



PHILIPPINE SCIENCE & TECHNOLOGY ABSTRACTS



**SCIENCE AND TECHNOLOGY INFORMATION INSTITUTE
INFORMATION RESOURCES AND ANALYSIS DIVISION**

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Bicutan, Taguig City, Metro Manila
Philippines**

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Bimonthly classified abstracts of the latest Philippine publications in the field of science and technology

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- 0001** A road to trust. Chase, Robert S., Labonne, Julien. **Social Welfare and Development Journal**, , 3(2):26-30

The authors explore the relationship between transaction costs and generalized trust, using panel data from 2,100 households in 135 rural communities of the Philippines collected for the impact evaluation of KALAH-CIDSS Project. The paper shows that where transaction costs are reduced (proxied by road construction); there is an increase in generalized trust. As trust is built through repeated interactions, the authors find that the individuals most likely to engage in exchange exhibit an increase in trust after road construction. These results suggest that, rather than being an input to economic growth, trust might be a product of reduced transaction costs (which also favors growth). **(Author's abstract)**

AGRICULTURE

- 0002** Agricultural liming contributes to global warming. Imoto, Hiromi, Miyazaki, Tsuyoshi, Nishimura, Taku, Hirai, Kenta, Dumale, Jr., Wilfredo A.. **Transactions of the National Academy of Science and Technology**, , 33(1):56

The role of atmospheric CO₂ in global warming is unchallenged. Lime carbonates contribute to atmospheric CO₂ emissions and enhance soil organic carbon (SOC) turnover in limed acid soils. Experimental data on the magnitude of lime-contributed CO₂ are still few although liming is common agricultural practice worldwide. To separate lime-contributed and SOC-originated CO₂-C to CO₂ evolution, we used Ca¹³CO₃ (¹³C 99%) as lime and tracer to an acidic Kuroboku Andisols from Tanashi, Tokyo Prefecture (35°44'N, 139°32'E) and Kunigami Mahji Ultisols of Nakijin, Okinawa Prefecture, Japan (26°38'N, 127°58'E). The lime was applied under two soil water conditions: 70% (FC70) and 30% (FC30) of the field capacity (FC) of the soils incubated at constant temperature (20° C).

After 36 days, ¹³CO₂-C evolution was 74.37 – 79.32% of total CO₂-C emissions from Kuroboku Andisols, and 62.32 – 70.4% in Kunigami Mahji Ultisols. This confirmed significant contribution of carbonates in CO₂ evolution of limed agriculture soils. Liming also increased ¹²CO₂-C evolution from native SOC. Priming effect of lime ranged from 51.97 – 114.95% in Kuroboku Andisols and 10.13 – 35.61% in Kunigami Mahji Ultisols. These are real priming effects since there was no other source of ¹²CO₂-C than SOC. Decrease in soil microbial biomass carbon (SMBC) indicated microbial stress due to liming, and rise in soil pH allowed an increase in microbial populations able to utilize SOC, explaining the extra ¹²CO₂-C evolution in limes soils. **(Author's abstract)**

Soil microbial biomass carbon. Priming effect. Lime carbonate. Agricultural liming. Soil organic carbon. Agriculture.

- 0003** Antagonistic effects of locally isolated *Streptomyces* sp, *Basillus amyloliquefaciens* and *Pseudomonas fluorescens* to *Xanthomonas oryzae* pv. *oryzicola* causing bacterial leaf streak on rice plants. Zulaybar, Teofila O., Pelin, Erika Angelyn B., Edera, Kristal Gay V., Torcal, Geillan

Rice, a staple food in most countries, currently faces production problems due to pathogens such as *Xanthomonas oryzae* pv. *Oryzicola* which causes leaf streak disease. Thus, this study aims to develop biological control agents such as *Bacillus amyloliquefaciens*, *Pseudomonas fluorescence* and 2 locally isolated *Streptomyces* sp. against *X. oryzae* pv. *Oryzicola*.

Antimicrobial assay was examined using the agar plug method and observing the growth of *B. amyloliquefaciens*, *P. fluorescence* and 2 locally isolated *Streptomyces* sp. Commercial fungicide was used as positive control and agar plug without the organism as negative control. Final screening was done by the cup cylinder method using liquid broth of the organisms. Assay plates were incubated for 48 hours to observe zones of inhibition.

The agar plug assay showed that *B. amyloliquefaciens* and *Streptomyces* sp 1 and 2 inhibited the growth of *X. oryzae* (zone of inhibition was 24.8 mm. in diameter for the 3 organisms while *P. flourescens* did not produce any inhibition). However, when the cup cylinder assay was done, the broth of *P. flourescens*, *B. amyloliquefaciens*, *Streptomyces* sp. 1 and 2 inhibited the growth of *X. oryzae* (diameter of the zone of inhibition was 10.9, 17.7 mm, 22.08 mm, 22.2 mm, respectively). The commercial fungicide used as positive control had a 32.96 mm zone of inhibition. Further analysis of the data showed that there is no significant difference between the three antagonists and the commercial fungicide. Thus, *B. amyloliquefaciens*, local *Streptomyces* sp. 1 and 2 can be used as biological control agents against *X. oryzae*. It is highly recommended to use *Streptomyces* sp. 1 and 2 because they could not cause negative effects to the environment. **(Author's abstract)**

Agriculture. Amyloliquefaciens. Fungicide. Oryzae.

- 0004** Antioxidant capacity and metabolic response of red striped snapper (*Lutjanus erythropterus* Bloch, 1790) fed diets with astaxanthin and/or oxidized oil. Angeles, Jr., Isagani P., Parallag, Quirino D., Chien, Yew-Hu. **Transactions of the National Academy of Science and Technology**, , 34(1):21

Marine fish diets contain large amount of highly unsaturated fatty acids (HUFA) which are easily oxidized. The oxidized HUFA might lead to oxidative stress in fish. Aside from pigment-enhancing property of astaxanthin (AX), it is commonly supplemented to fish diet to act as a powerful antioxidant against oxidative stress. This study evaluated the effects of AX on antioxidant capacity, metabolic response and liver AX content of red striped snapper (*Lutjanus erythropterus*) (20.05±1.65 g) fed diet with or without oxidized oil (OX). The commercial diet served as the control (C). Fish were fed diet containing 240 mg kg⁻¹ AX, 100 ml kg⁻¹ OX or combination of 240 mg kg⁻¹ AX and 100 ml kg⁻¹ OX (AX+OX) for one day. Antioxidant capacity and metabolic response were monitored at 0, 6, 12, 24, 48 and 72 h and liver AX content was analyzed at 72 h after feeding. The AX-fed fish (AX and AX+OX) had significantly lower antioxidant capacity and metabolic response at 6 and 12 h than the non AX-fed fish (C and OX). On the other hand, OX-fed fish resulted in higher GPx at all sampling times, except 24 h, as compared to the non OX-fed fish. Moreover, OX-fed fish had higher GR, glucose, triglycerides and lactate at 6 and 12 h than the non OX-fed fish.

Additionally, treatments that received AX showed significantly higher liver AX content. These results indicated that AX could enhance the antioxidant capacity and metabolic response of *L. erythropterus*. **(Author's abstract)**

Agriculture. Antioxidant capacity. Astaxanthin. *Lutjanus erythropterus*. Metabolic response. Oxidized oil.

- 0005** Antioxidant capacity, phenolic content and sensory profile of peanut skin infusions. Resurreccion, Anna VA., Francisco, Ma. Leonora dL.. **Transactions of the National Academy of Science and Technology**, , 33(1):42

The popularity of functional beverages led to the search for alternative sources of raw materials that provide both great taste and functionality to consumers. Peanut skins, a thin papery skin that encases the peanut seed, are a rich source of phenolic compounds and their utilization in beverages was exploited. The objective of this study was to determine the total phenolics (TP), antioxidant capacity (AOC), phenolic content and descriptive sensory profile of peanut skin infusions and evaluate the relation between these properties.

Raw peanuts were blanched at 100°C, 10 to 20 min, and skins were collected. Hot water infusions were prepared and AOCs were measured using TP and Trolox equivalent antioxidant (TEAC) and oxygen radical absorbance capacity (ORAC) assays. Reversed-phase HPLC was used to determine phenolic acids, stilbenes and flavonoids. Trained panels evaluated the sensory profile of peanut skin infusions.

Principal component (PC) analysis showed that the cumulative percent of variability accounted for by the first three PCs is 87.9%. PC1, accounting for 44.2% of the variance, appears to be associated with TP, TEAC, ORAC, the compound resveratrol and the descriptive attributes 'woody', 'bitter' and 'astringent'. PC2 explained 31.0% with large loadings relating to the attribute 'clarity', and the compounds protocatechuic and caffeic acids, and quercetin, PC3 (12.8%) appears to be associated with the compounds catechin epicatechin and p-coumaric acid. Distribution of skin infusions for the first two PCs reveals two sample groupings. These findings suggest that peanut skin type may significantly alter AOC properties, phenolic composition and sensory properties. Beverage products with peanut skins, as an alternative health beverage, may deliver beneficial effects to human health. **(Author's abstract)**

Descriptive test. Phenolics. Antioxidant capacity. Infusions. Agriculture. Peanut skin.

- 0006** Application of dihaploid breeding technology in variety development and QTL mapping in rice (*Oryza sativa* L.). Brar, Darshan S., Abe, Toshinori, Redoña, Edilberto D., Lapitan, Victoria C.. **Transactions of the National Academy of Science and Technology**, , 33(1):36

Â Â Â Â Dhaploid technology has become a promising tool in breeding for producing homozygous lines more rapidly than most conventional breeding methods. Doubled haploids (DH) are also excellent materials for genetic studies because of their homozygosity and uniformity. A total of 313 DHs were generated thru another culture

from the F1 of PSB Rc10 and Nipponbare. Characterization of these DHs revealed the very high homogeneity and stability at the DNA level using SSR analysis and under field conditions.

Field trials of 237 DHs in 2009 WS resulted in selection and advancement of 54 superior lines in 2010 DS and WS. Ten 10 DHs have been selected as promising lines based on high yield, phenotypic acceptability, tolerance to major pests, and uniformity which are better/comparable to the checks; PSB Rc10, PSB Rc18, and PSB Rc82. In less than 3 years, elite breeding lines were developed while conventionally, it takes 6-7 years for selected inbreds to reach yield trial. Stable and potential donor parentals were also developed and included in the germplasm pool based on resistance to blast (9), early maturity (3), enhanced grain quality (3), and short to medium plant height (10). On the other hand, a mapping population consisting of 219 DHs was used for identifying QTL for grain quality traits using 205 SSR markers. Thirteen QTLs were identified; three for amylose content and five each for gel consistency and gelatinization temperature. QTL mapping for drought tolerant traits such as days to maturity, spikelet fertility, early vigor, and green leaf retention is now ongoing using the same mapping population. Information on mapped QTLs associated with these traits and the SSR markers that have tight linkage to them may be used to speed up the process of breeding new rice varieties with better quality and drought tolerance through molecular marker-assisted selection (MAS). (Author's abstract)

Doubled haploids. SSR markers. MAS. QTL. Anther culture. Agriculture.

- 0007** Aseptic cultivation of *Coprinus comatus* in pulp and paper waste. Reyes, Renato G., Kalaw, Sofronio P., Dulay, Rich Milton R., Madlao, Jelly Ann. **Transactions of the National Academy of Science and Technology**, , 33(1):64

Coprinus comatus is a wild edible mushroom that normally grows incellulosic substrates. It is considered as a weed mushroom that competes with *Volvariella volvaceae*. In this study, we developed production technology for aseptic cultivation of this mushroom using paper sludge and corn grit. Two strains of *C. comatus* were rescued from decomposing pile of rice straw and cultured in different combinations of pulp and paper waste and corn grit.

Mycelial growth of *C. comatus* strain1 was more vigorous than strain 2. *C. comatus* strain1 grown in 7 parts paper waste + 3 parts corn grit had the shortest incubation period with a mean of 6 days while those cultured in 5 parts paper waste + 5 parts of corn grit produced the heaviest fruiting bodies with a mean of 9.87g and the most number of fruiting bodies with a mean of 23. Moreover, 2 parts paper waste + 8 parts corn grit produced the longest fruiting bodies with a mean of 9 days, heaviest fruiting bodies (8.58g) and the most number of fruiting bodies (64.33). Finally, those that are grown in 7 parts paper waste + 3 parts corn grit produced the longest fruiting bodies with a mean of 40.77 mm. (Author's abstract)

Cellulosic. Production technology. Aseptic cultivation. Pulp and paper waste. Agriculture. *Coprinus comatus*.

- 0008** Assessment of the variability of rainfall and temperature in Ilocos Norte, Philippines for crop production management. Galacgac, Evangeline S., Acosta, Charito G.. **Transactions of the National Academy of Science and Technology**, , 34(1):15

Climate change is now widely recognized as a major environmental problem facing the globe. In the Philippines, the variability of rainfall and temperature had already been generally analyzed but limited studies have been conducted so far to determine the extent of this phenomenon in specific localities. In view of this, it is therefore important to analyze the local weather data to have better understanding of the changes that have been occurring and to come up with coping mechanisms or climate change adaptation strategies and thereby minimizing its negative impacts. This study aims to provide decision-makers with the needed information and tools to manage or mitigate the risks brought about by the changes in rainfall and temperature in the province of Ilocos Norte. Thirty-five-year (1976-2010) daily weather data on rainfall and temperature from MMSU-PAGASA Agrometeorological Station in Batac, Ilocos Norte and 30-year (1981-2010) tropical cyclone data from Laoag City, Ilocos Norte Synoptic Station were analyzed to determine the variability of rainfall, temperature, and cyclone patterns in Ilocos Norte. Annual and monthly variations were determined using descriptive statistics and simple linear regression analysis was used to determine the degree of annual change. Average data from 1976-1990 (normal base period) and 1991-2010 were compared to find out if there were changes that occurred during these periods. Result showed that there is an increase in annual temperature and this was found to have deviated from the normal-base period. With respect to rainfall, the annual trend is variable but there is a significant change in monthly pattern and a slight change in the frequency of maximum rainfall events. On the other hand, the number and intensity of tropical cyclone increases annually and deviated from the normal. Likewise, monthly trend and intensity posted a remarkable change. **(Author's abstract)**

Agriculture. Climate change. Rainfall. Temperature. Ilocos Norte. Crop production management.

- 0009** Bioaccumulation of some heavy metals in adult tilapia *Oreochromis niloticus* in Southern Part of Laguna De Bay. Sandoval, Kristine L., Padua, Haizelle O., de Jeus, Editha E., Enal, Maria Luisa A.. **Transactions of the National Academy of Science and Technology**, , 32(1):38

Tilapia, *Oreochromis niloticus*, one of the most important fish species in Philippine aquaculture, is grown abundantly in Laguna de Bay. A preliminary study was conducted to determine the levels of accumulated mercury (Hg), cadmium (Cd) and lead (Pb) in the muscle tissue of this freshwater fish collected from February (wet season) to March (dry season) 2008 in the southern part of Laguna de Bay. Heavy metal analyses using atomic absorption spectrophotometer (AAS) showed a higher concentration of Hg and Cd during the wet season than in the dry season. However, analysis of variance revealed significant seasonal variation only in Cd ($P=0.0253$). Lead, on the other hand, was not detected in the fish samples. The mean concentration of Hg (0.023 ppm) was lower than the permissible concentration set by FAO but the mean level of Cd (0.161 ppm) was almost equal to the limit given for fish. This could represent a significant health risk to the consuming public. **(Author's abstract)**

Agriculture. Bioaccumulation. Heavy metals. Laguna de Bay. Spectrophotometry. Tilapia.

- 0010** Bioactivity of talisay leaf extract against *Ralstonia solanacearum* in hydroponics. Rufila, Eliose Jeann L., Bonsubre, Julie Ann M.. **Transactions of the National Academy of Science and Technology**, , 32(1):18

Hydroponics is one of the many ways of conserving and maintaining plant genetic resources. It offers many advantages, but it also has disadvantages. One of these disadvantages is bacterial infection of plants. The study investigates the potential of Talisay leaf extract in inhibiting the growth of *Ralstonia solanacearum* in hydroponics.

Fifteen strawberry plants were grown in hydroponics for three days before being subjected to experimental treatments. In treatment 1, plants were soaked in Talisay leaf extract for 1 hour, then soaked in water with *R. solanacearum* for another hour. The soaking sequence was reversed in Treatment 2. For the control group, the first positive control was soaked for 1 hour in a chloramphenicol solution before being soaked in water with *R. solanacearum* for another hour. The soaking sequence was reversed in second positive control. The negative control was soaked for 1 hour in water with *R. solanacearum*. After the soaking, treatments were then brought back to hydroponic culture and observed for 12 days.

The Talisay leaf extract inhibited the growth of *R. solanacearum* in hydroponics, with T1 showing the highest inhibition rate among the five treatments. In terms of wilting, significant differences were obtained and T1 was the least infected among the five treatments. There was no significant difference in tolerance rate, survival rate and yellowing among the treatments. **(Author's abstract)**

Agriculture. Hydroponics. *Ralstonia solanacearum*. Talisay leaf extract.

- 0011** Bio-fortification of zinc in rice (*Oryza sativa* L.) grains through soil and water management. Descalsota, Jonathan C., Sanchez, Pearl B.. **Transactions of the National Academy of Science and Technology**, , 34(1):9

Rice is considered as the staple food of most Asian countries however milled rice is mainly carbohydrate and has relatively low concentration of crude protein, crude fat, crude fiber, minerals and vitamins. Efforts are now undertaken to increase the level of minerals (i.e iron, zinc, etc.) in rice grains. In line with this, a pot experiment was conducted to study the influence of chicken manure application and water management on zinc concentration in rice grains. The treatments consist of two soil type (Buguey clay loam and Alimodian silty clay), two rice varieties (MS13 and IR72), two water management (saturated and flooded) and two levels of chicken manure application (0 and 3 t ha⁻¹). The sixteen treatment combinations were replicated three times and laid out in randomized complete block design. Results showed that application of additional chicken manure significantly increased grain yield, straw yield and Zn as well as uptake of other nutrients like N, P, K in grains since chicken manure provided additional source of these nutrients. Flooding combined with chicken manure application resulted in highest grain yield. Zinc concentration and uptake as well as grain yield were higher in varieties grown on Alimodian silty clay. Grain yield and Zn uptake of MS13 was not significantly influenced by water management whereas

flooding increased grain yield and Zn uptake of IR72. **(Author's abstract)**

Agriculture. Rice. Zinc. Bio-fortification. Uptake. Grains.

- 0012** Cage culture and lake management practices in Lake Danao, San Francisco, Central Philippines. Gonzaga, Ricardo B., Tanduyan, Serapion N., Andriano, Berenice T.. **Transactions of the National Academy of Science and Technology**, , 34(1):20

Lake Danao of Camotes Island was studied to find out its status and government initiatives to conserve the lake being the source of livelihood and a tourist destination in the Islands of Camotes. The interview guide and actual field visits were used to gather data. Results show that fishing with the use of gill nets and fish pots topped among the activities of the inhabitants in Lake Danao, followed by soli-soli gathering for mat weaving and other articles, ecotourism, aquaculture and nipa shingles making. Government initiatives in conserving and sustaining the lake includes the legislative supports which are declaring Lake Danao as flora and fauna sanctuary; requiring barangay captains of six lakeshore barangays to implement activities for lake protection; declaring September 18 of every year as Municipal Clean Up Day in the marine and lake waters of San Francisco; prohibiting slash and burn farming on lakeshore; prohibiting cutting of mangroves and other tropical trees in the lake; ban on bird hunting around the lake; soli-soli plant cutters/weavers to secure mayor's permit; prohibiting the use of motorized vessels, carabao bathing and washing of clothes and laundry along lakeshore; prohibiting construction of dwellings and other structures twenty meters from lakeshore; adopting and implementing of article 51 and 52 of RA 1067 prohibiting solid waste and garbage dumping in the lake; collecting entrance fees from Lake Danao visitor and creation of San Francisco Lakewatch. Aquaculture activities in the lake are only given to BFAR, LGU and other agencies to control proliferation of cages and maintain the carrying capacity of the lake. BFAR-7 had a quarterly restocking of the lake with 50,000 tilapia fingerlings and imposing the standard size of gillnets to be used in fishing. The Cebu Technological University and BFAR-7 conducted limnological researches of the lake to monitor lake health and sustainability. **(Author's abstract)**

Agriculture. Cage culture. Lake Danao. Central Philippines. Camotes Islands.

- 0013** Carbon stocks assessment of mangrove in Batangas and Quezon Province, Luzon, Philippines. Gevana, Dixon T., Lasco, Rodel D., Pulhin, Florencia B., Pampolina, Nelson M., Im, Sang-Jun. **Transactions of the National Academy of Science and Technology**, , 32(1):30

Mangroves have a significant role in addressing climate change because they serve as sinks of CO₂. This study aimed to assess the carbon storage potential of mature mangroves of Verde Islands Passage (VIP) in Batangas and Tayabas Bay in Quezon Province. A nested plot method and allometric equations developed by Komiyama et al. (2005) and Brown (1997) were employed to estimate the carbon density of these stands. Results revealed that mangroves of VIP and Tayabas Bay are generally comprised of *Rhizophora* and *Avicennia* species. Carbon density of *Rhizophora* dominated stands in VIP was estimated to be around 115.45 ton/ha. Among the species, *Rhizophora mucronata* and *Xylocarpus granatum* were noted as

major contributors to carbon sink. In Tayabas Bay, carbon density of *Rhizophora* stands was recorded to be around 92.36 ton/ha. *Rhizophora apiculata* was observed as the most abundant species in this site. In view of the *Avicennia*-dominated stands, VIP has a carbon density of around 141.71 Mg/ha, while Tayabas Bay has around 139.07 ton/ha. *Avicennia marina* was observed dominant in both sites. Overall, mangroves of VIP and Tayabas Bay exhibit a good carbon storage potential hence proper forest management is essential to sustain and improve its capacity to mitigate climate change. **(Author's abstract)**

Agriculture. Carbon storage. Climate change. Mangrove. Mangrove forest.

- 0014** Changes on the antioxidant activity and total phenolics content of different leafy and fruit vegetables as affected by storage time and temperature.. Mendoza, Eusebia Joy B., Rodriguez, Felicito M., Hurtada, Wilma A.. **Transactions of the National Academy of Science and Technology**, , 33(1):30

Antioxidants are known to provide health benefits such as the prevention of diseases like cancer, cardio and cerebro vascular diseases. Vegetables contain considerable amount of antioxidants. This study shows changes in the levels of antioxidant activity and total phenolic content of malunggay, pechay, chili leaves, sweet potato tops, and kangkong and fruit vegetables okra, tomato, eggplant, ampalaya, sitao as they are affected by storage temperatures and time of storage.

Ten leafy and fruit vegetables were stored under cold and room temperatures and monitored for total phenolics content using the Folin-Ciocalteu method and antioxidative activity using the DPPH method until the end of marketability. Results were statistically analyzed.

The antioxidative activity of leafy vegetables stored both at room temperature and refrigerated temperatures showed that prolonged and cold storage decreased. The total phenolics content of leafy vegetables stored at refrigerated temperature showed varied effects with chili and malunggay decreased, while kangkong, sweet potato tops, and pechay increased. Generally, leafy vegetables stored at room temperature showed increasing trends while fruit vegetables exhibited decreasing total phenolics content except for okra and sitao.

Storage time and temperature affect the antioxidant activity and total phenolic content of leafy and fruit vegetables. The total phenolics content of vegetables at room temperature increased while those at refrigerated temperature decreased. Antioxidative activity behaves otherwise. **(Author's abstract)**

Cold storageFruit vegetables. Leafy vegetables. Phenolics content. Antioxidant activity. Agriculture.

- 0015** Characterization of restorer and maintainer lines using morphological and SSR markers. Rigor, Alex T., Luciano, Virginia P., Coloma, Leah P., Pacada, Imeldalyn G.. **Transactions of the National Academy of Science and Technology**, , 33(1):40

Genetic diversity is a prerequisite in any breeding program. Genetic diversity can be measured by different approaches such as pedigree analysis, morphological data and use of molecular markers. In this study, we evaluated the diversity of 175 parent lines (39 maintainer and 136 restorer) used in hybrid rice breeding program at PhilRice using 26 qualitative, 12 quantitative traits and 38 microsatellite or simple sequence repeat (SSR) markers. The data was analyzed using Unweighted Pair-group method with arithmetic mean (UPGMA). Morphological analysis revealed two major clusters with similarity coefficient of 3.09. Out of the 38 traits analyzed, eight gave significant contribution for the separation of some individuals and groups of genotypes. The percentage of contribution of each trait to total genetic variation was estimated through principal component analysis (PCA). Analysis based on SSR markers showed two major clusters with similarity coefficient of 0.71. Four maintainer lines represented one group whereas the other group consisted 36 maintainer and 56 restorer lines. Combined analysis also showed two major clusters with similarity coefficient of 0.42. One consisted of only two maintainer lines whereas other comprised 37 maintainer and 55 restorer lines. Overall, the results showed an average degree of variation among the hybrid parent lines indicating that there is a need for new germplasm source to improve the diversity of our hybrid breeding materials. In addition, the study provided important information for hybrid rice breeders on heterotic group identification and enhancement of heterotic F_1 combination. (Author's abstract)

Hybrid rice. SSR. UPGMA. Heterosis. Genetic diversity. Agriculture.

- 0016** Chemical fertilizer replacement capability of mykovam biofertilizer for increased growth and fruit yield of okra. Guy, Adoracion T., Aggangan, Nelly S.. **Transactions of the National Academy of Science and Technology**, , 34(1):8

Okra (*Abelmoschus esculentus* L. Moench) is one of the Philippines' major fresh vegetable for export. In 2010, 4,500MT of okra was exported to Japan valued at \$ 15M (about P600M). A field trial was conducted to assess the capability of MYKOVAM biofertilizer (containing mycorrhizal fungi) in replacing chemical fertilizer for increased growth and marketable fruit yield of okra. The experiment was established at the Central Experimental Station, UP Los Baños, Laguna from February to July 2011. Treatments were applied during seed sowing (Mykovam), transplanting (NPK) and two and four weeks (urea) after transplanting. Highest total fruit yield was obtained from those treated with the full Recommended Rate of Chemical (RRC) fertilizer (14-14-14 and 46-0-0) and RRC+Mykovam, with increases of 92 to 94% over the control which had the lowest (5,477g/1m x 5m plot). Fruit yield and number were significantly increased with Mykovam+1/2RRC which were comparable with those treated with RRC and RRC+Mykovam. Moreover, Mykovam+1/2RRC gave comparable height, root collar diameter, and total dry weight with those treated with RRC+Mykovam. Total dry weight was increased by 100% compared with 71% only by the latter. The uninoculated unfertilized control had the lowest height (66cm), root collar diameter (1.63cm) and total dry weight (91.8g/plant). In conclusion, Mykovam can replace half of the recommended NPK fertilizers with growth comparable with those treated with full chemical fertilizer rates. Mykovam treated plants gave more marketable fruits than with chemical fertilizers. (Author's abstract)

Agriculture. *Abelmoschus esculentus*. Mycorrhizal fungi. Complete fertilizer. Urea.

- 0017** Climate change mitigation in crop production. Ladia, Villamor A., Descalsota, Jonathan C., Santos, Primitivo Jose A.. **Transactions of the National Academy of Science and Technology**, , 33(1):55

Problems due to soil salinity are widely spread throughout different agro-ecological zones. Corn (*Zea mays* L.), as one of the major cereal crops in the world, is adversely affected by this stress. Efforts to develop tolerant varieties are underway to limit the ill effect of salinity on corn production. Greenhouse experiments and field trials were conducted to evaluate the potential of 25 yellow corn populations or open pollinated varieties (OPVs) developed by the Institute of Plant Breeding (IPB) for salinity tolerance. Initial screenings were conducted in the greenhouse using the nutrient solution culture with varying degree of salinity. Treatments were replicated three times and were arranged in randomized complete block design with salinity levels serving as main plot and variety as the subplot. Results of agronomic parameters like percent survival root and shoot length, root and shoot biomass, chlorophyll content (SPAD value) and leaf area revealed three varieties with good potential for improving their saline tolerance; these were Phil 1-115, IPB Composite 3 and IPB Composite 5. These OPVs were further evaluated by growing them under actual saline soil. IPB Composite 3 and IPB Composite 5 produced the heaviest biomass and grain yield with the IPB Composite 3 being the better of the two. Thus, IPB Composite 3 had been chosen as the best OPV candidate for yellow corn population improvement for salinity tolerance. **(Author's abstract)**

Nutrient solution culture. Salinity tolerance. Corn population improvement. Agriculture. Climate change.

- 0018** Climate change mitigation through conservation of Angat watershed reservation in Luzon, Philippines. Cruz, Rex Victor O., Pulhin, Florencia B., Gevaña, Dixon T.. **Transactions of the National Academy of Science and Technology**, , 33(1):58

The impact of climate change are becoming more severe. For the past decades, the Philippines have witnessed strong typhoons, prolonged rains and intense drought that caused significant damages to agriculture, infrastructures, human settlements and health. As proposed by the Intergovernmental Panel on Climate Change (IPCC), mitigation strategies such as reforestation and protection of the remaining forest cover can help lessen the impacts of climate change. Forested watersheds such as the Angat Watershed Reservation Dam in Luzon have huge capacity to store and sequester atmospheric carbon. Among the greenhouse gases, carbon dioxide is the most important contributor to global warming. Using the biomass sampling technique developed by ICRAF-ASB and Winrock Foundation, the study estimated the carbon stocks of Angat watershed. On the average, old growth forest has the largest carbon density with 404 ton ha⁻¹. This was followed by second growth forest (387.5 ton ha⁻¹ C), tree plantations of *Swietenia macrophylla* (357 ton ha⁻¹ C) and *Gmelina arborea* (240.7 ton ha⁻¹ C), submarginal forest (151.9 ton ha⁻¹ C), and lastly grassland (65.7 ton ha⁻¹ C). Total carbon stock of the watershed was estimated to around 22 gigaton C, an amount that is significant to help compensate the country's carbon emission level. Overall, the study emphasized the need to protect Angat watershed in order to

sustain its twin role of climate change mitigation and sustainable water and energy generation. **(Author's abstract)**

Watershed. Carbon stock. Climate change. Dam. Agriculture.

- 0019** Coconut carbon sequestration part 2/strategies for the carbon market & simulating potential incomes for coconut CDM projects. Labouisse, J.P., Sileye, T., Rouziere, A., Henry, M., Hamel, O., Rounsard, O.. **The Philippine Journal of Coconut Studies**, , 33(2):38-54

The following article is a review of possible strategies of the coconut sector facing the carbon market, through the Clean Development Mechanism (CDM) of the Protocol of Kyoto, but also through Non-Kyoto (voluntary) initiatives. It sums up the conditions for certifying plantations, together with recent statistics of similar projects accepted by UNFCCC, which are currently displaying a rapid growth rate. It stresses the complexity of the CDM, but also the accessibility for coconut energy & afforestation + reforestation (A/R) projects, considering that coconut plantations do actually correspond to the definition of "forest".

Using recent scientific information on C cycle of coconut plantations and coconut oil, it proposes also a simulation of the expected potential profitability of coconut energetic and A/R projects. From the point of view of the farmer and of the oil mill, in absence of any CDM project (the reference here), the value-added comes mainly from local processing of the copra into coconut oil. When implementing a short-term A/R project (t-CER), the value-added by C fixation in the ecosystem would be ca. +15 to +19%, as compared to the copra and oil references. When implementing a long term-project (l-CER), the value-added would reach +40 to +52%. When implementing an energy-oil project solely, the value-added by C fixation in the coconut oil would be only +5% (this not including other benefits at national scale, however). When implementing a dual A/R + energy-oil project, the value-added by C fixation would be +19% for t-CER, and +45% for l-CER with respect to the copra and oil references. These results are just potential values given for example, suspected to vary much according to the actual conditions of coconut plantation productivity, management and also C market conditions. However, the simulation clearly supports every APCC initiative in this direction. **(Author's abstract)**

Agriculture. coconut. carbon sequestration. coconut sector.

- 0020** Coconut productivity and production potential in coastal areas of the Philippines. Magat, S.S.. **The Philippine Journal of Coconut Studies**, , 33(2):55-63

This paper aims to provide a substantial understanding of the nature, strengths, opportunities and technical constraints to overcome in the coastal lands in the country for coconut production. Such vital information is immensely important and valuable in most development activities, allocation of investment resources or capitals, and strategic industry directions and goals, in short, the medium and the long term visions.

