of the Youth's Nutritional Status in Selected Areas in the Philippines and Opportunities for Program Development and Engagement

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The Filipino youth, 15–24 yr old, are at a critical period characterized by a shift from adolescence to adulthood. While the youth make up about one-fifth of the population, they are often not a priority in program development such as in food, health, and nutrition. This study looked into the socio-demographic profile and nutritional status of youth and food security status of their households in six areas in the Philippines. It also determined the factors affecting the nutritional status of youth such as sex, educational status, occupation, wealth, and household food security status. Descriptive statistics, chi-square test, and multilevel mixed-effects logistic regression were employed in the analysis using STATA Version 16. Results showed that about 15% of youth in the study had low body mass index (BMI), while 10% had high BMI. The majority (70%) belonged to food-insecure households. Among working youth, the most common types of employment were service work, farming, forestry and fishery work, and laborer and unskilled work. Being poor and belonging to a food-insecure household increase the likelihood of being undernourished by 0.23 and 0.17 times, respectively. Belonging to rich households and food secure status significantly increases the likelihood of being overnourished by 0.58 and 0.34 times. Having no grade completed (2.66) or attained elementary level (1.06), being a working student (0.44), belonging to a poor household (0.95), and having food-insecure status (0.07) significantly increases the likelihood of becoming stunted. Improvement of nutritional status through various youth programs and food systems engagement during adolescence and early adulthood can be considered the second window of opportunity for intervention to address the inter-generational cycle of poverty, food insecurity, and malnutrition. **(Author's abstract)**

Keywords: Adolescent, Food security, Food system, Malnutrition, Nutritional status, Nutrition

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Dietary Zinc Intake and the Underlying Factors of Serum Zinc Deficiency among Preschool Children in the Philippines

Musa, Ma. Cristina A. , Ducay, Apple Joy D. , Maniego, Ma. Lynell V. , Goyena, Eva A., Angeles-Agdeppa, Im

Zinc deficiency is linked to linear growth and is considered as one of the risk factors of stunting. Stunting persists as a public health problem in the Philippines, affecting 30% of children below 5 yr old. This study assessed the adequacy of dietary zinc intake and the prevalence and associated factors of serum zinc deficiency among preschool-age children 6–71 mo old. Data from the 8th National Nutrition Survey (NNS) conducted in 2013, involving 2,892 preschool-age children, were analyzed. Zinc intake was collected using two non-consecutive 24-hr food recalls, while dietary zinc inadequacy was intake below 100% of the estimated average requirement (EAR) for zinc prescribed by the 2015 Philippine Dietary Reference Intakes (PDRI). Serum zinc level was analyzed using atomic absorption spectrophotometry. Factors associated with zinc deficiency such as micronutrient status, wealth status, food security, and dietary adequacy were identified using multivariate logistic regression analysis. Almost half (47.2%) of preschool-age children had inadequate zinc intake. The national prevalence of serum zinc deficiency was 17.9%, and it is highest among children 6–23 mo old and those from rural, poorest, and food-insecure households relative to other subgroups. Poor wealth status was found to be a strong predictor of zinc deficiency (OR 4.0; 95% CI = 2.22–6.00). Stunting (OR 1.37; 95% CI = 1.06–1.76) and serum vitamin A deficiency (OR 1.80; 95% CI = 1.43–2.26) were associated with higher odds of zinc deficiency. Adequate vitamin A intake was an important protective factor against zinc deficiency. The odds of a child being zinc deficient is significantly predicted by poor wealth status, stunting, and vitamin A deficiency, while adequate nutrient intake serves as a crucial protective factor. Strengthening programs on micronutrient supplementation (including zinc), food fortification, and dietary diversification – combined with micronutrient-dense food consumption among preschool-age children – could help achieve long-term nutrition and health outcomes. **(Author's abstract)**

Keywords: *Filipino children, Stunting, Zinc deficiency, Zinc intake, Nutrition*

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Factors Affecting the Nutritional Status of School-aged Children Belonging to Farming Households in the Philippines

Talavera, Maria Theresa M. , dela Luna, Kim Leon

Undernutrition among school-aged children continues to be a public health concern in the Philippines, where agriculture is the primary source of income. School-age is a crucial phase of development and growth among children since it can establish nutritional knowledge and healthy eating habits across the next life stages. Evidence suggested that undernutrition exists among school-aged children belonging to households relying on agriculture. This study aims to identify factors affecting the nutritional status of school children belonging to farming households. The data set from the 2015 Updating of the Nutritional Status of Filipino Children and Other Population Groups of the Department of Science and Technology–Food and Nutrition Research Institute (DOST-FNRI) consisting of 1,689 school children belonging to farming households was used in this study. Multiple logistic regression was used to determine significant factors affecting the nutritional status of school-aged children while holding other variables constant. Household wealth index and age were significantly associated with underweight and wasting. Meanwhile, poor dietary diversity score was also an essential confounding factor between socioeconomic status with underweight and stunting but not wasting. The study's findings can provide empirical

evidence that the most important underlying causes of undernutrition among school-aged children belonging to farming households were wealth index and food availability. It is recommended that their investments be made in addition to livelihood for families relying on agriculture and provide them better access to government services to diminish the existing issues of scarcity. **(Author's abstract)**

Keywords: *Farming households, Nutritional status, School-aged children, Nutrition*

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0342

Knowledge and Practices in the Utilization of Banana (Musa sp.) Leaf as Food Contact Material in the Metropolitan Manila Foodservice Industry

Recote, Jessa May Q. , Luna, Myrna Ben

Banana (*Musa sp.*) leaf is widely used as a food contact material (FCM) in the Philippine foodservice industry. In spite of its usage in serving and wrapping various raw and cooked foods, the Association of Southeast Asian Nations (ASEAN) general guidelines on FCMs exempted its application to banana leaf (BL) and other natural materials that have not undergone chemical modification. This study documented the knowledge and practices in the utilization of BL in foodservice establishments within the top five local government units (LGUs) in Metropolitan Manila, Philippines. Key informant interviews using a semi-structured questionnaire and participant observation were employed in data collection. Data were analyzed using the constant comparison method. Results showed that despite technological and scientific advancement, the BL has remained a functional FCM in the foodservice industry due to its perceived ethnic, sensory, and environmental impacts. The BL specifications – including leaf maturity, dimensions, integrity, cleanliness, and varietal source – are related to its functionalities as FCM. Generally, preparation methods employed by foodservice establishments include wiping, washing, and heating. These methods of preparation were found to be significantly associated with types of food products. The efficacy of these preparation methods needs to be evaluated due to possible leaf contamination and deterioration due to improper handling and storage prior to usage. Furthermore, the foodservice industry identified BL supply, price, and quality issues that should be properly addressed. As an FCM, BL influences final food product quality and safety. Thus, the utilization of BL by other actors within the foodservice supply chain should be further studied to provide baseline information for the establishment of Philippine standards for BL as an FCM. **(Author's abstract)**

Keywords: *Banana leaf utilization, Food contact material, Food quality and safety, Foodservice, Key informant, Knowledge and practices, Nutrition*

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Science and Technology Intervention Strategy on Complementary Feeding to Improve the Nutritional Status of Young Children in Two Yolanda Disasters Areas in the Philippines: Evidences from the Grounds

Ygaña, Jennilyn S. , Domiquel, Dovie G. , Ferrer, Eldridge B. , Azaña, Glenda P. , Viajar, Rowena V. , Caraig, Georgina S. , Dorado, Julieta B. , Rongavilla, Emily O., Capanzana, Mari

The project aimed to reduce the prevalence of malnutrition among 6–35-mo-old children, and to determine the implementation of intervention strategy through process evaluation in a disaster area affected by super typhoon "Yolanda". The effects of the intervention on the nutritional status and food intake of children-participants, as well as the nutrition knowledge of their mothers and caregivers in disaster-stricken areas, were determined. The project covered 344 underweight and normal weight-for-age infants and young children 6–35-mo-old in four barangays each in Jaro, Leyte and Basey, Samar, Philippines. The planning, organizing, implementation, monitoring, and process evaluation phases of implementing a nutrition intervention were documented. Weights and heights/lengths of children and food intake were taken before and after the intervention. The children-participants were fed for 4 mo with complementary foods, while their mothers/caregivers were taught about health and nutrition concepts. A significant increase in the mean weight and height/length of children-participants after 120 feeding days and the improvement in the energy and protein intakes of the children were observed. However, these increases had no significant impact on the overall nutritional status of children living in a disaster area. Likewise, a significant increase in the mean knowledge scores of their mothers/caregivers on breastfeeding and food safety at endline ($p < 0.001$) was noted. The implementation was closely monitored following some guidelines and its feasibility in a disaster situation. The intervention strategy provided an option of doing nutritional assessment and implementing a food-based and education intervention for mother and child during the rehabilitation phase of a disaster. **(Author's abstract)**

Keywords: *Assessment, Complementary feeding, Complementary food, Disaster, Nutrition intervention, Process evaluation, Nutrition*

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Updating of the Philippine Food Exchange Lists for Meal Planning

Santos, Noelle Lyn C. , Madrid, Marilou L. , Orense, Consuelo L. , Lat, Hazel T. , Mendoza, David Kenne

The food exchange list (FEL) is a tool for planning meals using a list of foods grouped with approximately the same amount of energy and macronutrients. The Philippine FEL underwent three revisions from its publication in 1953 until 1994. This most recent revision of the FEL aimed to review calculations of macronutrient and energy content per exchange and by food group, review the methods of dietary calculation, and enhance the design and appearance of the handbook. Revision of the handbook started with needs assessment using a survey as study design among 529 registered nutritionist-dietitians (RNDs) and nutrition students, and focus group discussion (FGD) among 36 selected hospital nutrition supervisors, nutrition faculty, and health workers in three cities of the Philippines – namely, Manila, Cebu, and Davao. The seven food groups in the previous FEL editions were adopted as the main components of foods for substitution. Macronutrient content per exchange was computed from the 2017 Philippine food composition tables (FCTs) and foreign food databases. Results of the survey revealed that most RNDs used the FEL in a clinical or hospital setting (98.1%), while students used the FEL for themselves (93.8%). The FEL was mainly used for meal planning (87.5%), as reference (62.8%), and for counseling (48.4%). Almost all respondents

described the FEL as very useful. The addition of more foods available in the market was the most common suggestion of respondents. Based on the suggestions from the survey and FGD the following changes were made: recomputed and reclassified 525 food items within the seven food groups and subgroups; reclassified rice group into low-, medium-, and high-protein subgroups; the alphabetical arrangement of foods with Filipino common names and English names; additional equations for deriving desirable body weight (DBW) and total energy requirement (TER); and included photos of selected foods per exchange. Improvement of the design and appearance of the handbook was accomplished through the use of color-coding, food photos, and a tabulated food listing. **(Author's abstract)**

Keywords: Nutrition, Food exchange lists, Food exchanges, Meal planning, Nutrition, Nutritionist-dietitians

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PHYSICS

0345

Adsorption and Dissociation of H_2O_2 on $Cu_2O(111)$ and F, N-doped $Cu_2O(111)$ Surfaces for Potential Anti-microbial and Anti-pollutant Properties

Padama, Allan Abraham B. , Putungan, Darwin B. , Santos-Putungan, Alexandra B. , Beronio, Ellaine R