Among the significant natural resources of the Philippine coconut industry is the extensive 3.2 M ha of coconut lands, of which about 32% or 1 M ha as estimated are

situated in coastal areas (coastal-flat and coastal-upland) planted with at least 100 M bearing trees. In recent years, coastal coconut lands had reached an average of 55 nuts/tree (5,500/ha) or with a range: 49.7 - 66.5 nuts/tree. In terms of annual copra (dried coconut meat <13% moisture), it has an average of 1.385 t copra, higher by 100 kg/ha over inland coconut areas. This difference is largely attributed to better chloride nutrition of coastal coconuts which impacts on the well known CI factor for thicker meat or higher copra weight compared to inland coconuts where natural chloride levels coming from aerial sea salt spray, is usually much below adequacy levels in inland areas.

Available strategies or technologies to increase coconut production and farm productivity in coastal areas, done singly or in combination, as: 1) coconut rehabilitation of current stands by crop nutrition and fertilization management; 2) replanting of senile trees and/or expansion of plantings; and 3) intercropping of coastal coconuts or farm diversification techniques are discussed. **(Author's abstract)**

Replanting. Intercropping. Fertilizer application. *Cocos nucifera*. Coconut productivity. Coconut palm. Coconut coastal areas. Agriculture.

0021 Coconut-based farming systems (CBFS). Magat, S.S.. **The Philippine Journal of Coconut Studies**, , 33(2):1-23

A recent and modern working concepts and principles in CBFS and its indicative social, ecological and economic values of the covered practices are presented. With a modern and productive coconut-based farming systems (CBFS) in mind, a conceptual model is presented to serve as guide for practitioners, research and extension workers, policy and decision-makers and development managers aimed at increasing efficiencies of coconut land resources and maximizing benefits from coconut farming, and many more.

At least seven (7) principles in more progressive CBFS are briefly mentioned and its implications are discussed. Considered all together, the practitioner-farmers and development managers and investors should be able to identify location-specific CBFS priorities and options to achieve the best socio-economic benefits with viable and sustainable agricultural and environmental gains.

Available methods in valuation of food (nutrition) and environmental uses and functions of coconut through their direct and indirect values are presented. Moreover, under the four (4) production options in coconut production (mature nut as copra, young coconut, de-husked nuts and coconut sap), both the food and environmental uses showed varying total coconut economic values (TCEVs). In these four primary production systems, except the coconut sap-based option, the ecological (environmental) values and/or services surpassed the food/nutrition value by at least 2 times. **(Author's abstract)**

Total coconut economic value. Coconut production systems. Coconut-based farming system. Coconut. Agriculture.

- 0022** Comparative study on population dynamics of major insect pests and their natural enemies in inbred and hybrid rice in Digos, Davao. Medina, Jose R., Balleras, Gina D.. **Transactions of the National Academy of Science and Technology**, , 33(1):46

The average population of major insect pests and their natural enemies inbred and hybrid rice was compared during wet season in Digos, Davao del Sur, Philippines. Field survey and monitoring was conducted on 50 selected farmers' field at weekly interval throughout the cropping season. Samples were collected using sweeping method and were transported to laboratory for proper taxonomic identification. Data on average population were subjected to t-Test. White stemborer (*Scirpophaga innotata* Walker, green leafhopper (*Nephotettix* spp.) and brown planthopper (*Nilaparvata lugens* Stal.) were recorded as the dominant insect pests. Results showed that average population of leafhopper and planthopper both in hybrid and inbred rice was highest at 35-42 days after transplanting (DAT). Significant difference between leafhopper population in hybrid and inbred rice was recorded at 5% level. Highest stemborer eggmass count was recorded 35 and 63 DAT for inbred and hybrid, respectively. Adult stemborer incidence was highest at 70-77 DAT. Total average population of predators (*Coccinellidae*, *Miridae*, *Tetragnathidae* and *Linyphiidae*) and parasitoids (*Ichneumonidae* and *Pipunculidae*) was 57 percent higher in inbred than in hybrid. It was noted that the abundance of these natural enemies is dependent on the availability of their host at a given crop growth stage. This study confirmed that insect pests are important component in the population dynamics of natural enemies. **(Author's abstract)**

Insect pest. Natural enemies. Hybrid rice. Inbred rice. Agriculture. Davao del Sur.

- 0023** Critical soil moisture requirement of banana CV. lakatan (*Musa acuminata* Colla.). Pabro, Louie Joseph A., Noel, Michael R., Esguerra, Manuel Q., Tamisin, Jr., Leonardo L., Aggangan, Nelly S., Rocamora, Patrick M., Tafere, Kathy Loren S., Aguilar, Edna A., Garcia, Jose Nestor M.. **Transactions of the National Academy of Science and Technology**, , 33(1):19

Most of the recommendations for banana production are based on the studies of banana cv. Cavendish. Studies for local banana cvs are necessary. A pot experiment in screen house was conducted to determine the critical soil moisture requirement of Lakatan banana at different growth stages. Three month old tissue-cultured Lakatan banana seedling were planted in half drums with 70-kg Lipa clay loam surface soil sample. The experiment was laid out in Randomized Complete Block Design (RCBD) with four soil moisture treatments (20, 25, 30, and 35% moisture by weight). Soil moisture was monitored semi-weekly and water was added to maintain the required water moisture level treatments. Agronomic parameters were collected monthly covering the different growth stages of the banana starting one month after transplanting. Plant biomass samples were partitioned and nutrient contents of each portion were analyzed. Nutrient content of the soil was analyzed monthly. Banana with 30 and 35% soil moisture levels were significantly taller, have broader leaf area, and large pseudostem diameter compared with those with lower moisture levels. Plants with less than 30% soil moisture content tend to develop more roots due to water stress. Nutrient contents of the partitioned plant biomass with lower moisture contents (20 and 25%), showed high total nitrogen and phosphorus in the plant corm and stem while at higher moisture contents (30 and 35%) the nutrients were evenly distributed. Total phosphorus showed no distinct differences within the treatments. The 30% moisture level appeared to be optimum for the growth of banana. At 25% soil moisture

content, the plants showed signs of water stress and a drastic reduction in growth rate and eventual death of the plants at 20% moisture content. This means that Lakatan banana growers need to maintain soil moisture near or at field capacity. **(Author's abstract)**

pot experiment. Soil moisture requirement. Lakatan. Banana. Agriculture.

- 0024** Cytotoxic potential of the invasive weed species *Chromolaena odorata* L. in the Zamboanga peninsula. Codilla, Lina T., Metillo, Ephrime B.. **Transactions of the National Academy of Science and Technology**, , 34(1):14

Chromolaena odorata is an aggressive invasive plant species that has spread in vast areas of the Philippines including many farmlands in the main island of Mindanao. The species is highly competitive and is known to contain strong allelochemicals, but specific bioactive compounds vary in composition with sampling locality. In this study, ethanol and aqueous crude extracts of *C. odorata* leaves were prepared, and their effects on tomato seed germination and seedling growth and onion root cells mitotic index were investigated. Ethanol crude extracts significantly inhibited germination and seedling growth in tomato, and reduced the mitotic index in onion root tips. The ethanol extract was subjected to column chromatographic elutions and eleven (11) fractions were obtained subjected to bioassay. Results revealed that only fractions 4 and 5 inhibited tomato seed germination at 25% concentration by volume. Phytochemical screening revealed that fractions 4 and 5 are positive for the presence of alkaloids and steroids. These two chemical components were believed to be primarily responsible in inhibiting seed germination and seedling growth in tomato as well as reducing the mitotic index in onion root tips. The inhibitory properties of these bioactive compounds operate at the cellular level, and may help attribute to their successful invasion in the Zamboanga peninsula. **(Author's abstract)**

Agriculture. *Chromolaena odorata*. Zamboanga peninsula. Invasive plants. Mitotic index. Crude extracts. Germination inhibition.

- 0025** Detection of episomal *Banana streak badnavirus* (BSV) in Philippine *Musa* germplasm collection by immunocapture-polymerase chain reaction (IC-PCR). Molina, Agustin B., Herradura, Lorna E., dela Cueva, Fe M., Dinglasan, Eric G.. **Transactions of the National Academy of Science and Technology**, , 33(1):45

Banana streak badnavirus (BSV), one of the five described viruses infecting banana (*Musa* sp), is currently being considered a serious threat and major constraint to *Musa* genetic improvement and germplasm movement. The virus occurs as non-infectious endogenous, wherein viral sequence is incorporated naturally on *Musa* genome, or infectious episomal, which can originate through activation from the endogenous sequences triggered by abiotic stress like tissue culture and drought condition. Accurate detection method must be developed/adapted and used to index the existing germplasm for the presence of episomal BSV. Virus detection was done using Immunocapture-Polymerase Chain Reaction (IC-PCR), which specifically detects episomal virus. Using purified BSV antibody and BSV F1/R1 primers, IC-PCR showed that 18 out of the 22 cultivars tested (82%) gave an amplification product of

220bp indicating the presence of episomal virus. Only 4 cultivars (18%) were negative to BSV. It was noted that all the leaf samples collected from the germplasm came from plants with no typical symptoms of virus infection. Based on the results of IC-PCR, it is very important to use an accurate and effective detection method to determine the presence of episomal BSV in the germplasm collection as part of tight integrated management measures. **(Author's abstract)**

Episomal. Endogenous. Musa germplasm. Immunocapture-PCR. Banana streak badnavirus. Agriculture.

- 0026** Developing low inorganic fertilizer recommendation for banana CVS saba and lakatan in Quezon Province. Pabro, Louie Joseph A., Noel, Michael R., Esquerra, Manuel Q., Tamisin, Leonardo L., Ricamora, Patrick M., Garcia, Jose Nestor M., Aguilar, Edna E., Aggangan, Nelly S.. **Transactions of the National Academy of Science and Technology**, , 33(1):18

Banana is the most economically important fruit crop in the Philippines and the only locally grown fruit available year-round. Banana is grown in adverse environments in the country from the lowlands, flat and sloping uplands to the marginal hilly lands. Most banana plantations are found in Mindanao, well fed with inorganic fertilizers. This study was conducted to develop a low inorganic fertilizers. This study was conducted to develop a low inorganic fertilizer recommendation for banana for low income farmers in Quezon Province. Three-month old tissue cultured banana cvs. Saba and Lakatan seedlings, half of which were pre- inoculated with biofertilizers (BF) Mykovam and BioN in the nursery during pricking, were outplanted in three farmers' farms in General Nakar and Infanta, Quezon Province. The experimental was RCBD with four blocks. Planted seedlings were applied with either 100% Recommended Inorganic Fertilizer (RF = 250N:30P205:350K20 kg/ha) or 25% RF. Results show that, in all farms, the onset of fruiting and harvesting was earlier (556-570 days) in the 100% RF treated plants but not significant as compared with 25%RF+BF (588-663 days). Likewise, the number and weight of hands per bunch and the number of fingers per hand were generally higher in 100%RF than the 25%RF+BF but not significant from each other. However, the number of bunch harvested in the 100%RF was two to three times more than in 25%RF+BF. Total weight of hands per bunch in 100%RF ranged from 7.19-10.11 kg while in the 25%RF ranged from 5.28-5.87 kg. Results showed the feasibility of substituting more than half of the inorganic fertilizer recommendation with BF and maintaining the same performance as that of 100% RF. **(Author's abstract)**

Bio-N. Mykovam. Biofertilizers. Tissue-cultured banana. Agriculture.

- 0027** Developing site index equation for smallholder tree plantation using height – age relationship. Palma, Richmond A.. **Transactions of the National Academy of Science and Technology**, , 34(1):25

Site index is an essential component in determining yield and a basis for sound and effective management of smallholder tree plantation for wood production and carbon sequestration. The study was conducted to develop a site index equation using height – age relationship and construct site index table for mangium (*Acacia mangium* Willd.) in Claveria, Misamis Oriental. Mangium is one of the important

smallholder tree plantation species and commodity for wood industry in the region and the country. Data on total height and age were produced from direct measurements of height and age of 3,910 trees. The study had generated site index equation, $\log SI = \log H + .8955 (\log A - \log BAGE)$ and site index table (ages 3 to 18 years and total height 5 to 40 meters). Based on the equation, the mean annual height increment of a smallholder Mangium plantation is 2.88 meters at site index 25 and 1.36 meters at site index 12. At age 10, mangium planted at site with an index of 12 could attain a total height of 15 meters while those at index 25 could attain 30 meters. The site index equation can be employed as a basis for efficient management and development of smallholder Mangium plantations. The tree farmers could make use of the site index table in determining economic rotation, cut schedule, plantation development schedule and business projection. The equation had been developed for plantations located in Claveria, Misamis Oriental. The equation was applicable outside the study area but careful validation should be done to ensure effective *A. mangium* tree plantation establishment and management. **(Author's abstract)**

Agriculture. Site index. Mangium. Height. Age. Smallholder. Equation.

- 0028** Development of in vitro selection and propagation of pineapple cv. 'queen' with resistance to *Phytophthora* heart rot. Valencia, Lolita DC., Pascual, Cecilia B., Delfin, Evelyn F.. **Transactions of the National Academy of Science and Technology**, , 32(1):29-30

Pineapple is one of the economically important fruit crops in the Philippines. The widespread occurrence of *Phytophthora* diseases is one of the main constraints in pineapple production. In vitro selection for resistance to this disease was done using pineapple calli that survived treatment with crude filtrate of *Phytophthora cinnamomi*, the identified causal organism of *Phytophthora* heart rot. Crown meristem tips of 'Queen' cultivar were used as explant in the initial induction of callus. Calli were tested at varying concentrations of the crude filtrate of *P. cinnamomi*. Results showed that crude filtrate of the pathogen were effective in the selection of calli resistant to the pathogen. In pure crude filtrate (1:0 of crude filtrate:water), no callus survived. In 1:1 concentration, severe effect was observed on the calli, and none to very few calli survived. Calli treated with 30% (3:7) crude filtrate of *P. cinnamomi* exhibited 50% survival and had optimum growth and high frequency of regeneration into plantlets. Treated calli became blackish to dark brown or whitish in color and soft in texture, and cream to creamy-white in color. The toxic effects of the crude filtrate on the calli decreased as the concentrations decreased. This was evident on the ability of the treated calli to grow and develop when transferred into a regeneration medium. High frequency of regeneration of calli into plantlets was observed when grown in MS medium supplemented with 5 uM benzene amino purine (BAP) and 1 uM gibberellic acid (GA3). Developing plantlets were multiplied in either liquid or solid MS medium with the same growth hormones. regenerated plantlets were subdivided into single plantlet from a cluster of multiple shoots of proliferating plantlets. The plantlets will be later evaluated for resistance to heart rot in vivo. **(Author's abstract)**

Agriculture. Callus. Culture filtrate. 'Queen' variety. *Phytophthora cinnamomi*. Pineapple.

- 0029** Developmental competence and midkine expression of water buffalo (*Bubalus bubalis* L.) oocytes in media supplemented with retinoic acid during *in vitro* maturation. Cajuday, Lilibeth

A., Herrera, Annabelle A., Duran, Danilda H.. **Transactions of the National Academy of Science and Technology**, , 34(1):12

Retinoic acid (RA), a vitamin A metabolite, regulates cellular growth, embryonic morphogenesis and differentiation. In this research, two studies were conducted to examine the effects of all-trans RA on the developmental competence of water buffalo oocytes. In study 1, the desired concentration and effects of all-trans RA was determined by examining its action on cumulus expansion, nuclear maturation, and embryo development and quality after *in vitro* fertilization. In Study 2, the midkine (MK) expression of the cultured oocytes was analyzed to examine its molecular effect. Midkine is a product of a retinoic acid responsive midkine gene (MDK) reported to enhance development of oocytes. Oocytes were retrieved from slaughterhouse derived ovaries and *in vitro* matured in maturation medium containing 0 (vehicle), 1, 3, and 5 μM all-trans RA. Vehicle used was ethanol. Oocytes matured without vehicle and RA in the maturation medium was used as Control group. Results showed that cumulus expansion, development to Metaphase II, cleavage and blastocysts development as well as blastocysts quality were improved in the presence of all-trans RA in the *in vitro* maturation medium. The presence of all-trans RA improved the MK expression but without all-trans RA, MK expression diminished during *in vitro* culture as evidenced by the faint band observed in the immunoblot and very weak signal detected by immunostaining with FITC in the Control group. The findings demonstrated that all-trans RA enhanced *in vitro* maturation of water buffalo oocytes to positively influence the development of embryos after *in vitro* fertilization. **(Author's abstract)**

Agriculture. *In vitro* maturation. Carbohydrate uptake. Midkine expression. Water buffalo. Retinoic acid.

0030 Dietary effect of saponin and/or yucca on growth, antioxidant capacity and metabolic response of Nile tilapia *Oreochromis niloticus* L.. Gallego, Laila N., Angeles, Jr., Isagani P., Parallag, Quirino D., Chien, Yew-Hu. **Transactions of the National Academy of Science and Technology**, , 34(1):19

The use of synthetic substances that were found to increase the efficiency of feed utilization by animals such as antibiotics and steroid hormones as animal feed additives are currently prohibited in several countries. In this context, search for natural, biologically active, and renewable plant products that could be used to replace hazardous synthetic growth stimulants are relevant. Saponin (S) can be a potential replacement since it can enhance the growth performance as well as the immune response and resistance of fish. This study evaluated the effects of S and/ or yucca (Y) on growth, antioxidant capacity and metabolic response of Nile tilapia *Oreochromis niloticus* (1.9 \pm 0.08 g). The commercial diet served as the control (C). Fish were fed diet containing 150 mg kg⁻¹ S, 150 mg kg⁻¹ Y or combination of 75 mg kg⁻¹ S and 75 mg kg⁻¹ Y (S/Y) for 8 weeks. Weight sampling was conducted every 2 weeks while survival was monitored everyday. Antioxidant capacity and metabolic response were analyzed after 8 weeks of feeding. The S/Y-fed fish had the highest weight gain among treatments. On the other hand, no significant difference was observed in survival. S/Y-fed fish had the lowest SOD level among treatments. On the other hand, glucose level of S-, Y- and S/Y-fed fish was decreased by 26, 42 and 60%, respectively as compared to the C. These results indicated that S/Y in the diet improves the growth performance, enhances the antioxidant activity and stabilizes the

metabolic response of fish. **(Author's abstract)**

Agriculture. Antioxidant capacity. *Oreochromis niloticus*. Metabolic response. Saponin. *Yucca*.

- 0031** Differential response of open-pollinated and hybrid tomato varieties to PGPR inoculation under field condition. Paterno, Erlinda S., Rodriguez, Felicitio M., Delfin, Evelyn F.. **Transactions of the National Academy of Science and Technology**, , 33(1):27

Enhancement of plant growth through inoculation with plant growth promoting rhizobacteria (PGPR) has been reported for various vegetable and agronomic crops. However, studies on varietal response to PGPR inoculation under field condition were limited. A field trial was conducted at UPLB to determine the response of ten open-pollinated (OP) and hybrid tomato varieties to PGPR inoculation under two levels of fertilization, recommended rate (138-47-60 NPK) and half the recommended rate. The following parameters were assessed at flowering and fruiting stage; plant growth, number of flower clusters and branches, nutrient uptake, dry matter and fruit yield.

Inoculation increased the number of branches formed by Improved Apollo by 33% for both fertilizer rates while Rosanna had a remarkable 40% increase with half-fertilizer rate application. Inoculation also increased the number of flower clusters of Rossana by 60% in the half-fertilizer treatment while 60-150% increases were obtained for inoculated Caraibo, Discovery and Atlas with full fertilization. The increase in root dry weight due to inoculation also increased the root shoot ratio of OP varieties, Northern Red and Improved Apollo. In general, Inoculation increased P content of the evaluated varieties from 0.20 to 0.21% P which also resulted to enhanced P uptake. The increase in P content of inoculated tomatoes indicates P solubilising activity of PGPR. With inoculation, the total fruit weight of Rosanna was increased by 27% while Atlas showed 19% increase across fertilizer treatments.

The results showed the different responses of OP and hybrid tomatoes to PGPR inoculation. There were OP and hybrid tomatoes which responded positively to inoculation while there were varieties which did not show significant response. This variation needs to be verified under different field conditions because a significant variety-PGPR interaction is crucial in the adoption of PGPR inoculation technology. **(Author's abstract)**

Inoculation. Tomato. Phosphorus. Open-pollinated. Agriculture. PGPR.

- 0032** Disease control methods for mangoes under modified atmosphere packaging (map). Rustia, Abigail S., Rocafort, Rachel F., Sales, Jocelyn M.. **Transactions of the National Academy of Science and Technology**, , 34(1):33

Disease is one of the major forms of deterioration in mangoes after harvest. Mangoes prior to storage in Modified Atmosphere Packaging (MAP) should be treated with effective disease control to prevent decay due to anthracnose and stem-end rot. This study aims to evaluate the physical and chemical methods to control diseases in the Philippine mangoes cv. Carabao held under MAP at 10°C and 30°C. Green

mature mangoes were treated for disease control by dipping in fungicides – Benomyl and Amistar®; chlorine; and hot water using low temperature, long time (LTLT) and high temperature, short time (HTST). Pre-treated mangoes were wrapped in either 30 CE or 20 CE MAP plastic films made of zeolite-coated low density polyethylene and stored at 10°C, at ambient conditions, and at 30°C for 18 and 10 days, respectively. The film was removed after the specified storage period, and mangoes from 10°C were transferred to 25°C in normal air to ripen. Control samples were not wrapped in the film but stored and ripened under similar ambient conditions. Effectiveness of disease control is in the following order: Amistar®>HTST>LTLT>Benomyl>Chlorine. Benomyl enhanced peel discoloration and is banned for use. In general, development of yellow peel color, shriveling, internal breakdown, and sensory characteristics were not affected by all disease control measures used regardless of storage conditions. Amistar®, however, resulted in the highest disease control >90% in mangoes stored under MAP at 10°C and 30°C. Although Amistar® provided the best disease control, this is currently registered as a pre-harvest and not yet as postharvest fungicide for mangoes. Further investigation on disease control measures suitable for prolonged storage of mangoes in MAP is recommended to exploit new markets for the export of Philippine mangoes. (Author's abstract)

Agriculture. Disease control. Mangoes. MAP. Decay. Postharvest treatment.

- 0033** Diversity and carbon sequestration potential of avicennia mangrove stand in Verde Island Passage, Luzon, Philippines. Gevana, Dixon T., Im, Sang-Jun, Pampolina, Nelson M.. **Transactions of the National Academy of Science and Technology**, , 32(1):31

Mangroves help in mitigating the impacts of climate change because they serve as sinks of CO₂ and barriers for tidal surges. This study aimed to assess the diversity and carbon storage potential of mature *Avicennia* dominated mangroves found along the Verde Island Passage (VIP) in the province of Batangas. *Avicennia* are mangrove species that belong to Family Avicenniaceae which are commonly found in the intertidal zone of estuarine areas. Nested plot method, Shannon-Weiner index, and allometric equations developed by Komiyama et al. (2005) and Brown (1997) were employed to estimate the diversity and carbon density of the stands. Results revealed that diversity at the large plot (20 x 100 m) and small plot (5 x 40 m) layers are low with $H' = 1.9222$ and $H' = 1.0114$, respectively. These findings are attributable to very few species recorded where Bongalon (*Avicennia marina*) and Malatangal (*Ceriops decandra*) were listed as the most frequent. In terms of carbon stock, a total of 116.57 ton/ha was estimated for the large plot layer. Bongalon (*Avicennia marina*) was noted to have the largest contribution to this value with 15.46 ton/ha. At the small plot layer, carbon stock was estimated to be around 19.59 ton/ha. Malatangal (*Ceriops decandra*) was noted to have the highest carbon density with 13.98 tons. Overall, the *Avicennia* mangroves of VIP exhibit a good carbon storage potential though its diversity is quite low. Proper forest management and mangrove amelioration projects are therefore essential to sustain and improve its capacity to mitigate the impacts of climate change. (Author's abstract)

Agriculture. Avicennia. Carbon sequestration. Climate change. Diversity. Mangrove.

- 0034** Diversity within collections of the sugarcane smut, a major disease of sugarcane in the Philippines. Luzaran, Rosalyn T., dela Cueva, Fe M.. **Transactions of the National Academy of Science and Technology**, , 32(1):15-16

The variability of sugarcane smut, *Ustilago scitaminea* Sydow in the Philippines was evaluated using molecular, pathogenicity and morphological approaches. A total of 96 isolates from 17 sugarcane growing areas were used.

Isolates were analyzed for their polymorphism at 10 microsatellite loci. Cluster analysis showing genetic relationship among isolates was derived using simple matching coefficient *U. scitaminea* isolates. From both analysis, there were three major cluster groups (A, B, C) observed and clustering based on geographic origin was not evident.

Analysis of Molecular Variance (AMOVA) results for the Simple Sequence Repeats (SSR) data indicated that the within population variance accounted for 76% of the total genetic variation while the among population variance accounted for 21% of the variation. Only 3% of the variation was attributed to among group of isolates.

Highly significant ($P < 0.01$) effect of variety, isolate and variety x isolate interactions were observed for virulence and aggressiveness of eight representative isolates using five differential hosts. Virulence and aggressiveness varied among the isolates studied.

The colony surface of the fungus varied from brown-black to creamy white or yeast-like growth. Teliospores of all isolates were globose to subglobose or ovoid, 6.32 to 7.05 μm in diameter, brown, lighter on one side, minutely echinulated. Sporidia were hyaline, spindle to oval-shaped and tapering toward their extremities. The average length of 11.44 μm and width of 2.20 μm did not differ much among the different isolates.

Based on the three categories established as R (Resistant), I (Intermediate) and S (Susceptible), there were seven distinct groups of isolates producing distinct reaction types on the five differential varieties indicating that isolates of *U. scitaminea* in the Philippines are highly diverse and races of the fungus probably exist. **(Author's abstract)**

Agriculture. Genetic diversity. Sugarcane smut. *Ustilago scitaminea*.

- 0035** Effect of cattle farming on potential groundwater resources in Masbate, Philippines. Pagorogon, Lorvi B.. **Transactions of the National Academy of Science and Technology**, , 33(1):57

Masbate Island receives an annual rainfall of 2,624.51 mm. However, 50% of its rocks have no obtainable groundwater and are infested with bacteria and amoeba. The island's area is 46% pasturelands and difficult areas are found in places where large pasturelands are located. This study is aimed at understanding how cattle-raising industry in the island affects groundwater supply in terms of magnitude of recharge and water quality; and at identifying options for cattle-raising management that would help ensure sustainable groundwater supply. Policy review, stakeholders' analysis, interviews and tests on bulk density, amount of surface runoff and runoff-bacteriology test were conducted. The social, economic, institutional and technical

aspects that affect the practices of cattle farmers were measured in terms of its effect on the magnitude and quality of potential groundwater resources. The findings of the study showed that practices of the farmers are affected by: their motive to generate income; their socio-economic status; and the incompetence and insufficiencies of policies. These were manifested by their practices on overgrazing, which resulted to compaction of soil in some of the grazing areas; unwillingness to adopt the use of improved grass, and unreligious reforestation of protected areas under FLGMA (Forest Land under Grazing Management Agreement). Forty-two percent of samples were found to have compacted soils. In their practices, the type of grass for grazing influenced the runoff behavior. Cogon grass showed strong influence in the behavior of runoff in which rainfall greater than 30 mm resulted to more than 8 mm-depth runoff. Total and fecal coliform in the runoff is greater than 8.0 MPN per 100 ml. **(Author's abstract)**

Cogon grass. Pastureland - Masbate, Philippines. Runoff. Cattle raising - Masbate, Philippines. Agriculture. Masbate, Philippines - Cattle farming - Groundwater resources.

- 0036** Effect of *Cymbopogon citratus* (lemongrass) and *Pandanus amaryllifolius* (pandan) infusion on rice-spoilage organism *Bacillus cereus*. Acevedo, Teresita, David, Anne Marjorie E.. **Transactions of the National Academy of Science and Technology**, , 33(1):52

The Philippines has a rice-based diet wherein people usually get their carbohydrate requirement from rice and its derivatives. *Bacillus cereus* is one of the most common spoilage organism found in rice, wheat, dairy products, etc. There are many ways to cook rice, among them is to add some species of grasses which may improve flavour and aroma. The objective of this study is to find if these aesthetic additions may have antimicrobial benefit. Leaf infusions of the two plants were screened through Kirby-Bauer disk diffusion method for antimicrobial properties. Different concentrations of the leaf infusion were used on vegetative cells (0.2 g/ml, 0.15 g/ml, 0.1 g/ml, 0.5 g/ml, and 0.25 g/ml) and spores (0.8 g/ml, 0.7 g/ml, 0.6 g/ml, 0.5 g/ml, 0.4 g/ml, 0.3 g/ml, and 0.2 g/ml). A close relative, *B. subtilis* was used for control and clindamycin was used as antimicrobial control. The highest inhibition for vegetative *B. cereus* was found at the highest concentration of lemongrass (1.6 mm) and at 0.1 g/ml of pandan (0.6 mm). While for *B. subtilis*, the highest inhibition was found at the same concentration (4.8 mm for lemongrass and 2 mm for pandan). The effect of lemongrass infusion in its inhibition of growth of *B. cereus* is directly proportional to its concentration. While the effect of pandan is increasing at first it decreases at higher concentrations of the infusion. The experiment has demonstrated that lemongrass has more antimicrobial activity than pandan for both *Bacillus* sp. Among the two, *B. subtilis* is more susceptible to antimicrobials. More research is needed to test isolated, purified compounds from infusion of the two plants to be used as rice additive. **(Author's abstract)**

Rice-spoilage. Pandanus amaryllifolius. Bacillus cereus. Cymbopogon citratus. Agriculture.

- 0037** Effect of glyphosate on survival, growth and reproduction of *Pontosclex corethrurus*. Rasco, Jr., Eufenio T., Taya, Hanna Mia Monica D., Lacsamana, Michael Val G., Ragas, Richie Eve G., Oguis, Georgianna Kae R.. **Transactions of the National Academy of Science and**

We aimed to examine the assumption that agricultural chemicals are bad for the environment, using a common earthworm species, *Pontoscolex corethrurus*, as indicator. Earthworms help maintain soil health but they are highly sensitive to changes in soil chemical content. The environmental effect of glyphosate, one of the most commonly used herbicides in Philippine agriculture, was evaluated using 4 laboratory experiments. In experiment 1 earthworms were observed in glass containers lined with filter paper irrigated with normal dosage of glyphosate, 10x, 20x, 30x, 40x and 50x the normal. In experiment 2, survival and weight gain of earthworms in soil-filled containers sprayed with 3 mL of the same range of doses of glyphosate, were measured for 2 weeks. The third experiment was an avoidance test where half the Petri dishes were lined with the control and the other half with the normal glyphosate dose. Earthworm positions were recorded for 100 min. Lastly, in reproduction test, soil-filled glass containers were sprayed with varying glyphosate doses (normal up to 16x the normal). On day 28, adult worms were removed and evaluated while cocoons and juveniles were observed for another 28 days. Glyphosate did not significantly show toxic effects to *P. corethrurus* up to the highest dosages in experiments 1, 2 and 4. However, in experiment 3, *P. corethrurus* showed significant avoidance response to normal concentrations of glyphosate ($P=0.03$). The study shows that the common assumption about the negative environmental effect of glyphosate may not be justified. (Author's abstract)

Agriculture. Glyphosate. Earthworms. *Pontoscolex corethrurus*. Toxicity.

- 0038 Effect of human geography on soil and ecosystem health. Baquirez, Cecilia J., Villegas-Pangga, Gina. **Transactions of the National Academy of Science and Technology**, , 33(1):16

In the Philippines the increasing demand for food, fiber, and energy vis-à-vis the declining hectareage of arable lands has been pressuring the agricultural sector to be more productive and meet the demand of the increasing population. The objective of this paper is to present an assessment of the contribution of human geography on soil and ecosystem health in selected sites in Laguna and Quezon, Philippines. The agricultural issues deliberated are focused on 'soil quality' and the impacts on the surrounding environment. The methodology employed in the study included resources assessment, physical observations, and surveys consisting of open- and close-ended questions including land use and cover changes and their relations to human population. The questionnaire was administered to each of the municipality under study and information obtained from the surveys were complemented through interviews with local officials in the relevant departments.

Research findings showed that the quantities of land available for agriculture are declining in all study sites. The deterioration of agricultural water quality in the country has rapidly proceeded with the vast increase in population accompanied by development and change in land use. Environment contaminants, particularly in soil and water, affect the well-being of the environment. This was brought about by the careless dumping of waste materials, excessive use of chemical fertilizers and pesticides, and increased agricultural activities to meet people's demand in terms of quantity and quality improvement of agricultural produce and food diversification. Since there is a growing demand for organic foods, driven primarily by consumers'

perceptions of the quality and safety of these foods, it is important that governments industry, and consumers carefully examine issues related to organic food quality and safety and ensure necessary interventions to protect the consumers. **(Author's abstract)**

Organic foods. Water quality. Soil quality. Ecosystem health. Soil health. Agriculture.

- 0039** Effect of pretreatment on the structure and catalytic properties of rice hull-derived zeolites. Paragas, Danila S., Gutierrez, Redel L., Salazar, Joel R., Gines, Michael O.. **Transactions of the National Academy of Science and Technology**, , 33(1):151

Rice hull was used as raw material for zeolite synthesis. It was pretreated with water and 1 M HCl before ashing at 600 °C in a muffle furnace for 3 hours. Purity of the rice hull ashes was verified by their percent carbon content. Characterization of the zeolites were done using electron dispersive X-ray (EDX), scanning electron microscopy (SEM) and X-ray diffraction (XRD) spectroscopy.

The rice hull pretreated with water had 21:16 (Si:A1) framework ratio while that pretreated with acid had 23:17 (Si:A1) which could mean that the Si-A1 framework ratio of the samples could be about 1.3:1. SEM scans at 7500x magnification revealed that zeolites derived from rice hull ash pretreated with water had bigger pore sizes (2 µm) than those of acid-washed (1 µm) diameter.

The catalytic properties of the prepared zeolites were determined by spiking a water sample with 69.0 ppm of NO₃⁻ solution (the maximum tolerable limit of nitrate in water), loading it with 0.2 g zeolite per liter of solution and aliquots analyzed after 2, 3 and 4 hours. The zeolite derived from water-pretreated ash removed nitrate in water (99.11%) and is not significantly different from that obtained from acid-pretreated ash (99.26%) after 4 hours. For comparison, commercial-grade zeolite was tested and was found to remove only 98.77% nitrate and is significantly different from the pretreated ones. Hence, pretreatment of the rice hull has an effect on the structure and catalytic properties of rice hull-derived zeolites.

Since water-pretreatment and acid-pretreatment yield zeolites that relatively remove nitrates in water, it is recommended that the former be employed for rice hull pretreatment. Study must be done also to determine the possibility of regenerating the zeolite after its use to remove nitrate. **(Author's abstract)**

Agriculture. Rice hull-derived. Pretreatment. Zeolites. Catalytic. Nitrate.

- 0040** Effectiveness, growth and survival of plants growth promoting bacteria (PGPB) in three soils. Cruz, Jayvee A., Fernando, Lilia M., Sutare, Alodia I., Paterno, Erlinda S.. **Transactions of the National Academy of Science and Technology**, , 32(1):25

One of the constraints to the adoption of PGPB technology is the lack of information on crop response to PGPB inoculation in different soils. This study examined the growth and survival of PGPB and their auxin production in sterilized Lipa clay loam [organic matter (OM)-4.7; pH-6.7], Luisiana clay (OM-2.8; pH-4.5), and

Binangonan clay (OM-5.7; pH-7.9), and in the lettuce rhizosphere.

One day after inoculation, the number of PGPB increased by 132% and 198% in Lipa clay loam and Binangonan clay, respectively. In contrast, PGPB population decreased by 98% in Luisiana clay. After 19 days, 7.25% of the initial population remained viable in Lipa clay loam and Binangonan clay but only 0.08% in Luisiana clay. Higher indole-3-acetic acid (IAA) concentration was obtained in Lipa clay loam (831.41 ug IAA equivalent soil) and Binangonan clay (861.04 ug IAA equivalent/g soil) than in Luisiana clay (128.99 ug IAA equivalent/g soil).

In a growth room experiment, the high R:S ratios in Lipa clay loam and Binangonan clay suggested better root colonization by PGPB in these soils than in Luisiana clay. However, a microscopic examination showed numerous bacterial cells on the surface of roots obtained from Luisiana clay and none on those obtained from the other two soils. The R:S ratio is helpful in determining the rhizosphere competence or the ability of PGPB to colonize the rhizosphere. The number of PGPB in the rhizosphere is denoted by 'R' while 'S' refers to the number of PGPB/bacteria in the non-rhizosphere soil.

In a screenhouse experiment, treatments with inoculation resulted in a 66% increase in shoot fresh weight of lettuce relative to the uninoculated treatments. Inoculation significantly increased NPK content by 10%, 3%, and 14%, respectively and NPK uptake by 57%, 66%, and 66%, respectively.

The N, P, and K content were significantly influenced by the interaction between soil type and rates of fertilization.

Interaction effect of rates of fertilization and PGPB inoculation increased shoot fresh weight, root dry weight, P and K content, and N and K uptake of lettuce.
(Author's abstract)

Agriculture. Auxin. Binangonan clay. Inoculation. Lettuce. Lipa clay loam. Luisiana clay. PGPB. Plant growth promoting bacteria. Rhizosphere.

- 0041** Effectiveness of BioGroe[®] plant growth promoter on *Momordica charantia* L. (cv. Sta. Rita). Reyes, Melquiades EC., Fernando, Lilia M., Ramirez, Elpidia L., Sutare, Alodia I., Paterno, Erlinda S.. **Transactions of the National Academy of Science and Technology**, 32(1):24

Ampalaya (*Momordica charantia* L.) is a cross-pollinated crop with a big market earning potential in the Philippines. Cultivar Sta. Rita is considered as the "mother-OPVs" in the Philippines and believed to be the source of elite breeding lines of ampalaya in hybrid breeding. A field experiment was conducted to determine the effectiveness of BioGroe[®] on the production of ampalaya (cv. Sta. Rita). BioGroe is a solid-based microbial plant growth promoter containing plant growth promoting bacteria (PGPB). PGPB are root-associated bacteria which influence root growth by producing plant hormones and provide nutrients in soluble form.

Results show that the application of the recommended rate of BioGroe[®] increased the total marketable yield by 63% and the total number of fruits by 50% relative to the control. The potential and actual yields were 42% and 63% higher than the control, respectively, with the application of the recommended rate of BioGroe[®]. These results

suggest that the application of BioGroe® can significantly increase the yield of ampalaya. **(Author's abstract)**

Agriculture. Ampalaya. BioGroe®. Hybrid breeding. Increased yield. Plant growth promoting bacteria.

- 0042** The effects of a small-scale community livestock production on the diversity of the forest fodder source in an upland village of Batangas, Philippines. Paningbatan, Jr., Eduardo P., Garcia, Jose Nestor M.. **Transactions of the National Academy of Science and Technology**, , 33(1):32

Livestock production has been an integral part of several small-scale integrated farming systems. Most of these utilized communal feed sources such as grasslands and forests as important sources of feed especially during the dry season when all other conventional feed sources become scarce. Extraction of the forests to supply feeds for the livestock involves the alteration of this ecosystem, which will eventually result to changes in the forest ecosystem and its capacity to provide ecosystem functions. There have been limited studies on the change in forest diversity as a result of utilizing them as livestock feeds; hence, measuring this change is therefore useful. The effects of livestock tethering on forest diversity was determined on a secondary growth *molave*-type forest, which have been exposed to long-term livestock tethering in the past. Tethering involved cutting of the fodder trees and feeding the foliage to the livestock. Forest diversity and similarity of species were measured and compared in two landscape locations with four and five sampling points on areas that were 'tethered' and 'not tethered' to livestock. Forest diversity index was negatively correlated (-0.50) with tethering but was significant only at 17.0% level. It should be noted however, that it was ten years since livestock tethering was stopped, forest regeneration may have already occurred. In both landscape locations, forest diversity was relatively higher in the 'not tethered' areas than the 'tethered' areas. A low similarity of species was observed between the 'not tethered' areas and a higher similarity between the 'tethered' areas. A higher percentage of the fodder species existed in the 'tethered' sites than the 'not tethered' site. The results suggest that long-term livestock tethering in the forest would reduced forest diversity and tend to leave similar species, more of fodder tree species. **(Author's abstract)**

Livestock production. integrated farming system. Tethering. Forest diversity. Agriculture.

- 0043** Effects of *Jatropha curcas* L. hedgerow and various management practices on the yield of maize and soil properties of an alley cropping system. Visco, Robert G., Marin, Rico A., Carandang, Wilfredo M., Cruz, Rex Victor O., Castillo, Arturo SA.. **Transactions of the National Academy of Science and Technology**, , 33(1):28

The study was conducted to evaluate the growth performance of *Jatropha curcas* L. planted as contour hedgerow (spaced 0.5 meter along the contour and 4 meters between contours) and its effects on the various management practices on maize and soil properties of an alley cropping system. This was laid out in split-split plot experimental design replicated three times. Fertilizer treatments comprised the main plot, pruning as the subplot, while mulching treatments served as the sub-subplot.

Findings revealed the average height and diameter growth of *J. curcas* hedgerow were enhanced by higher pruning (75-cm) having 124.89 cm and 5.5 cm, respectively. The low pruning (50-cm) had only an average height of 84.89 cm and diameter of 4.9 cm.

Maize treated with organic biofertilizer had longer ear length (16.05 cm) and higher grain yield (2652 kg ha⁻¹) while those applied with pure inorganic fertilizer had shorter ears and lesser yield. Dry matter and grain yield of maize were enhanced with *J. curcas* mulch pruning with 3793.8 kg ha⁻¹ and 2570.8 kg ha⁻¹, respectively.

Improvement of the soil chemical and physical properties was observed when the contour hedgerows have stabilized. Findings revealed *J. curcas* hedgerow's potential of preventing sheet erosion in slopping farmland having soil accumulation ranging from 23.09 tons ha⁻¹ to 36.51 tons ha⁻¹ while the no hedge plot had a soil loss of 24.32 tons ha⁻¹. Soil accumulation was also observed to be higher when *J. curcas* pruning was applied as mulch with 37.63 to ha⁻¹ while the plot with no mulching application had only 20.88 tons ha⁻¹.

Financial analysis showed that *J. curcas* hedgerows in an alley cropping system had the capability of providing profit to farmers. Treatments with hedges have higher Benefit Cost Ratio ranging from 2.7 to 3.1 as compared with the no hedge plot with only 2.1. **(Author's abstract)**

Maize. Hedgerow. Agroforestry. Alley cropping. *Jatropha curcas*. Agriculture.

- 0044** The effects of vermicomposts, mycorrhiza, and inorganic chemical fertilizers on growth parameters of corn (*Zea mays*). Zarate, Jocelyn T., Labita, Teresa May Samantha A., Moran, Ma. Patricia R., Sevilla, Therese Angeline C.. **Transactions of the National Academy of Science and Technology**, , 33(1):21

Corn is second to rice in terms of hectareage production due to its use as food and as animal feed. Continuous research on alternatives to chemical fertilizers is of utmost importance. Two greenhouse trials were established to determine the potential of using vermicompost and Mykovam for corn production along with three levels of chemical fertilizers. In the second trial, five different inoculation methods of Mykovam and vermicompost were evaluated.

Results showed that height growth and dry matter production of corn plants were comparable in the three chemical fertilizer treatments (0, ½ RRC as 60-30-30 and full RRC as 120-60-60 kg NPK/ha). Soil amendment treatment such as Mykovam (M) alone, vermicompost (V) alone or combined Mykovam and vermicompost (M+V) significantly promoted shoot dry matter weight by 9%, 28% and 22%, respectively over the control. In terms of height increment, ½ RRC + M gave the biggest height increment at 93.97 cm or a 15% increase over the uninoculated and unfertilized control (0 fertilizer). Best shoot dry matter production was observed in the following treatments: ½ RRC + M, ½ RRC with M+V and full RRC with V or M+V. Heaviest cob yield was in full RRC + Mykovam, followed by full RRC and M + V. This indicated that Mykovam and vermicompost can potentially improve vegetative growth and enhance corn yield and are effective soil amendments to chemical fertilizers for better corn growth and dry matter production. Benefit cost ratio analysis showed that the best treatment was in RRC + Mykovam + Vermicompost treatment.

In the second corn trial, the combination of Mykovam and vermicompost in liquid form was found to be the best preparation in terms of shoot and cob dry weight. The banding method of applying Mykovam was also comparable with the application of Mykovam in tablet form. Further studies should be done to explore more efficient inoculation methods for corn. **(Author's abstract)**

Chemical fertilizers. Vermicompost. Mykovam. Corn. Agriculture.

- 0045** Elevated soil organic carbon turnover in limed acid soils. Dumale, Jr., Wilfredo A., Hirai, Kenta, Nishimura, Taku, Miyazaki, Tsuyoshi. **Transactions of the National Academy of Science and Technology**, , 34(1):16

Agricultural ecosystems are significant terrestrial sources of atmospheric CO₂. Management practices like liming of acid soils were initially found to accelerate CO₂ emission due to the mineralization of lime-carbonates. We used ¹³C-labeled calcium carbonate Ca¹³Co₃ (13C 99%) as lime and tracer in a 33-day constant temperature laboratory incubation experiment. We were able to distinguish and quantify lime-CO₂ and soil organic carbon (SOC)-CO₂ from an acid soil and identified contribution of liming to the turnover of native SOC. It was confirmed that 67.01-67.43 % of total CO₂ emission was lime-CO₂, indicating that it is the major source of CO₂ emission during liming. SOC turnover (¹²Co₂) between limed and non-limed samples indicated a priming effect (PE) of 47.44-51.01 %. PE are short-term increases in SOC turnover due to moderate treatment of the soil. ¹²Co₂ turnover was higher by 8.69-8.81 mg kg⁻¹ dry soil in limed samples. To determine the source SOC pool of the extra ¹²Co₂ emission in limed samples we have separated the stable SOC fraction using a combined chemical dispersion and physical fractionation procedure. It was confirmed that the increased turnover of SOC have originated from the labile SOC fraction and not from the stable pool. Considering the extent of global acid soils and world utilization of lime, we need to incorporate the contribution of the priming effect of lime in our CO₂ simulation and modeling studies in terrestrial ecosystems. **(Author's abstract)**

Agriculture. Liming. Mineral-associated organic carbon. Soil organic carbon. Priming effect. CO₂.

- 0046** Enhanced rooting of cassava cuttings using plant growth promoting rhizobacteria. Aranda, Joey Ohmar I., Bautista, Katrina May I., Munlawin, Katherine C., Librada, Rose Ann B., Calanog, Venson Paul A., Tumesa, John Henrix B., Delfin, Evelyn F., Paterno, Erlinda S., del Rosario, Edwin A.. **Transactions of the National Academy of Science and Technology**, , 32(1):28-29

The demand for planting materials of cassava(*Manihot esculenta* Crantz) has increased in recent years with the identification of cassava as an alternative source of biofuel. Hence, rapid production of cassava planting materials is needed to meet the required volume of materials to plant the target area for food, feed and ethanol production.

Two replicated experiments were conducted to evaluate the response of cassava cuttings to inoculation with plant growth promoting rhizobacteria (PGPR). Rapid

propagation was sought by inoculating two-node cassava cuttings variety 'Lakatan' with two PGPR formulations 9F1 and F3) developed at National Institute of Molecular Biology and Biotechnology, University of the Philippines Los Baños (BIOTECH, UPLB) and maintained for four weeks in styroboxes that were either enclosed in clear plastic bags ('kulob') or left without plastic cover (open condition) along with uninoculated cuttings. Enhanced rooting by PGPR inoculation was observed in terms of root length and plant height at four weeks after rooting. Significant rooting condition by treatment interaction was obtained for both parameters such that 29% increases in root length were obtained with F1 inoculation under open condition while F3 inoculation in the 'kulob' treatment increased root length by 16%. Under open condition, F1-inoculated seedlings were taller than the control and F3-inoculated seedlings by 23% and 30%, respectively. However, only F3 inoculation increased plant height by 36% in the 'kulob' treatment.

Further study compared the effect of PGPR inoculum rate and commercial rooting hormones on germination of cassava. The inoculum rate applied at half the concentration used for vegetable crops was found effective on cassava cuttings in terms of average number of roots and height of germinated seedlings at 4 weeks after rooting. Cassava seedlings inoculated with 0.5x PGPR were taller than the seedlings rooted with Hormex and Quick Root by 27% (**Author's abstract**)

Agriculture. Cassava. Cassava rooting. Kulob treatment. PGPR. Rooting hormone.

- 0047** Enhancing coconut growth and survival in the field with biofertilizer and bio-organic material application. Montemayor, Leonardo Q., Bulatao, Salvacion M., Paterno, Erlinda S., de la Cruz, Reynaldo E., Jonos, Amihan M., Zarate, Jocelyn T.. **Transactions of the National Academy of Science and Technology**, , 33(1):20

Coconut-based products serve as one of the top ten dollar earners of the country. However, land conversion and aging coconut plantations threaten to deplete coco-based products' supply. Transplanting new coconut seedlings was encouraged by the Federation of Free Farmers (FFF) in its 17 anchor farms in support of the Coconut Farm Development Program (CFDP). The members of the coconut farmer cooperatives were trained on the use of biofertilizer products namely Mykovam and Biogroe and bio-organic soil amendments to decrease dependence on chemical-based inputs. Three anchor farms became researcher- managed demonstration sites, while the rest of the anchor farms became farmer-managed demonstration trials.

Results of inoculation trials, after one year and six months in the field in Quezon and Zamboanga showed that very slow growth rate was observed, with an average of only 20 cm and only one additional frond per plant, per quarter. In the Quezon Site, leaf nutrient analysis showed that although nitrogen (N) content was similar for all treatments, potassium (K) content was significantly highest in Mykovam (M) and BioGroe (B) singly inoculated plants. Phosphorus (P) content was significantly highest in combined MB treated seedlings at 2,660.97 ppm, 41% increase over the control. In the Bohol and Zamboanga sites, extreme summer condition affected plant growth by decreasing total number of actively photosynthesizing leaves that led to shorter plant height. However, leaf N and P content was highest in Mykovam+ RRC (Recommended Rate of Chemical Fertilizers) treated plants followed by 1/2 RRC treatment. This is equivalent to a 26% increase in N and 10% increase in P content compared to the control plants, while K content was highest in Mykovam + 1/2 RRC. These results imply that biofertilizer inoculation can assist coconut seedlings extract

nutrients better and survive in the harsh field conditions. **(Author's abstract)**

FFF. Biogro. Biofertilizers. Mykovam. Coconut. Agriculture.

- 0048** Eradication of wild daisy (*Wedelia trilobata* (L.) Hitchc) using different levels of herbicide. Pumatong, Jason, Palma, Richmond A., Omboy, Nely. **Transactions of the National Academy of Science and Technology**, , 34(1):36

Wild daisy was considered one of the top 100 most invasive species in the world and also a problem in many farms in Misamis Oriental. The study was conducted to determine the effective level of glyphosate ($C_3H_8NO_5P$) to control the growth of *Wedelia trilobata* (L.) A.S. Hitchc (Wild daisy). Also, determine its effect on growth and biomass under field condition. The experiment was laid out following a randomized complete block design with four replications and treatments: 1) No herbicides (control); 2) Recommended dosage (160 ml/ 16liters); 3) twice below the recommended dosage (80 ml/ 16 liters); 4) Twice above the recommended dosage (320 ml/ 16 liters). At the end of the experiment, growth characteristics such as coloration, % biomass, length of stolon, and period of recovery were documented. The result showed that wild daisy was significantly affected by the herbicide treatment of 320ml/ 16 liters. The length of stolons was reduced by 48.7 cm. Similarly, the amount of biomass produced was significantly different compared to the control. All other treatments were not significant to each other. The effects to the leaves were assessed based on the color. Plots treated with 360 ml/ 16 liters showed yellowing after 2 days and were eradicated while plots treated with 80 ml/ 16 liters and 160 ml/ 16 liters exhibited yellowing after four days and showed regrowth. Control of wild daisy invasion on farmland, open – grassland, forestland and gardens can be effectively implemented by using treatment 320 ml/ 16 liters. **(Author's abstract)**

Agriculture. Wedelia. Herbicides. Glyphosate. Biomass. Stolons. Growth.

- 0049** Estimating solute transport parameters from physical soil properties using artificial neural network analysis. Alibuyog, Nathaniel R., Ella, Victor B.. **Transactions of the National Academy of Science and Technology**, , 32(1):3

Availability of solute transport parameters is important in understanding the dynamics of contaminants in the subsoil. They are key input for models simulating chemical or contaminant transport in soils to analyze pollution risks and contain a pollution episode. In spite of their importance, these properties are not easily obtainable mainly because measuring them is resources intensive. One approach to address this data gap is through the development of pedotransfer functions. Thus, this study was carried out to develop two pedotransfer functions for predicting contaminant transport parameters from soil physical properties, such as soil texture, bulk density and porosity using artificial neural network analysis. The two solute transport-pedotransfer functions (ST_PTFs) were developed using 80 soil samples and validated using 30 soil samples representing different soil textural groups.

The ST-PTFs developed have great potentials in predicting pore velocity, dispersion coefficient and dispersivity. Both the ST-PTFs developed could account for

more than 50% of the total variation of pore velocity. The inclusion of soil porosity in the SSCBDP model had significantly improved its performance over SSCBD model. SSCBDP model accounted for 56%, 55% and 59% of the variation of pore velocity, dispersion coefficient and dispersivity, respectively.

This study suggests that solute transport parameters can be predicted from soil physical properties through the use of pedotransfer functions. The use of artificial neural network analysis proves to be a useful tool and is comparable in developing pedotransfer functions. The newly developed ST-PTFs provide improved relationships for estimating solute transport parameters of Philippine soils from soils properties. As such, it may prove useful in studies dealing with assessment of soil water quality and other contaminant transport problems. **(Author's abstract)**

Agriculture. Artificial neural network. Dispersion coefficient. Dispersivity. Pedotransfer. Pore velocity. Solute transport.

- 0050** Estimation of genetic variability in two maize (*Zea mays* L.) populations for drought tolerance. Bautista, Maria Alma B., Salazar, Artemio M., Hernandez, Jose E., Sta Cruz, Pompe C.. **Transactions of the National Academy of Science and Technology**, , 34(1):3

The experiment was conducted to estimate genetic variation in IPB Var 6 and IPB Var 13 using full-sib and S1 families and asses the performance of these two populations to drought stress imposed at flowering stage. Reduction in performance for morphological traits, yield related traits and grain yield itself was an evidence of the effect of water limiting condition to maize plants. However, it causes lengthening effect on days to anthesis and silking, leading to prolonged anthesis-silking interval. IPB Var 6 exhibited more tolerance to drought stress than IPB Var 13. Variance components quantified revealed sufficient variability for almost all traits which is useful in genetic enhancement of both populations. Heritability for yield was lower under drought compared to normal as genetic variance decreased more rapidly than environment variance with the onset of stress. The low rank correlation of the full-sib families for yield between normal and drought conditions suggests the need for separate evaluation under the two contrasting conditions to identify stable genotypes. But using S1 families, the rank correlation was high *i.e.* those good under normal are also good under drought. This suggests the efficiency of S1 testing when breeding for this particular stress. **(Author's abstract)**

Agriculture. Correlation. Drought stress. Genetic variability. Heritability. Maize.

- 0051** Evaluation of gamma irradiated abaca (*Musa textilis* Nee.) for resistance to abaca bunchy top virus and banana bract mosaic virus under greenhouse condition. Lalusin, Antonio G., Reyes, Luciana A., Damasco, Olivia P., Lobina, Irish T., Dizon, Teodora O.. **Transactions of the National Academy of Science and Technology**, , 33(1):51

Abaca (*Musa textilis* Nee) is the source of natural strong fiber in the Philippines. There has been decreasing production of abaca fibers in the last decade since the available commercial varieties are susceptible to the two major viral diseases, namely bunchy top and bract mosaic. *In vitro* technology coupled with gamma irradiation

(⁶⁰Cobalt) were sought in order to develop varieties with resistance to these two viruses.

To start with the irradiation of to varieties, namely Tinawagan Pula and Tangongon, the optimum dose level or lethal dose or LD₅₀ of ⁶⁰Cobalt was established by taking the rate of shoot proliferation and growth development of shoot cultures (SubCycle 1 to 3). After bulk irradiation using developed LD₅₀, all plantlets were inoculated with abaca bunchy top virus and banana bract mosaic virus using insect transmission and mechanical transmission, respectively.

Out of the 2,296 plants of variety Tinawagan Pula and 974 plants of variety Tangongon, 43 plants or 1.9% and 9 plants or 0.9%, respectively, were negative to abaca bunchy top virus using Enzyme-linked immunoassay (ELISA). For bract mosaic, from the 2,169 plants of variety Tinawagan Pula, and 1,006 plants of variety Tangongon, 57 plant or 2.6% of variety Tinawagan Pula and 14 plants or 1.4% of variety Tangongon, were negative to banana bract mosaic virus using Polymerase Chain Reaction (PCR). The putatively resistant lines of these two varieties from the screenhouse experiment are being micro-propagated for field evaluation. **(Author's abstract)**

Gamma irradiation. Banana bract mosaic virus. Abaca bunchy top virus. Abaca. Agriculture.

- 0052** Explaining the persistence of nine weed species in a plantation agriculture environment. Oguis, Georgianna Kae R., Rasco, Jr., Eufenio T., Camarillo, Ed Levi C.. **Transactions of the National Academy of Science and Technology**, , 34(1):35

Seed longevity and germination pattern of 9 weed species, *Ageratum conyzoides*, *Bidens pilosa*, *Cleome rutidosperma*, *Acalypha indica*, *Drymaria cordata*, *Eleusine indica*, *Cyperus brevifolius*, *Paspalum conjugatum* and *Cynodon dactylon*, in a banana plantation in Davao City were studied to explain their population dynamics in a long term weed control experiment using paraquat and manual weeding. Dry seeds were exposed to high temperature (day/night temperature of 33°C / 28°C and 2.9x10⁴ lux) and high relative humidity (95%) in an improvised accelerated aging chamber. Initial germination percentage was taken for freshly collected seeds of each species. Every week, for 3 months, samples of seeds from each species were obtained from the chamber and were germinated in Petri dishes lined with cotton and daily irrigated with distilled water. There were 3 replicates with 50 seeds per replicate. Germination was done in the laboratory with a day temperature range of 26°C to 30°C and a night temperature range of 24°C to 28°C. Germination percentage of all species except *A. indica*, *E. indica* and *P. conjugatum* significantly fluctuated (P<0.05) in the course of the experiment. Percentage germination of *C. rutidosperma* and *D. cordata* seeds steadily decreased through time, consistent with the pattern observed in seeds that do not have dormancy and easily eradicated. On the other hand, germination of *A. conyzoides*, *B. pilosa*, *A. indica*, *C. brevifolius* and *C. dactylon* was spread out and showed no marked decline with length of storage. Percent germination of *A. conyzoides*, *B. pilosa*, *E. indica* and *P. conjugatum* increased during storage. These patterns are associated with persistent weeds. They constitute a mechanism for long-term survival of these species under fluctuating soil moisture conditions. **(Author's abstract)**

Agriculture. Seed longevity. Weeds. Banana plantation. Seed dormancy. Seed germination.

- 0053** Expression of papaya ringspot virus coat protein gene in genetically modified Philippine papaya. Ramil, Carlo P., Hautea, Desiree M., Merca, Florina E.. **Transactions of the National Academy of Science and Technology**, , 32(1):11

The concept of pathogen derived resistance was applied in the development of papaya ringspot virus (PRSV) resistant papaya in the Philippines. The coat protein gene of mild strain of PRSV in the Philippines was inserted in the genome of the local cultivar 'Davao Solo' papaya. In this report, the three candidate events of transgenic papaya were analyzed for the expression of the PRSV coat protein gene (*prsvcp*). The transgenic plants that tested positive for the presence of the 318 bp fragment of *prsvcp* by gene-specific PCR were used in the expression analysis. The partial transcript of the *prsvcp* gene was detected by RT-PCR where amplified cDNA of the 318 bp *prsvcp* gene fragment was obtained from all three events, as well as the full length transcript of 792 bp *nptII* marker gene but the transcript of the 935 bp *prsvcp* gene was not detected. The expression of the transgene at the protein level was detected by Western blot analysis using PRSV antiserum. The detected protein is smaller than the expected 36 kDa viral protein which is consistent with the undetected full *prsvcp* gene and its transcript. The possible sequence of the expressed coat protein was derived from the cloned sequence of the 318-basepair fragment of the *prsvcp* gene in transgenic papaya event 132. Analysis of the protein sequence for potential allergenicity was based on the criteria proposed by the Food and Agricultural Organization of the United Nations and the World Health Organization in 2001 and 2003. The PRSV coat protein sequence showed very low homology to allergenic proteins using full FASTA search and a sliding window of 80 amino acids. The absence of an 8-contiguous amino acid motif identical to allergens in the databases indicates low possibility of the novel PRSV coat protein in transgenic Philippine papaya to be allergenic. **(Author's abstract)**

Agriculture. Allergenicity. Coat protein. Expression. PRSV-resistant. Transgenic papaya.

- 0054** External parametric indicators of in vitro developmentally competent water buffalo oocytes. Hufana-Duran, Danilda, Duran, Peregrino G., Atabay, Eufrocina P.I., Kanai, Yukio, Takahashi, Yashiyuki, Cruz, Libetado L.. **Transactions of the National Academy of Science and Technology**, , 32(1):33

External parametric indicators for developmentally competent water buffalo oocytes were determined. Oocytes were retrieved from ovarian follicles and classified based on the density and compactness of the surrounding cumulus cells, the granulation and size of the ooplasm, and the size of the donor antral follicle. Oocytes classified based on these parameters were matured and fertilized in vitro and the nuclear maturation, cleavage and blastocyst development rates were assessed after in vitro fertilization. Results showed that oocytes surrounded by multi-layers (>5 layers) of cumulus cells had highest developmental competence. Oocytes with a compact cumulus required a longer (24 to 26 h) period of in vitro maturation (IVM) and those with loose cumulus required a shorter (20 to 22 h) period of IVM for optimum blastocyst development. Oocytes with a diameter of <100 µm lacked

developmental competence which is evident by the failure to develop to metaphase II (MII) after IVM while oocytes with a diameter $\geq 100 \mu\text{m}$ developed to MII and cleaved after in vitro fertilization (IVF). Optimum cleavage (96.8%) and blastocyst development (27.0%) was observed in oocytes with $\geq 120 \mu\text{m}$. The size of the donor follicle was linearly correlated with oocyte developmental competence with follicles $\geq 6 \text{ mm}$ containing highly developmentally competent oocytes. Based on the above findings, oocytes surrounded by >5 layers of compact or loosened cumulus with evenly granulated and $\sim 110 \mu\text{m}$ diameter ooplasm, and came from $>4 \text{ mm}$ follicles are developmentally competent. These results suggest that the density and compactness of the surrounding cumulus, the diameter of ooplasm and donor follicles are positive indicators for oocytes with developmental competence. **(Author's abstract)**

Agriculture. Indicators of developmental competence. In vitro fertilization. Water buffalo oocytes.

- 0055** Fertilizers and organic residue effects on the dynamics of CO_2 and N_2O in saturated and unsaturated soils. Takizawa, Kei, Dumale, Jr., Wilfredo A., Nishimura, Taku, Miyazaki, Tsuyoshi. **Transactions of the National Academy of Science and Technology**, , 34(1):34

Carbon dioxide (CO_2) and nitrous oxide (N_2O) are two of the most potent greenhouse gases produced in managed agricultural ecosystems. In an 80-day constant temperature laboratory incubation experiment, we determined the CO_2 and N_2O dynamics in the following: Treatment 1 (T1): Unfertilized (control); Treatment 2 (T2): $100 \text{ mg } (\text{NH}_4)_2\text{SO}_4\text{-N kg}^{-1} \text{ soil}$; Treatment 3 (T3): $100 \text{ mg paddy residue-N kg}^{-1} \text{ soil}$; and Treatment 4 (T4): $100 \text{ mg } (\text{NH}_4)_2\text{SO}_4\text{-N} + 100 \text{ mg paddy residue-N kg}^{-1} \text{ soil}$. CO_2 emission in both saturated and unsaturated conditions peaked in the early stage of incubation and in a declining pattern. The application of $\text{NH}_4\text{-N}$ seemed to decrease CO_2 emission both in saturated and unsaturated conditions. CO_2 emission in T2 was even lower in the unfertilized treatment (control). N_2O flux peaked in T3 and T4 two days after flooding in the saturated condition and three to four days after flooding in T1 and T2 but at a much lower concentration. N_2O flux was almost nil under unsaturated conditions. Residue and nitrogen application did affect N_2O flux only at the early stage of flooding and had no influence at all under unsaturated conditions. Nitrogen application can decrease CO_2 emission with and without residue application and nitrogen fertilization is a good strategy to decrease CO_2 emission from decomposing organic residues in agricultural fields. **(Author's abstract)**

Agriculture. Carbon dioxide. Nitrous oxide. Residues. Saturated soil. Unsaturated soil.