In this work, we probed the adsorption and dissociation of H_2O_2 on pristine plus nitrogen- and fluorine-doped $Cu_2O(111)$ surfaces via density functional theory to assess their efficacy as anti-microbial and anti-pollutant materials. It is found that H_2O_2 is chemisorbed on all surfaces with spontaneous dissociation into two OH species. Such dissociative adsorption is a result of charge transfer from the copper atom to H_2O_2 , which activates the cleaving of the O-O bond. Further charge analysis revealed that charge transfer is most active in fluorine-doped $Cu_2O(111)$, which makes F- $Cu_2O(111)$ the most active surface in H_2O_2 adsorption and dissociation. Furthermore, this surface is found to promote the formation of H_2O which could be of importance in other related reactions. Due to the weak interaction between fluorine and copper, it was observed that an extensive rearrangement of atoms occurred on the fluorine-doped $Cu_2O(111)$ upon H_2O_2 adsorption on the surface. This is in contrast to the nitrogen-doped surface, where the surface structure was maintained even after dissociative H_2O_2 adsorption. Our results point to the effective dissociation of H_2O_2 on doped $Cu_2O(111)$ and the efficient generation of reactive oxygen species (ROS), which are of significance in the degradation of bacteria, viruses, and organic pollutants. **(Author's abstract)**

Keywords: H_2O_2 adsorption, H_2O_2 dissociation, $Cu_2O(111)$, Doped $Cu_2O(111)$, Density functional theory, Physics

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NP

Characterization and Radiation Shielding Properties of Philippine Natural Bentonite and Zeolite

Hila, Frederick C. , Gili, Mon Br

In this paper, the investigation of the structural and radiation shielding characteristics of natural bentonite and zeolite was presented. XRD (X-ray diffraction) and SEM (scanning electron microscopy) were used to examine the structural properties and morphologies of the minerals. The Electron-Photon Interaction Cross Sections 2017 (EPICS2017) library through EpiXS software was used to obtain the photon shielding properties – including mass attenuation coefficients, mean free paths, half-value and tenth-value layers, effective atomic numbers, and buildup factors for energy absorption and exposure. The ESTAR web program and SRIM code were used to obtain electron and ion stopping powers and ranges. The neutron removal cross-sections and the fast and thermal attenuation factors were obtained using the Phy-X/PSD, MRCsC, and NGCal software. The results showed that the zeolite grain sizes were typically smaller than 50 μm , while the bentonite grain sizes were larger reaching 100 μm . It was found that both materials were significantly composed of mordenite and montmorillonite. The photon shielding quantities for both materials showed similar *MFP*, *HVL*, and *TVL* values with different buildup factor values at large penetration depths. The high-energy charged particle range within both materials described similar trends and values. The range of alpha particles was significantly smaller than the average grain sizes for both materials. The fast neutron removal cross-sections of zeolite and bentonite were significantly higher than for typical soil values. Both natural materials may be suitable candidate ingredients for radiation shielding composites, especially due to their natural abundance and unique properties. **(Author's abstract)**

Keywords: *Bentonite, Electron, EpiXS, Mass attenuation, Neutron, Zeolite, Physics*

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Design of a Low-cost Differential Optical Absorption Spectroscopy Set-up for Simultaneous Monitoring of Atmospheric NO₂ Concentration and Aerosol Optical Thickness

Tugado, Catherine A. , Faustino, Maria Angela B. , Cafe, Arven I. , Juguilon, Vince Paul , Bacaoco, Miguel Y., Bagtas, Gerry , Estacio, Elmer

Air quality monitoring in urban areas is indispensable in understanding the environment and how anthropogenic factors contribute to the increasing volume of pollutants in the atmosphere. Differential optical absorption spectroscopy (DOAS) is a useful technique in identifying and quantifying trace amounts of air pollutants over a wide region. In this paper, a low-cost DOAS set-up was developed and was used to measure nitrogen dioxide (NO₂) concentration and aerosol optical thickness (AOT) in the University of the Philippines Diliman campus. The temporal variation of NO₂ concentration from the DOAS measurement was found to agree with the relative NO₂ integrated absorbance from 430-450 nm. A calibration curve was then constructed with calculated sensitivity of 4.467 per $\text{mg}\cdot\text{mm}^{-3}$ (8.540 per ppm). The concentration range of the low-cost set-up is also able to detect unhealthy NO₂ levels in the Philippines. Aerosol optical thickness was then retrieved and showed similar temporal variation with NO₂ throughout the duration of the experiment. The correlation was attributed to the photochemical reaction of NO₂ to NO₃-, which then forms into aerosol. Average daily AOT at different wavelengths was then determined and was compared to AERONET's data. The results were in agreement with each other and both displayed decreasing AOT at increasing wavelength, which is an expected behavior for a Mie-scattered light due to aerosol. More importantly, proof-of concept demonstration of low-cost DOAS set-up, capable of measuring trace amounts of NO₂

and AOT, was successfully performed. Results show that the low-cost design can provide an alternative, cheaper and portable atmospheric NO₂ and aerosol measurement technique with reliable sensitivity for environmental monitoring applications. **(Author's abstract)**

Keywords: Nitrogen dioxide (NO₂), Aerosol, Differential optical absorption spectroscopy (DOAS), Urban air pollution, Physics

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NP

0348

Investigation on Criticality and Burnup Performance of Pebble Bed Reactor with Thorium-based Nuclear Fuel

Zuhair, R. Andika Putra Dwijayanto, Suwoto, Zaki Suâ

Thorium-based nuclear fuel has become an interesting subject for a variety of research with a wide range of applications. Research focusing on thorium-based fuel is aimed to overcome the scarcity and limitation of natural uranium resources as an alternative nuclear fuel in a thermal reactor. As thorium has no naturally occurring fissile isotope, it requires other fissile isotopes in order to be converted into fissile ²³³U to produce energy. The isotopes ²³⁵U and ²³⁹Pu are two of the few alternatives available as the fissile nuclei for a thorium-fueled reactor. The purpose of this paper is to investigate the criticality and burnup performance of pebble bed reactor using two options of thorium-based fuel—namely, UO₂-ThO₂ and PuO₂-ThO₂. The HTR-10 was chosen as the reactor model. A series of criticality calculations with various uranium contents in UO₂-ThO₂ fuel and various plutonium contents in PuO₂-ThO₂ fuel was conducted using the Monte Carlo transport code MCNP6 and continuous energy nuclear data library ENDF/B-VII. The calculation result shows that 35% plutonium content in PuO₂-ThO₂ fuel has comparable criticality with 80% uranium content in UO₂-ThO₂ fuel. The former is shown to be better to ensure longer reactor operational time. However, that is due to the higher fissile fraction compared to that of the latter fuel. Meanwhile, thorium played little part in prolonging reactor criticality, as ²³³U production is not particularly significant. **(Author's abstract)**

Keywords: Burnup, Criticality, ENDF/B-VII, MCNP6, Pebble bed reactor, Thorium-based nuclear fuel, Physics

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0349

Physical and Mechanical Properties of Selected Fruit-bearing and Underutilized Tree Species in the Philippines

Marasigan, Oliver S. , Sapin, Gilberto N. , Bondad, Elvina O. , Alipon, Mar

To help augment the raw material supply of the wood-based industries, the study evaluated the physical and mechanical properties (PMP) of six selected timber species in the Philippines – four fruit-bearing and two

underutilized tree species. The fruit-bearing species were “nangka” (*Artocarpus heterophyllus* Lamk.), “santol” [*Sandoricum koetjape* (Burm. F.)], “durian” (*Durio zibethinus* Murray), and “marang” [*Litsea perrottetti* (Blume) F. Vill.] collected from Bislig, Surigao del Sur (Caraga Region, Mindanao), while the underutilized tree species were “antipolo” [*Artocarpus blancoi* (Elmer) Merr] and “batino” (*Alstonia macrophylla* G. Donn) collected from Batangas City and Quezon Province (Region IV, Luzon), respectively. Physical properties included relative density (RD), moisture content (MC), and shrinkage. Mechanical properties covered modulus of rupture, stress at proportional limit, and modulus of elasticity in static bending; compression parallel-and perpendicular-to-grain; shear; hardness; and toughness. Standard testing procedures (ASTM-D143) were followed. Variations on the six species’ PMP were statistically analyzed, including the effect of individual trees and height levels. Among the six species, batino exhibited the highest RD (0.60), followed by nangka (0.49), antipolo (0.47), santol (0.46), marang (0.36), and durian (0.34). The MCs of nangka, santol, durian, antipolo, batino, and marang were 111.07, 121.21, 183.7, 152.68, 85.77, and 189.97% while the volumetric shrinkages (VSs) were 6.67, 6.86, 6.96, 9.07, 12.23, and 9.39%, respectively. The RD of batino was classified moderately high; those of nangka, santol, and antipolo were moderately low; and those of marang and durian were low. There was an inverse relationship between RD and MC in the six species. The VS values of nangka, durian, and santol were classified low; those of batino were medium; and those of antipolo and marang were moderately low. Overall, the mechanical properties of batino were moderately high; those of nangka, santol, and antipolo were moderately low; and those of durian and marang were low. The mechanical properties of the six species were compared with those of the “Philippine mahogany” species traditionally used for construction. **(Author's abstract)**

Keywords: *Antipolo* [*Artocarpus blancoi* (Elmer) Merr], *Batino* (*Alstonia macrophylla* G. Donn), *Durian* (*Durio zibethinus* Murray), *Marang* [*Litsea perrottetti* (Blume) F. Vill.], *Nangka* (*Artocarpus heterophyllus* Lamk.), *Santol* [*Sandoricum koetjape* (Burm. F.)], *Physics*

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 (Filipiniana Analytics)
 NP

0350

Quantum Description of a Damped Coupled Harmonic Oscillator via White-Noise Analysis ***Baybayon, Roel N. , Procurato, Jhon D***

In this paper, the quantum mechanical dynamics of a particle subjected to a damped coupled harmonic oscillator potential was investigated by solving its quantum propagator using the Hida-Streit formulation—also known as the White-Noise analysis. A coordinate transformation to decouple the system was also performed. After the decoupling process, the authors obtained a separate expression of the Lagrangian for a one-dimensional damped harmonic oscillator. Then, the obtained Lagrangian was cast to the classical action and evaluated their propagator using the white noise path integration. The full form of the propagator was solved by taking the product of the individual propagator, and from that, the wave function, particularly the ground state wave function was extracted by symmetrization and setting the quantum number $n_1 = n_2 = 0$. The result agrees with the propagator of a coupled harmonic oscillator without damping (Pabalay et.al, 2007) as the damping factor γ is turned off. **(Author's abstract)**

Keywords: *Propagator, White-Noise Analysis, Coupled Oscillators, Quantum Mechanics, Physics*

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 (Filipiniana Analytics)
 NP

School-based Information and Education Campaign (IEC) Program and Knowledge Gain of Student Participants on Rabies in a Private School in Davao City, Philippines

Mata, May Anne E. , Ong, Angeline R. , Arrieta, Cheszka Ysabelle T. , Dy, Pam Danica L. , Ang, Joanna Danielle G. , Lachica, Zython Paul T., Alviola, IV, Pedr

Rabies is a viral disease transmitted to humans through the bite of a rabid animal, commonly from dogs. In Davao City, Philippines, many of the dog bite victims are children below 15 yr old. To educate the city's vulnerable age group on rabies, the City Veterinarian's Office (CVO) conducted a school-based information and education campaign (IEC). In this paper, we assess the knowledge gain on rabies of the student participants aging 6–19 yr old after participating in the CVO's school-based IEC program by comparing their pre-test, post-test, and retention test scores. We also identified socio-demographic drivers that are related to the student participant's rabies knowledge scores. Observations coming from 367 student participants were analyzed. Our results show that 294 student participants scored higher in the post-test than in the pre-test, but 213 student participants scored lower in the retention test than in the post-test. Nevertheless, 264 student participants still had a higher retention test score than the pre-test score. Furthermore, the student participant's age and whether he or she received a human rabies vaccination, the head of the household's gender, educational attainment, and monthly income, and the CVO's IEC lecture are significantly associated with the knowledge score to rabies. Even though CVO's school-based IEC lecture is positively associated with rabies knowledge, this paper recommends that rabies education be integrated into classroom instructions to ensure knowledge retention among student participants. Furthermore, developing age-specific IEC media for students and IEC reinforcement through text messaging are recommended as well. (**Author's abstract**)

Keywords: Knowledge, Panel regression, Rabies repeated measures, School-based campaign, Physics

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2021 October,

(Filipiniana Analytics)

NP

SCIENCE AND TECHNOLOGY

Demand Elasticities of Canned Tuna at Point of Sale of a Large Retail Chain in Southern Philippines: Implications for Sustainability Policy

Sarmiento, Jon Marx P. , Castro, Miko Mariz C., Digal, Larr

New variants of canned skipjack tuna have been developed by large manufacturers of canned tuna in the Philippines. This study analyzes the expenditure and price elasticities of canned tuna and determines the implications for sustainable fishery. An AIDS (almost ideal demand system) model incorporating an income group variable was used to estimate these elasticities. This study utilized a pooled time series data of 459 weekly point-of-sale observations from 2010–2012 of three store branches of a large supermarket chain in southern Philippines. The point-of-sale data suggest that canned tuna consumption is composed mostly of tuna in sauce with vegetables followed by tuna in oil and tuna in sauce without vegetables. For both high- and low-income groups, the expenditure elasticities have the expected positive signs – indicating that as the income of consumers' increases, the quantity demanded for canned tuna in three product mediums also increases. For high-income consumers, consumption of tuna in sauce with and without vegetables is more responsive to income changes. The own-price elasticities of the three product mediums across high- and low-income store branches have negative signs – suggesting that as their own price increases, the quantity demanded for these products decreases. The cross-price elasticities suggest that tuna in sauce with

vegetables is a substitute for tuna in oil and in sauce without vegetables for both income groups. Thus, promoting more use of vegetables through product development may lead to a lower volume of tuna meat used in canned tuna products, which contributes to addressing tuna resource sustainability. **(Author's abstract)**

Keywords: *Canned tuna, Demand estimation, Point-of-sale, Retail, Sustainable fishery, Science and technology*

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NP

0353

Dietary Fiber and Fermentability Characteristics of Different Pili (Canarium ovatum, Engl.) Varieties in the Philippines

Sagum, Rosario S. , Altavano, Bernardo A. , Millena, Cristop

Pili nut (*Canarium ovatum* Engl.) is an indigenous fruit-bearing tropical tree nut in the Philippines. This study determined the dietary fiber and *in vitro* fiber fermentability characteristics of the pulp and kernel of seven approved Pili nut varieties that are cultivated in single soil conditions. The Pili nut pulp is an excellent source of dietary fiber (4.18–14.5 g/ 100 g soluble fiber; 34.0–43.2 g/ 100 g insoluble fiber), while kernel contributes a considerable amount. Short-chain fatty acid (SCFA) acetic acid (0.46–0.93 mmol/g) was the organic acid detected in the Pili nut kernel, while the pulp's major organic acids were acetic (0.59–2.49 mmol/g), butyric (0.31–1.68 mmol/g), and propionic (0.22–1.04 mmol/g) after simulating human colonic fermentation. Significant difference in SCFA concentration was observed among varieties ($p < 0.05$). Pili pulp total anthocyanidin ranged from 197–305 mg catechin/ 100 g. Aside from the commonly consumed Pili nut kernel, the nut pulp is a readily available source of low-cost dietary fiber and health-promoting SCFA. (Author's abstract)

Keywords: *Canarium ovatum, Pili nut, Dietary fiber fermentability, Short-chain fatty acids (SCFA), Science and technology*

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2021 August,
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NP

0354

Estimation of Poisson Autoregressive Model for Multiple Time Series

Barrios, Erniel B. , Lansangan, Joseph Ryan G. , Redondo, Paolo Vic

A Poisson autoregressive (PAR) model accounting for discreteness and autocorrelation of count time series data is typically estimated in the state-space modeling framework through an extended Kalman filter. However, because of the complex dependencies in count time series, estimation becomes more challenging. PAR is viewed as an additive model and estimated using a hybrid of cubic smoothing splines and maximum likelihood estimation (MLE) in the backfitting framework. Simulation studies show that this estimation method is at the least comparable to PAR estimated in the state-space context, especially with larger counts. The flexibility of the additive model has two significant benefits: [1] robust estimation in the presence of temporary structural change and [2] viability to integrate

the PAR model into a more complex model structure. We further generalized the PAR(p) model into multiple time series of counts and illustrated it with indicators in the financial markets. **(Author's abstract)**

Keywords: Additive model, Backfitting algorithm, Count data, Hybrid estimation, Multiple time series, Poisson autoregression, Science and technology

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NP

0355

Level of Awareness of Smart Manufacturing Technologies and its Nexus to Adoption among Micro, Small, and Medium Enterprises in the Philippines
Sales, Anthony C. , Wabina, Vanessa Ellen R. , Barroga, Kenn

With the rapid developments in the manufacturing industry, micro, small, and medium enterprises (MSMEs) need to equip with smart manufacturing (SM) technologies to keep abreast with the fourth industrial revolution (FIRe). This paper sought to assess the level of SM awareness among MSMEs in the Philippines and its correlation to technology uptake. The data were obtained from the survey gathered from 496 cooperators of the Department of Science and Technology's (DOST) Small Enterprises Technology Program (SETUP), a government initiative that assists MSMEs in upgrading technologies. This study employed mixed methods of quantitative [principal component analysis (PCA), index construction, and Pearson's r test] and qualitative [triangulation method using key informant interviews (KII)] analyses to provide an understanding of the variations of awareness and adoption of nine SM-enabling technologies. The degree of differences was classified into high, average, below average, and poor. Results revealed that medium-sized companies have a higher level of awareness and adoption than micro and small businesses. However, MSMEs have generally poor technological knowledge and implementation of SM. Among the SM technologies, cloud computing and 3D printing are the most critical technologies that can explain the variability of awareness and adoption. These findings can contribute to the plans of DOST to upgrade the SETUP program that aligns with the emerging need of FIRe. **(Author's abstract)**

Keywords: DOST SETUP, Fourth industrial revolution, Smart manufacturing, SME, Technology awareness and adoption, Science and technology

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0356

Utilization of Unwanted Weed, Paragis Leaves (Eleusine indica Linn.) in Cookie Production
Cimafranca, Lynette C. , Makinano, Do

Paragis is a common grass which is abundant and can be seen everywhere but is regarded as having no economic value. To add value to this grass, the study generally aimed to formulate cookies with powdered paragis leaves and mashed bananas; and specifically, it aimed to evaluate the sensory quality of the product. A 3 x 3 factorial design was used, with three levels for both powdered paragis leaves (0, 5, 10 % w/w) and mashed bananas (0, 15, 20 %

w/w). Sensory evaluation was done to determine the product's acceptability in terms of color, taste, aroma, texture, and flavor using a sensory panel. Acceptability ratings were subjected to response surface regression analysis using STATISTICA software. Results revealed that the combination of powdered *paragis* leaves and mashed bananas showed a significant effect on the color, aroma, texture, taste, flavor, and general acceptability of the product. The optimum combination was 8.8 % and 1.3 to 1.8% of mashed bananas and powdered *paragis* leaves, respectively, based on the volume of flour. It can be concluded that *paragis* leaves could be utilized in cookie production, providing potential value to this unwanted commodity using the optimum combination. **(Author's abstract)**

Keywords: *Paragis leaves, Cookie production, Banana, Optimization, Science and technology*

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NP

SOCIAL SCIENCES

0357

The Adaptability of Public School Teachers amidst the Pandemic ***Munda, N***

This study focused on the adaptability of public-school teachers from a national high school, in a city schools division in Laguna, Philippines during 2019 – 2020. Using a descriptive type of research design, the study was conducted among 90 respondents (with 24 males and 66 females) with the use of survey. The instrument was adopted, modified, and validated by pool of experts with reliability analysis carried out and yielded a Cronbach's alpha of 0.901 which shows the questionnaire reached an excellent reliability. For the statistical tools, the study include frequency, percentage, mean, and standard deviation. The study found that the respondents' adaptability was "High" in terms of self-awareness, personal management, problem-solving and decision-making, attitude, and knowledge of competencies. Male respondents appeared to be more adaptable than females. Respondents with age greater than 50 obtained a very high adaptability level compared to the rest of the age groups. Respondents with teaching experience 16 – 20 and greater than 30 years got very high adaptability. In conclusion, the participants were highly adaptable even when they are experiencing the pandemic COVID-19. Thus, it is recommended that teachers should communicate with the persons concerned using any medium and understand their situations, and pursue performing their responsibilities. **(Author's abstract)**

Keywords: *Adaptability, Public School Teachers, Pandemic, Social sciences*

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NP

The Bliss and Burdens of Grandparents in Child Caregiving: The Case in Bukidnon
Jumawan-Dadang, Raq

Grandparenting is a phenomenon in the Philippines. Grandparents attending to their grandchildren in schools and at home is a common scenario. They serve as caregivers or child-minders, extending financial, physical, moral, and spiritual support. Hence, the study was conducted to analyze the issues concerning grandparenting and care-giving. The study was conducted in Bukidnon. A survey was conducted to 120 respondents, and a Key Informant Interview was facilitated to the Senior Citizen Organization officers. Most grandparents are in an abject situation. They are poor whose health is fragile and delicate but are still compelled to work to support themselves and their grandchildren. The factors behind grand-parenting include financial instability of parents, broken relationships, financial dreams, personal choice, and compulsion. The role of caregivers over grandchildren is overwhelming, but most elderly perceive grand-parenting positively. For them, it is a part of life, a stage to welcome. Grandparents are happy because they are blessed with grandchildren, but they are financially hard-up, struggling to survive with their grandchildren. Though burdened, their perceptions on grand-parenting and the meanings they attach to it, give them the spirit to perform their tasks. Their situations and experiences put into context the principles of Activity Theory. **(Author's abstract)**

Keywords: *Social sciences, Grandparents, Child-minders, Poverty, Issues*

CMU Journal of Science, Volume No. 23 Issue No. 1, 43-50
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 NP

Bouncing back, blogging knack: A general overview of resilience and blogging as a psychological intervention
Relajo-Howell, D

During adverse life circumstances, it can be hard to stay positive and find our balance; this is a situation that requires resilience. Given that mental health problems are associated with large direct costs for individuals and society, it is pragmatic to explore what constitutes resilience and find resources on how it can be enhanced. When these resources are cultivated, they can improve a person's overall ability to effectively cope with stress and hardship. **(Author's abstract)**

Keywords: *Social sciences, Blogging, Psychological intervention*

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 NP

Cebuano Particles and their Functions in Selected Radio Segments

Pielago, Charis C. , Malimas, Mary Ann P. , Fronteras, Michae

This study analyzed the Cebuano-Bisaya particles and their corresponding functions, as well as their frequency of usage between two disk jockeys (DJs) and a random number of callers. The current research involved six (6) chosen 99.5 RT Ninduta Ah! Radio broadcasts, specifically from a segment called “*Itanong Mo Portion*.” The DJs and the callers served as the participants for this study. The recorded conversations from the said segment containing the use of the different types of Cebuano-Bisaya particles provided the study’s main source of data. Results unveiled that placeholder particles were the most evident among all the types of the Cebuano-Bisaya particles; “word search while holding a turn ranked first as the most common function of the Cebuano-Bisaya particles, followed by “*emphasis*,” “to assert information” as the third and “to convey an attitude” as the fourth. However, the use of “euphemism” and “reformulating clausal structure” provided no data in the study, and the post-nominal type of particles was the least used. Furthermore, between the DJs and the callers, it was found out that the DJs were the frequent users of the Cebuano-Bisaya discourse particles compared to the callers. **(Author's abstract)**

Keywords: *Cebuano language, Discourse particles, Radio segment, Social sciences*

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 (Filipiniana Analytics)
 NP