- 0056** Finally, from weed to crop? *Cassia tora* L. (Mani-Mani). Jamago, Joy M., Llausas, Jean E.. **Transactions of the National Academy of Science and Technology**, , 33(1):23

Cassia tora L. is locally known as mani-mani, a common weed in the Philippines that usually grows in pasturelands and farmlands with other weeds. Mani-mani is a phenotypical variable in 12 municipalities of Bukidnon. Analysis of variance showed highly significant differences among ecotypes for plant height, number of primary branches per plant, number of mature pods per plant, number of seeds per pod, and weight of 100 seeds. Shannon-Weaver's Diversity Index showed high diversity

($H \geq 0.75$) for 10 of the 13 traits evaluated including percent crude protein. Protein concentration of seeds from Libona (20.40%) and Malitbog (19.50%) were comparable with most mungbean varieties (usually from 20% to 22%). In 5 municipalities, uses on mani-mani were documented in this study: relief for stomachache, menstrual pain and muscle pain, component vegetable for viands, and component for swine feed. It is therefore possible to select for an acceptable ecotype or to breed for improved lines with available genetic diversity to increase its economic adaptability as a new crop in the country. **(Author's abstract)**

Ecotypic diversity. Genetic diversity. Bukidnon. Weedy legume. Mani-mani. Cassia tora. Agriculture.

- 0057** Formulation and evaluation of different mutton recipes. Pastor, Corazon Diana A., Balneg, Benito B., Sair, Roseminda R.. **Transactions of the National Academy of Science and Technology**, , 34(1):22

Sheep is easy to raise, require less capital, has short production cycle and prolific. However, farmers are raising limited number of sheep because there was no ready market for fresh mutton. Disposing and selling the animals at a right time has a greater impact on income derived from venturing to animal production. To encourage farmers to venture on sheep production, ways must be designed and developed on how to utilize mutton or lamb aside from fresh meat. Two recipes (burger patty and skinless sausage) were formulated and prepared. The products were cooked and subjected for organoleptic test. The products were evaluated for aroma, taste, texture, appearance and general acceptability using the 9-point Hedonic scale. Five different groups served as evaluators. The products were also subjected to microbial analysis and descriptive analysis was used in the study. In terms of aroma, taste, texture and general acceptability, both the burger patty and skinless sausage were rated *Like Very Much*. For appearance of the products, skinless sausage rated *Like Very Much* while the burger patty was rated *Like Moderately*. Rating for the appearance was attributed to the color of the processed product. Skinless sausage was attractive due to the added food color to the product because mutton is whitish in nature. Results of the microbial analysis showed that just after slaughter, *E. coli* was detected. This maybe because parts of the animal such as skin, hooves, rumen and intestines contained enormous counts of bacteria. However after processing the products, no trace of *Salmonella*, *Staphylococcus coagulase* and *Listeria monocytogenes* were found in the processed products. Based on simple cost and return analysis, skinless sausage cost P9.62 per piece while one piece of burger patty cost P8.05. Mutton can be processed into skinless sausage and burger patty and can satisfy the taste of the Ilocano consuming public. **(Author's abstract)**

Agriculture. Sheep. Mutton. Formulated. Sausage. Patty.

- 0058** Fusarium ear rot. Salazar, Artemio M., Ocampo, Eureka Teresa M., Pascual, Cecilia B.. **Transactions of the National Academy of Science and Technology**, , 33(1):50

The fungi *Fusarium moniliforme* Sheldon and *Fusarium proliferatum* (Matsushima) Niren, the cause of Fusarium ear rot, were reported to produce a series of toxins on

corn which include the fumonisins, of which fumonisin B₁ and B₂ have cancer promoting activity. Other mycotoxins produced include moniliformin, fusarin C and fusaric acid. Fumonisin B₁ has been shown to be responsible for most of the toxicological affects observed from ingesting corn infected by toxigenic isolates of these fungi. *F. moniliforme* occurs in all parts of growing corn plant throughout the season.

To appropriately manage Fusarium ear rot in corn, isolates of the causal pathogen must be accurately characterized and identified. Based on morphology, the collected four isolates belong to Fusarium sp. To determine the species, they were molecularly characterized by PCR using ITS-rDNA primers and by homology analysis of the nucleotide sequence through BLAST to compare with other reported Fusarium-causing ear rot in corn. Results showed that three isolates (from UPLB experiment station, Northern Cotabato and from CMU, Bukidnon) were highly related to *F. moniliforme* from China while one (from South Cotabato) was highly related to *F. graminearum*.

Resistance is still the most economical method to control these pathogens. The identified resistant varieties or inbreds can be used for improvement of corn to ear rots or they can also be directly used by farmers or growers in the case of identified resistant hybrids or populations. Results of resistance evaluation to Fusarium ear rot using ear injection method showed that out of twenty entries evaluated, two inbreds (S3YB 137-1-1-B and TUP1 (S3) 15-2-B) were moderately resistant, 14 inbreds and hybrids were moderately susceptible and four were susceptible. None was found highly resistant to the disease. Further evaluation of germplasm is needed to identify highly resistant sources to avoid fumonisin production in corn kernels. **(Author's abstract)**

Host resistance. Corn. Fusarium moniliforme. Fusarium ear rot. Agriculture.

- 0059** Gender impacts of manual corn sheller on corn processing in Barili, Cebu. Amongo, Rossana Marie C.. **Philippine Agricultural Mechanization Bulletin**, , 11(3):3-13

This descriptive study examines the gender impact of manual corn sheller technology among users in Barili, Cebu. The Agricultural Mechanization Development Program (AMDP) of the College of Engineering and Agro-industrial Technology fabricated the technology to improve the efficiency in corn production. The research investigated the changes, especially on the economic structure, that may result from using the manual corn sheller. Among the methods used for this study, conducted in 2003, are participants' observation and use of primary and secondary data, mainly from the interview of twenty (20) respondents.

The data focused on demographic profile of the respondents; gender disaggregation of economic activities, decisions and responsibilities; traditional means used in corn production (bare hands, gadgaran, banguran and others); and production improvements derived from the use of AMDP corn sheller technology. Among the conclusions are the following: the AMDP manual corn sheller "increased the shelling capacity three times compared with the traditional method of shelling; the production efficiency is translated into time savings, which the families were able to use in engaging in other income generating activities; women's participation saved the family from hiring farm helpers; and improved family relations. The study recommends "a policy on appropriate technology" where the needs of the untended users are

incorporated in the design.

Agriculture.

- 0060** Generation of gamma irradiation and EMS-induced mutant lines of the H7996 tomato (*Solanum lycopersicum* L.). Canama, Alma O., Galvez, Hayde F., Tongson, Eden Jane U., Quilloy, Reynaldo B., Hautea, Desiree M.. **Transactions of the National Academy of Science and Technology**, , 32(1):5

Tomato (L.) is one of the most important vegetable crops grown worldwide for the fresh vegetable market and food processing industry. With the completion of the genome-sequencing projects in various crops, the major challenge will be to determine the gene function. One approach is to generate and to analyze mutant phenotypes. The paper reports the generation of gamma-irradiated and ethylmethane sulfate (EMS)-treated mutant populations, identification and phenotypic characterization of dominant and visible mutations in tomato mutant lines. Mutant populations of tomato H7996 were created using physical (Cobalt 60 gamma ray) and chemical EMS mutagens.

Generally, based on high-throughput phenotypic characterization, mutations were observed on the plant habit, size, morphology, leaf and flower color and morphology and fruit characteristics. Specifically, the most common dominant and visible mutations noted in the M₁ generation were monopodial, compact, short internodes, multi-branch plant type, light yellow and ghost leaf coloration, tiny and long pedicel leaf morphology and small or short plant size. In the M₂ generation, homogeneous and segregating M₂ families were selected to constitute the core set of visible tomato mutants. Initial bacterial wilt resistance (BWR) gene knockouts were also identified.

The mutant lines will be used as a rich source of genetic materials for breeding and functional genomics of tomato. **(Author's abstract)**

Agriculture. EMS. Gamma ray irradiation. Tomato mutant lines.

- 0061** Genetic diversification of rice breeding lines through an international evaluation and exchange network. Dilla, Christine Jade A., Redo-Áa, Edilberto D.. **Transactions of the National Academy of Science and Technology**, , 32(1):7

Diverse germplasm and efficient genetic evaluation are essential in breeding rice varieties that perform well in different ecosystems and show tolerance to abiotic and biotic stresses. The International Network for Genetic Evaluation of Rice (INGER; <http://seeds.irri.org/inger/>) has assembled and evaluated elite breeding lines worldwide since 1975. Elite lines nominated by national agricultural research and extension systems (NARES) for inclusion in ecosystem-oriented and stress-oriented nurseries have been used by plant breeders in their breeding programs, with many being released directly as varieties. For the last three decades, more than 25,000 unique breeding lines have been distributed to 85 countries. To determine the genetic variation of 2009 NARES nominations to different INGER nurseries, we analyzed the genetic diversity of entries for six ecosystem-oriented (irrigated and rainfed lowland)

and six stress-oriented nurseries, including those for abiotic (salinity, high temperature, cold temperature) and biotic stresses (resistance to bacterial blight disease, brown planthopper, and stemborer). Two hundred seventy-eight NARES nominations and controls were assayed using 20 polymorphic SSR markers covering the 12 chromosomes. Genetic distance was based on Dice coefficient and clustering analysis was done using unweighted pair-group method of arithmetical means (UPGMA). An average dissimilarity of 0.63 was determined for the 12 nurseries.; hence, these genetically diverse entries distributed by INGER and their potential use in breeding, promise to further increase genetic diversity of rice varieties available on-farm. **(Author's abstract)**

Agriculture. INGER. Rice breeding programs. Rice genetic variation. Rice nurseries.

- 0062** Genetic diversity and clustering of pineapple (*Ananas comosus* (L.) Merr.) genotypes using random amplified polymorphic DNA (RAPD). Castro, Sheryl D., Valencia, Lolita DC.. **Transactions of the National Academy of Science and Technology**, , 33(1):39

Genetic variation among 14 pineapple genotypes was assessed through molecular characterization using Random Amplified Polymorphic DNA (RAPD). RAPD was utilized to measure the genetic diversity and relationship among the different genotypes. The Doyle and Doyle extraction method was done in the DNA extraction of the 14 pineapple genotypes. Two Operon primers (OPY-15 and OPAV-06) were used in the PCR - based RAPD analysis of the different genotypes. Of the two primers used, OPY-15 (5' AGTCGCCCTT3') yielded consistent DNA polymorphic amplification in repeated trials and generated 11 banding patterns ranging from 0.40 - 3.00bp. Using primer OPAV-06 (5'CCCGAGATCC3'), banding patterns formed were not clearly identified. Cluster analysis was done by similarity matrix within the NTSys program using unweighted pair-group method with arithmetic averages (UPGMA) to determine values of genetic distance. A dendrogram of the 14 genotypes separated the pineapple cultivars and hybrids from the wild relatives. Based on the dendrogram at 0.76 similarity coefficient, the 14 genotypes were divided into four clusters: Cluster 1, *Ananas bracteatus*; Cluster 2, 'Smooth Cayenne', 'MD2', 'Aklan' and 'MG3'; Cluster 3, 'Red Spanish', 'Clone 74', 'NP2' and 'Queen'; and Cluster 4, 92-1 (hybrid), 'DM Gold', 92-2 (hybrid) 'Sweet 16' and Calauan (ornamental-like). At 0.51 coefficient similarity, 3 clusters were generated: Cluster 1, *Ananas bracteatus*; Cluster 2, 'Smooth Cayenne', 'MD2', 'Aklan', 'MG3', 'Red Spanish', 'Clone 74', 'NP2' and 'Queen'; and Cluster 3, 92-1 (hybrid), 'DM Gold', 92-2 (hybrid), 'Sweet 16' and Calauan (ornamental-like). The RAPD of the 14 pineapple genotypes studied could be an ideal tool for detection of variation and relationship among genotypes and hence, can be useful in the assessment of genetic diversity and cluster analysis of pineapple germplasm accessions and varieties. **(Author's abstract)**

Dendrogram. Randomly amplified polymorphic DNA (RAPD). Operon primer. Cluster analysis. Pineapple. Genetic diversity. Agriculture.

- 0063** Genetic diversity, population structure and DNA fingerprinting of abaca (*Musa textilis* Nee). Tecson-Mendoza, Evelyn Mae, Laurena, Antonio C., Castro, Sheryl D., Lalusin, Antonio L., Yllano, Orlex B.. **Transactions of the National Academy of Science and Technology**, , 33(1):38

Abaca, an indigenous fiber crop, is a major export commodity of the country. Assessing the genetic diversity of abaca is a prerequisite to a successful breeding program. Using microsatellite markers, the genetic diversity of abaca in Luzon, Visayas and Mindanao was determined to be highly diverse ($I=0.67$). These variations present in abaca population are needed in widening the genetic background of the species, thereby, providing a wide selection of parents for abaca breeding programs. The genetic structure of abaca population is considered as genetically heterogeneous with 94% variability within population (AMOVA). Principal component analysis revealed sharing of alleles in three populations. Distance matrix analysis clustered abaca genotypes from Luzon, Visayas and Mindanao into three big groups and six small groups. This study also optimized SSR markers with high polymorphism information content (PIC) value (0.48 to 0.79). A combination of SSR markers that can differentiate T genome (*textilis*), B genome (*balbisiana*) and A genome (*acuminata*) of the genus *Musa* was also identified. Using these markers, some of the duplicate accessions of abaca in the gene bank were recognized. Likewise, these SSR markers can distinguish susceptible, tolerant and resistant genotypes to abaca bunchy top disease (AbBTD) which are crucial for marker-assisted breeding for AbBTD resistance trait. These results are useful for abaca varietal identification, germplasm characterization, marker-assisted selection, and for the development of DNA-based diagnostic kit for AbBTV disease. **(Author's abstract)**

Fiber. Molecular markers. Phylogeny. Microsatellites. Agriculture. Genetic diversity.

- 0064** Genetic overlap of salt tolerance QTLs at the seedling and tillering stages in rice. Elec, Venus, Jin Ping, Zang, Yong, Sun, Long, Xu Jian, ZhiKang, Li. **Transactions of the National Academy of Science and Technology**, , 32(1):8

Salt tolerance is a complex trait and varies with the growth stages in rice. Understanding the expression and genetic relationships of quantitative trait loci (QTLs) detected at different developmental stages would greatly assist in breeding for enhanced salt tolerance. This study aims to identify and compare QTLs for salt-tolerance (ST) related traits at the seedling and tillering stages in rice. A total of 99 BC₂F₈ introgression lines (ILs) derived from a cross between IR64 (indica) as a recurrent parent and Binam (japonica) from Iran as the donor parents were used. Salinity tolerance screening was carried out in a phytotron (seedling stage) under highly salinized Yoshida solutions and in the greenhouse (tillering stage). Thirteen QTLs for salt tolerance (ST) related traits were identified at seedling stage and 22 QTLs in tillering stage. QTLs detected at the tillering stage showed obvious differential expression to salt stress and were classified into three types based on their differential behaviors. Comparing the distribution of QTLs detected at the seedling and tillering stages, most (69%) of them were genetically independent. Only four were the same or adjacent regions on chromosomes 1, 2, 8 and 11 harboring ST QTLs detected at the two stages, suggesting that partial genetic overlap of ST across the two stages occurs. It is likely, therefore, to develop St rice variety for both stages by pyramiding of ST QTLs of different stages or selection against the overlapping QTLs between the two stages via marker-assisted selection (MAS). **(Author's abstract)**

Agriculture. Genetic overlap. Quantitative trait loci (QTL). Rice. Salt tolerance (ST).

- 0065** Germplasm collection by DNA fingerprinting. Romero, Gabriel O., Panes, Vivian A., Lota, Jamaica P.. **Transactions of the National Academy of Science and Technology**, , 33(1):41

The PhilRice Genebank was established in 1985 and holds 11,259 collections. Most of the collections came from the elevated Cordilleras, from agricultural colleges and development centers as well as opportunistic collecting by PhilRice staff. However, with the limited resources such as finite storage space, low processing and maintenance outlay, there is an urgent need to identify duplicates and unique accessions for maximum resource utilization. The morphological characterization procedure presently employed in the PhilRice genebank is inadequate for this purpose because it represents a narrow portion of the genome and are influenced by the environment. The study aimed to: obtain DNA fingerprints of 427 rice germplasm accessions in the PhilRice Genebank using the multiplex SSR system, and determine the level of DNA polymorphism among the 427 rice accessions.

The dendrograms generated from UPGM and bootstrapping revealed 100% similarity coefficient for Binangkuro accessions from Occidental Mindoro. Binuhangin and Buntalan accessions also from Occidental Mindoro as well emerged to have 100% similarity coefficients. Bolig-bolig accessions from Palawan and Banate accessions from Iloilo both showed 100% similarity coefficients. Such accessions are hence considered as redundants. On the other hand, 22 unique accessions were detected in the germplasm. In conclusion, the allelic diversity revealed by multiplex PCR consisting of 4 SSR markers serves as baseline information of the genetic diversity of the 427 rice germplasm accessions. Multiplex PCR enhances the efficiency of SSR markers, thus providing a marker system allowing heterozygosity assessment. The multiplex procedure was also found useful in determining redundancy in the germplasm. **(Author's abstract)**

Polymorphisms. DNA fingerprinting. Germplasm. Agriculture.

- 0066** Gis-aided crop suitability assessment and design of crop intensification and diversification models for major soil series in upland non-rice-based farming systems in Batangas, Philippines. Labita, Jacob B., Badayos, Rodrigo B.. **Transactions of the National Academy of Science and Technology**, , 34(1):17

Effective and feasible land use planning at present requires systematic evaluation on inter-relationship among attributes of land to acquire optimum and sustained crop yield. Adopting the 1976 FAO framework, land evaluation was performed for major upland land units (LUs) in non-rice-based land utilization types (LUTs) in Batangas to characterize the major upland soils, assess the suitability to important crops and design the development models in agreement with the cropping intensification and diversification potential of the area using Geographic Information Systems (GIS). Pertinent biophysico-chemical variables of LUs were considered for crop-land suitability analysis. Results show that considerable portion of eight soil series analyzed by quick fertility test had moderate nutrient availability while Sibul and Taal series were moderately low and Tagaytay was high. Generally, most of the crops were classified as moderately (S2) and marginally suitable (S3) due to limitations on topography (t), soil physical condition (s) and fertility (f). Coconut-banana intercrop and single corn system models can be intensified (S2wstf-S2wst and S3tsf,

respectively). For corn-sweet potato double crop, land use shift to pineapple cultivation (S2tfs rating and PhP 130,381 ha⁻¹ net benefit) is recommended due to severe limitations of Tagaytay sandy loam (8-16% slope) and current unsuitability to corn production (U 1 fts). Diversification models are focused to recommend modifications on vegetable and sugarcane LUTs. Sitao (S2tws) is socially-accepted and suitable to vegetable production models. Green pepper (S2wsft) and goat integration in sugarcane farming model is expected to gain a net benefit of PhP393,976 ha⁻¹. When the schemes are applied in certain areas, farmers can adopt the identified combination of specific component technologies. Since crop yields are location and season specific, the models can be subjected to validity thru field trials to determine the actual increase on productivity and profitability in the area. **(Author's abstract)**

Agriculture. Intensification. Diversification. GIS. Component technology.

- 0067** Growth performance of *Eucalyptus robusta* Sm. and *Pterocarpus indicus* Willd. to weeding and spacing treatments in Bukidnon, Philippines. Marin, Rico A.. **Transactions of the National Academy of Science and Technology**, , 34(1):23

Eucalyptus robusta Sm. and *Pterocarpus indicus* Willd. are promising plantation species in Bukidnon. The former species is exotic while the latter is endemic in the Philippines. The study was conducted to evaluate the effects of various weeding and spacing treatments on the growth performance of the two tree species planted under smallholder-farm conditions. It was laid-out in split plot design replicated three times. Spacing treatments comprised the main plot of the study while the weeding treatments served as the subplot. The study was carried out in Lantapan, Bukidnon with a duration of three (3) years. Findings revealed significant difference in stem diameter increment and degree of termite infestation in *E. robusta*. On the other hand, significant difference in height growth was observed in *P. indicus*. *E. robusta* has a diameter increment of 5.5 cm in ring weeding treatment while only 4.2 cm. in strip brushing treatment. Degree of termite infestation was also lesser in ring weeding with 32.9% compared to strip brushing treatment with 39.2%. In *P. indicus*, wider spacing (2 meters x 4 meters) presented taller height growth with 216.8 cm while the treatment of closer spacing (2 meters x 2 meters) had only 171.8 cm. Furthermore, ring weeding treatment was slightly higher in height growth for *P. indicus* with 197.4 cm as compared to strip brushing with 197.3 cm. On farmers' evaluation, ring weeding treatment was preferred over strip brushing since the former accordingly was easier to perform with less time spent in carrying out the activity. Frequency of conducting ring weeding in the plantation was lesser (2 times a year) as compared with strip brushing which was between 3-4 times a year. In terms of spacing, farmers prefer wider spacing since there was lesser number of trees maintained for weeding operations. **(Author's abstract)**

Agriculture. *Eucalyptus robusta* Sm.. *Pterocarpus indicus* Willd.. Strip brushing. Ring weeding. Spacing.

- 0068** Growth performance of sheep fed with formulated ration and urea molasses mineral block. Balneg, Benito B., Pastor, Corazon Diana A., Sair, Roseminda R.. **Transactions of the National Academy of Science and Technology**, , 34(1):11

Aside from the breed of sheep to be raised, roughages or grasses also play an important role in sheep production especially during the dry season wherein grasses are not enough and of low quality for animal nourishment. This study was conducted to determine the growth performance of growing-fattening sheep fed with formulated ration (FR) and Urea Molasses Mineral Block (UMMB). The study was laid-out in Randomized Complete Block Design with four treatments (Napier alone, Napier + FR, Napier + UMMB and Napier + FR + UMMB) and replicated three times. Based on the result, cumulative bi-weekly weight showed that sheep fed with napier + FR + UMMB consistently gained more than those fed with napier alone and napier + FR but comparable to those fed with napier + UMMB. The average daily gain in weight of sheep fed with napier + FR + UMMB gained significantly more per day (57.14g) but comparable to those fed with napier + UMMB (50.79g). Sheep fed with napier alone had the least gained in weight per day (32.80g). The ability to convert feeds into body weight was not significantly affected by the supplementation. However, sheep fed with napier + UMMB required least amount of feed, 13.69 kg feed/kg gain in weight. Sheep fed with napier alone required the greatest amount of feed, 20.26 kg of feeds/kg gain in weight. Sheep fed with napier + FR + UMMB incurred significantly higher expenses (P127.58) as compared to the other treatments. Thus, UMMB supplementation can increase production with lesser expenses. **(Author's abstract)**

Agriculture. Sheep. Napier. Ration. UMMB. Supplementation.

- 0069** Health status of banana in the national and regional germplasm collections. Molina, Agustin B., Damasco, Olivia P., Herradura, Lorna E., Lobres, Ma. Adelfa N., Dinglasan, Eric G., dela Cueva, Fe M.. **Transactions of the National Academy of Science and Technology**, , 33(1):29

A large collection of wild, edible, and introduced banana cultivars is being maintained in the national and regional germplasm collections at the Institute of Plant Breeding, UPLB and Bureau of Plant Industry, Bago-Oshiro, Davao City. *Banana bunchy top virus* (BBTV), *Banana bract mosaic virus* (BBrMV), and *Cucumber mosaic virus* (CMV) are the major viruses detected in the germplasm collections. Virus-infected accessions and/or cultivars were replaced with virus-free materials. Efforts to eliminate viruses through *in-vitro* techniques are also being exerted.

In BPI Davao, 10 out of 85 accessions were infected either by BBTV or BBrMV, hence, they were eradicated from the collection. In IPB, BBrMV and CMV were detected from wild *Musa balbisiana* collections. A total of 268 samples from 61 banana cultivars and accessions in *in-vitro* culture were indexed through ELISA. All samples were found to be negative to viruses except one sample from Grand Naine which was BBTV-positive. In the repository glasshouse, an *ex-situ* gene banking strategy, a total of 64 local and introduced banana cultivars were indexed against BBTV, BBrMV, and CMV. Of these, 32 accessions were newly recollected to replace the accessions that were lost either by natural calamities or disease infection. Moradong Puti, was BBTV-positive while one Pondol plant and two Moko plants were CMV-positive. Infected plants were eradicated from the collections. **(Author's abstract)**

Field genebank. ELISA. Virus indexing. In-vitro technique. Agriculture. Banana germplasm

collection.

- 0070** Heritability of and relationship among selected seed traits of three provenances of *Jatropha curcas* L.. Vallesteros, Shierel F., Carandang, Wilfredo M., Galapia, Genevieve A.. **Transactions of the National Academy of Science and Technology**, , 33(1):25

Due to its high oil yield per hectare and its ability to grow in a wide range of environment, *Jatropha* is on top of the promising potential crop as biofuel feedstock. However, *Jatropha*'s full potential is yet to be realized due to lack of systematic improvement/breeding programs aimed at increased oil yield.

Improvement programs require knowledge on variability and genetic parameters. Thus, this study intended to determine the extent of variation and relationship between seed traits.

Data on seed traits for the three provenances, namely, South Cotabato, Bacolod and Talisay, were obtained from Vallesteros (2009). Analysis of variance showed no considerable difference between provenances in seed length and breadth at $P < 0.05$. Seeds from South Cotabato were found to be significantly thicker than the other two provenances.

Heritability estimates obtained for all the seed traits were high ($>80\%$). High genotypic coefficients of variations (GCV) indicate that traits are less amenable to changes due to environmental flux. Seed thickness had the highest heritability and GCV (721.3%). In general, variation among the provenances in terms of the seed characters studied is low, which indicates narrow genetic resources of *Jatropha* in the country. Unproductive breeding is expected unless introduction of material from other sources, especially from the center of origin of the plant, is done. **(Author's abstract)**

Agriculture. Heritability. *Jatropha curcas* . Provenances.

- 0071** Host-virus interaction and serological detection of chlorotic ringspot virus disease of oil palm (*Elaeis guineensis*). Mendoza, Mary Joy C., dela Cueva, Fe M., Gumarang, Alain A., Palacpac, Andmerle B.. **Transactions of the National Academy of Science and Technology**, , 32(1):16

Chlorotic ringspot virus (CRSV) causing chlorotic ringspot, mosaic and streak in oil palm was identified by electron microscopy, host range experiments, and serological tests. The virus was 700 nm in length and filamentous in shape under electron microscope. Viral infection was transmitted via mechanical inoculation and insect transmission from oil palm to *Sea mays*, *Sorghum bicolor*, *Saccharum officinarum* and *Aguingay* sp. among twenty host species inoculated. *A. gossypii*, *M. saccharii*, and sorghum aphids were insect vectors able to transmit the virus successfully. There is strong positive reaction on both naturally and mechanically infected plants exhibiting characteristics symptoms against sugarcane mosaic virus (SCMV) antibody using enzyme-linked immunosorbent assay (ELISA) test. Moreover, the CRSV was strongly related serologically to SCMV compared to other potyviruses using indirect ELISA. These results confirmed that the virus is SCMV **(Author's abstract)**

Agriculture. Chlorotic ringspot virus. *Elaeis guineensis*. Oil palm.

- 0072** Immune response of *Macrobrachium rosenbergii* immersed with hot-water extraction from *Gracilaria edulis* challenged with *Vibrio alginolyticus*. Maningas, Mary Beth B., Abquina, Eldrin M., Gonzalez, Patrick Raymond G., Obias, Maribon M., Pausanos, Rainier S., Siapno, Jyacinth Lucille Y.. **Transactions of the National Academy of Science and Technology**, , 34(1):13

Macrobrachium rosenbergii is the species most favoured for freshwater shrimp farming purposes and remains by far the major subject of cultivation for commercial farming. However, despite their innate immunity, shrimp farms have been experiencing decreased production brought by viral and bacterial disease outbreaks. *Vibrio alginolyticus* is a bacterial pathogen responsible for high mortality of cultured shrimps worldwide. *Gracilaria edulis*, a species that is abundantly distributed all over the country has not yet been tested for its immunostimulant properties. Here we report for the first time the efficiency of hot-water extracts from *G. edulis* as an immunostimulant in *Macrobrachium rosenbergii*. Immune parameters, including total haemocyte count (THC) and phenoloxidase (PO) activity were examined, as well as resistance to *V. alginolyticus* infection. Upon immersion in 0.1g/L of the extract, the shrimps exhibited higher THC and greater PO activity compared to the control group. Shrimps immersed in 0.1g/L dosage, significantly increased percentage survival at the end of the challenge test, highlighting its capability in inducing bacterial resistance particularly against *V. alginolyticus*. Furthermore, it was found that doses larger than 0.1g/L are detrimental to the health of shrimps. The hot-water extract from *G. edulis* has an immuno-stimulatory effect on freshwater shrimp *M. rosenbergii*. Overall, the results demonstrated that exploring the Philippine *Gracilaria* species and their application as immuno-stimulants might pave the way in the development of local feeds for the country's aquaculture industry. **(Author's abstract)**

Agriculture. *Gracilaria edulis*. *Macrobrachium rosenbergii*. *Vibrio alginolyticus*. Total hemocyte count (THC). Phenoloxidase (PO).

- 0073** Improvement of antioxidant of sweet pepper fruit by manipulation of plant nutrients concentration. Ocampo, Eureka Teresa M., Ocampo, Cathrin Maia M., Perez, Jan Michelle. **Transactions of the National Academy of Science and Technology**, , 32(1):23

The dietary intake of plant foods with high antioxidant capacity has been reported to be inversely related to the morbidity of degenerative diseases. Since Filipinos are known to have a low per capita consumption of vegetables, increasing the antioxidant content per unit edible portion of vegetables could be a good strategy for health improvement. This study reports the preliminary investigation on the effects of highly elevated concentrations of the different essential nutrients on the improvement of antioxidant contents of sweet pepper fruits.

Seedlings of a local sweet pepper cultivar were established in Simple Nutrient Additional Program (SNAP) hydroponics under four different concentrations of SNAP nutrient solution. After 3 weeks, the growing solutions were topped with the recommended concentrations for normal vegetable production. Ripe fruits were

harvested three months after seedling transplanting. Methanolic extracts of fruit tissues were used in the colorimetric assays for total antioxidant activity, polyphenol and flavonoid contents. The total antioxidant activity was assessed by the ability of the fruit extracts to trap the stable free radical 2,2 diphenyl-1-picryl hydrazyl (DPPH), which can be visualized by the decrease in absorbance at 517 nm.

Fruits from seedlings that were established at doubled concentrations of the plant nutrients iron, magnesium and the trace elements showed consistently higher total antioxidant activity, polyphenols and flavonoid contents. However, doubling all the plant nutrients resulted in fruits with the lowest antioxidant contents. The high concentration could have resulted in toxic effect on overall plant growth, underscoring the need for striking a balance between nutrient concentration and maximum production of antioxidants. Similar studies should be conducted on other vegetable crops to validate the effect of plant nutrient concentration on the improvement of antioxidant contents. **(Author's abstract)**

Agriculture. Antioxidant. Flavonoids. Polyphenols. SNAP hydroponics. Sweet pepper.

- 0074** Improving the performance of a vision-based computerized egg grader. Zarsuela, Allan L., Pabico, Jaderick P.. **Transactions of the National Academy of Science and Technology**, 32(1):35

The presence of physical-based quality attributes on egg shell surface such as pinholes, stretch marks, strain, discoloration, cracks, as well as dirt, and their combinations makes egg grading a complex process. Candling, the manual method of egg grading common in the *Balut* (duck egg embryo) making industry in the Philippines, is labor intensive and susceptible to some mechanical intrusion as human contact with the egg is unavoidable. The judgement of experienced human graders is error-prone due to subjectivity, eye strain, boredom, and tiredness. To improve efficiency, minimize errors and *capture* the human's expertise, we developed a computer-based vision system using an artificial neural network (ANN) as grader. Using a digital camera, we obtained 500 color images of human-graded eggs to train, test, and validate several ANNs. Using the respective grades of experienced human graders from two local *balut* farms in Quezon province as benchmark, we chose the ANN with the highest specificity and sensitivity (93% and 79%, respectively). We observed, however, that the wrongly-graded eggs by the best ANN were correctly graded by most of the ANNs that we did not choose. From among those ANNs that we did not choose, we further observed that the mis-graded eggs by some ANNs were graded correctly by other ANNs. Thus, to improve specificity, we combined all ANNs into a committee of classifiers, where each member casts a vote as its classification. We take the majority vote as the committee's grade for a given egg. We validated the committee's output over the validation dataset and results show that the committee agrees 98% of the time with the human graders, improving the grading efficiency by 5%. **(Author's abstract)**

Agriculture. Balut. Committee machines. Computer vision. Duck egg embryo. Egg grading. Neural network.

- 0075** Increasing rice productivity in flash flood-prone areas vulnerable to effects of climate change. Tatlonghari, Gerlie T., Pamplona, Alvaro M., Vergara, Gina V., Manzanilla, Digna O., Paris, Thelma R., Ismail, Abdelbagi M., Mackill, David J., Labios, Romeo V.. **Transactions of the National Academy of Science and Technology**, , 33(1):61

Flash floods of up to 2 weeks can occur at any crop growth stage, sometimes more than once, resulting in severe yield losses in rice. Despite the risk, farmers continue to grow susceptible modern varieties, local landraces with low yield, or leave the field idle and wait for another season. Six mega varieties introgressed with *SUB1* gene and other lines possessing the *SUB1* gene were disseminated in Southeast Asia; their adoption was facilitated. On-station adaptive yield trials, subjected to normal and flooded conditions, and on-farm researcher and farmer-managed participatory varietal selection (PVS) followed by preference analysis and sensory evaluation were implemented. Following complete flooding for 8 to 13 days, varieties with SUB 1 had 1-3 t ha⁻¹ yield advantage over normal varieties. Results from PVS showed Swarna-Sub1 (5.2 t ha⁻¹ yield) was most preferred in North Vietnam, while IR64-Sub1, (3.7 t ha⁻¹ yield) was most preferred in Central Vietnam. TDK1-Sub1, developed from the popular variety TDK1, and PSB Rc68 are top choices in Laos and Northeast Thailand. IR64 was the second most popular variety after Ciherang; thus, acceptance of IR64-Sub1 is faster in Indonesia. In the Philippines, IR49830-7-1-2-3 and BR11-Sub1 yielded 4.2 and 3.8 t ha⁻¹, respectively, and were most preferred. Varietal registration and accreditation of IR64-Sub1 (Submarino1) for the Philippines and IR70213-9-CPA-12-UBN-2-1-3-1 (INPARA-3), IR64-Sub1 (INPARA-4) and Swarna-Sub1 (INPARA-5) for Indonesia was made possible, thus commercialization and support from national governments was achieved. Initial success was attained through active partnership among farmers, local officials, extension workers, scientists, and other stakeholders. These Sub1 varieties provide considerable security for farmers in flash flood-prone areas. **(Author's abstract)**

Submergence tolerant rice. Participatory varietal selection. SUB1 gene. Flash flood-prone areas. Agriculture.

- 0076** Indigenous knowledge systems as stimulus to a better soil health and bionetwork. Villegas-Pangga, Gina. **Transactions of the National Academy of Science and Technology**, , 33(1):15

There have been increasing concerns worldwide on the adverse effects of highly intensive farming activities on the quality and safety of food, the environment, and their contribution to global warming. To address these issues, there must be a concerted effort among various stakeholders to promote the adoption of environment - friendly farming technologies. A project was conducted to document the indigenous practices and existing technologies in selected rice-based farming areas in Southern Luzon Philippines. Practices/strategies and technologies that focus on the improvement of soil health and the conservation of the remaining farm resources are importantly realized. Indigenous practices can be referred as unique practices belonging to a specific community or local group and that the people in a given community have developed over time, and still continue to develop. These practices are based on experience, often tested over years of use, adapted to local culture and environment and as their basis for natural resources management. The worsening ecological conditions of rice and vegetable farms in the project sites and the technological constraints affecting the soil quality were documented. This study

showed that there are existing technologies which originated from traditional practices but were modified through time, or changes were made to fit the ecological conditions. Several farmers have been documented to employ innovative practices and approaches to control pests and diseases.

Food security and nutritional adequacy are important indicators of a stable and sustainable farming household and must be the major feature in any attempt to evaluate success in the future. The intensification of production must not be undertaken through ecologically destructive approaches, in which the indigenous knowledge systems may apply. Food security and nutritional adequacy are important indicators of a stable and sustainable farming household and must be the major feature in any attempt to evaluate success. **(Author's abstract)**

Farming practices. Sustainable farming system. Indigenous knowledge. Ecosystem health. Soil health. Agriculture.

- 0077** Induced chlorophyll variation in pineapple CV.'queeanjan na ba ung akin?n' by gamma irradiation (⁶⁰cobalt). Valencia, Lolita DC.. **Transactions of the National Academy of Science and Technology**, , 34(1):6

Irradiation using gamma rays (⁶⁰Cobalt) coupled with *in vitro* culture techniques was undertaken to induce variation or mutation in pineapple. Calli from crown meristem tips of pineapple cv. 'Queen' [*Ananas comosus* (L.) Merr.] were initiated using Murashiege and Skoog's basal medium supplemented with 10mg/liter 4-amino-3,5,6-trichloro-2-pyridinecarboxylic acid (Picloram). High percentage of growth and shoot proliferation was observed in basal medium supplemented with 50 µM benzene adenine purine (BAP) and 10 µM gibberellic acid (GA) after 8 weeks *in vitro*. Regenerants derived from shoots using different doses of gamma rays (0, 5, 10, 15, 20, 25 and 30Gy) were evaluated under laboratory conditions. Of the different doses, 15 Gy produced the most variegation in young shoots (chlorophyll variants) maintained *in vitro*. The variants appeared to have yellow and green color combinations on the young leaves of pineapple 'Queen' variety. When transplanted inside the greenhouse, high percentage of plantlets survival was observed, ranging from 90-95%. Of the different irradiation doses, variegation in young leaves was observed at 15, 20, 25 and 30 Gy. Further assessment on the effect of irradiation is currently being undertaken under screenhouse conditions. The variants produced could serve as basis for selection of ornamental-type pineapple. In addition, protocols developed on the use of *in vitro* culture techniques could be utilized as a tool for induced mutation breeding in pineapple. **(Author's abstract)**

Agriculture. Chlorophyll variants. In vitro culture technique. Irradiation. Gamma ray. Murashiege and skoog. Mutation breeding. Pineapple cv. 'queen'.

- 0078** Insect non-preference and reduced virus multiplication on irradiated banana cv lakatan resistant to banana bunchy top virus (BBTV). Dinglasan, Eric G., dela Cueva, Fe M., Sison, Ma. Luz J., Damasco, Olivia P., Lim, Charlemagne A.. **Transactions of the National Academy of Science and Technology**, , 32(1):13

Gamma-irradiated "Lakatan" bananas have demonstrated resistance against Banana Bunchy Top Disease (BBTD) caused by *Banana bunchy top virus* (BBTV). Resistance of mutant lines to BBTV were characterized and evaluated based on host - insect vector relationship, symptomatology, and virus multiplication. Resistance to the insect vector, *Pentalonia nigronervosa*, was elucidated by artificially inoculating individuals lines with 20 viruliferous aphids. Insect preference was determined by counting the number of aphids per plant at a weekly interval. Reaction of the different irradiated lines to the disease was observed through symptomatic expression while resistance to virus multiplication was determined by knowing the titer of BBTV on the different mutant lines through Enzyme-Linked Immunosorbent Assay (ELISA). Results showed that there were differences on aphid preference based on mean aphid colony count on irradiated lines. Disease incidence was significantly higher on lines that were preferred by aphids and lower on those that were not colonized. For example, line 6-30-2 was observed to be most preferred having a mean colony count of 63.9 and disease incidence of 66.67% while line 9-28-2 was not preferred having a mean colony count of 26.3 and disease incidence of 11.11%. Non-irradiated banana cv Lakatan was observed to have a mean aphid colony count of 41.3 and disease incidence of 33.33%. Virus titer was also higher on irradiated lines with high aphid colony count and disease incidence. ELISA absorbance at 405 nm of lines 6-30-2 and 9-28-2 ranged from 0.138 – 0.172 and 0.126 – 0.423, respectively while that of non-irradiated banana cv Lakatan ranged from 0.132 – 0.397. Healthy and infected banana cv Lakatan as negative and positive controls gave an absorbance of 0.145 and 0.680, respectively. Based on the results of the study, non-preference of the aphid vector to colonize and reproduce in irradiated plants contributed to lower BBTD infection and lower titer of the virus in tested materials. **(Author's abstract)**

Agriculture. Aphid preference banana bunchy top virus. Gamma-irradiated banana.

- 0079** Insecticide use impacts of integrated pest management (IPM) farmer field schools. Hammig, Michael D., Rejesus, Roderick M., Yorobe, Jr., Jose M.. **Transactions of the National Academy of Science and Technology**, , 33(1):54

This article empirically examines the impact of Farmer Field Schools (FFS) on insecticide use by onion farmers in the Philippines. FFS is an intensive Integrated Pest Management (IPM) information dissemination method that encourages producers to lower their reliance on chemical insecticides for controlling pests and diseases in their farms. These FFS-IPM trainings have been conducted within vegetable-based production systems in the country since 1994. The data used in the study are from the face-to-face farm level survey in 2009 of 200 onion growers in Nueva Ecija. Using instrumental variable (IV) procedures to control for endogeneity and selection problems in the data, we found that FFS trained onion farmers in the Philippines have significantly lower insecticide expenditures (~PhP5,000) than non-FFS trained control farmers. By not controlling for these econometric biases, the FFS training did not show any effect on insecticide use. The insecticide reducing effect of FFS has important environmental and health implications, and provides evidence about the effectiveness of the FFS training method in disseminating important IPM concepts in the country. **(Author's abstract)**

Onion production. Integrated pest management (IPM). Instrumental variables technique.

Insecticide use impact. Farmer field schools. Agriculture.

- 0080** Isolation of *Bacillus* from janitor fish (*Pterygoplichyts disjunctivus*) gut and preliminary screening for its antibacterial activity against plant and human pathogen. Sagmaquen, Lilibeth D., De Los Santos, Maria Leonora L., Muñoz, Clara Mae I., Zulaybar, Teofila O., Papa, Irene A.. **Transactions of the National Academy of Science and Technology**, , 32(1):20

Diseases of plants, animals and human caused by bacteria pose unique challenges for health care in rural and urban areas. Access to effective and safe broadspectrum topical antibiotics is of paramount importance to address these needs. This study investigated the effectiveness of 90 *Bacillus* isolates from janitor fish (*Pterygoplichyts disjunctivus*) gut against *Staphylococcus aureus* and *Xanthomonas oryzae* using the agar plug assay.

Out of the ninety bacillus isolates, 68 inhibited the growth of *S. aureus* and *X. oryzae* suggesting the potential of using the isolates for production of antibiotics. Mean comparison of zones of inhibition using the Duncan's multiple range test suggest that the isolates were equally effective against the test organisms. Both test organisms were susceptible to the isolates. we recommend that the bioactive compound produced by the isolates be characterized and tested against other bacterial pathogens. **(Author's abstract)**

Agriculture. Janitor fish. *Bacillus*. *Staphylococcus aureus*. *Xanthomonas oryzae*.

- 0081** Laboratory bioassay of putative *Bacillus* sp. against major rice pathogens, *Pyricularia grisea* and *Fusarium fujikuroi*. Gergon, Evelyn B., Nazareno, Eric S., Quimio, Arcadio J.. **Transactions of the National Academy of Science and Technology**, , 32(1):14

Recognizing the enormous important role of microorganisms in plant disease control, *Bacillus* species which are naturally occurring antagonists were collected and tested in the laboratory against two important seed transmitted pathogens of rice causing blast and bakanae diseases, *Pyricularia grisea* and *Fusarium fujikuroi*, respectively.

One hundred thirty isolates of putative *Bacillus* were obtained from healthy rice seeds and roots collected from different PhilRice stations throughout the Philippines. Based on growth diameter of *Bacillus* using a multiple culture method, bioassay results showed that 14 or 10.7% of the bacterial isolates were highly effective and 11.5% were moderately effective in reducing the growth of *F. fujikuroi* on potato dextrose agar medium. These highly effective isolates which exhibited growth of 20 to 30 mm were also found inhibitory to *P. grisea*. Among the isolates, however, only isolate nos, 59, 130, 01, 64, and 13 were consistent in controlling both pathogens in all replications. Except for isolate 130 which was obtained from Los Baños stock culture, the most effective antagonists were isolated from PhilRice seeds of NSIC Rc 156 and 158 from Iloilo and PSB Rc 18 and NSIC Rc 160 from Nueva Ecija. All potential isolates will be tested *in vivo* under greenhouse and fields conditions. Eventually, the successful candidate(s) will be mass produced, formulated, and commercialized as a biocontrol agents against blast and bakanae diseases of rice. **(Author's abstract)**

Agriculture. Bacillus species. Bakanae. Bioassay. Blast. Rice.

- 0082** *Lentinus tigrinus*, an addition to newly recorded and successfully propagated wild strain of Philippine Edible Mushroom. Eguchi, Fumio, Reyes, Renato G., Kalaw, Sofronio P., Cabrera, Esperanza C., Dulay, Rich Milton. **Transactions of the National Academy of Science and Technology**, , 33(1):33

Most of the commercially cultivated mushrooms in the Philippines were imported from other countries and their cultivation technologies were modified to suit the local conditions. Though well accepted by most Filipinos, these imported strains are not always available in the local market and one of the strategies is to use our own mycological resources. In the past, we were successful in the domestication of *Collybia*, *Schizophyllum*, *Ganoderma*, *Coprinus*, *Auricularia* and *Volvariella*. Another wild locally growing mushroom with nutraceutical potential is *Lentinus tigrinus*, which are usually found growing on fallen logs. In our desire to develop a practical production technology for this mushroom, we initiated study on its biophysiology. The secondary mycelial growth and fruiting body performance were elucidated with special reference to the influence of different indigenous culture media, pH, aeration and illumination. The secondary mycelia grew best of coconut water gulaman with a pH of 8 while being incubated in sealed and dark condition. Among the evaluated granular spawn, palay seeds yielded very luxuriant mycelial growth having the shortest incubation period of 5 days. Highest biological efficiency of 15.93% was recorded in a formulation consisting of 8 parts of rice straw + 2 parts of sawdust. *Lentinus tigrinus* has a great potential for cultivation as another newly recorded and propagated Philippine wild edible mushroom. **(Author's abstract)**

Biological efficiency. Biophysiology. Secondary mycelia. Mycelial growth. *Lentinus tigrinus*. Agriculture.

- 0083** Long-term weed management, diversity and abundance of broadleaf weeds in a banana plantation in Davao City, Philippines. Ragas, Richie Eve G., Del Fierro, Marcel Joshua L., Oguis, Georgianna Kae R., Rasco, Jr., Eufenio T.. **Transactions of the National Academy of Science and Technology**, , 33(1):53

Weeds are often considered pests because they reduce crop yield. However, some weeds perform useful ecological functions such as providing a habitat for biocontrol agents, nourishing useful microorganisms in the soil and preventing erosion. Appropriate weed management should therefore aim to maintain a certain level of useful weed population and diversity instead of totally eliminating them. To determine the effects of manual and chemical (paraquat and glyphosate) weed management on the abundance and diversity of broadleaf weed species in a banana plantation, counts, dry weights, seed bank and diversity indices of broadleaf weed species were compared in two identical experiment in 15% and 25% slopes. Bananas were at the fruiting stage and were established 2 to 5 years earlier when the experiment started. Seedlings emergence and diversity indices of broadleaf weeds showed an increasing trend in seed banks in both 15% and 25% slope over 3 years. Field counts and biomasses were significantly lower in the chemical plots compared to the manual

plots. The sustained dominance of *Ageratum conyzoides* was also observed in the field but chemical treatment was better than manual treatment in reducing its population. Species *Cleome rutidosperma* and *Bidens pilosa*, which were dominant in the first year of sampling, continuously declined. Along with this decline was the increase in *Drymaria cordata* and *Acalypha indica* in the 15% and 25% slopes, respectively. The ecological significance of the shifts in weed composition resulting from manual and chemical weeding is discussed in this study. The chemical treatment was ecologically advantageous compared to manual treatment as it has effectively reduced weed abundance and dominance of noxious weed without concomitantly decreasing weed diversity. **(Author's abstract)**

Paraquat. Glyphosate. Agriculture. Weed diversity. Banana plantation. *Ageratum conyzoides*.

- 0084** Management practices of grouper cage culture in Negros Occidental. Abeto, Mario N.. **Transactions of the National Academy of Science and Technology**, , 33(1):3

The study was conducted to evaluate the farming practices of 68 grouper cage growers in the four grouper growing LGUs in Negros Occidental. A research questionnaire was formulated to investigate the farming practices from stocking until harvest and marketing. The purpose of the study was to provide insights about the strengths and weaknesses of grouper cage culture. It further paves the way for an effective management and production intervention in the context of sustainable aquaculture. The data gathered can be used as a baseline reference for the local government units and concerned government agencies to promote long term livelihood opportunities for small scale fish farmers. Results showed that the industry is still dependent on wild caught grouper fry with poor survival rates. Relatively large number of farmers stocked their cages at low stocking density and still used trash fish as food for the fish. Almost all farmers revealed that mortalities do occur in their cages which were attributed to poor environmental conditions and diseases. Also, majority of the farmers had limited technical knowledge on husbandry and health management resulting to low production. This study suggested that practical training courses on grouper culture should be initiated by the academe in collaboration with the LGUs and other government agencies to enhance competencies in managing grouper cage culture. **(Author's abstract)**

Harvesting. Disease control and prevention. Monitoring of water parameters. Sampling. Feeding. Stocking. Grouper cage culture. Management practices. Agriculture.

- 0085** Marker-aided transfer of genes for β -carotene biosynthesis into popular Philippine rice varieties. Avellanoza, Eleanor S., Garcia, Nelson S., Ravelo, Gerald B., Dilla, Christine Jade A., Espejo, Emilie O., Somera, Jean J., Alfonso, Antonio A.. **Transactions of the National Academy of Science and Technology**, , 33(1):35

Golden Rice accumulates β -carotene in the grains and is considered as a sustainable and effective food-based strategy to alleviate vitamin A deficiency. Through DNA marker-assisted recurrent backcrossing, Golden Rice1 (GR1) locus was introgressed into PSB Rc82 and NSIC Rc128 varieties. Selection in the progenies was

based on yellow-colored dehulled grains after bleach treatment, presence of GR1-specific PCR amplicons, high recovery of the recurrent parent genome, good agronomic traits and high betacarotene content. Parental recovery was measured using phenotypic data and polymorphic simple sequence repeat (SSR) markers (98 for PSB Rc82 and 103 for NSIC Rc128 progenies). After 2-3 backcrosses and 3-4 selfing generations, nine introgression lines (four from PSB Rc82 and five from NSIC Rc128) were selected. SSR data revealed at least 80% genomic recovery of the recurrent parents. The highest β -carotene concentration in the progenies using samples stored for two months at ambient temperature was 1.80 $\mu\text{g/g}$ per gram of milled grains compared to 1.62 $\mu\text{g/g}$ in the GR donor. These results illustrate the feasibility of transferring Golden Rice trait into popular local varieties using this approach. Concomitant with the work on GR1 was the introgression of Golden Rice2 event R (GR2-R, $\sim 36 \mu\text{g/g}$) into PSB Rc82. With higher betacarotene content, GR2-R will be used in line development, single- and multi-location field tests, biosafety and sensory evaluation, and other tests required for regulatory approval and varietal release. Activities towards combining GR2-R with resistance to tungro and bacterial blight in elite genotypes are underway. **(Author's abstract)**

Varietal evaluation. Beta-carotene. Marker-assisted introgression. Vitamin A deficiency. Golden rice. Agriculture.

- 0086** Minimizing bacterial leaf blight and other diseases in rice using organic pesticide. Saclangan, Dan A., Amar, Gracia B., Gergon, Evelyn B.. **Transactions of the National Academy of Science and Technology**, , 33(1):49

The current agricultural system calls for organic-based pesticides to avoid health and environmental hazards. Hence, we evaluated lactic acid labeled Antica against two important diseases of rice, the bacterial blight (BLB) and tungro. On-farm trial in RCBD was conducted using NSIC Rc156 and PSB Rc72H in Nueva Ecija and Isabela, respectively. Treatments were Antica as spray at 5, 10, 15, and 20 ml/L water, Antica as seed coat (SC), copper hydroxide $[\text{Cu}(\text{OH})_2]$ at 3.75 g/L water, and untreated control. Cypermethrin, was used in Isabela instead of $[\text{Cu}(\text{OH})_2]$. Seed treatment was also excluded. Application was done at 2-week intervals 5 days after transplanting (DAT) until heading. Diseases, arthropods, and phytotoxicity were assessed 1 week after treatments. Antica at 5 ml/L water reduced BLB incidence by 17.5% and severity by 33% at 42 DAT compared with the untreated control. As disease progressed, Antica-plots remained to have lesser BLB incidence and severity. At 75 DAT, BLB incidence and severity were lowest in plots sprayed with 5 ml Antica/L water with 33.7% reduction in incidence and 25% reduction in severity. Incidence of tungro, although low, was also reduced in Antica-treated plots with as much as 50%. In Isabela, BLB was lower but data showed 17-25% reduction in incidence in Antica sprayed-plots. Bacterial leaf streak, which occurred in higher frequency in Isabela was also reduced by 25-39%. SC-plots were not statistically different from control. Antica also reduced the number of herbivores such as green leafhoppers, brown planthoppers, and white-backed planthoppers without affecting the predators and parasitoids, except for coccinelids whose densities dropped in plots treated with 20 ml Antica. No phytotoxicity were observed in all plots indicating that Antica is safe for use in rice. Antica gave a yield advantage of 7.3 to 13.87% over the other treatments. In most instances Antica was effective at the rate of 5 ml/L water. **(Author's abstract)**

Tungro. Herbivores. Rice. Disease. BLB. BLS. Lactic acid. Agriculture. Antica.

- 0087** Modified atmosphere packaging (map) technology for the extension of mango (*Mangifera indica* L.) fruit freshness. Rocafort, Rachel F., Rustia, Abigail S., Sales, Jocelyn M.. **Transactions of the National Academy of Science and Technology**, , 34(1):32

The market of Philippine mangoes (*Mangifera indica* L.) is limited due to its short shelf life in which the fruit ripens in five to eight days after harvest at ambient condition. Modified atmosphere packaging (MAP) technology is known to supplement temperature and relative humidity control to maintain the quality and prolong the shelf life of fresh fruits. This study aims to increase the shelf life of mangoes using MAP technology. Mangoes obtained from various parts of the country were pre-treated with fungicide with active ingredient, azoxystrobin, and vapor heat treatment (VHT) prior to storage in MAP at various conditions including: a) low temperature storage at 10°C and 15°C, b) use of local and imported MAP plastic films in storing mangoes at 10°C and c) packaging MAP mangoes in different packing sizes. Stored mangoes in MAP were evaluated for physical and sensory qualities and shelf life was determined. Results showed that the shelf life of MAP mangoes pre-treated with fungicide and VHT could be extended up to 30 days by storing MAP fruit using 30 CE plastic film of the Korea Food Research Institute (KFRI) as modified atmosphere packaging material, bulk packing at 4 boxes of 5 kg fruits to a box, and storage at 10°C. At the maximum shelf life of 30 days, MAP mangoes did not shrivel, ripened to yellow peel color index of 5 to 6, had slight to moderate mango odor and flavor, and had no internal breakdown. MAP is a promising technology that could extend the mango fruit freshness and allows export of fruits to distant markets therefore increasing the share of exports of Philippine mangoes globally. **(Author's abstract)**

Agriculture. MAP. Mango. Shelf life. Bulk packing. MAP film.

- 0088** Molecular analysis of elite introgression lines derived from the cross of rice (*Oryza sativa* L.) and a wild species (*O. longistaminata* A. Chev. et Roehr.) using simple sequence repeat (SSR) markers. Francisco, Anchilie, Villa, Neilyn O., Brar, Darshan S.. **Transactions of the National Academy of Science and Technology**, , 32(1):10

Ten alien introgression lines (AILs) selected from the cross of New Plant Type (NPT) of rice (*Oryza sativa*) and a wild species (*O. longistaminata*) were used in the analysis of yield and yield components. Significant differences were found for number of tillers per plant, plant height, panicle length, grains per panicle, 100-seed weight and grain yield per plant. The introgression line were superior to the recurrent parent. A set of 66 SSR markers distributed on 12 chromosomes was tested and showed 25.76% introgression. Furthermore, AIL 1, 2, 3, 6, 7, and 10 have introgression in chromosome 1 specifically within the range (66.2-115.2 cM) of yield enhancing loci, *y/d1.1*. These lines showed a significant increase in the number of tillers per plant, panicle length, 100-seed weight and grain yield per plant. Thus, wild species of rice particularly *O. longistaminata*, though phenotypically inferior, carry some useful alleles that can improve yield and yield components of rice varieties. **(Author's abstract)**

Agriculture. Introgression. New plant type (NPT). Wild species. Yield.

- 0089** Molecular diversity of rumen methanogens in carabao and cattle in response to dietary tannin. Radovan, Gondelina A.. **Transactions of the National Academy of Science and Technology**, , 34(1):74

The molecular diversity of rumen methanogens in domesticated carabao and cattle fed tannin – containing banana leaves or supplemented with commercial tannin extract was assessed using polymerase chain reaction – denaturing gradient gel electrophoresis (PCR-DGGE). Primer set 0357 F- GC and 0691 R was used to amplify the methanogenic archaeal community of the rumen. A total of 26 DNA fragments were excised from DGGE gels and their nucleotide sequences were successfully determined. PCR-DGGE band profile and nucleotide sequence analysis revealed that domesticated carabao harbors fewer methanogens compared to cattle. Methanogen resembling *Methanobrevibacter* sp. YE288 is the predominant methanogen in carabao while *Methanobrevibacter thaueri* strain CW and *Methanobrevibacter millerae* strain ZA-10 are the predominant ones in cattle. Feeding of tannin-containing banana leaves remarkably altered the methanogen composition of both carabao and cattle more than commercial tannin extract supplementation in the diet. **(Author's abstract)**

Agriculture. Methanogens. Cattle. Tannin. Banana leaves.

- 0090** A multiplex PCR design for the detection of the abaca bunchy top virus (ABTV) in leaf samples. Aquino, Vermando M., Leyson, Christina Lora M.. **Transactions of the National Academy of Science and Technology**, , 33(1):47

The abaca bunchy top virus or ABTV is one of the most devastating pathogens that infect abaca today. A key element in preventing its spread is early detection and disease indexing of planting materials. To this end, a design for a multiplex PCR able to detect the presence of ABTV DNA has been developed. Four primer pairs were used: Three primer pairs target ABTV genes, namely the coat protein, movement protein, and replication initiation protein (Rep) genes. In addition, a fourth primer pair targets a region in the chloroplast NADH dehydrogenase subunit (*ndhB*) gene, which is conserved in diverse plant taxa. Amplification of the *ndhB* gene serves as an internal positive control. In the detection of plant viruses, the PCR template is often the total DNA extracted from plant samples. Hence, the amplification of an internal positive control would determine if PCR conditions are favorable to amplification of DNA and to an extent, if the quality of the DNA template is acceptable. Each primer pair used for multiplex PCR yields an amplicon of a unique size to ensure unambiguity. An ideal result for the said multiplex PCR design would be the amplification of the *ndhB* intron in all samples (healthy and infected) and at the same time, the amplification of ABTV only in infected samples. The multiplex PCR design outlined above have been tested on 30 leaf samples taken from Bicol and Leyte. Results of the test have so far corroborated with parallel assays using ELISA (enzyme-linked immunoassay). **(Author's abstract)**

Replication initiation protein. *ndhB* gene. Coat protein gene. Movement protein

gene. Multiplex PCR. Virus detection. Abaca bunchy top virus. ABTV. Agriculture.

- 0091** Nodule occupancy and nitrogen uptake variability among mungbean varieties (*Vigna radiata* [L] Wilczek) inoculated with *Bradyrhizobium* sp. under field condition. Delfin, Evelyn F., Aquino, Mary Rose G., Torres, Fe G.. **Transactions of the National Academy of Science and Technology**, , 32(1):26

Legumes derive as much as 90% of their nitrogen content from the atmosphere through biological nitrogen fixation. Inoculation with superior strain of rhizobia improved yield and nodulation of legumes grown in low nitrogen soils. However, response to inoculation is influenced by the host's affinity to the introduced strain as well as the level of native rhizobia population.

A field trial was conducted in Ilagan, Isabela to determine the affinity of ten mungbean varieties to *Bradyrhizobium* sp. strain M6 inoculation. The trial was a split-plot experiment involving inoculation, without inoculation, N fertilizer treatment (30 kg N/ha) and ten mungbean varieties as variables. With a low native rhizobia population of 22 cells per g soil, nodule occupancy by the inoculant *Bradyrhizobium* sp. strain M6 differed significantly among the entries tested and ranged from 39 to 62%. Pag-asa 7 had the highest percent of nodules infected by strain M6. Across treatment, the ten entries differed in terms of crown nodule number, crown nodule dry weight and total nodule number. Crown nodule number ranged from 1 to 3 nodules plant⁻¹ while crown nodule dry weight ranged from 0.96 to 2.64 mg/plant. Taiwan Green had the highest crown nodule number of 3 nodules/plant and highest crown nodule mass of 2.64 mg plant.

A significant variety treatment interaction was observed in terms of nitrogen uptake. Inoculation of mungbean varieties Pag-asa 3 and Acc 12748 with strain M6 significantly improved N uptake compared with the uninoculated plants by 42 and 101%, respectively. Pag-asa 7, the highest grain yielder, showed a 21% increase in N uptake with inoculation. The N uptake of inoculated Acc 12988 and Acc 12748 were found comparable with the N uptake of N-treated plants. The rest of the entries did not show significant differences in N uptake across treatments. **(Author's abstract)**

Agriculture. Mungbean. Nitrogen uptake. Nodulation. Nodule occupancy. Rhizobia.

- 0092** Nutritional and physical requirements for mycelial growth of *Agrocybe cylindracea* (DC.:Fr.) Maire. Reyes, Renato G., Kalaw, Sofronio P., Cabanting, Rosa Mia. **Transactions of the National Academy of Science and Technology**, , 33(1):31

Agrocybe cylindracea is a widely distributed edible mushroom that usually grows in fallen logs and agricultural wastes. This mushroom has great potential in the nutraceutical and pharmaceutical industries because of its hypoglycemic effects, anti-carcinogenic activity and antioxidant property. Although this mushroom is successfully cultivated in Japan and Taiwan, the production technology under Philippine condition has not yet been developed. The results generated from this study will serve as benchmark information for the development of production technology for growing this mushroom.

The research team evaluated different indigenous materials and physical factors (pH, aeration and illumination) and different grain materials for efficient and luxuriant mycelial growth and proliferation. Among the different indigenous culture media evaluated, sorghum sucrose gulaman registered very thin and widest mycelial diameter with a mean of 82.67 mm after 8 days of incubation while corn grit sucrose gulaman recorded very thin and smallest mycelial diameter with a mean of 40.67 mm. Moreover, coconut water gulaman is the most suitable medium for optimum mycelia growth with a mean mycelia diameter of 64 mm. Results further showed that *A. cylindracea* cultured on coconut water gulaman at pH 6 incubated in sealed and alternating light and dark conditions favored the mycelial growth and proliferation. Meanwhile, among the grains evaluated for mass production of fruiting bags, sorghum seeds recorded the shortest incubation period with a mean of 14 days while rice seeds had the longest incubation period with a mean of 41.33 days. **(Author's abstract)**

Grain spawn. Indigenous culture media. Biophysiology. *Agrocybe cylindracea*. Agriculture.

- 0093** Paradigm shift on mushroom technology for ligninolytic fungi in the Philippines. Reyes, Renato G., Kalaw, Sofronio P., Dulay, Rich Milton R., Bellere, Arce D., Yoshimoto, Hiroaki, Kikukawa, Tadahiro, Eguchi, Fumio. **Transactions of the National Academy of Science and Technology**, , 32(1):32

The Philippines being a tropical country is rich in forest product resources. The most common botanical-based forest products which are oftentimes used by the Filipinos for commercial purposes include bamboo, rattan, dipterocarp – based lumber for furniture making, wild fruits and epiphytes. Though mushrooms in other developed parts of the world serve as one of the primary forest products and are highly considered as prime commodity, these remain to be under utilized in the Philippines. Their scarcity in the local market in their fresh form makes mushrooms a luxury food. With the favorable climatic conditions in the country during rainy season, mushrooms become seasonally abundant. Mushrooms are oftentimes injudiciously collected from the wild by the village people. However, due to the change of habitat as a result of unprecedented deforestation, climatic change and massive collection, occurrence of wild mushrooms is diminishing. To conserve these wild fungal genetic resources we surveyed a number of wild mushrooms in the country and studied their biophysiology and possibility for domestication. We rescued the cell lines of these wild mushrooms and developed production technologies for *Auricularia polytricha*, *Collybia reinakeana*, *Schizophyllum commune* and *Ganoderma lucidum*. Though these mushrooms are generally known as wood rotters and they are widely and commercially grown on sawdust-based medium, we were able to develop production technologies using composted rice straw as the basal medium. In practice, farmers customarily burn the rice straw as the basal medium. In practice, farmers customarily burn the rice straw in order to easily get rid of this agricultural waste. Understanding fully the biophysiology of these wild mushrooms, we successfully grew and produced higher biological efficiency on this basal medium. The use of rice straw as basal medium would discourage the burning of straw and minimize the dependency on sawdust for mushroom cultivation. **(Author's abstract)**

Agriculture. *Collybia reinakeana*. *Ganoderma lucidum*. *Schizophyllum commune*. Philippine

mushrooms.