Disaster Risk Reduction Management in Carcar Central Elementary School Cebu City

Bacus, Juve

School children are the most vulnerable group in times of disaster and empowering them to prepare for and respond to disaster is imperative. The creation of the culture of safety in school is one of the aims of any educational institution and Disaster Risk Reduction Management (DRRM) is its key. This study aims to determine the Disaster Risk Reduction Management in a public elementary school in Carcar City. A descriptive survey method was utilized in this study, where 71 respondents comprising administrators, teachers, PTA officers and student leaders were involved. Instruments used were the School Emergency and Disaster Preparedness Level of Knowledge, Level of Implementation, and an Interview Guide for the Focused Group Discussion which dealt on the challenges and opportunities in the implementation of DRRM. Findings revealed that the level of knowledge by the respondents is only “fair” while the level of implementation is at “low extent” only. Their insufficient awareness on different DRR measures lead its implementation not an impressive one. This was attributed to various challenges and barriers that hinder its effective implementation. They were not that familiar with their roles and responsibilities as the actors in the program implemented. It is therefore recommended that the proposed action framework, crafted by the researcher and the rest of the school’s DRR team, and with the participation of CDRRMO and the barangay captain, be utilized. **(Author's abstract)**

Keywords: *Action framework, A culture of safety, Implementation level, Knowledge level, Social sciences*

CMU Journal of Science, Volume No. 24 Issue No. 1, 19-25
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 (Filipiniana Analytics)
 NP

A Documentary Analysis of USC Linguistics Faculty Publications from 2006-2017

Mariñas, Marciana R. , Maxilom-Mangompit, Rowanne Marie R., Magno, Joseleano

This study determined and analyzed the combined unigram and bigram predominant keywords evident in the Linguistics faculty published articles, the journals where the published articles were published, and the Master of Arts in Applied Linguistics (MAAL) courses that can use the published articles. This study used the documentary analysis in analyzing the 67 published journals of USC Linguistics Faculty from 2006-2017. This study revealed that the predominant keywords are English, Discourse Analysis, and Cebuano Language while the majority of the faculty published their journal articles in local journals. Moreover, the Discourse Analysis, Psycholinguistics & Multilingualism with First Language Acquisition and Second Language Acquisition as well as Semantics & Pragmatics in Intercultural Communication can be used in the courses of MAAL. Consequently, this study provides implications on the gaps of research that had to be filled by including the unexplored research topics in the research agenda of the Department of Communications, Linguistics, and Literature. Linguistics faculty could continue in publishing their research projects, especially to international journals. **(Author's abstract)**

Keywords: *Analysis, Documentary, Faculty, Journals, Linguistics, Social sciences*

CMU Journal of Science, Volume No. 24 Issue No. 1, 61-67

2020,

(Filipiniana Analytics)

NP

Emotive language in virtual interaction on learning from home

Frigillano, Shir

This study analyzed the Hiligaynon speakers' emotive language and communication devices in online conversation. Issues that went viral on the opening of online classes served as the interaction objects. The researcher used the qualitative research method, specifically, linguistic discourse analysis, to describe the online texts in various contexts. Result analysis revealed positive and negative emotive language to the viral posts on learning from home: sarcasm, disgust, optimism, and empathy. Sarcasm and disgust are common in attacks and humor, while optimism and empathy in hypocoristics/endeckment and appeals as language devices. The study promotes optimism and empathy for it broadens the students' attention and thinking towards new learning. These positive feelings give a favorable interest in response to online interaction or other communication situations. With the absence of negativity, positive emotions actively produce health and well being as well. Sarcasm challenges creativity and motivation towards action. **(Author's abstract)**

Keywords: *Emotive language, Learning, Interaction, Virtual, Social sciences*

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NP

***Exploring relations between Muslim women traders and Non-Muslim clients in Bukidnon:
Discerning Strategies for Peace Harmony
Jumawan-Dadang, Raquelyn , Natividad-Mendoz***

While deliberately formulated initiatives on achieving peace in Mindanao are recognized, there may also be latent, unintentional mechanisms that could be derived from mundane, casual social relations. Thus, this study explored the experiences of Meranao women traders in relating with their non-Muslim clients in two selected non-Muslim cities in Bukidnon. As an exploratory study, it employed In-depth Interviews among selected Meranao women traders. Their diaspora in these communities are brought about by economic, socio-political, and climatic factors. They both have negative and positive experiences in relating to their non-Muslim clients. They may have negative responses to the unpleasant treatment by some non-Muslims, but generally, their responses demonstrate both a potential for a multicultural ethnic relation and a sense of agency despite their subordinated position as women, small-scale traders, and ethnic minority. There is also a need for their host communities to raise their level of cultural sensitivity to eliminate prejudices towards Muslims. The study recommends for the LGUs concerned to conduct socio-cultural activities bringing Muslims and non-Muslims together, and ask the big companies to consider advertisement that promote cultural understanding, and to sponsor IECs fostering multi-culturalism. Likewise, curricular program planners are encouraged to embed cultural sensitivity in the curriculum. **(Author's abstract)**

Keywords: *Inter-ethnic relations, Muslim-Christian relations, Trading, Women, Social sciences*

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NP*

***Graduate Theses' Rhetorical Moves in the Introduction and Methodology Sections
Cacha, Sweet Kristel , Maxilom-Mangompit, Rowanne Marie R. , Magno, Joselea***

This study aimed to analyze the rhetorical moves found in the introduction and methodology sections of the Master of Arts in Applied Linguistics' (MAAL) Theses of the Department of Communications, Linguistics, and Literature (DCLL). Swales' (1990) CARS Model of Rhetorical Moves and the corresponding model of the method section by Lim (2006) served as the frameworks. All graduate theses, a total of 22, of the MAAL program from 2005 to 2018 served as data. The theses copies were retrieved from the library or from the authors. Findings revealed that discourse analysis, pragmatics, conversation analysis together with second language acquisition & bilingualism especially code-switching have been mostly explored while Labov's (1999; 1967) framework in analyzing narrative structure was considered overused. Swales' (1990) three 'moves' in writing an introduction were employed following this pattern: Establishing a territory (Move 1) by Claiming Centrality (Step 1A under Move 1) followed by Establishing a niche (Move 2) by indicating a gap (Step 1B under Move 2), and Occupying niche (Move 3) by outlining purposes (Step 1A under Move 3) as the most prevalent pattern. On the other hand, in terms of moves in the methodology section, this pattern is applied: Describing Data collection procedures (Move 1) by describing the location (Step 1A), population size (Step 1B), and recounting the steps in data collection (Step 2) followed by Delineating procedure/s for measuring variables (Move 2) by presenting an overview of the design (Step 1), and Elucidating data analysis procedure/s (Move 3) by relating data analysis procedure/s (Step 1). Findings suggest that the research design (i.e. qualitative and quantitative), environment, participants/respondents, instruments, and

procedures are highly important in describing the methodology of the study. Significant implications for research writing are also discussed. **(Author's abstract)**

Keywords: *Applied Linguistics, Graduate Theses, Rhetorical Analysis, Social sciences*

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NP

0366

Income and Happiness: A Philippine Context ***Palanca-Tan, Ro***

This paper adds to the relatively scant developing country perspective in the economic literature on happiness by investigating the relationship between income and happiness in the context of Koronadal, a low-income city in Mindanao, Philippines. Subjective happiness and potential contributory factors to happiness (demographic, economic, and social capital variables) are elicited through a survey and analyzed using descriptive and regression analyses. The study provides empirical evidence for the “happy poor” image of the Filipinos, with its survey data revealing that despite high poverty incidence and generally low-income levels, people in Koronadal are pretty happy with a mean self-reported happiness score of 6.75 on a scale of 0–10. The study also lends some empirical support to the modified Easterlin hypothesis: an increase in income increases happiness marginally, but there exists a threshold level – a monthly income of about PHP 20,000 – beyond which further increase in income ceases to increase happiness. Further, survey data reveal that happier people are younger, female, possessing a mobile phone, living in houses with more bedrooms, with savings and no outstanding loans, and are members of credit cooperatives. In so far as these findings reveal some socially favorable economic and institutional conditions, they serve to provide inputs and directions to government officials and policymakers in terms of social programs formulation and implementation. **(Author's abstract)**

Keywords: *Economic welfare, Income, Modified Easterlin hypothesis, Philippines, Subjective happiness, Social sciences*

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(*Filipiniana Analytics*)
NP

0367

When Information Technology Fails: A Challenge for Nurses ***Soliven, Richard Allan R., Soliven, Mae Dayanne***

Within the dynamics of technology, it is the increasing complexity of healthcare that inhibits and makes barriers to the transformational reforms of healthcare delivery. The technology nurses encounter in the nursing practice drastically improves patient care and safety. However, nurses’ dependency on technology would mean it would be indispensable, that by losing this resource would mean adversity in the workplace. Information Technology-related failures in health care often are covered up, ignored, or rationalized, so mistakes are repeated. A probable solution would buildup nurses with technological resilience would mean survival in the worst-case scenario, although the

notion needs to be grounded and philosophically underpinned. Being technologically resilient does not mean deferring the use of technology but rather an idea that, in the advent of an information technology breakdown, the nurse will be able to deliver positive patient outcomes despite the challenges. **(Author's abstract)**

Keywords: *Barriers to information technology, Technological resilience, Social sciences*

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2019,
(Filipiniana Analytics)
NP

0368

Looking into the Concept of Self, Struggles, and Aspirations of Badjaus as Temporary Settlers in Bukidnon Province

Anino, Rudjia Faith T. , Cabacungan, Alisa M. , Celeste, Bryan Lee D. , Buntod, April R

This article focuses on one of the marginalized groups in the Philippines, the Badjaus, who are temporarily settling in Bukidnon. This looks into the nomadic behavioral patterns of the Badjaus and the factors that led them to this situation. To make sense of this query, we have discussed the “coming of Badjaus” in the mountain province of Bukidnon by exploring their sense of self, day-to-day struggles, aspirations, and the factors leading to their coming. Gathering of data was done by employing a descriptive-qualitative method with the aid of key-informants, in-depth interviews, and an obtrusive observation. The researchers interviewed ten respondents. Findings reveal that our Badjau respondents have been displaced and are forced to move out of the Zamboanga Peninsula due to conflicts between the military and terrorist groups. In the process of moving from places to places, they have encountered a more serious threat with their daily subsistence. Thus, affecting their total well-being and representation of the Badjaus in their day-to-day encounters. To survive, they find ways in search of basic necessities like food and shelter. Overall, the “coming of Badjaus” in Bukidnon is viewed as an act of coping, surviving, and escaping the harsh social realities they experience. **(Author's abstract)**

Keywords: *Aspirations, Bukidnon, Nomadic life, Social sciences*

CMU Journal of Science, Volume No. 23 Issue No. 1, 5-8
2019,
(Filipiniana Analytics)
NP

0369

Online Learning Preparedness and Preferences Among Central Mindanao University Veterinary Medicine Students

Sajol, Philip John S. , Condino, Melrose P. , Daguro, Ted Aries A. , Obatay, Aldren D. , Obedencio, Jr., J

The COVID-19 pandemic has affected all sectors of the society, especially the education system, which now has to design a flexible learning environment. This study aimed to assess the level of preparedness towards online learning among veterinary medicine students at the College of Veterinary Medicine, Central Mindanao University, and to determine their online learning attitude, styles, and preferences through mixed methods approach. The study utilized a survey and interviews in data collection. The results show that a majority (62.13%) of the students were well-

prepared for online learning. A majority (60.43%) of them had a neutral attitude towards online learning. The students mostly preferred visual learning (30.64%), with 40.0% leaning towards non-interactive teacher or learner-centered online instruction. A significant relationship between online learning experience with preparedness and attitude toward online learning was found. Veterinary students in the study are capable of conducting an online learning method, and most have the necessary technology access, internet, and software skills, and social support. However, they still have doubts about this method of learning. A longitudinal survey is suggested to be conducted in future studies to determine improvements in the students' attitudes since online learning experience is significantly associated with it. **(Author's abstract)**