- 0094** PCR-based identification of potyviruses in infected abaca plants using codehop primers. Aquino, Vermando M., Ramirez, Katherine R.. **Transactions of the National Academy of Science and Technology**, , 33(1):48

The abaca fiber industry is one of the most lucrative businesses in the country since the Philippines supplies 84% of the total demand in the international market and earns US \$ 80 M annually. However, in recent years, the abaca industry suffers from severe infestations caused by different plant viruses. Most viral diseases are identified based on symptomatology alone. Most viruses belonging to the same family often show the same symptoms particularly the potyviruses. Infected leaf samples showing symptoms typical of bract mosaic infection were collected from Bicol and Davao were used in the study. A new approach was developed in the identification of potyviruses. CODEHOP or consensus degenerate hybrid oligonucleotide primer was designed based on the consensus sequence targeting the C-terminal half of the coat protein, which has the most conserved sequences in a potyviral genome. The CODEHOP forward was paired with a published degenerate N1 primer to specifically amplify the C-terminal half of whichever potyvirus present in the sample. The Bicol isolate produced a 700 bp amplicon while the Davao isolate produced an 800 bp amplicon. Both amplicons were cloned into PCR 2.1 cloning vector (Invitrogen) for sequencing. Sequences were analyzed using internet based programs, Blast and Multalin. Blast sequences revealed that Bicol isolate showed 98% identity with banana bract mosaic virus while Davao isolate showed 98% identity with sugarcane mosaic virus, recently identified as abaca mosaic virus. These results proved that even though both isolates were morphologically identified as bract mosaic, based on CODEHOP PCR, the two isolates, Bicol and Davao, were infected with two different viruses, banana bract mosaic virus and abaca mosaic virus respectively. **(Author's abstract)**

Abaca mosaic virus. Banana bract mosaic virus. CODEHOP. Coat protein. Potyvirus. Symptomatology. Agriculture.

- 0095** Phenotypic diversity in a population of rice black bugs, *Scotinophara molavica* (hemiptera: pentatomidae) from Buug, Zamboanga Sibugay, Philippines. Torres, Mark Anthony J., Figueras, Grayvmin S., Luceño, Aprille Joy M., Patiluna, Ma. Lotus E., Manting, Muhmin Michael E., Rampola, Rolliebert B., Joshi, Ravindra C., Barrion, Alberto T., Sebastian, Leocadio S., Demayo, Cesar G.. **Transactions of the National Academy of Science and Technology**, , 34(1):18

Rice black bugs (RBB) are believed to be a serious pest of rice infesting all growth stages of the plant. Different management approaches have already been applied to control and regulate populations of this pest. However, control efforts have been muddled by lack of understanding of the taxonomy of this insect resulting from immense intra- and inter-population diversity in phenotypic traits. Here, a total of thirty one traits were scored from an outbreak population consisting of one hundred and twenty female rice black bugs from Buug, Zamboanga Sibugay and analyzed using principal component analysis. Plots of the two principal components summarizing 68.8% of the total variation and subsequent K-means clustering showed that this population of RBB belong to at least four groups distributed as follows: group 1 – 14

individuals; group 2 – 12; group 3 – 60 and group 4 – 34. These individuals are polymorphic for nine traits only, specifically on the length of relative lengths of the Tylus and the Jugum, presence of Cicatrices humps, number of antennal segments, shape and reach of the Scutellum, Shape of the junction of vein R+M in the outer wing, number of closed marginal cells, 1number of ongitudinal veins below discal cell, and Proboscis reach. The importance of these traits to intra-population divergence and life history of the RBB has yet to be determined. Thus, further studies should be conducted to determine the genetic and functional bases of the observed diversity. This information is necessary for the proper formulation of management strategies for the control and regulation of populations of this insect. **(Author's abstract)**

Agriculture. Rice black bug. Phenotypic diversity. K-means clustering. Principal component analysis. *Scotinophara molavica*.

- 0096** Phenotypic variation in morphological traits, fruit, seed and oil of jatropha (*Jatropha curcas*) from three provenances. Vallesteros, Arvin P., Carandang, Wilfredo M., Galapia, Genevieve A.. **Transactions of the National Academy of Science and Technology**, , 33(1):24

Jatropha (*Jatropha curcas* L.) is a promising crop for large-scale production of biodiesel. In recent years, it has become a focus of research and development investments in many relevant government agencies and private companies in the Philippines. Heightened attention to jatropha was driven by the belief that it can be made to yield the desired quantity of product in marginal lands; and growing it in marginal lands would prevent the food and fuel competition. Widely distributed across the country, identification of provenances that will give higher seed yield and oil content is deemed necessary before large plantations are established.

Eight trees from each of the three provenances planted in Mt. Makiling in Los Baños, Laguna were selected from among the experimental plants to examine tree-to-tree variation. The provenances were Bacolod, South Cotabato, and Talisay.

Variability was large in all morphological traits, the highest being in length of unbranched stem (CV = 46.51%) and number of first order branches (CV = 33.72%). Seed yield was positively and significantly correlated with basal diameter, length of unbranched stem, and crown diameter.

Variability was small in fruit and seed traits. Crown diameter appeared to be a predictor ($P < 0.05$) of three seed size parameters, namely: length, breadth and thickness. Among the seed traits, seed length was significantly correlated ($r = 0.498$) with oil content. The oil content in kernel ranged from 41.40% to 59.26%). **(Author's abstract)**

Oil content. *Jatropha curcas* L.. Provenances. Agriculture.

- 0097** Plasma free insulin-like growth factor 1 (IGF-1) with the growth performance and scrotal lengths of landrace boars. Sangel, Percival P., Roxas, Ninfa P.. **Transactions of the National Academy of Science and Technology**, , 32(1):34

Insulin-like Growth Factor I (IGF-I) is a 7.6 kDa, 70 amino acid residue peptide hormone that has been shown to be involved in the metabolic regulation of growth and reproduction in livestock. The present study was undertaken to quantify the concentrations of plasma free IGF-I in growing Landrace boars and determine whether the plasma free IGF-I concentration can be used as a selection criterion for growth. A total of fourteen (n= 14) Landrace boars were bled, weighed and monitored for ADG, backfat thickness and scrotal length at 15 and 24 weeks of age. Plasma samples were extracted from the blood and plasma free IGF-I concentrations were measured using the DSL 10-9400 Active free IGF-I Enzyme-Linked Immunosorbent (ELISA) kit. Experimental Landrace boars data on live weight, ADG, backfat thickness and scrotal length were correlated with their levels of plasma free IGF-I.

This study has demonstrated a significant decrease ($P= 0.0001$) in the circulating plasma free IGF-I concentration of Landrace boars from 15 to 24 weeks of age. Furthermore, correlation of plasma free IGF-I concentration with growth traits showed a positive association with ADG ($r= 0.72575$) while negative associations were established with backfat thickness ($r= -0.41236$), scrotal length ($r= -0.700016$) and live weight ($r= -0.57916$). Results of this study suggest that circulating plasma free IGF-I is related to leaner body composition in swine. **(Author's abstract)**

Agriculture. Growth hormone. IGF-1. Landrace boar.

- 0098** Potassium and sodium uptake of corn (*Zea mays* L.) grown on saline soil. Descalsota, Jonathan C., Santos, Primitivo Jose A., Sanchez, Pearl B., Ocampo, Apolonio M., Sta Cruz, Pompe C.. **Transactions of the National Academy of Science and Technology**, , 34(1):30

Corn is considered as a moderately saline sensitive crop and there is a shifting interest to corn farming due to its high value and demand. However, in some areas identified to have saline soil, corn remains as one of the famous crop and one of the most practical way to minimize the adverse effect of this stress to corn is to grow tolerant varieties. A field experiment was conducted to evaluate the potassium and sodium uptake of three corn varieties grown on saline soil amended with additional potassium. The experiment was laid out in randomized complete block design with four replications and three varieties were used. Salinity severely affected the performance of the three corn varieties. IPB Composite 3, which was screened to be drought tolerant, showed better performance compared with the other varieties. Potassium uptake of IPB Composite 3 was also significantly higher compared to the other varieties while on the other hand sodium uptake of this variety was significantly lower. Na:K ratio of IPB Composite 3 was relatively lower compared to other varieties indicative of its inherent characteristics to be saline-tolerant. **(Author's abstract)**

Agriculture. Corn. Potassium. Sodium . Uptake. Salinity.

- 0099** Potential effects of using lemongrass oil on the growth of fungal pathogens attacking Gumamela. Pascual, Cecilia B., Valencia, Lolita DC., Castro, Sheryl D., Magdalita, Pablito M.. **Transactions of the National Academy of Science and Technology**, , 32(1):17

Lemongrass (*Cymbopogon citratus* Stapf.) locally known as 'tanglad' is an aromatic tropical plant native to Southeast Asia. It is abundant in the Philippines and believed to have a wide range of therapeutic effects. Fresh or dried leaves of lemongrass, and the essential oil derived from them, are used as a drug, effective as natural antibacterial, antifungal and antiseptic. Lemongrass oil ranging from 10, 20, 30, 50 ul was tested for its antifungal activity against *Colletotrichum* sp, *Fusarium* sp. and *Rhizoctonia* sp. isolated from *Hibiscus rosa-sinensis* *in vitro* and *in vivo*. The efficacy of the extracted oil was compared with benomyl. The *in vitro* assay showed that lemongrass oil, at different concentrations inhibited the mycelial growth of the three fungi. Complete inhibition was observed at higher concentrations (30-50 ul) of lemongrass oil. *In vivo* assay revealed that lemongrass oil suppressed disease development on inoculated plants and is comparable with the performance of the fungicide (benomyl), while the untreated check (sterile distilled water) exhibited typical infection. The bioactivity of essential oil in its vapor phase makes it a possible fumigant for crop protection. The present study presents lemongrass oil as a cost effective alternative to chemical fungicides. **(Author's abstract)**

Agriculture. Antifungal activity. *Colletotrichum* sp.. *Fusarium* sp.. *Hibiscus rosa-sinensis*. Lemongrass oil. *Rhizoctonia* sp..

- 0100** Predicting soil water retention curve using the extended nonlinear regression analysis. Alibuyog, Nathaniel R., Ella, Victor B., Paningbatan, Jr., Eduardo P.. **Transactions of the National Academy of Science and Technology**, , 32(1):4-5

Soil hydraulic characteristics, especially the soil water retention curve and hydraulic conductivity, are essential for many agricultural, environmental, and engineering applications. Their measurement is time consuming and thus costly. Hence, many researchers work on methods enabling their indirect estimation. In this paper, pedotransfer functions (PTFs) for predicting soil hydraulic properties from soil physical properties such as soil texture, bulk density and porosity were developed using linear regression (MLR5 and MLR 15) and extended nonlinear regression analyses (MNLR5 and MNLR15). Performance of the four PTFs in predicting soil water retention were compared.

Results showed the PTFs developed using the linear regression analysis did not perform well in predicting soil water retention. However, adjusting their regression coefficients using the extended nonlinear regression through a global optimization approach significantly improved their performance over their linear versions. The coefficient of efficiency (EF) of the nonlinear models, MNLR5 and MNLR15, increased by about 117% and 134% compared to linear version, resulting in an EF of 0.26 and 0.35, respectively. Furthermore, after adjusting the coefficients of the two linear models, the performance of MNLR5 and MNLR15 were comparable. This makes MNLR5 preferable as it requires fewer input variables and less prone to multicollinearity problems.

We conclude that the soil hydraulic properties can be predicted from soil physical properties through the use of pedotransfer functions. The use of nonlinear regression analysis with global optimization algorithm of the defined objective functions proves to be a useful tool and is comparable in developing pedotransfer functions. These PTFs may provide improved relationships for estimating water retention curves of Philippine soils from soil texture and related soil properties. **(Author's abstract)**

Agriculture. Hydraulic properties. Nonlinear regression. Pedotransfer.

- 0101** A pre-harvest 1-methylcyclopropene (1-MCP) aqueous spray formulation to delay ripening of mango (*Mangifera indica* L. cv. 'carabao'). Castillo-Israel, Katherine Ann T., Esguerra, Elda B., Merca, Florinia E., Serrano, Edralina P., Sabularse, Veronica C.. **Transactions of the National Academy of Science and Technology**, , 34(1):31

A pre-harvest 1-methylcyclopropene (1-MCP) aqueous spray was applied to mangoes to determine whether it could effectively control ethylene responses. Mango produces two ethylene peaks, the first of which occurs at about 10 days before harvest maturity. 1-MCP at 0, 10, 20 and 30 ppm was sprayed to mangoes at 90, 100 and 110 days after flower induction (DAFI). Fruits were harvested at 117 DAFI, stored at 12.5°C and ripening parameters were monitored. CO₂ production peak was delayed for 7d in the 1-MCP treatments at 100 DAFI with 10 ppm having the lowest CO₂ production. Ethylene production was lower for 10ppm 1-MCP treatment at 100DAFI compared with the control. Significantly higher firmness, delayed peel color development, decline in visual quality and slower disease development was also observed with this treatment. 1-MCP was found to be effective as a pre-harvest spray when applied at 100 DAFI. At this stage, sufficient ethylene receptors are already present in tissues but the upsurge in ethylene production pre-harvest has not yet occurred. 1-MCP was proven effective because it was able to bind to the ethylene receptors which are mostly unbound to ethylene. The 1-MCP concentration of 10ppm was enough to saturate the receptors and further increase in concentration would not elicit a more favorable response. A pre-harvest aqueous spray formulation of 10 ppm 1-MCP applied at 100 DAFI was proven effective to delay the ripening of mango. This is the first study, to the best of our knowledge, on a pre-harvest 1-MCP aqueous spray application on 'Carabao' mango. **(Author's abstract)**

Agriculture. 1-methylcyclopropene. "Carabao" mango. Pre-harvest spray. Delayed ripening. Aqueous spray.

- 0102** Preliminary study on integrated management practices for the control of dryness appearance of young nuts and immature bud drop of coconut in Bangladesh. Ali, R., Ahmed, M.F., Rafiuddin, M., Islam, M.I., Hossain, M.A., Hossain, M.F., Islam, M.N.. **The Philippine Journal of Coconut Studies**, , 33(2):64-69

An investigation was carried out at the Regional Agricultural Research Station (RARS), Bangladesh Agricultural Research Institute (BARI), Jessore during the period of May 2006 to May 2008 to control distortion and immature bud drop. Two experiments were designed to achieve the objectives. Foliar application of Oomite (miticide) and soil application of boron (in the form of boric acid) at different doses were used in first experiment while Oomite in second experiment was applied at different doses followed by removing of infected nuts and inflorescence. Application of boron could not cure the dryness appearance of pericarp but improve the skin color of immature nut. Based on the results of the 1st experiment, palms when treated with 0.2% Oomite after removing of newly born inflorescences as well as infected young nuts, no infections were noticed in subsequent bunches. **(Author's abstract)**

Agriculture. young coconuts. coconut. RARS. Oomite. inflorescences.

- 0103** Proportion of phosphorus, potassium, zinc and molybdenum in relation to corn (*Zea mays* L.) growth on limestone-derived soils.. Samonte, Henry P., Ocampo, Apolonio M.. **Transactions of the National Academy of Science and Technology**, , 33(1):17

Limestone-derived soils or calcareous soils contain high amounts of CaCO_3 that effervesce when treated with 0.1 N HCl and which inherently possess several nutritional problems. Such unique chemical condition makes it one of the problem soils that generally have very low productivity. But the need to produce more food because of the increase in population coupled with the reduction of arable land per person makes it necessary to utilize these soils more effectively and efficiently.

This study was conducted to evaluate the physical and chemical attributes related to nutritional problems of corn on a CaCO_3 -derived soil and quantify the specific limitations and possible corrections.

A field experiment on the effect of fertilization, quantities and balances of phosphorus, potassium, zinc and molybdenum on the yield of corn on a limestone-derived soil from El Salvador, Misamis Oriental was conducted.

The pH of the surface and subsoil of the Bolinao clay were strongly acidic and moderately acidic, respectively, while the C horizon was alkaline. Free CaCO_3 was low in Bolinao clay especially at the solum which refers to the A (top soil) and B (subsoil) horizons (or zone of soil development) and does not include the C horizon. The surface soils were low in P and organic matter.

On a very weak calcareous Bolinao clay, corn responded only to P fertilization up to 120 kg P_2O_5 /ha. There were no significant yield increments attributed to K, Zn and Mo applications indicating that 0.8 meq K/100g and 10.9 ppm Zn were sufficient. The corresponding proportion of K on the exchange site was 1.6% which produces Ca/K ratio of 20.5. High grain yields were associated with 0.29% P and 2.0% K in the earleaf. The corresponding nutrient proportions were 6.7 to 7.5 for K/Ca and 5 for K/Mg. Contrary to some results, Zn concentration in the earleaf, stover and grains increased as more P was applied. **(Author's abstract)**

Fertilization. Problem soil. Calcareous soils. Limestone. Corn. Agriculture.