Keywords: COVID-19,, E-learning, Higher Education, Philippines, Social sciences

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0370

***The Rise of Lake Apo into an Ecotourism Site: Conservation Initiatives and Issues on
Community-based Water Governance
Aribal, Lowell G. , Jumawan- Dadang, Ra***

Lake Apo, an 18-hectare lake situated in Guinoyoran, Valencia City, Philippines is a tourist destination. It was once an ordinary pond, but with the initiatives of the community and some visionary private individuals, it has become a promising tourism site. Hence, the study was conducted to assess the initiatives of conservation undertaken by the stakeholders of Lake Apo, analyze the issues confronting the lake, and describe the tourists' assessment on the lake. The study is descriptive employing quantitative and qualitative approaches. Survey, Focus Group Discussion, and Key Informant Interview were the tools used in data gathering. The residents claimed to be highly dependent on the lake. It gives them livelihood since it was opened to tourism, a source of leisure, and a source of protein. As a tourist spot, the lake receives positive assessment from tourists. Its beauty and serenity appear captivating. Tourism is the lake's most viable utility. The stakeholders are desirous to transform the lake into a vibrant and sustainable ecotourism site. However, young as it is now, tourism in Lake Apo is hounded with controversy on conflicting claim of ownership, and issues on poor resource management, unregulated anthropogenic activities, and poor waste management. **(Author's abstract)**

Keywords: Ecotourism, Assessment, Perceptions, Conflict, Social sciences

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Socioeconomic Status and Self-efficacy vis-a-vis Academic Performance
Villamor, Ma. Ri

The purpose of the study was to determine the effects of socioeconomic factors (SES) and the level of self-efficacy in relation to the academic performance of high school students. The study utilized a descriptive survey method using correlational design to analyze the data collected. Prior to the study, letters were given each to the division office, school head, parents, and children. Upon approval, the researcher collected necessary information through survey, after which the data were tallied, tabulated, and statistically treated. The following were the findings of the study: 1. most of the students' academic performance were Approaching Proficiency. 2. most of the students were from Low income level 3. the Grade 7 students manifested a Moderate level of self-efficacy. 4. there was a significant correlation between the respondents' SES based on annual family income and their academic performance. On the contrary, the academic performance of students had no correlation with their SES based on MBN Indicators. 5. between the students' self-efficacy and their academic performance, there was no significant relationship.

As a conclusion, the Grade 7 students' socioeconomic status based on annual family income was a predictor of their academic performance. However, socioeconomic status based on MBN indicators and their perceived self-efficacy were not determinant factors in their academic standing. **(Author's abstract)**

Keywords: *Socioeconomic status, Self-efficacy, Academic performance, Social sciences*

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 (Filipiniana Analytics)
 NP

Students' Perceptions and Learning Gains Using Whole Brain Teaching Strategy in the STEM Strand of K to 12 Education

Ledesma, Jaymor O. , Benben, Vanie Y. , Teofilo, Myra Vanessa C. , Bucayong, Ceci

In this study, the researchers explored the effectiveness of Whole Brain Teaching (WBT) in teaching circuits to Senior High Students (SHS), particularly Academic track, STEM strand of K to 12 curriculum. Learning activities in electric circuits were developed as WBT strategy and administered in a pretest-posttest design. To further analyze the effectiveness of WBT, learning gains of respondents were compared to students exposed to the traditional method of teaching of electric circuit. The result showed that SHS students attained 19.3% learning gain which is considerably small. However, comparative statistical results gave a significant difference ($t = 2.62$, $p = 0.007$) in favor to WBT approach. Further, a survey instrument was developed, validated, and administered to assess if using varied teaching strategies could be linked to positive student perceptions of the teaching intervention. Further, regression analysis was conducted to determine if such approaches were predictive to learning gains. Results showed that perceptions of the student have no significant effect on their learning and no quadrant of the brain can

be considered predictive on the learning gains. Therefore, the result of the study may support the significance of catering the four brain quadrants in teaching for conceptual understanding. **(Author's abstract)**

Keywords: *STEM K to 12, Whole Brain Teaching (WBT) Strategy, Social sciences*

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STATISTICS

0373

Interval Estimation of the Stress-Strength Reliability for Lower Record Data Based on One-parameter Exponential Distribution Using Median Ranked Set Sampling and Record Ranked Set Sampling

Srisodaphol, Wuttichai , Sorin, Mi

This paper develops interval estimation of stress-strength reliability when data are lower record values from a one-parameter exponential distribution using resampling schemes such as median ranked set sampling (MRSS) and record ranked set sampling (RRSS). For illustrative aims, we inspect the performance of the proposed interval estimation methods, bootstrap, and generalized confidence intervals (CIs) by using a simulation study and real examples. The result indicates that the proposed interval based on a bootstrap percentile (BP) CI and a generalized CI (GC) using MRSS is suitable for the application. **(Author's abstract)**

Keywords: *Exponential distribution, Interval estimation, Lower record values, Resampling, Stress-strength reliability, Statistics*

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VETERINARY MEDICINE

0374

A CASE OF HEMORRHAGIC SEPTICEMIA IN A LACTATING HOLSTEIN-FRIESIAN X JERSEY COW

Pilapil-Amante, Flor Marie Immanue

Hemorrhagic septicemia is a highly fatal, acute septicemic disease in buffaloes and cattle caused by *Pasteurella multocida* (Shivachandra, *et al.*, 2008). A lactating non-pregnant 2-year old Holstein-Friesian x Jersey imported cow weighing 423 kg (BCS 3/5) was observed to be exhibiting tachypnea, hypersalivation, and edema on the neck and thorax on October 9, 2017. As hypocalcemia or acidosis was suspected, medication and prescription given were according to these two metabolic disorders. On October 20, 2017, a blood sample was collected which resulted in a

positive *Pasteurella multocida* antibody ELISA test. Long-acting oxytetracycline (200 mg/mL) was injected IM once the following day. On October 24, the patient exhibited nasal flaring with clear discharge, frothy tachypnea, pyrexia, sunken orbits, and dullness while standing. Medication and prescription given were 10% marbofloxacin (2 mg/kg) IM once daily for three days and tolfenamic acid (2mg/kg) IM once. Unfortunately, the cow died the following morning. Upon necropsy, the significant gross lesions were neck and brisket swelling, lung consolidation, pneumonia, and petechial hemorrhages on the heart. This disease could have been prevented through vaccination and strict biosecurity. **(Author's abstract)**

Keywords: Cattle, Hemorrhagic septicemia, *Pasteurella multocida*, Pasteurellosis, Veterinary medicine

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0375

**COMPARISON OF THE TENSILE STRENGTH BETWEEN BURIED KNOT AND
PULLEY KNOT-FREE ANCHOR IN INTRADERMAL SUTURE PATTERN IN
DOMESTIC SHORT-HAIRED CATS (*Felis catus*)**

Oronan, Rey P. , Dumaraos, Ros Jezreel C., Reyes, Marco F. , Lampa, Rizza Elaine

Tick infestation is among the most common parasitic problems affecting dogs. Since the 1990s, fipronil has been used in the Philippines for the control of tick and flea infestations in dogs. Resistance to fipronil has been reported in other countries but not in the Philippines. This study was conducted to detect fipronil resistance in the brown dog tick *Rhipicephalus sanguineus sensu lato* from household dogs in Las Piñas City, Metro Manila, Philippines. Nearly engorged female *R. sanguineus s.l.* were collected manually using a specialized tick remover. These were allowed to lay eggs in the laboratory where the larvae that hatched were used for the larval packet test (LPT) with three different doses of fipronil: recommended dose (0.25%), half of the recommended dose (0.125%), and double the recommended dose (0.50%). Additionally, three fipronil commercial brands were subjected to LPT using the commercial dose to compare their effect on larval mortality. The larval mortality in all fipronil doses and commercial brands ranged from 91.6% to 100%, suggesting the absence of fipronil resistance. This indicates that fipronil is still useful in controlling tick infestation in dogs in Las Piñas City however, more studies covering other areas should be done to determine the status of resistance in the country. **(Author's abstract)**

Keywords: Buried knot, Cat, Intradermal, Pulley knot-free, Suture pattern, Tensile strength, Veterinary medicine

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COMPARISON OF TILETAMINE-ZOLAZEPAM-XYLAZINE AND KETAMINE-XYLAZINE ANESTHESIA IN PHILIPPINE NATIVE GOATS UNDERGOING RUMENOTOMY

Abalos, Jovencio Hubert A. , Pajas, Arville Mar Gregorio Amano , Addatu, Mariane Jane B. , Gicana, Karlo Rom

Twelve Philippine native goats were used to compare two anesthetic combinations for rumenotomy. These were randomly assigned into treatment groups: TZX (3.5 mg/kg tiletamine – zolazepam + 1 mg/kg xylazine) and KX (10 mg/ kg ketamine with 1 mg/kg xylazine). Vital signs, SpO₂, reflexes, induction time to recovery, serum cortisol levels, and ECG characteristics were monitored and compared. TZX had significantly longer duration of anesthesia, standing recovery time, and higher mean heart rate (MHR) at 45 minutes after induction. On the other hand, KX had significantly higher SpO₂ level at 30 minutes, lower cortisol during induction and after 30 minutes as well as shorter induction to sternal recovery time. There were no significant differences seen in temperature and respiratory rates at different time intervals, cortisol levels 30 minutes after recovery, induction until standing recovery time, mean time from obliteration to return of reflexes, and flank pain. In both groups, the common ECG abnormalities seen were atrial fibrillation, atrial flutter, and ventricular premature contractions. The KX combination produced better analgesia and maintained better oxygenation while TZX had a longer duration of anesthesia. Hence, TZX can be considered as an alternative anesthetic combination for long surgical procedures in goats. **(Author's abstract)**

Keywords: *Anesthesia, Ketamine–xylazine, Philippine native goats, Rumenotomy, Tiletamine–zolazepam–xylazine, Veterinary medicine*

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DETECTION OF RESISTANCE TO FIPRONIL IN BROWN DOG TICKS (*Rhipicephalus sanguineus sensu lato*) FROM HOUSEHOLD DOGS IN LAS PIÑAS CITY, PHILIPPINES THROUGH LARVAL PACKET TEST

Divina, Billy P. , Katalbas, Francisella P., Galay, Remil

Tick infestation is among the most common parasitic problems affecting dogs. Since the 1990s, fipronil has been used in the Philippines for the control of tick and flea infestations in dogs. Resistance to fipronil has been reported in other countries but not in the Philippines. This study was conducted to detect fipronil resistance in the brown dog tick *Rhipicephalus sanguineus sensu lato* from household dogs in Las Piñas City, Metro Manila, Philippines. Nearly engorged female *R. sanguineus* s.l. were collected manually using a specialized tick remover. These were allowed to lay eggs in the laboratory where the larvae that hatched were used for the larval packet test (LPT) with three different doses of fipronil: recommended dose (0.25%), half of the recommended dose (0.125%), and double the recommended dose (0.50%). Additionally, three fipronil commercial brands were subjected to LPT using the commercial dose to compare their effect on larval mortality. The larval mortality in all fipronil doses and commercial brands ranged from 91.6% to 100%, suggesting the absence of fipronil resistance. This indicates that fipronil is still useful in controlling tick infestation in dogs in Las Piñas City however, more studies covering other areas should be done to determine the status of resistance in the country. **(Author's abstract)**

Keywords: *Acaricide resistance, Dog, Fipronil, Larval packet test, Rhipicephalus sanguineus, Veterinary medicine*

***EFFICIENT PRODUCTION OF NUCLEOTIDES OF SELECT VETERINARY
FLAVIVIRUSES USING OVERLAP EXTENTION - POLYMERASE CHAIN REACTION***

Nakamura, Masaaki , Carner, Gerry Amor, Endoh, D

Tick-borne encephalitis (TBEV), Louping ill (LIV), and West Nile viruses (WNV) are notorious flaviviral agents that continue to plague domestic animals including horses, sheep, goats, cattle, pigs, dogs, birds, and also humans. To efficiently produce DNA fragments of TBEV, LIV, and WNV viruses, an algorithmic DNA primer design was developed using overlap extension-polymerase chain reaction (OE-PCR). Arithmetic formulation, with emphasis on the manipulation of melting temperatures (T_m) to enable advanced production of nucleotide lengths, was constructed. The method was validated using OE-PCR carried out using original and modified electrophoresis, with the latter producing 30 nanogram and prominent 256 bp of DNAs used for sequencing by Sanger method. Algorithmic formulation resulted to production of remarkable amount of artificial DNA products whereby accession numbers to each of the three amplified oligomers with complete nucleotide sequences of select veterinary flavivirus of 256 bp each for WNV, LIL and TBE were registered at DDBJ/NCBI. A relatively high synthesis performance of basically T_m -manipulated algorithmic OE-PCR design using simply designed oligonucleotides has paved for availability of ample amount of DNAs for extensive scientific and experimental explorations of select veterinary significant flaviviruses. Future study employing the use of synthetic veterinary flaviviral DNAs is suggested. **(Author's abstract)**

Keywords: Algorithmic design, DNA, OE-PCR, Synthetic nucleotides, Veterinary flaviviruses, Veterinary medicine

***FACTORS AFFECTING THE KNOWLEDGE, ATTITUDE, AND PRACTICES OF PET
OWNERS ON RESPONSIBLE PET OWNERSHIP IN MAGALANG, PAMPANGA,
PHILIPPINES: A CROSS-SECTIONAL STUDY***

Bundalian, Jr., Reynaldo DL. , San Jose, Remedios D., Magsino, Patricia Joy

Rabies remains a serious public health problem worldwide and in the Philippines. It is 100% fatal however, it is also 100% preventable. Pet owners' lack of awareness of their responsibilities as well as poor attitude and practices towards their pets are among the major barriers to rabies elimination in the country. This cross-sectional study identified demographic factors that influenced the level of knowledge, attitude, and practices (KAP) of pet owners on responsible pet ownership (RPO). It utilized a structured questionnaire administered to 380 pet owners from eight randomly selected urban and rural barangays in Magalang, Pampanga, Philippines from April to September 2017. Bivariate Chi-square analysis and logistic regression modelling were utilized to determine association between KAP

and demographic variables. Results showed that majority of the pet owners had good knowledge (242/380 or 63.7%) and moderately positive attitude (257/380 or 67.6%) on RPO. Dog owners showed good (189/336 or 56.3%) practices because majority vaccinated (73.2%) and fed their dogs (97.3%), leashed them (64.6%), and prevented them from roaming (72%). Cat owners had moderate RPO practices (111/168 or 66.1%). The area of living, particularly urban or rural, pet ownership status, and educational attainment were significant factors that influenced pet owners' knowledge, attitude, and practices on responsible pet ownership. **(Author's abstract)**

Keywords: Pet owners, Rabies, Responsible pet ownership, Veterinary medicine

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0380

FIRST REPORT OF *Plagiorchis vespertilionis* (Müller, 1780), A KNOWN ZOONOTIC FLUKE, WITH NOTES ON TWO SPECIES OF *Paralecithodendrium* (PLATYHELMINTHES: TREMATODA) FROM *Myotis* sp. AND *Miniopterus* sp. (MAMMALIA: CHIROPTERA)
Eduardo, Salc

Plagiorchis vespertilionis (Müller, 1780) from the mouse-eared bat (*Myotis* sp.) is described and illustrated based on materials from the Philippines. It is reported for the first time in the country constituting a new locality record for the species. It is differentiated from other species of *Plagiorchis* declared in the country and also from species from bats in other countries. A pictorial comparison of the general morphology of *P. vespertilionis*, *P. philippinensis*, *P. potamonides* and *P. maculosus* is provided. Two other species but of the genus *Paralecithodendrium* namely *P. longiforme* (Bhalerao, 1926) from the mouse-eared bat and *P. ovimagnosum* (Bhalerao, 1926) and the bent-winged bat (*Miniopterus* sp.) are also reported, described, and illustrated based on the present specimens. *P. vespertilionis* and *P. longiforme* occurred as concurrent infection in the same host. This is the third account of the two species since these were first recorded in 1928 and last reported in 1986. **(Author's abstract)**

Keywords: Bat, Philippines, *Paralecithodendrium* spp., *Plagiorchis vespertilionis*, Trematode, Zoonotic parasite, Veterinary medicine

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HEMATOCRIT AND WHITE BLOOD CELL COUNT VALUES OF PHILIPPINE NATIVE GOATS RAISED IN LOS BAÑOS, LAGUNA

Constante, Jesalyn L. , Prado, Ian C

The study was conducted to determine reference baseline data regarding the hematocrit (HCT) and total and differential white blood cell (WBC) counts of Philippine native goats. A retrospective study between October 2017 and December 2019 was conducted using medical records of six male and 24 female clinically healthy Philippine native goats. Mean, standard deviation (SD), and p values were computed for the HCT and WBC count (total and differential). Results showed that the mean HCT and total and differential WBC counts of Philippine native goats did not significantly vary with reported values for other goat breeds ($p>0.05$). Goats older than one year had significantly higher neutrophil count than animals less than or equal to one year of age ($p<0.05$). Female goats had significantly higher HCT, total WBC, neutrophil, and monocyte counts than male goats ($p<0.05$). Higher neutrophil and lower lymphocyte counts had been recorded in animals during the rainy season ($p<0.05$). The results obtained are the first reported values of HCT and WBC counts in Philippine native goats. These preliminary findings can be used for further studies to determine reference hematologic values of Philippine native goats that will help veterinarians monitor the health status of these locally raised small ruminants. (Author's abstract)

Keywords: Blood, Goat, Hematology, Leukocyte, Philippine native, Veterinary medicine

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HISTOLOGICAL CHARACTERIZATION OF THE GUT-ASSOCIATED LYMPHOID TISSUE IN THREE-MONTH OLD GUINEA FOWLS (*Numida meleagris*)

Shahmizad, Mohammad , Hamedi, S

Gut associated lymphoid tissue (GALT) in avian species is considered an indispensable part of mucosa associated lymphoid tissue (MALT) which plays a principal role in the production of an appropriate mucosal immune response. This study described the microscopic morphology of GALT in ten clinically healthy three month old Guinea fowls. Five male and five female Guinea fowls were euthanized and samples were collected and processed histologically. Slides were stained with H&E for histological and histomorphometric characterization. The GALT contained diffused or more compactly aggregated lymphoid cells that were present in lamina propria of pharyngeal tonsil, cervical part of esophagus, duodenum, jejunum, Meckel's diverticulum, and ileum. A few lymphoid follicles that comprised a germinal center were observed in esophageal tonsil, proventriculus, pyloric tonsil, cecal tonsils, and rectum. Histomorphometric parameters of cecal tonsils and bursa of Fabricius showed some similarities with Chukar partridges at the same age especially for number of follicle per tonsillar unit or plica. In conclusion, three-month old Guinea fowls have a developed GALT which indicates similarities to other avian species especially chickens and Chukar partridges although species-specific differences are also present. (Author's abstract)

Keywords: Gut associated lymphoid tissue, Guinea fowls, Histology, Veterinary medicine

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**ISOLATION AND UNIPLEX POLYMERASE CHAIN REACTION-BASED DETECTION
OF *Salmonella* spp. IN NATIVE CHICKENS (*Gallus gallus domesticus* Linn.) FROM
SELECTED LIVE BIRD MARKETS IN BATANGAS, PHILIPPINES**

Umali, Dennis V. , Galvez, John P

Salmonellosis continues to be a pressing problem in poultry. Currently, data gap exists between the distribution and prevalence of *Salmonella* spp. in live bird markets (LBM) in the Philippines. Hence, isolation and molecular detection of *Salmonella* in native chickens from four LBMs in Batangas, Philippines were performed. Conventional bacterial isolation and uniplex polymerase chain reaction (PCR)-based assay were utilized for detection of *Salmonella*. A total of 114 samples composed of 16 pooled cloacal swabs, 49 liver samples, and 49 caecum samples were used for bacterial isolation. For PCR, 38 pooled samples were utilized which comprised of 10 pooled HTT broth from liver, 10 pooled HTT broth from cecum, and 18 pooled cloacal swabs. Results showed that 1/16 (6.25%) of the cloacal swabs and 1/114 of the total samples (0.88%) were positive for *Salmonella* in bacterial isolation. In comparison, uniplex PCR showed a detection rate of 12/18 (66.67%) in pooled cloacal swabs and an average positivity detection rate of 31.57%. Among the LBMs, Lemery had the highest PCR-positivity rate which is 6/15 (40%) compared to 1/8 (12.5%) for Padre Garcia and 5/15 (33.33%) for Rosario. Routine surveillance for *Salmonella* contamination is essential in preventing foodborne diseases from poultry in the Philippines. **(Author's abstract)**

Keywords: Isolation, Live bird market, Uniplex PCR, *Salmonella*, Swab, Veterinary medicine

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**MACROSCOPIC AND MICROSCOPIC CHARACTERISTICS OF THE WOUND AFTER
INTRADERMAL CLOSURE USING FOUR-LOOP AND THREE-LOOP PULLEY KNOT-
FREE ANCHOR PATTERN IN CATS (*Felis catus*)**

Flores, Marianne Leila S. , Mariano, Denise Ara , Salvador, Rose Carmeli G., Reyes, Marc

The study compared four-loop and three-loop anchorages of intradermal suture to close abdominal skin incisions. Two 3.81 cm incisions were performed on the mid-ventral abdomen of 12 adult female cats. The incisions were closed using intradermal suture pattern, anchored using three-loop pulley (cranial), and four-loop pulley (caudal), then evaluated in terms of macroscopic and microscopic characteristics for a 21-day duration. Macroscopically, minimal scab formation was observed in the both anchorages at Days 7 and 14. Pus, Grade 3 hyperemia, and wound dehiscence were observed in the four-loop at Day 7. Grade 1 elevation persisted in the three-loop. No scar formations were observed. The three-loop had slightly higher mean tensile strength compared to the four-loop. Microscopic evaluation revealed slight invagination in both anchorages at Day 21. Grade 3 epidermal thickening was noted in both anchorages at Day 7, and in the four-loop at Day 14. Wound gap was observed in the four-loop at Day 7. Macrophage infiltration and fibroblast proliferation were consistent throughout the duration in both anchorages. Statistical analyses reveal that the three-loop and four-loop pulleys have no significant differences, thus, can be used interchangeably. However, in terms of cosmetic appearance, the four-loop pulley is favored. **(Author's abstract)**

Keywords: Four-loop pulley, Pulley knot-free, Surgery, Suture pattern, Three-loop pulley, Veterinary medicine

**MASTITIS IN A HOLSTEIN X SAHIWAL COW CAUSED BY STREPTOMYCIN-
RESISTANT *Pasteurella multocida***

Pilapil-Amante, Flor Marie Immanuelle R. , Manzanilla, Russel De

Mastitis, the most economically relevant disease in the dairy industry, can be caused by a wide array of bacterial species. Although scarcely reported, *Pasteurella multocida* is included as a contagious etiologic agent causing mastitis. Targeting the pathogens is the treatment approach when dealing with udder infection and with bacteria being the chief causative agents, antibiotics is prominently utilized for therapy. This dairy farm was previously treating its mastitis cases using a Penicillin-Streptomycin solution for intramuscular injection without veterinary supervision. The collection of milk samples from infected quarters was prompted by non-response of their mastitis cases to antibiotic treatment. The selection of quarters for sample collection was based on the severity of clinical signs present. Bacterial isolation was performed using the milk samples afterward, the isolated bacteria, *Staphylococcus aureus* and *P. multocida*, were subjected to antibiotic sensitivity tests. The two isolates shared a resistance against streptomycin, an antibiotic previously used in the farm in combination with benzylpenicillin. Thus, a different antimicrobial drug, oxytetracycline, was prescribed to which the pathogens responded positively.
(Author's abstract)