- 0104** *PWT3-Rwt3* interaction ubiquitously involved in the incompatibility between an *Avena* isolate of *Magnaporthe oryzae* and cereals. Tosa, Yukio, Cumagun, Christian Joseph R.. **Transactions of the National Academy of Science and Technology**, , 33(1):37

~~~~~ *Pwt3* (pathogenicity to wheat) is a locus conditioning the specificity of *Avena/Triticum* isolates of *Magnaporthe oryzae* on wheat identified among  $F_1$  progeny derived from parent cross between an *Avena* isolates carrying the avirulence allele PWT3 and a *Triticum* isolate carrying the virulence allele pwt3. To confirm the monofactorial segregation of PWT3 an  $F_1$  culture was backcrossed with the *Triticum*

isolates four times producing near isogenic lines of the *Triticum* isolate carrying *PWT3*. Several hexaploid and tetraploid wheat cultivars including barley inoculated with two parental isolates and a near isogenic line of *Triticum* isolate responded to *PWT3*. Representative cultivars of hexaploid and tetraploid wheat cultivars inoculated with 31 BC<sub>4</sub>F<sub>1</sub> cultures were resistant to all *PWT3* carries and susceptible to all *pwt3* carriers, suggesting that they recognize *PWT3*. Resistance gene *Rwt3* corresponding to *PWT3* was identified in wheat cultivars including a resistance gene in barley which may correspond to *PWT3*. These results suggest that *PWT3* could be ubiquitously involve in the avirulence of the *Avena* isolate on wheat and barley because of the possible ubiquitous distribution of *Rwt3* on these cereals. *PWT3* locus was mapped on chromosome 6 using SSR markers providing a starting point for cloning of this gene. **(Author's abstract)**

Wheat blast. Resistance gene. Magnaporthe oryzae. Gene-for-gene interaction. Agriculture. Avirulence gene.

- 0105** Scaling up of SSNM maize technology for wider adoption in the Philippines. Ocampo, Apolonio M., Labios, Jocelyn D., Labios, Romeo V., Pasuquin, Julie Mae, Pampolino, Mirasol. **Transactions of the National Academy of Science and Technology**, , 34(1):7

The Site-Specific Nutrient Management for Hybrid Maize (SSNM Maize) Technology was developed for the Philippines through collaborative research in 3 key maize areas in 2005-2008. Using the same approach, wider scale on-farm trials (OFT) were conducted in key sites in sixteen regions from 2008 to 2010 with the goal of improving productivity and profitability in wider maize areas in the country. Through OFTs the project was able to a) quantify maize yield gaps, b) quantify attainable yield and yield responses to fertilizer NPK, c) evaluate the agronomic and economic performance of SSNM, and d) estimate the contribution of Bio-N and organic matter application. Results showed that there are significant opportunities for increasing maize production, where the yield gap between farmers' yield and attainable yield is 2.1 t ha<sup>-1</sup>. Research data showed that the national average yield is lower than that obtained by progressive farmers and that there is a wide range of attainable yield obtained across regions. Field results likewise showed that Bio-N and organic fertilizers can substitute 23 kg N/ha of total N requirement of maize and are more effective when combined with inorganic fertilizer. Farmer participatory evaluation (FPEs) was done in some sites in 2010-2011 dry and 2011 wet season involving more farmers and with bigger plot sizes. The Nutrient Expert for Hybrid Maize™, a decision support software developed by the International Plant Nutrition Institute (IPNI), and the Quick Guides for fertilizing maize in large areas, developed through the project, are two significant outputs of the SSNM Maize activities in the Philippines and are planned for wider dissemination. **(Author's abstract)**

Agriculture. Maize. Site-specific nutrient management. SSNM maize technology. Bio-N. Nutrient expert for hybrid maize.

- 0106** Screening of plant growth-promoting bacteria (PGPB) for acid tolerance. Valdez, Lowela C., Fernando, Lilia M., Sutare, Alodia I., Paterno, Erlinda S.. **Transactions of the National Academy of Science and Technology**, , 32(1):27

PGPB have been shown to enhance productivity in non-acid soils. Very few studies on the effectiveness of PGPB in acid soils have been done. This study was conducted to determine the survival and auxin production of the acid tolerant PGPB 24 and the non-acid tolerant PGPB 6 in acidic liquid medium and in acid soil and their effectiveness in acid soil using corn (*Zea mays* L.) as test crop. Acid tolerant IPB Var1 and acid intolerant Arkansas SWCB-Syn 1 were the cultivars used.

In liquid medium, PGPB 24 showed better survival than PGPB 6 at pH 4.7 and pH 7.0. Auxin production by PGPB 24 was also higher than PGPB 6 at both pH values. PGPB 24 showed better survival in both acid and non-acid soils.

Auxin production by PGPB 6 and PGPB 24 at 14 days was 831 ppm and 698 ppm, respectively. In the acid soil, the amount of auxin produced fluctuated. Higher auxin production was observed in non-acid soil for both PGPB 24 and PGPB 6.

The test for effectiveness revealed that, regardless of cultivar, the acid tolerant PGPB 24 performed better than the non-acid tolerant PGPB 6 in acid soil (pH 4.8) in terms of number of roots, available P in the soil and N uptake of the shoot. On the other hand, PGPB 6 had better N and P uptake than PGPB 24 in non-acid soil (pH 6.8). These observations indicate that the acid tolerant PGPB 24 performed better than the acid intolerant PGPB 6 in acidic soil (pH 4.8).

There was a significant influence of the interaction between cultivar and inoculation on the N, P, and K content of roots at 7 weeks after planting. These observations seem to indicate a better affinity of the acid tolerant PGPB with the acid tolerant cultivar. **(Author's abstract)**

Agriculture. Acid tolerance. Auxin. Corn. Inoculation. PGPB. Plant growth promoting bacteria.

- 0107** Single nucleotide polymorphisms in the water buffalo (*Bubalus bubalis*) leptin gene associated with high milk yield with implications to the Philippine Carabao Center's dairy buffalo breeding program. Herrera, Jesus Rommel V., Villanueva, Amie S., Maramba, Jennifer F., Flores, Ester B.. **Transactions of the National Academy of Science and Technology**, , 34(1):10

Traditional selection of dairy buffalo cows involves collecting milk performance data for 2-3 lactations and ranking them based on the milk production, taking 6-7 years to identify a good milker. In the case of bulls, milk performance data of daughters are evaluated to identify animals with high genetic merit, taking around 8 years. Using available performance records coupled with single nucleotide polymorphisms (SNPs) associated with milk production traits, identification of good dairy animals can be dramatically shortened while increasing the accuracy of selection. This study aimed to identify potential SNPs of the water buffalo leptin gene that are associated with milk yield and milk component traits. Deoxyribonucleic acid (DNA) samples of buffalo cows with milk performance data were used in the study. Since the buffalo genome has not yet been sequenced, primers used to amplify the coding regions were based on the gene sequence of cattle. Association studies revealed that animals with the 'CC' and 'CT' genotypes have statistically higher milk yield compared with animals carrying the 'TT' genotype. SNPs associated with milk yield and milk component traits will be used as a selection tool in conjunction with Best Linear Unbiased Prediction (BLUP).

Pre-selection of young bulls carrying the favourable genotype can reduce the number of bulls entering the progeny testing program, thus, lowering the cost of running the program. Moreover, potentially good replacement heifers can be selected by genotyping even at a young age, thus, shortening the generation interval. **(Author's abstract)**

Agriculture. Water buffalo. Milk production. Leptin. DNA . SNP. Breeding program.

- 0108** Soybean breeding at Central Mindanao University for high seed protein and seed yield. Jamago, Joy M., Tinhay, Rush A., Villanueva, Mitchel G., Ramirez, Hope T., Gabisay, Grace Glend R.. **Transactions of the National Academy of Science and Technology**, , 34(1):5

Soybean is largely consumed in the country in various ways but mainly as animal feed but local production is very inadequate. Importation of soybean meal, oil and other products has increased through the years. Currently, there are few outstanding soybean varieties developed in the Philippines and breeding efforts have declined. Availability of high-yielding (HY) and high-protein (HP) cultivars could encourage local production, since on average Philippine varieties have about 33% protein. Soybean breeding at CMU commenced in 2008. Seed yield and protein concentration are generally negatively correlated but Jamago and Nelson's (2007) protocol had been promising in hurdling this breeding bottleneck, and was employed for this study. Using locally available germplasm, 22  $F_2$  populations were developed in 2009. In 2010, selections were made at the  $F_2$  based on stand, maturity, pods per plant, and overall morphology. A total of 370  $F_2$  selections were evaluated for yield in 2011 as  $F_{2:3}$  families with PSB Sy2 as check. Days to flowering, maturity, plant height, lodging score at maturity, 100 seed weight, seed yield, and crude protein concentration (CPC), among others were measured. Mean CPC of  $F_{2:3}$  lines ranged from 34.66% to 47.34% ( $F_3$  NSIC Sy8 x PSB Sy2). PSB Sy2 had 40.77% CPC. All lines with CPC either higher or comparable to PSB Sy2 will be advanced as HP populations from whence lines variable for yield may be selected. Desirable HP and HY lines are hoped to be identified in the  $F_5$  or  $F_6$  generation. **(Author's abstract)**

Agriculture. Soybean. Glycine max. Soybean breeding. Seed protein concentration. Seed yield. Central Mindanao University. CMU.

- 0109** Stability of protein expression in  $BC_2F_1$  generation of fruit and shoot borer-resistant eggplant. Ripalda, Roanne R., Canama, Alma O., Hautea, Desiree M.. **Transactions of the National Academy of Science and Technology**, , 32(1):12

The eggplant fruit and shoot borer (*Leucinodes orbonalis* Guen.) remains as one of the major factors that limits the productivity and profitability of eggplant production in the country. With the aid of genetic engineering and *Bacillus thuringiensis* (Bt) technology, a highly but selectively resistant event of eggplant was produced and subsequently chosen as a donor parent in a local breeding program that uses conventional backcross breeding method. Currently, multi-location trials are about to be conducted.

The Department of Agriculture mandates the establishment of proof of stable protein expression for genetically-modified crops before approval for multi-location trials could be released. One proof for stability of protein expression is the presence of the transgenic protein throughout the growth and development stages of the genetically-modified crop. Hence, protein expression in the terminal leaf of backcross-derived population of eggplant grown in the greenhouse specifically in the BC2F1 generation was analyzed using quantitative enzyme-linked immunosorbent assay (ELISA).

Expression of Cry1Ac protein in terminal leaf tissue sample during vegetative, early reproductive and late reproductive stages fluctuated in the course of eggplant growth and development. Mean Cry1Ac protein concentration in BC2F1 DLP x EE-1 was 24.53 ppm in the vegetative stage, 11.91 ppm in the early reproductive stage and 12.23 ppm in the late reproductive stage. Mean Cry1Ac concentration in BC2F1 Mara x EE-1 was 15.89 ppm, 20.24 ppm, and 17.83 ppm in the respective stages. A significant difference in Cry1Ac protein expression was observed in the two crosses: DLP x EE-1 and Mara x EE-1, which emphasizes the importance of parental background in Cry1Ac protein expression. **(Author's abstract)**

Agriculture. Bt technology. Cry1 Ac protein. Eggplant fruit and shoot borer. Quantitative ELISA. Transgenic eggplant.

- 0110** Submergence screening of introgression lines preselected for stress tolerance using phenotypic and molecular approaches. Elec, Venus, Zamora, Chenie, Francisco, Anchilie, Mendoza, Lolita, Ali, Jauhar, Li, Zhikang. **Transactions of the National Academy of Science and Technology**, , 32(1):9

Global climate change has exerted an increasing pressure on crop production in recent years, as it is associated with a range of biotic and abiotic stress factors that limit crop yields. In order to sustain rice sufficiency, plant breeders have utilized several strategies in enhancing the tolerance and resistance of rice to several stresses. A total of 115 BC<sub>1</sub>F<sub>4</sub> derived from a cross between Huang Hua Zhan (HHZ) and OM 1723 was screened for submergence in a concrete tank, during the 2009 wet season. These materials were first separately raised under 3 stress conditions (irrigated, drought and salinity) during the early generation backcross. Germinated seeds of each line were sown on trays, grown for two weeks and submerged for 14 days. IR49830 and IR42 served as tolerant and susceptible checks, respectively. Percentage survival was determined and submergence tolerant lines were identified and characterized. Variation in response to submergence stress was observed among the 115 lines. About 54 lines (47%) showed higher survival rate than the recurrent parent, HHZ. A total of 7 lines were identified to have a higher survival rate than the tolerant check. All these lines were pre-selected from irrigated condition in the early generation. Molecular characterization was also done using 60 polymorphic markers from a total of 500+ SSR markers. These markers had determined the introgression of the favorable segments from OM 1723 regions using GGT software. With this breeding approach we have also identified lines that were showing multiple abiotic tolerances. However, such lines will be carefully used in designed QTL pyramiding approach of pooling more of the favorable chromosomal segments into elite high yielding backgrounds. By doing so, we can breed varieties that are not only submergence tolerant but also exhibit drought and salinity tolerance. **(Author's abstract)**

Agriculture. Backcross introgression. QTL. Rice. Submergence.

- 0111** The susceptibility of the lacewing butterfly, *Cethosia biblis insularis* C & R felder (Nymphalidae:Lepidoptera) to cry 1 AB protein. Ardes, Karen, Belen, Josemari M., Sumalde, Augusto P., Siegfried, Blair D., Cuaterno, Wilma R., Gonzales, Pablito G., Alcantara, Edwin P., Cayabyab, Bonifacio F.. **Transactions of the National Academy of Science and Technology**, , 33(1):34

There are very few studies in the Philippines related to the risk assessment of Bt corn to non target organisms. The lacewing butterfly, *Cethosia biblis insularis* C & R Felder is a non target organism and an uncommon butterfly present in riparian areas (land immediately surrounding water source) where Bt corn is planted. It feeds on flowers where Bt corn pollen are deposited during pollen shedding. This study was conducted at NCP-CPC Plant Quarantine Support Laboratory from January 2009 to May 2010 to find out the effect of Cry 1 Ab protein on the Lacewing butterfly.

Bioassay using the maximum hazard dose (i.e. approximately 10x the maximum Cry 1 Ab protein in Bt corn) was done. The estimated amount of Cry 1Ab protein in Bt corn pollen is 0.09 mg/g pollen. Whole leaves of *Adenia zucca*, the host plant of lacewing butterfly were soaked in Cry 1 Ab protein and air dried. Another set of leaves were dipped in 0.1 M carbonated buffer and these served as control group. Ten three day-old larvae were exposed per leaf. Nine trials or 450 treated larvae and 450 non-treated larvae were done. The percentage mortality range for the treated group was 0-10% with a mean of 3.11%. The percentage mortality range for the control group was 0-14% with a mean of 1.56%. The range of weight in grams of the treated group was 0.016-0.053 with a mean of 0.033, respectively. Differences on mean mortality and mean weight of treated control leaves using t-test with computed values of 0.704 and 0.315 were not significant. Hence, the Cry 1 Ab protein was not toxic to the lacewing butterfly. **(Author's abstract)**

Lepidoptera. Susceptibility. Butterfly. Lacewing. Cry 1Ab protein. Agriculture.

- 0112** Tapping of pili (*Canarium ovatum* Engl.) for sustained resin yield. Garcia, Esteven D., Domingo, Emmanuel P., Ella, Arsenio B.. **Transactions of the National Academy of Science and Technology**, , 33(1):22

This study is a combination of R&D and techno-transfer activities on the improved tapping of pili (*Canarium ovatum* Engl.) in the Bicol Region.

The effect of tapping length, ethylene concentration and rainfall on resin yield was determined by tapping 36 pili trees growing in Barangay Calomagon, Bulan, Sorsogon. The study used three tapping lengths (15 cm, 20 cm and 30 cm) at the same width (2 cm) and same depth (enough not to reach the cambium) and four levels of ethylene application using the brand name "ethrel" at 0%; 0.5%; 1.5%; and 2.5% concentrations. Retapping after the weekly resin harvest was done immediately above the previous cut. Each treatment was replicated thrice.

Increasing tapping length increased resin yield with 30 cm giving the highest yield. Ethrel concentration likewise affected resin yield which was highest at 2.5%, while monthly rainfall did not.

The development of *Canarium* resin tapping as an alternative source of livelihood option for farmers and pili growers will rely on the following identified strengths: a) supply of resin is expected to be plenty as evidenced by the tremendous number of *Canarium* trees growing in the area and resin yield collected in this study following FPRDI tapping techniques and b) concerned farmers and pili growers have been trained on proper methods of *Canarium* resin tapping.

Further, resin yield of trees with ethrel application increase by 37.5%, thus additional revenue income for farmers and resin tappers.

The farmers' active participation in the seminar/training was evident following the correct tapping procedures. The technology's adaptability may indicate a bright and sustainable *Canarium* resin production in the entire province of Sorsogon. **(Author's abstract)**

Rainfall. Ethylene concentration. Tapping length. Sorsogon. Bicol. Resin tapping. Manila elemi. Pili. *Canarium* trees. Agriculture.

- 0113** Towards marker-assisted introgression of downy mildew resistance in targeted maize breeding lines. Canama, Alma O., Malijan, Arma Kristal B., Mangiat, Proceso H., Galvez, Hayde F., Hautea, Desiree M.. **Transactions of the National Academy of Science and Technology**, 32(1):6

Downy mildew (DM) disease caused by *Peronosclerospora philippinensis* Weston (Shaw) seriously reduces corn production and yield in the Philippines and other Asian countries. Despite breakthroughs in chemical control such as metalaxyl seed treatment, the use of resistant maize varieties still remain as the most economical and effective control strategy. Current breeding efforts are now geared towards incorporating downy mildew resistance (DMR) through marker-assisted selection to targeted maize breeding lines to produce outstanding maize lines with improved host resistance and ready for commercial use.

Promising inbred lines, B012 and C01 identified as highly resistant to maize DM were selected as donor of resistance. maize inbred lines with desirable traits such as good combining ability and high yielding qualities but have differential reaction to DM, were selected as recipient parental inbred lines. The selected parental inbred lines include A01, D17, E31, F12, and HJ12. Using previously identified simple sequence repeat (SSR) markers that represent the ten chromosomes of maize, individual plant purity testing of the parental lines was done before selecting the homozygous plants that were used in hybridization.

The hybridization crosses produced a total of 54 F<sub>1</sub> hybrids generated from the 10 crosses made between the ten donor lines and five recipient parental inbred lines. The desired traits of both parental inbred lines are expected to be exhibited by the F<sub>1</sub> hybrids. Heterosis or increased vigor is the primary phenomenon to be achieved by hybridization. Hybridity testing and DM evaluation of the F<sub>1</sub> hybrids from the ten crosses is underway. The selected hybrids can be used as potential maize lines for future breeding strategies to be conducted such as backcrossing and gene fixation.

**(Author's abstract)**

Agriculture. DMR. Hybridity testing. Introgression. MAS. SSR.

- 0114** Upland rice landraces and traditional varieties of Bukidnon. Cortes, Rosemarie V., Jamago, Joy M.. **Transactions of the National Academy of Science and Technology**, , 34(1):4

Enhancing upland rice production is one of the small solutions to help achieve rice sufficiency in the country. Or, even if to just alleviate poverty in the upland agro-ecosystems. Improved genotypes contribute to this goal at a relatively low cost to farmers. This study determined the availability of upland rice landraces and traditional varieties (URLTVs) in selected areas in Bukidnon, estimated the diversity of available genotypes, and documented their use and importance. Twenty-four barangays from 10 municipalities and 2 cities were surveyed from November 2010 to May 2011. Interviews (n=45), seed sourcing, and evaluation of 13 seed traits were done. A total of 140 URLTVs were collected, of which 66 were from Barangay Matupe, San Fernando. Overall, 82 URLTVs (59%) were sourced from San Fernando, whose peoples were mostly of the Matigsalug tribe. As per ANOVA, lemma and palea color (LPC), caryopsis: pericarp color, and lemma: apiculus color (LAC) were variable among municipalities/cities. However, as per SWDI, 100 seed weight, grain length and width, grain thickness, caryopsis length and width, and LAC showed high diversity ( $H' = 0.76$  to  $0.88$ ). Thirteen significant associations among seed traits with  $r > 0.50$  were noted. The URLTVs were grown for household consumption, church offering, food for special occasions, and to reduce chemical inputs. For the Matigsalugs, their URLTVs serve to strengthen their cultural beliefs and are trademarks for their tribal group. Further collection from other areas of Bukidnon needs to be done to ascertain the available germplasm and the threats to these plant genetic resources. **(Author's abstract)**

Agriculture. Upland rice. *Oryza sativa*. Landraces. Traditional varieties. Bukidnon. Plant genetic resources. Food security. Genetic diversity.

- 0115** The UPLB mini-hand tractor. Pangan, Ronel S.. **Philippine Agricultural Mechanization Bulletin**, , 10(2):23-26

Hand tractors or what is known as power tillers have been used instead of carabaos in lowland and upland rice farming. Most upland tractors that are available in the market, however, are expensive that the Agricultural Mechanization Development Program of University of the Philippines Los Baños had developed a hand tractor, which even the small scale farmers can use in planting "high value crops." This UPLB fabricated mini-hand tractor that can be easily fabricated since the materials used are locally available. Among the features of this mini-hand tractor are its lightness and affordability. The machine has undergone preliminary testing and it found that it can plow "a fourth of a hectare in a day in upland conditions." The machine has yet to undergo further testing to be conducted in various farmers' fields to evaluate its performance.

Agriculture.

- 0116** Use of rice bran and vermicompost as supplemental feeds for Nile tilapia (*Oreochromis niloticus*) fingerlings in aquaria. Guerrero, III, Rafael D., Guerrero, Luzviminda A.. **Transactions of the National Academy of Science and Technology**, , 32(1):37-38

Rice bran is the most commonly used supplemental feed for the Nile tilapia (*O. niloticus*) in the Philippines. In China, vermicompost, the organic material produced with the culture of earthworms has been found to be useful as a supplemental feed for fish in the Philippines.

To test the efficacy of vermicompost produced with the "African night crawler" (*Eudrilus eugeniae*) from dried tree leaves, two feedings trials on Nile tilapia fingerlings in aquaria were conducted. In Trial 1, unfermented rice bran (D2) only (Control), 80% unfermented rice bran + 20% vermicompost (Treatment I) and 80% fermented rice bran + 20% vermicompost (Treatment II) were fed to the fingerlings which were stocked at a density of 10 per aquarium with three replicates per treatment. In Trial 2, fermented rice bran only (Control), 75% fermented rice bran + 25% vermicompost (Treatment I) and 50% fermented rice bran + 50% vermicompost (Treatment II) were fed to the fish with the same design as in Trial 2. The feeding period was two weeks for each trial.

Trial 1 showed that the fish fed with Treatment II had the mean net gain in weight which was significantly higher than those of the Control and Treatment I. In Trial 2, the mean net gain in weight of the fish fed with Treatment I was significantly higher than those of the Control and Treatment II.

Proximate analyses of the supplemental feeds used indicated that fermented rice bran was comparable with unfermented rice bran in terms of crude protein, crude fat and ash but was slightly lower in terms of crude fiber and higher in carbohydrates. Vermicompost, on the other hand, was higher in crude protein and ash compared to rice bran but lower in crude fat, crude fiber and carbohydrates. Survival rates of the fish in all treatments of Trial 1 was 100%, but it was only 93% in the Control and Treatment I and 87% in Treatment II of Trial 2.

We conclude that the use of 80% fermented rice bran + 20% vermicompost gives better growth of the fish than use of unfermented rice bran whether singly or in combination with vermicompost. Use of vermicompost as supplemental feed up to 25% replacement for fermented rice bran is more efficient than use of fermented rice bran alone or a combination of 50% fermented rice bran and 50% vermicompost.

Further studies to verify the result of the abovementioned trials are recommended.  
**(Author's abstract)**

Agriculture. Nile tilapia. Supplemental feeds. Rice bran. Vermicompost.

- 0117** Variability in forewing venation patterns and genital shapes among four populations of rice black bugs, *Scotinophara coarctata* (Fabricius) from Mindanao, Philippines. Torres, Mark Anthony J., Yañez, Geoffrey Reuel Q., Mahinay, Christine Lovelle A., Ong, Gerald Manuel P., Esencia, Jay Ar O., Martinez, Joey Genevieve T., Tabugo, Sharon Rose M., Adamat, Liza A., Manting,

Muhmin Michael E., Joshi, Ravindra C., Barrion, Alberto T., Sebastian, Leocadio S., Demayo, Cesar G.. **Transactions of the National Academy of Science and Technology**, , 33(1):123

Rice Black Bugs are small, cryptic, and highly invasive pest species attacking all growth stages of the rice plant. This pest is extremely variable in morphology resulting to problems in its taxonomy. The present study reports on variability in wing venation patterns and genital plates among four populations of RBBs comprised of 1,1149 males and 1,164 females from Tacurong, Sultan Kudarat (44M, 45F), Lala, Lanao del Norte (132F, 102M), Sta. Josefa, Agusan del Sur (216M, 216F) and Kabacan, North Cotabato (150F, 150M).

Results showed immense inter-individual variability in venation patterns among the populations. The most important variations are in the type and number of marginal cells on the anterior distad part of the wing. The marginal cells are either closed or open and vary in number from 1-6. Geometric Morphometric analyses revealed considerable differences in the shapes of the genital plates of both sexes (@&: Wilk's Lambda: 0.0005, P: <0.000; B&: Wilk's Lambda: 0.0009, P: <0.000). Results showed differences in the concavity of the anterior and postero-lateral margins of the genital plates. The results of the current study may indicate possible genetic differentiation. Such variability may have direct bearing on the management of the RBB as a pest of rice agroecosystem. **(Author's abstract)**

Agriculture. Scotinophara spp.. Rice black bug. Relative warp analysis. Geometric morphometrics. Wing venation pattern. Genital plates.

- 0118** Variation in physiology and water use efficiency among *Musa balbisiana* genotypes in response to drought. Molina, Agustin B., dela Cruz, Felipe S., Gueco, Lavernee S., Dinglasan, Eric G., Herradura, Lorna E., Damasco, Olivia P., dela Cueva, Fe M., Ocampo, Eureka Teresa M., Delfin, Evelyn F.. **Transactions of the National Academy of Science and Technology**, , 33(1):26

*Musa balbisiana* genotypes are reported to have traits that confer field drought tolerance. However, the natural variation in these traits is relatively unknown, and therefore cannot be exploited in breeding programs. This paper reports on the variation of the effects of drought on the growth and physiology of twenty-nine wild and edible *M.balbisiana* genotypes from the Philippine and Southeast Asian germplasm collection.

Two batches of tissue-culture derived seedlings were potted out and established in the greenhouse from March to May 2010. Drought was imposed after three months. Pots were weighed at soil field capacity and periodically during progressive drought. Stomatal conductance determination showed that stomatal openings closed on the third and sixth day after water was withheld in April and May 2010, respectively. The stomatal conductance was significantly affected by the interaction between genotype and stress condition.

Water use efficiency (WUE) differed significantly among genotypes during drought, which ranged from 8.9 to 19 g dry matter kg<sup>-1</sup> water used. Genotypic differences in relative water content (RWC) were observed in April 2010 trial, but not in May 2010 when temperatures were much higher. RWC ranged from 80-96% even when leaves were already wilted. Genotypic variation in plant and root growth and accumulation of

dry matter were also observed. **(Author's abstract)**

Stomatal conductance. Physiology. Water use efficiency. Musa. Banana drought. Agriculture.

- 0119** Variations among populations of the bean podborer *Maruca vitrata* (Fabricius) (Lepidoptera:Crambidae) in the Philippines. Sison, Maria Luz J., Adalla, Candida B., Barrion, Adelina A., Cervancia, Cleofas R., Medina, Jose R.. **Transactions of the National Academy of Science and Technology**, , 32(1):19

The bean podborer *Maruca vitrata* (Fabricius) is a major insect pest of grain and vegetable legumes in the tropics and temperate regions of the world. It shows a wide host range and geographical distribution indicating the possibility of genetic variation in *Maruca vitrata* populations.

In this study, podborers were collected from cowpea, pole sitao, mungbean and snap beans in eight bean growing sites in the Philippines. The genetic variations among populations of *M. vitrata* sampled from Isabela (Ilagan), Benguet (Tublay and La Trinidad), Nueva Ecija (Valdefuente), Laguna (Bay), Palawan (Puerto Princesa), Aklan (Julita, Libacao) and Davao (Pagsabangan, Tagum City) were determined, described and compared. The optimized protocol originally used for *H. armigera* was used for DNA isolation in *M. vitrata*. The mitochondrial cytochrome oxidase II (COII) genes from the eight populations were sequenced. The observed sequence divergences of 0.16% - 0.83% showed that the seven populations were closely related to each other. They significantly diverged from the Laguna population. The high divergence between Laguna and the other populations is comparable to those between recognized biotypes in other Lepidoptera species. The nucleotide composition of the different sequences showed a high A-T content (81%) compared to C - G richness, which is typical of other insect species. The results obtained suggest that COII sequence is a suitable basis for inferring phylogenetic relationships in *M. vitrata*. The restriction enzyme digestion by *MseI* resulted to a single polymorphic DNA pattern. The polymorphic band with the fragment size of 257 bp was observed in two populations of Benguet, Nueva Ecija, and Isabela but none in Davao and Laguna. There was no DNA pattern observed on the two populations from Aklan and Palawan. **(Author's abstract)**

Agriculture. Cytochrome oxidase. Genetic variation. *Maruca vitrata*. Polymorphism.

- 0120** VAST-Agro. Garcia, Jose Nestor M., Wagan, Amparo M.. **Transactions of the National Academy of Science and Technology**, , 33(1):62

Vulnerability and adaptive capacity assessment is a necessary step prior to planning, implementation and prioritization of responses to changing climate. Often results of global and regional assessments are not appropriate for the local level thus requires a local-level assessment for a more focused and realistic adaptation measures, particularly for the agriculture sector, which is not highlighted in any of the available hazard assessment procedures. This paper aims to present a structured approach to vulnerability assessment specific for the Philippine agricultural systems at

the local level. Available hazard assessment procedures were reviewed and examined in terms of their purpose, framework, methods, agriculture-related data and applicability to agriculture areas facing climate change. Based on the concept that vulnerability to climate change is the interaction of exposure to climate change-related hazards and their potential impacts as determined by sensitivity and adaptive capacity, a stepwise procedure was designed for understanding the local situation, describing the climate-related hazards, describing vulnerabilities, capacities and local adoption measures. Climate-related and agriculture indicators were identified to describe exposure of the production systems and the farming communities to hazards, sensitivity of the system and the communities to the said hazards like high risks areas, vulnerable farming system and groups, preparedness and adaptive capacity of the farming communities including physical, economic and technological adaption capacities. As a community-led vulnerability assessment, an instrument was devised requiring data collection techniques involving community participation as well as integration of science, technical and local knowledge. A test of the methodology in the upland areas provided outputs including maps of vulnerable communities and agricultural production areas and a vulnerability index that showed areas requiring immediate attention and specific adaptation measures needed. **(Author's abstract)**

Agroecosystem. Agricultural system. Vulnerability. Adaptive capacity. Agriculture. Climate change.

- 0121** Vegetation and land-use of Mak-ban Geothermal Area, Philippines. Abraham, Emmanuel R.G., Maligalig, Susana M., Luna, Amelita C.. **Transactions of the National Academy of Science and Technology**, , 34(1):58

CHEVRON Geothermal Philippines, Inc. (CGPHI) and Aboitiz Power Renewable Inc. (APRI) are operating within the areas that are supporting multiple uses other than geothermal generation. Within their areas of operations are perennial crop-based agricultural areas, forest reserve, resorts, industrial and residential areas. One important aspect of generating geothermal power is taking care of watershed areas that are essential in protecting and maintaining healthy water recharge system and undertaking active conservation and rehabilitation efforts. The objectives of the study were to ground validate the cover areas identified as potential critical areas such as headwaters, riparian areas, areas with existing high canopy density and areas with biodiversity conservation potential and measure forest canopy density, list forest or perennial crop cover and assess land management practices. A total of 26 sample plots were established and measured within the project site. A greater proportion (from 67% to 91%) of the ecological influence areas are covered with vegetation canopies ranging from low to high density. The vegetation cover and land use in the area include intact natural forests (mossy forest, lowland dipterocarp forest), secondary forests coconut plantations, fruit orchards, banana plantations, as well as grassland areas. All sub-watershed areas are more than 60% vegetation cover. Low vegetation density and built-up areas are concentrated on the lowland areas which are privately owned. Overall, the lowland areas are dominantly coconut-based farms that are either multi-story or mono-perennial. **(Author's abstract)**

Agriculture. Critical areas. Land-use. Headwaters. Perennial crop-based agricultural areas. Riparian areas.

- 0122** Yellow corn (*Zea mays* L.) inbred screening for saline soil tolerance. Salazar, Artemio M., Ladia, Villamor A., Santos, Primitivo Jose A., Descalsota, Jonathan C.. **Transactions of the National Academy of Science and Technology**, , 33(1):14

Development of salt tolerant crops is the most practical way of ensuring the sustainability of crop production in agricultural areas located along coastal regions. In these areas, corn remains as one of the popular crops although it is very susceptible to salt injury. To address this problem, a project was undertaken to develop yellow corn hybrids that would be tolerant to saline soils. Thus, a series of greenhouse and field trials were conducted to identify the yellow corn inbreds that could be used as parents for developing corn hybrids with salinity tolerance. Thirty yellow corn inbreds were evaluated during the screening using sand-culture and nutrient-culture techniques where the nutrient solutions used had different degree of salinity. Treatment combinations were laid out in randomized complete block design with salinity level as the main plot and inbred as the subplot. Results of greenhouse screening showed APS 9-B-B-37-2-2-B, Tupi Yellow (D) 63-1-1-1-B, APS 17B-B-33-2-2-B, Tupi Yellow (D) 86-2-1-1-B and APS 19B-B-55-1-2-B were the inbreds that produced the highest shoot and root biomass among the inbreds under the salinity level of 10 dS m<sup>-1</sup>. Normally, corn plant would be injured permanently and even die if exposed to salinity level of 4 dS m<sup>-1</sup>. Further screening under field condition resulted in the selection of six inbreds, namely, APS 15B-B-37-1-1-B, APS 15B-B-70-2-86-2-1-1-B and APS 19B-B-55-1-2-B. The latter two inbreds also exhibited good growth under nutrient solution culture. All these selected inbreds will be used as parents in the diallel crosses that will eventually result in new yellow corn hybrids with better salinity tolerance for growing in salt-affected areas. **(Author's abstract)**

Screening. Salinity tolerance. Breeding. Corn inbreds. Agriculture.

- 0123** Yield and oil content ideotypes specification in *Jatropha curcas* L.. Vallesteros, Shierel F., Carandang, Wilfredo M., Palijon, Armando M., Cruz, Rex Victor O.. **Transactions of the National Academy of Science and Technology**, , 32(1):22

Twenty four trees were selected from an experimental plantation to determine an ideotype for *Jatropha curcas* L. based on seed yield and oil content. Variability was large in all morphological traits such as unbranched stem (CV = 46.51%) and number of first order branches (CV = 33.72%). Seed yield was positively and significantly correlated with basal diameter, length of unbranched stem, and crown diameter. Variability was small in fruit and seed traits. Crown diameter appeared to be a predictor of three seed size parameters ( $P < 0.05$ ), namely: length, breadth and thickness. Among the seed traits, seed length was significantly correlated with oil content. The oil content in the kernel ranged from 41.40 to 59.26%.

The proposed ideotype is described as a relatively short tree with big and circular basal diameter; large first order branches positioned low on stem forming an angle of more or less 50 from horizontal; crown is rounded and compact; large number of fruits per bunch and fruits ripen at the same time or nearly so; bearing large fruits with three seeds per fruit; and long seed length. The ideotype may tolerate some amount of shade and should be spaced 2 m x 2 m or wider. **(Author's abstract)**

Agriculture. Ideotype. *Jatropha curcas* L..

- 0124** Yield equation and biomass expansion factor for above ground carbon density estimation of smallholder tree plantations in Northern Mindanao. Palma, Richmond A.. **Transactions of the National Academy of Science and Technology**, , 33(1):117

Regression equations for the estimation of tree volume and biomass expansion factor (BEF) in a smallholder *A. mangium* plantation were developed based on direct measurements of trees in Northern Mindanao, Philippines. *A. mangium* is an important smallholder tree plantation species and commodity for wood industry in the region and the country. Sound and effective management of smallholder tree plantation for wood production and carbon sequestration necessitates information on yield. The study was designed to develop reliable yield prediction equation and BEF according to various ages, site qualities and spacing. Fifty temporary sample plots were established in Claveria, Misamis Oriental with a total of 3,910 trees measured.

The study had generated two equations: 1) yield prediction equation ( $\ln YIELD = -4.250101 + 2.017218 \cdot \ln AGE + 1.079861 \cdot \ln SI + .2352149 \cdot \ln SP$ ); and, 2) BEF ( $BEF = 1.693517 \cdot .9938733^{VB}$ ). The yield prediction equation can be employed as a basis for efficient management and development of smallholder tree plantations. The tree farmers could make use of yield tables in determining the volume of wood that can be harvested, economic rotation, cut schedule, plantation development schedule and business projection. The yield equation and BEF can also be used to predict above ground biomass carbon density for smallholder *A. mangium* plantation. The equations have been developed for plantations located in Claveria, Misamis Oriental particularly those with ages ranging from 3 to 18 years old, site index ranges from 12 to 25 meters and spacing of 2m x 2m, 1m x 4m, 2m x 3m, 1m x 6m, 2m x 4m, 3m x 3m, 3m x 4m, 2m x 6m and 1m x 8m. The equations were applicable outside the study area but careful validation should be done to ensure effective *A. mangium* tree plantation establishment and management. **(Author's abstract)**

Agriculture. Biomass. Mangium. Yield. BEF. Regression. Smallholder.

## BIOLOGY

- 0125** *Aedes aegypti* life cycle, temperature effects, and dengue fever-dengue hemorrhagic fever incidence. Teves, Franco G., Bautista, Jing B., Opena, Edward Laurence, Bado, Venessa Mae, Dulay, Aubrey Valora. **Transactions of the National Academy of Science and Technology**, , 33(1):101

Climate change impact on various aspects of human existence includes worsening scenario of highly infectious vector-borne diseases such as dengue fever and dengue hemorrhagic fever. Providing an evidence-based framework for the interaction of mosquito life cycle, temperature and disease outbreaks is vital for predictive model construction and for disease control.

Hospital reports on dengue fever (DF) and dengue hemorrhagic fever (DHF) for the years 2005 to 2009 were obtained from cooperating hospitals in Iligan City, Philippines. Meteorological data (2005 to 2009) were purchased from the PAGASA Region 10 Station. Simulated environments at different temperatures (36°C, 38°C, 42°C, 44°C and 48°C) were constructed for larval development studies.

Results show that average minimum temperature has a direct relationship with number of DF and DHF cases. Further, that the amount of rainfall correlates positively with number of DF and DHF cases more than relative humidity. *A. aegypti* life cycle studies reveal that pupae have higher survival rates at 36°C and 38°C in a four-hour period compared to other temperatures. There was also an apparent shorter life cycle at higher temperatures seen as an adaptive strategy of the mosquito. More significantly, there was an observed deviation from the reported thermal death point of 41°C for 1 hour for *A. aegypti* aquatic stages. Pupae survived at 42°C for 72 hours and at 44°C and 48°C for 2 hours.

Therefore, warmer temperatures and increased rainfall coupled with thermal adaptive strategies significantly provide an efficient synergistic mechanism for virus transmission in the human population. **(Author's abstract)**

Biology. *Aedes aegypti*. Dengue fever. Dengue hemorrhagic fever. Climate change. Adaptive strategies.

- 0126** Ampalaya (*Momordica charantia* L.) leaf extract as treatment against non-alcoholic fatty liver disease. Rebusi, Jr., Romeo B., Salunga, Thucydides L.. **Transactions of the National Academy of Science and Technology**, , 33(1):76