Keywords: Antimicrobial resistance, Bovine mastitis, *Pasteurella multocida*, Streptomycin, Veterinary medicine

**Molecular Characterization and Polymorphism of Inhibin (*INHβA*) Gene in Water Buffalo
(*Bubalus bubalis*) Bulls**

Mamuad, Felomino V. , Tubalinal, Gabriel Alexis SP. , Uy, Mary Rose D. , Babera, Sanny C., Mingala, Clar

The study characterized inhibin-βA (*INHβA*) gene of 12 water buffalo (*Bubalus bubalis*) bulls [two Philippine Carabao (PC), five Bulgarian Murrah (BM), and five Italian Murrah (IM)] using DNA extracted from semen. Using MEGA 7.0 software and Signal P® version 4, the sequences were assembled and aligned and amino acid sequences were determined, respectively. BM bull sequence showed 100% similarity with *B. bubalis* from the National Center for Biotechnology Information (NCBI) database. However, a lower similarity was seen on both PC and IM at 98%. The translated amino acid sequence of PC, BM, and IM had 95, 97, and 93% similarity with *B. bubalis* sequence from NCBI, respectively. The phylogeny tree revealed that both PC and IM were closely similar in their gene sequence, while BM was more similar with *B. bubalis* from NCBI. Their similarities in nucleotide sequence suggest that *INHβA* gene was conserved in bulls. The signal peptide was observed in BM and *B. bubalis* from NCBI. BM has an amino acid exchanged from threonine to alanine, while in *B. bubalis* has an amino acid exchanged from

histidine to aspartic acid. This polymorphism from their cleaving site could cause an interaction in the reproduction, growth, and maintenance of the bull. **(Author's abstract)**

Keywords: *Bubalus bubalis*, Bulgarian Murrah, INH gene, Italian Murrah, Philippine Carabao, Water buffalo, Veterinary medicine

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0387

NON VIRULENT Escherichia coli O157:H43 IN NATIVE PIGS (Sus scrofa domestica Erxleben) FROM SELECTED FARMS IN CAVITE, PHILIPPINES
De Castro, Renzi Owell V. , Dalmacio, Ida F. , Rundina-Dela Cruz, Ma. Cynt

The study confirmed the presence of *E. coli* O157:H43 in the feces of native pigs from selected farms in General Trias, Cavite, Philippines. Twenty seven (27) presumptive EHEC organisms manifesting as colorless colonies with a smoky center on Cefixime Tellurite-Sorbitol MacConkey (CT-SMAC) Agar were subjected to morphological and biochemical characterization. The isolates were Gram negative rod-shaped organisms and possessed biochemical characteristics typical of *E. coli* except for three isolates that did not ferment the sugar sorbitol. Two of the three isolates agglutinated the O157 typing serum but not the H7 typing serum and this was confirmed through PCR. Moreover, PCR showed that none of the isolates harbored the virulence genes for Shiga toxin 1 (*stx1*), Shiga toxin 2 (*stx2*), intimin (*eaeA*), and hemolysin (*hlyA*). The isolates were also non-hemolytic. The BLAST search confirmed 100% identity with *E. coli* O157:H43 DNA, O antigen biosynthesis gene cluster, strain PV00-24 which represent a distinct class of *E. coli* O157 that are not pathogenic. A prevalence of 3.3% was obtained. To the best of the authors' knowledge, this is the first report of *E. coli* O157:H43 in native pigs and an *E. coli* O157 strain that is non-pathogenic in domestic animals in the country. **(Author's abstract)**

Keywords: EHEC, Hemolysin, Native pigs, Toxin, Virulence, Veterinary medicine

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0388

OBLIQUE FRACTURE HEALING STABILIZED WITH POLYDIOXANONE SUTURE OR STAINLESS STEEL WIRE IN INTRAMEDULLARY FIXATION IN DOMESTIC CATS
Torres, Eduardo B. , Oronan, Rey B., Matawaran, Veronic

Twenty-four domestic shorthaired cats (12 males and 12 females) about two years old were subjected to a 70° oblique femoral osteotomy. Osteotomies were repaired using intramedullary pins and stabilized using polydioxanone (PDS) suture or stainless steel wire (SSW) in cerclage technique. The fractures were radiographed at days seven, 14, 21, 28, 35, and 42, and assessed qualitatively (callus formation, blurring of fracture ends, bridging of fracture ends) and quantitatively (fracture gap, compression, angulation). Representative animals were sacrificed,

and osteotomies were harvested after radiography schedule. Histopathology with hematoxylin and eosin staining was performed to examine for hemorrhage, fibroblastic, chondrocytic, and osteocytic proliferation. Masson's trichrome staining was performed to examine for collagen. Limb use was assessed by early weight bearing. Callus, blurring, and bridging of the fracture ends were seen at Days 21 and 28 in SSW and PDS, respectively. The fracture gap and angulation were not different between groups. Bone compression was observed in PDS. Hemorrhage was seen early which decreased over time. Fibroblasts, chondrocytes, osteocytes, and collagen increased during healing. Early weight bearing was observed in SSW and PDS at Days 1 and 2, respectively. PDS is similar to SSW in the stabilization of long oblique fractures in cats but it has not prevented compression forces. **(Author's abstract)**

Keywords: *Feline, Fracture healing, Oblique fracture, Polydioxanone, Stainless steel wire, Veterinary medicine*

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0389

PHENOTYPIC ANTIMICROBIAL RESISTANCE PATTERNS IN *Escherichia coli* ISOLATED FROM SLAUGHTERED HEALTHY PIGS AND CATTLE IN NUEVA VIZCAYA, PHILIPPINES

Haidee E. Torio, , Tabuac, Jayson V. , Bakakew, Chrys

This cross-sectional study investigated antimicrobial resistance (AMR) prevalence and characterized and compared phenotypic resistance in intestinal *Escherichia coli* from healthy pigs and cattle at slaughter in Solano, Nueva Vizcaya. A single *Escherichia coli* isolates from pig and cattle fecal samples were tested by the disk diffusion method to a panel of eight antimicrobials important to human therapy. A total of 83 *E. coli* were isolated in 111 fecal samples from pigs and cattle. Of these, 75 (90.36%) were found to be resistant to at least one antimicrobial agent with rates in pigs at 95% and in cattle at 88.6%. Over-all, high resistance rates to amoxicillin (78.3%), tetracycline (63.8%), and trimethoprim sulfamethoxazole (50.6%) were observed. Isolates from pigs showed higher percentage resistance compared to cattle for tetracyclines (86.4% vs 38.5%) ($p<0.00001$), trimethoprim-sulfamethoxazole (77.3% vs 20.5%) ($p<0.00001$), amoxicillin (81.8% vs 74.3%) ($p>0.05$), and chloramphenicol (43.2% vs. 5.1%) ($p<0.0001$). Multidrug resistance was significantly higher in pig isolates at 88.1% compared to 39.4% in cattle ($p<0.00001$). Thirty-one resistance patterns were observed in all isolates. The most common resistance pattern in cattle isolates is to a single antimicrobial, amoxicillin at 24.24% while in pigs, chloramphenicol-amoxicillin-trimethoprim sulfamethoxazole-tetracycline is common at 14.28%. Resistance to ciprofloxacin was not observed in both species. Results revealed high percentage resistance in *Escherichia coli* from both pigs and cattle. Both species could be major sources of *Escherichia coli* resistant to multiple antimicrobials used in human therapy **(Author's abstract)**

Keywords: *Antimicrobial resistance, Cattle, Escherichia coli, Pigs, Philippines, Veterinary medicine*

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**PHYLOMOLECULAR ANALYSIS USING THE FUSION (F) GENE OF PIGEON
PARAMYXOVIRUS SEROTYPE 1 (PPMV-1) IN RACING PIGEONS FROM LUZON,
PHILIPPINES**

Umali, Dennis V. , Marasigan, Cris Niño

Pigeon paramyxovirus serotype 1 (PPMV-1) is a variant of the velogenic NDV that primarily infects pigeons however, the infection is not only limited to the pigeon population. Due to its ability to spill-over, PPMV-1 can potentially exacerbate economic losses due to poultry mortalities. Currently, there has not been a reported clinical case of the infection in the Philippines yet. In this investigation, suspected PPMV-1 infection in racing pigeons from Luzon, Philippines were submitted for phylomolecular characterization. The presence of the pathogen was confirmed through the use of multiplex RT-PCR and nested RT-PCR. Nucleotide sequence analysis using the hypervariable region of the fusion (F) gene revealed that the isolates were velogenic, with a proteolytic cleavage site motif of ¹¹²KRQKRF¹¹⁷. Phylogenetic analysis and subgenotyping further characterized the field strains as a member virus of the subgenotype Vlb/2 group. Comparison of the nucleotide sequence showed that the samples share high sequence homology with the Russian, Egyptian, Iranian, Austrian, and Ukrainian isolates. The results of this molecular characterization study on PPMV-1 from the Philippines would help design better prevention and control measures for this important pathogen. **(Author's abstract)**

Keywords: *Phylomolecular, Pigeon paramyxovirus serotype 1, Racing pigeons, Subgenotype Vlb I 2, Velogenic type, Veterinary medicine*

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**PREVALENCE AND MOLECULAR CHARACTERIZATION OF TRYPANOSOMES IN
DOGS, IN ABEOKUTA, NIGERIA**

Michael, Takeet I. , Ibrinke, Oyewusi K. , Adewale, Talabi O. , Simon, Abakpa A. V., Olukayode, Daramol

Most studies of canine trypanosomosis in Nigeria were based on morphological identification. This study molecularly determined the prevalence and characterized trypanosomes in dogs, in Abeokuta, Nigeria. Two hundred and seventy four dogs were screened through PCR targeting internal transcribed spacer (ITS1) ribosomal gene. Sequence analysis of positive samples was done using Big Dye Terminator cycle sequencing kit. Phylogenetic tree was constructed using UPGMA, MEGA 5.05. Haematological parameters of clinical cases and healthy dogs were assessed. Of 274 sampled dogs, 25 (9.1%) were positive for trypanosomes comprising of 13 males and 12 females. Gel electrophoresis of the ITS1 PCR products of twenty five samples revealed band sizes of 250 bp, 480 bp and 700 bp corresponding with known band sizes of *T. vivax*, *T. brucei* and *T. congolense*, respectively. Aligned sequencing of *T. brucei gambiense* and *T. congolense* showed less polymorphism while *T. vivax* as obtained from GenBank revealed high polymorphic sequence. Phylogenetic analysis yielded tree with topologies of relatively higher bootstrap or nodal support for the three species of trypanosomes. Clinically sick dogs showed significantly low haematological profile compared with healthy dogs. We concluded that canine trypanosomosis is prevalent in Abeokuta and dogs harbor *T. brucei gambiense*. **(Author's abstract)**

Keywords: *Dogs, Molecular characterization, Prevalence, Trypanosomes, Veterinary medicine*

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PREVALENCE AND RISK FACTORS OF *Trypanosoma evansi* INFECTION IN WATER BUFFALOES (*Bubalus bubalis*) OF UBAY, BOHOL, PHILIPPINES

Salces, Caro B. , Bajenting, Gundolino P. , Divina, Billy P. , Mingala, Claro N. , Baldrias, Loinda R. , Tapdasan, Emer

Trypanosoma evansi, the cause of surra has a wide host range and extensive distribution in tropical countries. Buffaloes and cattle are most commonly affected in Southeast Asia resulting to serious economic losses due to reduced productivity and mortality. It has become a serious problem for the Philippines' livestock industry. A cross-sectional study involving 85 farms and 130 water buffaloes was conducted in Ubay, Bohol where outbreaks of the disease had been reported, to determine the farm and animal prevalence, Knowledge, Attitudes and Practices (KAP) of water buffalo raisers regarding surra, and risk factors of surra. Blood samples were collected to test for *T. evansi* antibodies and DNA using CATT/*T. evansi* and PCR assay, respectively. True farm prevalence was 25% and true animal prevalence was 16%. Risk factors identified were the following: distance of water buffalo from nearest other water buffaloes, goats and pigs; frequency of deworming; Body Condition Score (BCS); last year of calving; last time the water buffalo was used as draft animal; year the water buffalo was introduced in the farm; and number of hours the water buffalo was allowed to wallow in a day. It is suggested that a surra control program be established in Bohol. (Author's abstract)

Keywords: Philippines, Prevalence, Risk factors, *Trypanosoma evansi*, Water buffaloes, Veterinary medicine

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SEROLOGICAL AND MOLECULAR DETECTION OF NEWCASTLE DISEASE VIRUS IN CAPTIVE PSITTACINES IN A WILDLIFE RESCUE CENTER IN LUZON, PHILIPPINES

Umali, Dennis V. , Lastica-Ternura, Emilia A. , Baydo, Jacquie

Newcastle disease (ND) is a viral infectious disease affecting wild and domestic poultry and is one of the major causes of the world's economic losses due to very high mortality. Limited information is known on the presence and distribution of Newcastle disease virus (NDV) in captive wild birds in the Philippines. The samples in this study were from captive psittacines in a wildlife rescue center in Luzon, Philippines. The birds were unvaccinated and did not show clinical signs of ND during the time of study. Thirty-four (91.89%) samples were seropositive for NDV using hemagglutination inhibition test with geometric mean titers ranging from 2^2 to $2^{10.5}$. Reverse Transcription Polymerase Chain Reaction (RT-PCR) showed 7 (18.34%) of the pooled oropharyngeal and/or cloacal swab samples of birds belonging to *Agapornis* spp., *Tanygnathus lucionensis*, *Cacatua galerita*, *Psittacus erithacus*, and *Melopsittacus undulatus* were NDV positive. Presence of antibody without detectable virus suggests that the birds have already recovered from infection and may not have been shedding the virus at the time of sample collection. However, RT-PCR positive results indicates active infection during sampling. Furthermore, seropositive results in RT-PCR positive birds could mean that there is prolonged viral shedding in these species. (Author's abstract)

Keywords: Captive psittacines, Hemagglutination inhibition, Newcastle disease, RT-PCR, Wild birds, Veterinary medicine

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0394

A SUSPECTED CASE OF PARANEOPLASTIC CHRONIC PRURITUS AND HEMATOLOGIC SYNDROME

Marasigan, Cris Niño Bon B., Pangga, Gladys Maria

Paraneoplastic syndromes comprise complex clinical abnormalities that may accompany a neoplasm in an animal. Due to their nonspecific nature, paraneoplastic processes are often underdiagnosed. In the present case, a 13-year old, intact female Shih Tzu with malignant epithelial tumor (MET) was clinically treated for a paraneoplastic syndrome. The patient was brought to a veterinary hospital due to recurrent pruritus. Physical examination showed presence of alopecia and erythema on the neck region and presence of irregularly shaped, soft, attached, lobulated masses on the right thoracic and inguinal mammary glands. Fine needle aspiration biopsy of the mass showed atypical cell populations suggestive of MET. Complete blood count revealed mild non-regenerative anemia as characterized by the presence of microcytic and normochromic red blood cells. In addition, neutrophilic leukocytosis and thrombocytosis were extremely evident. Based on the current clinical and medication history, the patient was treated for paraneoplastic chronic pruritus and hematologic syndrome. Oral anti-thrombotic drug (aspirin 0.5 mg/kg) and essential fatty acids were given to the patient to address possible blood coagulopathies and for skin nourishment, respectively. Periodic blood profiling was recommended for close monitoring. This report discussed the clinical findings and suspected diagnosis of paraneoplastic syndrome in a dog with MET. **(Author's abstract)**

Keywords: Chronic pruritus, Malignant epithelial tumor, Non-regenerative anemia, Paraneoplastic hemolytic syndrome, Thrombocytosis, Veterinary medicine

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0395

THE RELATIONSHIP OF BODY CONDITION SCORES TO MILK PRODUCTION IN DAIRY BUFFALOES

Bautista, Jose Arceo N. , Bril, Pinky M , Tandang, Abraham G , Takeshita, Hironobu , Saludes, Th

A retrospective study of body condition scores (BCS), milk yield, and lactation records of 34 purebreds and crossbred dairy Murrah buffaloes, and climatic parameters were used to determine their relationships with one another. The visual assessments developed for Murrah buffalo was used in BCS determination. Significant correlations ($P < 0.01$) between all parameters except rainfall were found to have weak to moderate monotonic relationships: BCS was negatively correlated to milk yield and affected milk yield by 0.858 kg/day per unit change in BCS. Milk yield was positively affected by early lactation while BCS negatively affected. In early lactation stage, the estimated rate of

milk yield increase was 1.519 kg/day and decrease in BCS by 0.267 units. Regarding breed differences, purebred milk yield was positively affected and BCS negatively affected. Purebreds produced significantly more milk (5.44 kg/day) than crossbreds (4.98 kg/day). The highest milk yield was observed both in March for purebreds and crossbreds while, the lowest in August and October for purebreds and crossbreds, respectively. BCS and milk yield were positively correlated with temperature while negatively for relative humidity. In conclusion, BCS, breed, stages of lactation, temperature, and relative humidity have significant effects to milk production. (**Author's abstract**)

Keywords: *Body Condition Scores, Dairy buffaloes, Milk production, Murrah buffalo, Veterinary medicine*

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0396

TREATMENT OF SUB ESTRUS AND SUSPECTED ENDOMETRITIS IN A SIX-YEAR OLD HOLSTEIN COW BY INTRAUTERINE INFUSION WITH TWO PERCENT POVIDONE IODINE SOLUTION

Pilapil-Amante, Flor Marie Immanuelle R. , Taishi, Kidaka , Yoshiaki

Breeding management is very important, especially in dairy cattle, to produce milk. Silent heat or sub estrus and endometritis are common problems, especially postpartum problems, in dairy animals. Use of hormones and antibiotics are the choices for treatment of endometritis and sub estrus however, there is withdrawal time for milk if antibiotics and hormones are administered. There is also the risk of development of resistant microbes. In this clinical case, a six-year-old Holstein cow which gave birth in October was diagnosed to have sub estrus and moderate endometritis. Second rectal palpation findings included a slightly thickened uterus and corpus luteum in the right ovary. This means the right ovary was still active. The animal came into estrus eleven days after treatment with 50 ml of two percent intrauterine infusion of povidone-iodine and Artificial insemination (AI) was done the following day. Forty-three days after the AI, the cow was diagnosed as pregnant and corpus luteum was found on the right ovary. Thus, intrauterine infusion of povidone-iodine induces estrus by stimulating the uterus to secrete endogenous prostaglandin. Generally, the animal will be in estrus eight days after intrauterine povidone-iodine infusion but there could be vast individual differences. (**Author's abstract**)

Keywords: *Endometritis, Intrauterine infusion, Povidone-iodine, Prostaglandin, Sub estrus, Veterinary medicine*

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ULTRASONOGRAPHIC FEATURES OF THE UTERUS AND OVARIES IN HOLSTEIN-SAHIWAL CROSSBRED DAIRY HEIFERS AT DIFFERENT PHASES OF THE ESTROUS CYCLE

Pajas, Arville Mar Gregorio A. , Ponco, Kristine Ysabel Y., Rayos, Antoni

The ultrasound features of the uterus, ovaries, dominant follicles, and corpora lutea of crossbred dairy heifers were described in relation to the phases of the estrous cycle. Ten (10) Holstein-Sahiwal crossbred dairy heifers underwent a double injection synchronization program using Prostaglandin F2 α , and sonograms of the uterus, ovaries, and its related structures (dominant follicles and corpora lutea) were obtained at each phase of the estrous cycle: estrus, metestrus, diestrus, and proestrus. B-mode sonograms were collected using an ultrasound machine equipped with a 7.5 MHz transrectal linear array scanner. Significantly higher measurements in the thickness of the left uterine horn were observed, revealing a thicker hyperechoic uterine wall during estrus in contrast to metestrus. The left uterine horn wall was significantly thicker during proestrus and thinnest during metestrus and diestrus. The ovaries appeared as a heterogeneously hypoechoic structure with the right ovary during proestrus having a significantly lower echo score, appearing less echogenic in contrast to other phases. The ovoid anechoic follicles at proestrus and estrus revealed lower echo scores than the hypoechoic corpus luteum at diestrus. The results of this study can serve as baseline information for further studies to improve reproductive performance in dairy heifers. **(Author's abstract)**

Keywords: Dairy heifers, Estrous cycle, Ovaries, Ultrasonography, Uterus, Veterinary medicine

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ULTRASOUND FEATURES OF THE LIVER, SPLEEN, KIDNEY, AND HEART IN DOGS WITH CANINE PARVOVIRAL ENTERITIS

Pajas, Arville Mar Gregorio A. , Acorda, Jezie A. , Mariño, Marga

The study was performed to determine the ultrasound features of the liver, spleen, kidney, and heart in dogs positive to canine parvoviral enteritis (CPE positive). Twenty-three CPE positive puppies and 14 apparently healthy puppies (CPE negative) with an age of less than one year and a body weight of less than 10 kg were utilized in the study. Two-dimensional ultrasonography was used to identify and evaluate the hepatic, renal, splenic, and echocardiographic structures while M-mode echocardiography was used to measure dimensions of various cardiac structures and calculate cardiac indices. No significant differences were found between the measurements of the CPE positive dogs and the CPE negative dogs. The results suggest that canine parvoviral enteritis does not produce any ultrasonographically visible abnormalities in the left kidney, liver, spleen, and heart of CPE positive dogs showing clinical signs such as bloody diarrhea and vomiting. Hence, ultrasonography of the aforementioned organs is of little value in the establishment of prognosis in dogs with active canine parvoviral enteritis. **(Author's abstract)**

Keywords: Canine parvovirus, Dog, Echocardiography, Enteritis, Ultrasonography, Veterinary medicine

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VIRULENCE FACTOR PROFILE AND ANTIBIOTIC RESISTANCE OF *Escherichia coli* O157 STRAINS ISOLATED FROM ANIMAL RAW MEAT

Tajbakhsh, Elahe , Momtaz, Hassan , Lotfi, M

The current research was done to study the prevalence of antibiotic resistance and distribution of virulence factors amongst the *Escherichia coli* O157 strains isolated from 180 animal raw meat samples (60 chicken, 30 camel, 40 bovine, 30 turkey, and 20 ovine). *E. coli* O157 strains harbored the highest prevalence of resistance against tetracycline (94.4%), trimethoprim (61.1%), co-trimoxazole (55.5%), and gentamicin (55.5%) antibiotics. The most commonly detected virulence factors amongst the *E. coli* O157 isolates were *fimH* (88.8%), *papC* (61.6%), *cnf1* (61.6%), *afa/draBC* (61.6%), *papGII* (55.5%), *csgA* (55.5%), and *cvaC* (55.5%). Findings exhibited that all bovine, ovine, caprine, and camel meat samples can be reservoirs of the virulent and antibiotic resistant *E. coli* O157 strains. Simultaneous presence of some virulence factors together were found in several *E. coli* O157 strains which showed their high pathogenicity. Retail ruminant meat may be reservoirs of virulent and resistant *E. coli* O157 strains.

(Author's abstract)

Keywords: Antibiotic resistance pattern, *Escherichia coli* O157, Raw meat, Virulence factors, Veterinary medicine

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