Non-alcoholic fatty liver disease (NAFLD) is characterized by a myriad of condition including steatosis or increase in triglyceride retention in the liver, liver inflammation, and increase in liver enzyme levels in the blood. Steatosis of the liver is due to the increase in the influx of free fatty acids (FFA) into the liver and the prevention of exportation of excess triglycerides. Increase in FFA is linked to obesity and retention of triglycerides is said to be caused by hyperinsulinemia or increase in insulin levels. Cases of NAFLD is said to be rising in an alarming rate and is said to be one of the leading cause of liver failure. A new non-genetic model of diabetes, obesity, and fatty liver was developed, called MSG-mice. This model is induced with the injection in newborn mice of monosodium glutamate (MSG). MSG-mice are regarded as the most comprehensive model described thus far based on the co-existence of multiple aspects of the human metabolic syndrome. This study was conducted to test the effectiveness of ampalaya or bitter melon (*Momordica charantia* L.) in treating various symptoms of NAFLD using the MSG-mice. Neonatal mice were subcutaneously injected for five consecutive days with MSG (2mg/g bodyweight). After eight weeks, MSG- and control-mice were fed with ampalaya leaf extract (10% and 15% gram over milliliter). At 18 weeks old, all the mice were sacrificed, along with positive and negative control groups, and their Body Mass Index (BMI), glucose levels, and liver / body weight ratio were determined. Liver samples were observed for the presence of inflammation and steatosis. It was determined that the BMI of some of the treated groups were significantly lower than that of untreated MSG-mice, that the weight change of the treated were lower than the controls, and that there is reduced steatosis in the treated groups compared to the control groups. It was concluded that both concentrations of ampalaya extract used were effective in lowering steatosis in MSG and non-MSG mice. **(Author's abstract)**

Biology. Fatty liver disease. Steatosis. Momordica charantia. Ampalaya. MSG-mice.

- 0127** Antimicrobial activity of *Parameria laevigata* (A.L. Juss.) moldenke and *Voacanga globosa* (Blanco) Merr. extracts. Vital, Pierangeli G., Rivera, Windell L.. **Transactions of the National Academy of Science and Technology**, , 33(1):112

Ethanol extracts of leaves of *Parameria laevigata* (A.L. Juss) Moldenke and *Voacanga globosa* (Blanco) Merr. were examined for their antibacterial, antifungal, and antiprotozoal properties. *P. laevigata* and *V. globosa* extracts were tested against bacteria namely, *Escherichia coli*, *Pseudomonas aeruginosa*, *Salmonella typhimurium*, *Bacillus cereus*, *Staphylococcus aureus*, *Micrococcus luteus*; fungus, *Candida albicans*; and protozoa, *Entamoeba histolytica*, *Trichomonas vaginalis*. Potential antimicrobial compounds were obtained through solvent extraction and rotary evaporation. To determine the antibacterial and antifungal properties of the extracts, disc diffusion assay was performed. *V. globosa* extracts revealed antibacterial and antifungal activities, inhibiting the growth of *B. cereus*, *M. luteus*, *P. aeruginosa*, *S. aureus*, *S. typhimurium*, and *C. albicans*. On the other hand, extract of *V. globosa* showed no antibacterial and antifungal activity. Lastly, to determine the antiprotozoal activity of the extracts, growth curve analysis and antiprotozoal assay were performed. The extracts were examined against *Trichomonas vaginalis* and *Entamoeba histolytica*. Results showed that both plant extracts can inhibit parasites. Thus, these plant extracts can possibly be used to produce alternative forms of antimicrobials. **(Author's abstract)**

Biology. *Parameria laevigata*. *Voacanga globosa*. Antibacterial. Antifungal. Antiprotozoal activity.

- 0128** Antioxidant property and histological effects of the ethanolic plant extracts of *Ficus septica* Burm, *F.* and *Uncaria perrottetii* (A. Rich) Merr in mice. Catap, Elena S., Canonizado, Excelle Grace M.. **Transactions of the National Academy of Science and Technology**, , 33(1):79

Many antioxidants that confer protection through inhibition of cellular membrane damage have been developed from various plants. In this study, the antioxidant properties of the leaf extract of *Ficus septica*, and the vine bark extract from *Uncaria perrottetii*. were assessed by measuring the malondialdehyde (MDA) levels, as by-product of lipid peroxidation, in the liver of ICR mice. In addition, histological examination was undertaken to determine the hepatoprotective effects of the two plant extracts. Mice were grouped into five cages, as follows: 1) negative control-phosphate buffered saline (PBS); 2) negative control-corn oil only 3) positive control-intraperitoneal injection of 30% carbon tetrachloride (CCl<sub>4</sub>) in corn oil (1 ml/kg BW) every 72 hours; 4) treatment with *U. perrottetii* + CCl<sub>4</sub>; and 5) treatment with *F. septica* + CCl<sub>4</sub>. Both crude extracts were injected at a dosage of 250 mg/kg BW, and were given daily through intraperitoneal injections for two weeks. Results obtained from the lipid peroxidation assay showed that the CCl<sub>4</sub>-treated mice had the highest MDA levels. Lower MDA levels were detected in the extract-treated mice and in the negative control mice but these were not statistically significant. However, histological examinations revealed various signs of cellular repair in the hepatic tissues of the

extracted-treated mice relative to the degenerative and necrotic pathologies in the CC1<sub>4</sub>-injected mice. The results show that the extracts conferred hepatoprotection but future validation studies must employ a longer period of treatment and other routes of extract application. **(Author's abstract)**

Biology. Antioxidant. Histopathology. Lipid peroxidation. *Uncaria perrottetii*. *Ficus septica*.

- 0129** Application of *Salmonella* DAS™ kit for rapid monitoring of *Salmonella* spp. in composts and other environmental samples. Ramirez, Teresita J., Saguibo, Jennifer D., Sedano, Susan A., Sapin, Arsenia B., Creencia, Armi R., Brown, Christine B., Tabao, Nik Shawn C., Tan Gana, Noel H.. **Transactions of the National Academy of Science and Technology**, , 34(1):75

The suitability of organic composts as soil conditioners and fertilizers in agriculture should be evaluated in terms of hygienic status and microbial quality prior to their application to avoid potential hazards to consumers. This study was conducted to test the applicability of the PCR-based *Salmonella* DAS™ kit developed at BIOTECH in monitoring *Salmonella* in various compost samples. Samples that include manure composts, water, and soil samples were artificially-spiked with *Salmonella typhimurium* BIOTECH 1826, and evaluated using the DAS™ kit and the conventional culture plating method. The established protocol that involved two enrichment stages of 20h+3h previously applied for food and feeds was applied to manure and environmental samples. Collaborative study with Philippine National Collection of Microorganisms yielded 97.3% agreement between the two methods used. To further improve the agreement value, the protocol was modified by extending the second enrichment stage from 3h to 6h which resulted to 100% agreement value. Therefore, the PCR-based *Salmonella* DAS™ kit could be used in monitoring *Salmonella* in manure composts and other environmental samples by employing the modified 20h+6h two-stage enrichment protocol. This PCR-based detection kit is more effective, more sensitive and more rapid with fewer manipulations for 28h compared with the culture plating that takes 5-7 days to complete. **(Author's abstract)**

Biology. Composts. Manure. PCR-based. *Salmonella* DAS™ kit. *Salmonella typhimurium*.

- 0130** Bacterial diversity in the saliva and plaque of caries-free and caries-active Filipino adults. Reyes, Candids Patrice A., Dalmacio, Leslie Michelle M.. **Philippine Journal of Science**, , 141(2):217-227

The oral cavity is inhabited by hundreds of bacterial species that play vital roles in maintaining oral health or in shifting to a diseased state such as dental caries. These microorganisms have been studied in the past using culture-dependent methods. However, due to the limitations of microbial identification through culture techniques, culture-independent techniques are currently being utilized to better understand the bacterial etiology of dental caries. In this study, molecular-based techniques were utilized to determine the bacterial profile of the saliva and supragingival dental plaque of caries-free and caries-active healthy Filipino adults. Bacterial DNA was amplified using primers for Eubacterial 16S rRNA gene (16S rDNA), diversity was assessed through denaturing gradient gel electrophoresis (DGGE), and the microorganisms

were identified through sequencing of the 16S rDNA. Based on the DGGE profile and 16S rDNA sequences, the caries-free group exhibited a more diverse microflora compared with its caries-active counterpart. This suggests that part of the microflora may be inhibited or absent in a caries-active oral cavity. This is the first study that provides a baseline profile of the oral microbial diversity in caries-free and caries-active Filipino adults using culture-independent techniques. This profile may assist researchers and dental practitioners to gain better understanding of the microbial etiology of dental caries. It may also be used in future caries risk assessment and anti-caries vaccine development. **(Author's abstract)**

Biology. Bacterial diversity. Caries-free. Caries-active. Dental caries. PCR-DGGE. 16S rRNA gene.

- 0131** Bacterial pathogen isolated from white shrimps *Pennaeus vannamei* cultured in Ilocos Norte. Franco, Prima Fe R., Hernando, Alice Geraldine. **Transactions of the National Academy of Science and Technology**, , 33(1):68

There is a need to have an alert surveillance on the microorganisms afflicting cultured shrimps to be able to curtail the spread of disease that could wipe out shrimp business ventures. This study focused on characterization and identification of a bacterial pathogen isolated from white shrimps cultured in Ilocos Norte.

White shrimps were surface sterilized for one minute prior to dissection. Swabs were obtained aseptically from the head parts after removal of the carapace and were inoculated into Nutrient broth cultured overnight. Colonies were grown in Nutrient Agar and pure cultures were further morphologically and biochemically characterized. The pure cultures were tested for hemolysin activity and the one that turned positive in the hemolysin test was identified using the API System of bacterial identification.

Results show that the isolates is a Gram negative non-fermenting aerobic rod. API identification system show that the isolate is Indole negative, nitrate reductase positive, Methyl red positive , Voges-Proskauer negative, catalase, positive, cytochrome oxidase negative, phenyl alanine deaminase positive, Tryptophan test negative, Urea positive, Casein negative starch negative, hydrogen sulfide positive and citrate agar positive. Over all characteristics reveal that the isolate is a *Proteus mirabilis*.

Results call for the need to collaborate with shrimp industry owners to become aware of the possible sources of contamination of grow-out ponds for the protection of their business as well as the consumers. **(Author's abstract)**

Shrimp industry. Biochemical characterization. *Proteus*. White shrimp. API. Biology.

- 0132** Biophysiology of *Panaeolus* spp. associated with dried dung of domesticated ruminants. Maylem, Excel Rio S., Dulay, Rich Milton R., Kalaw, Sofronio P., Reyes, Renato G.. **Transactions of the National Academy of Science and Technology**, , 33(1):87

*Panaeolus* is a psychoactive mushroom usually found growing on dried dung of

domesticated ruminants such as carabao and horse. In our efforts to look for alternative source of bioactive compounds for drug development, we initiated a study on domestication of this wild mushrooms hallucinogenic activity. The baseline information generated in this research is necessary for the development of production technology towards its sustainability. As a prelude to its domestication, we evaluated the nutritional and physical requirements for efficient mycelial growth of *Panaeolus* sp. and fruiting body performance on different formulated substrates under aseptic condition. Wild strain of *Panaeolus* sp. was obtained from dried carabao dung. The cell lines were aseptically rescued following the standard tissue culture protocol for mushroom.

Among the different media evaluated, results revealed that potato sucrose gulaman (PSG) was the best culture medium as indicated by vigorously thick mycelial density and shortest incubation period with a mean of 9 days. Moreover, potato sucrose gulaman with pH of 6.5 incubated under sealed and alternating light-dark condition favored the mycelial growth of *Panaeolus* sp.

Aseptic cultivation using 90% carabao dung and 10% rice bran recorded thick and fast mycelia growth and shortest incubation period with a mean of 11 days. However, 90% horse dung and 10% rice bran yielded more fruiting bodies with a mean of 0.39g, highest mean height of 33.67 mm and highest biological efficiency with a mean of 1.15%. **(Author's abstract)**

Biology. Psychoactive mushroom. *Panaeolus*. Domesticated ruminants. Aseptic cultivation.

- 0133** Bioremediation performance of *Arachis pinto* (mani-mani) under greenhouse condition. Villanueva, Cheryl Joy T., Estira, Flordeliz R.. **Transactions of the National Academy of Science and Technology**, , 34(1):50

Phytoremediation is the use of plant to mitigate environmental problems like soil contamination. This is less expensive, less-disruptive to the environment and one of the most effective methods in soil remediation because it has the potential to treat sites with more than one type of pollutant. The study aimed to evaluate the bioremediation performance of *Arachis pinto* under greenhouse condition. This study was initiated by obtaining soil from the Laoag sanitary landfill and subjected to Cd, Cu, Pb and Zn analysis. Using three (3) types of soil media namely: landfill soil without amendment (LSw/oA), landfill soil with amendment (LSw/A) and garden soil (GS), performance of the plant was observed in terms of % survival, growth responses and biomass production. Results showed that *A. pinto* survived in any of the soil media. However, its growth and biomass production were better in the sanitary landfill soil with amendment with greater number of leaves and branches(19.32 and 5.17), greater size (Sd=2.51 mm, Rd=1.95 mm, R1=12.11 cm, H=23.93 cm) and greater total biomass (57.77g). While, its growth and biomass production in LSw/oA (Sd=2.31 mm, Rd=1.28 mm, R1=7.87 cm, H=18.47 cm, biomass=42.22g) was as good as in GS (Sd=2.46 mm, Rd=1.27 mm, R1=9.55 cm, H=20.40 cm, biomass=46.57). After 60 days, plant tissues were analyzed for metal uptake by AAS. Results showed that absorption is more efficient in the landfill soil with amendment than in landfill soil without amendment Bioaccumulation Coefficient (BAC) analysis in the plant tissues showed that metal accumulation is most efficient in the roots, followed by the stems and least in the leaves. Based from the BAC values determined, *A. pinto* is capable of metal accumulation and is evaluated to be a moderate accumulator of Cd, Pb, Zn and

**Cu. (Author's abstract)**

Biology. Phytoremediation. Heavy metal accumulation. Bioaccumulation coefficient. Arachis pintoi.

- 0134** Bioremediation potential of bacterial isolates from the Laoag City Sanitary Landfill. Dumlao, Princess Kimberly F., Estira, Flordeliz R.. **Transactions of the National Academy of Science and Technology**, , 34(1):51

Bioremediation addresses the use of microorganisms to remove ground soil contaminants that remain in place during the clean up. The challenge has been to enhance the activity of these microorganisms and develop a means to bring the contaminant into direct contact with the organisms to achieve optimal bioremediation. The study aimed to isolate and characterize bacteria from the Laoag City Sanitary Landfill and evaluate their potential to bioremediate lead-contaminated soil. In conducting the study, four (4) treatments (100, 120, 140 and 160 ppm) were made with different concentrations of lead nitrate to determine the potential of bacterial isolates in cleaning up lead. Based from their morphological characteristics and gram staining affinity, there were four (4) bacteria isolated from the sanitary landfill soil namely Isolates A, B, C and D. Isolate A is a gram positive, undulate, smooth, irregular, umbonate and filiform rod. Both B and C were undulate, smooth, irregular, umbonate rod bacteria but B was gram positive while C was gram negative. Isolate D was circular, convex, entire, smooth, effuse gram positive coccus. All the isolates were able to survive (100%) and grow in culture media containing 45 ppm- 160 ppm lead nitrate. Comparatively however, Isolate D exhibited the narrowest tolerance having the least mean number of colonies of 10 CFUs when grown in media containing 160 ppm lead while Isolates A, B and C had 56.6, 33.3 and 16.6 CFUs respectively. These indicate that all the bacterial isolates from the sanitary landfill soil have the potential to bioremediate lead-contaminated soil with Isolate A exhibiting the greatest potential as lead accumulator. **(Author's abstract)**

Biology. Bioremediation. Lead accumulation. Lead tolerance. Bacteria. Sanitary landfill.

- 0135** Bioremediation through selective recovery of heavy metals from industrial wastewater using biogenic hydrogen sulfide. Trinidad, Lorele C., Migo, Veronica P., Alfafara, Catalino G., Abisado, Rhea G., Suyom, Reynan Fiel G.. **Transactions of the National Academy of Science and Technology**, , 32(1):41-42

The use of commercially available synthetic media for the cultivation of H<sub>2</sub>S-producing bacteria used in the bioremediation of heavy metal contaminated wastewaters makes treatment process impractical and expensive. Hence, the need for an economical media for efficient H<sub>2</sub>S production was addressed in this study. H<sub>2</sub>S production of local H<sub>2</sub>S-producing bacterial isolate SRB-B15 in media of different carbon and sulfate sources was compared and quantified based on % copper precipitation. Optimum pH favoring H<sub>2</sub>S production was determined. Throughout the experiment, 250 mL media plus 50 mL of inocula were incubated for two days at ambient room temperature. H<sub>2</sub>S produced was purged to 200 mL of wastewater with copper concentration range of 5000 ppm – 8000 ppm. Purging time was kept at 20

minutes, time interval between purging was kept at 24 hours. SRB-B 15 was capable of using egg as alternative carbon source but not coconut water and molasses; it was also capable of using  $\text{CaSO}_4$  as sulfate source. Comparison of  $\text{H}_2\text{S}$  production in  $\text{CaSO}_4$ -Egg Media (CEM),  $\text{Na}_2\text{SO}_4$ -Egg Media (NEM) and Sulfate – Reducing Media (SRM) showed 90%, 81% and 58% copper precipitation, respectively. CEM and NEM were optimized by varying their pH levels. The optimum pH for CEM and NEM were pH 10 and pH 8, respectively. At optimum pH, CEM gave 99.99% copper precipitation after purging seven (7) times while NEM gave 99.99% copper precipitation after purging twelve (12) times. The remaining copper concentration for both cases was below the DENR effluent standard of 1.3 ppm. The same % removal was observed using 5 L of SRM. It can be concluded from the results that CEM and NEM are more effective than SRM because a relatively high volume of SRM was needed to produce 99.99% copper removal. CEM and NEM have high potential for being used to actual industrial scale because they are cheaper, easier to prepare and more efficient than commercially available synthetic media like SRM. **(Author's abstract)**

Biology. Bioremediation. Biogenic hydrogen sulfide. Copper precipitation. Sulfate-reducing bacteria.

- 0136** Body shape variation among three congeneric species of pony fishes (Teleostei:Perciformes:Leignathidae). Requiron, Elanie A., Manting, Muhmin Michael E., Torres, Mark Anthony J., Demayo, Cesar G.. **Transactions of the National Academy of Science and Technology**, , 32(1):49-50

Ponyfishes, locally known in the Philippines as "sapsap", are bioluminescent, schooling fishes common in the near-shore and estuarine waters of the Indo-West Pacific. These fishes occupy diverse ecological niches and show different feeding habits which could also be reflected in their body shape. Thus, three congeneric species of ponyfishes *Leiognathus equulus* (Forsskal, 1775), *Leiognathus daura* (Cuvier, 1829) and *Leiognathus aureus* (Abe and Haneda, 1972) were investigated to determine the differences, if any, in their body shapes. In this study, the truss network systems comprised of 16 landmarks were used applying the tools of geometric morphometrics. The Cartesian coordinates of 16 landmarks were digitized from scanned images of the fishes (1,200 dpi) (n=100 per species, 50 males and 50 females). Specifically, the method of Relative Warp Analysis (RWA) was used to describe the body shapes of the three congeneric species of ponyfishes collected from Riverside Punta Reef, Kolambagan, Lanao del Norte, Philippines. Landmark analyses were carried out using the Thin-Plate Spline (TPS) series. TPS is used for the analysis of images with landmarks in order to incorporate curving features within the images. This method includes the Procrustes registration, its use to construct average configurations and landmark residuals about the average, the thin-plate spline interpolation, and its uses as a geometry-based metric and to construct average images. Results showed clear-cut differentiation in the body shapes among the female ponyfishes (Wilks'  $\lambda$ :0.005, p-value: 4.616E-24; Pillai trace: 1.848, P-value: 2.892E-24), and among the males (Wilks'  $\lambda$ : 0.009, p-value: 1.747E-59; Pillai trace: 1.692, p-value: 1.594E-44). The result of this study validates the use of the truss network system in the discrimination and clasification of these species of fishes. Also, the results are discussed in relation to how differences in feeding habits and habitat preferences translate to differences in body shapes of among fishes. **(Author's abstract)**

Biology. Landmark. Pony fishes. Relative warp analysis. Truss network.

- 0137** A candidate gene sequence for downy mildew resistance in maize. Galvez, Hayde F., Tongson, Eden Jane U., Ripalda, Roanne R., Canama, Alma O., Malijan, Arma Kristal B., Hautea, Desiree M.. **Transactions of the National Academy of Science and Technology**, , 33(1):116

We report a putative resistance gene ortholog for resistance to downy mildew caused by *Peronosclerospora philippinensis* Weston (Shaw) in Philippine maize. We designed two gene-specific markers based on sequence information of the resistance gene *analog*, *srga3*. BLAST analysis of the *srga3* amplicon showed 39 hits against the maize rust resistance protein *rp3-1* gene with a maximum score of 81.3 and 78% identity. The gene-specific markers were tested for co-segregation with the *srga3*-quantitative trait loci (QTL) and downy mildew resistance phenotype on BC<sub>1</sub>F<sub>1</sub> mapping population consisting of 121 individuals. These will be used in map-based isolation of the downy mildew resistance gene in maize and marker-assisted selection towards the development of downy mildew resistant maize varieties. **(Author's abstract)**

Biology. Downy mildew. QTL. Resistance gene analog. Gene-specific markers. Maize.

- 0138** Cave-dwelling bats of Apolinario Cave, Barangay Lapakan, Zamboanga City. Iran, Mark Neil B., Quin, John Ramon S., Obra, Jr., Mario R.. **Research Journal**, , 31(1):25-40

The study aimed to identify and classify the species of cave-dwelling bats found in Apolinario Cave, Sitio Nangka, Lapakan, Zamboanga City. It also sought to determine the estimated population of fruit bats based on the estimated bat count and the area of roosting stain. Scoop net and a harp trap were used to capture the cave-dwelling fruit bats and insect bats, respectively. The study has identified and classified one (1) species of fruit bat (Family Pteropodidae), which is the *Eonycteris spelaea* with common name of Long-tongued dawn bats and two (2) species of insect bats (Family Vespertilionidae), which are the *Miniopterus australis* the little long-fingered bats and *Miniopterus schreibersii*, the common bent-wing bat. Furthermore, it has determined an estimated population of 260,818 individual fruit bats. A total area of roosting stains of 822 m<sup>2</sup> was also measured and based on the 256 individual bats per square meter (densely packed) and 125 individual bats per square meter (loosely packed) applied to 75% of the measured stain area; the method calculated an estimate number of bats with a maximum colony size of 210,435 individual bats and a minimum colony size of 102,750 individual bats in an area. **(Author's abstract)**

Biology. Cave-dwelling bats. Apolinario Cave. Population bat count. Fruit bats (Family Pteropodidae). Insect bats (Family Vespertilionidae).

- 0139** Cellular phone radiation effects on the fetus of white mice. Tabalbag, Baby Jean B., Yadao-dela Cruz, Reggie, Samaniego, Lorelei A., Porquis, Heidi C.. **Transactions of the National Academy of Science and Technology**, , 34(1):54

Cellular phone are considered indispensable by man nowadays. The side effect of its use however remains to be seen. This study aimed to determine whether cellular phones have effects on the development of white mice. Eighteen pregnant white mice were divided into three groups subjected to the following treatments:  $T_0$  - control/unexposed to cellphone radiation;  $T_1$  - 18 hours exposure/day for 10 days;  $T_2$  - 18 hours exposure/day for 20 days. After 20 days, all treatment mice were sacrificed by cervical dislocation and the fetuses examined. Body weight, body length and morphology of each fetus were determined. Implantation and gestation indices were also computed. Data were analysed using Kruskal-Wallis Test. Result showed that the fetuses of exposed pregnant mice had significantly ( $K= 15.00$ ,  $P= 0.0006$ ) lesser body weight than the control.  $T_0$  had an average body weight of 1.15g while  $T_1$  and  $T_2$  had 0.51g and 0.36g respectively. They had significantly ( $K= 14.44$ ,  $P = 0.0007$ ) shorter body length than the control.  $T_0$  had an average body length of 2.22 cm while  $T_1$  and  $T_2$  had 1.48 cm and 1.39 cm, respectively. Morphological examination of the fetuses revealed no difference in terms of the number of eye slits, ears, legs and digits. The treated mice however appeared to have less developed organs than the control. The treated mice also had slightly lower implantation indices. It is concluded that cellular phone radiation at Specific Absorption Rate (SAR) of 1.24 W/kg caused growth retardation in white mice fetus. **(Author's abstract)**

Biology. Cellular phone. Radiation. White mice. Pregnancy. Growth retardation.

**0140** Characterization of Cebu Port Water. Baga, Cecilio S.. **Transactions of the National Academy of Science and Technology**, , 32(1):42

Cebu City Port waters are prone to domestic and industrial pollution, thus these were characterized to determine quality based on biological parameters, particularly total bacterial count, coliform count and *Vibrio* count, physical parameters including pH, dissolved oxygen, phosphates, nitrates and ammonia-N and water temperature. Piers 1 to 5 of Cebu City were considered as Samplings sites 1 to 5. Sampling site 3 water samples had the highest bacterial count ( $10^5$  cfu/ml), followed by sampling sites 1 and 2 ( $10^4$  cfu/ml) and sampling sites 4 and 5 had the lowest bacterial count ( $10^3$  cfu/ml), while total bacterial count of all sampling sites belong to a very high category (above  $1.0 \times 10^3$  cfu/ml) as revealed by the Bureau of Fisheries and Aquatic Resources RO7 quantitative bacteriology report. However, the coliform counts for all sampling sites have the same level of more than 1600 MPN/ml, categorized as unsafe, base on the water quality standard for bathing (1000 MPN/ml) adopted by the Department of Environment and natural Resources. *Vibrio spp* was detected from sampling sites 2 to 5 water samples. pH and dissolved oxygen tests revealed that the water taken from sampling sites 1-5 are within the normal level. Based on the mandatory standards for ammonia-N (0-1 ppm), nitrate-N (5 ppm) and phosphates (0-2 ppm), the Cebu City Port waters are within acceptable range/standards. The researchers are currently verifying the seaport water characteristics to obtain data at various seasons. The data will serve as basis for clean-up strategies, rehabilitation technologies and benchmarks of good practices. **(Author's abstract)**

Biology. Bacteriology. Clean-up. Pollutants. Physico-chemical. Seawater. Waterways.

- 0141** Characterization of *Moringa oleifera* Lam. germplasm collections in the Philippines by DNA fingerprinting. Panes, Vivian A., Tandoc, Elaine Anne L., Fortuno, Erica E., Romero, Gabriel O.. **Transactions of the National Academy of Science and Technology**, , 33(1):74

*Moringa oleifera* Lam. or *Malunggay* is increasing in commercial relevance because of its nutritional, therapeutic and prophylactic properties. However, in the Philippines, there are few studies of *Malunggay* on the genetic level despite the extensive genetic resources. To contribute to the knowledge about *Malunggay*, in this study, genetic variation of *M. oleifera* germplasm collections in the Philippines was analyzed using intersimple sequence repeats (ISSRs) and SRILS as genetic markers. Seventy five accessions of *Malunggay* cuttings and seeds were collected from different locations in the Philippines. From this cuttings and seeds, genomic DNA was extracted using DNAzol and Zymo plant DNA extraction kits. Twelve ISSRs and nine SRILS primers were used as markers. Genomic DNA was subjected to PCR analysis. The PCR products were run on agarose gels. Then the results were analyzed by scoring the presence (1) and absence (0) of the different bands for all the sample. Polymorphic bands were determined as the bands that were present and absent across the samples. Results showed that there are 8 polymorphic bands using the ISSR primers and 15 of polymorphic bands emerged using the SRILS primers. These results indicate that *M. oleifera* in the Philippines is genetically diverse. A preliminary analysis was done by using the PAUP software and phylogenetic tree construction is underway. More accessions are currently being optimized for PCR analysis. Hence, the extent of genetic diversity of the *Malunggay* germplasm collection in the Philippines is yet to be determined statistically. (**Author's abstract**)

Biology. Germplasm. *Moringa oleifera*. DNA fingerprinting.

- 0142** Characterization of pigment producing bacteria for industrial purposes. Layaoen, Heraldo, Franco, Samuel S., Acosta, Rowena, Gaoat, Cecile A., Franco, Prima Fe R.. **Transactions of the National Academy of Science and Technology**, , 33(1):70

This study focused on the isolation and characterization of pigment producing bacteria from various sources like larvae of insects affecting sweet sorghum, fish paste and cultured shrimps in Ilocos, Norte.

Insect larvae affecting sweet sorghum include earworm, army worm and katydid. The larvae were first surface sterilized prior to dissection. Inocula were obtained aseptically from their guts and are cultured in Nutrient broth overnight, Pigmented isolates were screened and grown in pure cultures in Nutrient agar and characterized morphologically and biochemically. Isolates produce yellow pigments Fish paste was inoculated into Sea Water Complex medium and cultures were grown overnight Pigmented isolates were plated and screened in Nutrient agar supplemented with 15%NaCl The isolates from fish paste are slightly yellow. They were tested for salt tolerance and results show that they could tolerate up to 20% salt concentration, an indication that they are pigmented halophiles.

Inocula from the head parts of shrimps *Pennaeus vanamae* were obtained and cultured in Nutrient Broth. Pure cultures were grown in Nutrient agar and were screened for pigment producers. The colonies obtained are blue green.

Most of the isolates are Gram positive coccus. Pigment production ranged from the 3<sup>rd</sup> to the 6<sup>th</sup> day after inoculation and is affected by the pH of the medium but not by temperature. The blue green, yellow and slightly yellow pigments are released into the medium and therefore extracellularly secreted.

The isolates are currently characterized at the molecular level. They are potential sources of dye in the food, fabric and leather industries. **(Author's abstract)**

Biochemical characterization. Biotechnology. Isolation. Pigment producing bacteria. Industry. Pigment. Biology.

- 0143** Cloning and sequence analysis of partial cDNAs of selected genes in normal and mutant 'makapuno' endosperms of coconut (*Cocos nucifera* L.). Yadao-dela Cruz, Reggie, Laude, Rita P., Diaz, Ma. Genaleen Q., Laurena, Antonio C., Mendiolo, Merlyn S., Tecson-Mendoza, Evelyn Mae. **Transactions of the National Academy of Science and Technology**, , 33(1):85

Makapuno is a mutant coconut (*Cocos nucifera* L.) with over proliferating endosperm, occurring in the Philippines and Dutch East Indies. Its fruit is almost full of viscous and delicious endosperm, commercially useful in making ice cream, pie and other delicacies. The science behind the makapuno phenomenon has not been completely understood. To determine the molecular basis of the makapuno phenomenon, we designed primers and cloned genes involved in cytokinin biosynthesis, polyamine synthesis, galactomannan degradation, glycolysis, alcoholic fermentation, fatty acid biosynthesis and cell cycle regulation. The total RNA from normal and makapuno endosperms of coconut were isolated and reversed transcribed. The cDNAs were used as template for PCR. The PCR products were ligated into pGEM<sup>®</sup>.T Easy vector, cloned in *Escherichia coli* JM109 cells and sequenced. A total of thirteen partial cDNA sequences were obtained. Interproscan and BLAST analyses revealed the cDNAs contain conserved domains and are highly homologous (68-98%) to equivalent sequences from other plant species. Pairwise alignment (Blossom 62) of the thirteen partial cDNAs between normal and mutant makapuno coconut revealed absence of nucleotide sequence differences implying no structural differences in the genes of the two coconut genotypes. The makapuno and normal coconut used in this study are of the same Laguna Tall variety. **(Author's abstract)**

Biology. Coconut endosperm. Endosperm overgrowth. cDNA cloning. Makapuno.

- 0144** Comparative analysis of the elemental composition and fungall diversity along the Calancan causeway of Sta. Cruz, Marinduque. Toledo, Kristina Isabel, Joson, Ron Edward, Zarate, Jocelyn T.. **Transactions of the National Academy of Science and Technology**, , 33(1):99

The Causeway, a 5-kilometer landmass formed by thirty years (1969 to 1996) of mine tailings waste from the operations of the Marcopper Mining Corporation (Marcopper), now dumped at Calancan bay, Sta. Cruz, Marinduque was subjected to soil elemental analysis and fungal diversity evaluation. The objectives of the study were to determine the level of heavy metal contamination in the site across three

specific locations: 1) Along the road path; 2) beach front of Calancan bay and 3) inner landmass recently re-vegetated area. X-Ray Fluorescence (XRF) was used to determine elemental concentrations of heavy metals while fungal diversity was analyzed through dilution plating.

After three to seven days incubation in Potato Dextrose Agar (PDA), fungal colonies were counted and re-isolated on PDA plates. Fungal diversity was noted by determining the occurrence of the fungal isolate in other dilutions and sites. PDA blocks and light microscopy were used to identify the isolates. Iron, potassium, titanium, manganese, copper, vanadium and chromium were the elements which exceeded the benchmark concentration tolerable to soil organisms as recommended by the U.S. Environmental Protection Agency (EPA). *Penicillium spp.*, *Verticillium spp.*, *Aspergillus spp.*, *Acremonium curvulum*, *Trichophyton terrestre*, *Chrysosporium spp.*, *Chrysonilia sitophila* and *Stemphylium spp* were the fungal species isolated from the soil samples. Station 2 (beachfront) had the highest fungal population with 2330 cfu/mL. Station 1 (along road path) had 561 cfu/mL while station 3 (inner land and newly re-vegetated area) had 349 cfu/mL of fungi. Among the elements in the sites, iron and potassium showed negative correlation with the fungal population. Fungal isolates were preserved for further screening trials such as, use as biological control agents and as source of important metabolites. **(Author's abstract)**

Biology. Causeway. Fungal diversity. Heavy metals. X ray fluorescence. Marinduque.

- 0145** Comparative study on the bioaccumulation of lead (Pb) in the tissues of *Arachis pinto* (pinto peanut) and *Imperata cylindrical* (cogon grass) grown in lead contaminated soil. Estira. Flordeliz R., Lu-Gonzales, Arlene, Esmerio, RenJean. **Transactions of the National Academy of Science and Technology**, , 33(1):81

Plants have the intrinsic capability to take up heavy metals and store and accumulate these in their tissues. These capabilities are selective of plants, of the heavy metal absorbed and on their interactions with the physico-chemical environment. This is the basis of selection of plants that could be used as potential phytoremediators. The Pb uptake potential in the root and shoot tissues of pinto peanut and cogon grass seedlings was investigated in potted greenhouse conditions and analyzed using Atomic Absorption Spectrophotometry (AAS). Percentage survival of the plants was also evaluated. Results indicated significant differences in Pb accumulation in both the root and shoot tissues of the two plants grown for 2 months in lead contaminated soil. Pinto peanut seedlings accumulated significantly greater amount of lead in their shoot (11.26 ppm) and root (8.74 ppm) than cogon grass seedlings which accumulated a noncomparably lesser amount of 1.47 ppm Pb in their shoot and 0.15 ppm Pb in their root. However, both plants showed 100% survival when grown in lead-contaminated oil. The greater bioaccumulation of lead in the tissues of pinto peanut suggests that the plant may be used for the clean up and phytoremediation of Pb-contaminated soils. **(Author's abstract)**

Biology. Lead (Pb). Bioaccumulation. Pinto peanut (*Arachis pinto*). Cogon grass (*Imperata cylindrical*). Phytoremediation.

- 0146** Computational reconstruction and characterization of ancestral proteins relevant to prokaryotic-eukaryotic transition 2 billion years ago. Pulido, Ma. Angelica S., Labastilla, Evelyn M., Guiam, Guia M., Pascua, Marilyn C., Endriga, Marla A., Deocaris, Chester C., Deocaris, Custer C.. **Transactions of the National Academy of Science and Technology**, , 33(1):90

Anaphase Promoting Complex 11, most probable ancient Ubiquitin ligase is correlated with a former study to have emerged after the Great Oxidation Event. RPN3, most ancient non-ATPase 26S proteasome lid appeared in cyanobacteria and proteobacteria emergence. However, BCS1 in mitochondria inner membrane, found to be the most ancient protein, functions as an ATP-dependent chaperone which led to some rise of multicellular organisms. The AA sequences of these genes were retrieved with Entrez gene in FASTA format and aligned with CLUSTALW via MEGA 4. Using gamma distribution and JTT matrix rates, distance matrices were obtained and used to create a phylogenetic tree. The ancestral sequences were generated in the codeml program of PAML. ProtParam and SWISS-MODEL were used in characterizing the 1<sup>o</sup>, 2<sup>o</sup>, and 3<sup>o</sup> structures of derived ancestral proteins and reference species. Using ProtParam, physico-chemical properties of Ub ligase, mitochondrial chaperones and proteasome were known. Visualization of the 3-dimensional structures of these ancestral proteins was requested from SWISS MODEL and Rasmol. New Likelihood-based Probability Method gave 0.91, 0.86, and 0.73 for all, variable and parsimony-informative sites, respectively, whereas the corresponding probabilities for the parsimony method were 0.84, 0.76, and 0.51, respectively. The probability that ancestral sequence was correctly reconstructed ranged from 91.3 to 98.7%. **(Author's abstract)**

Biology. Ubiquitin proteasomal degradation. Mitochondrial chaperones. PAML. ProtParam. SWISS-MODEL.

- 0147** Construction of a plant expression vector containing the replication initiation protein (Rep) gene of the abaca bunchy top virus (ABTV). Lipio, Patrick Louie G., Roa, Marylette B., Quirante, Kristine Ace F., Polido, Mary Ann Robelle L., Aquino, Vermando M.. **Transactions of the National Academy of Science and Technology**, , 33(1):109

The abaca industry in the Philippines produces an average of 68,962 metric tons per year of fiber utilized on many industries generating an income of USD 80.8M on exports alone. However viral diseases like the Abaca bunchy top virus (ABTV) cause damaging effects to the plant. A strategy to control ABTV is through pathogen derived resistance (PDR) wherein a virus component is introduced to the plant and its expression could mediate resistance to the virus. The replication initiation protein (Rep) gene, an ABTV DNA virus component is a possible candidate for PDR. For this study, the Rep gene was isolated and cloned to a plant expression vector. Primers were designed to target the Rep gene and appended with restriction endonuclease sites *Bgl*II and *Bst*EII for subsequent cloning. Amplification using the designed Rep primers and genomic DNA from ABTV infected abaca plants from Leyte yielded an approximately 900bp product. This was further subcloned to pCR2.1® TOPO® vector for sequencing. Sequencing results showed 99% similarity to the Banana bunchy top virus (BBTV) Rep gene. The pCR2.1® TOPO®-Rep construct was digested with *Bgl*II and *Bst*EII as well as the plant expression vector pCAMBIA 1302. The ligated pCAMBIA 1302-Rep gene construct was transformed in DH5α cells for propagation and screening. Screening using CaMV35S and NosTer pCAMBIA vector specific primers showed an approximately 1100bp product. Further sequencing is necessary

to confirm if the Rep gene is inserted to pCAMBIA 1302. This construct would be delivered to abaca plant cells for assessment of its expression and at most conferring ABTV resistance to the plant. **(Author's abstract)**

Biology. Abaca bunchy top virus (ABTV). Pathogen derived resistance (PDR). Replication initiation protein (Rep) gene. Cloning. pCR2.1@TOPO@. pCAMBIA1302.

- 0148** Crustaceans as bioindicators of water in Labac River of Cavite. Dimero, Dickson N., Rint, Josefina R.. **Transactions of the National Academy of Science and Technology**, , 33(1):91

The study was conducted to assess the physico-chemical status of water in Labac river in Cavite using crustaceans as bioindicators.

The occurrence of crustaceans was assessed quantitatively in eight sites of the Western Labac river and nine sites of the eastern Labac river of Cavite.

The banks of the entire Labac river are highly vegetated. Some river waters are still undisturbed and clear while majority of the river stations have polluted waters.

Labac river is narrow (6.84 m) and very deep (>1.50 m) with a cold water temperature (25.9°C), slow water velocity (26.41 cm/sec), alkaline water (7.25), had sufficient DO (7.72 mg/L), low level of TDS (0.27 mg/L), high level of TSS (280 mg/L) and high level of salinity (2 ppt).

Shrimp population count was positively correlated with width, pH, and TDS and moderately correlated with depth and salinity of river water while crab population is moderately correlated with river water temperature. DO has a very small positive correlation with crab population.

Shrimps favor wide and deep rivers with acidic to alkaline water, and low level of TDS and salinity in water. Crabs prefer shallow, cool and shaded areas and high level of dissolved oxygen in river water.

Shrimps can be bioindicators of pH, total dissolved solids and salinity, while crabs can be bioindicators of temperature and dissolved oxygen in river water. **(Author's abstract)**

Biology. Crabs. Dissolved oxygen (DO). Labac river. pH. Salinity. Shrimps. Total Dissolved Solids (TDS). Total Suspended Solids (TSS).

- 0149** Cytogenetic analysis of selected native and endemic Philippine freshwater fish species. Reyes, Roberto C., Dela Viña, Celia B., Carpena, Nathaniel T., Ocampo, Pablo P.. **Transactions of the National Academy of Science and Technology**, , 33(1):93

Cytogenetic analysis may show variations in chromosome numbers and total DNA content of the nuclei which enables the identification of species origins and relationships. This project plans to establish the chromosome constitution of selected native and endemic fishes.

Ten individuals from each species were collected from Laguna, Quezon and Bicol freshwater rivers and lakes. The selected species were *Glossogobius celebius* Valenciennes (Gobiidae), *Glossogobius giuris* Hamilton (Gobiidae) and *Leiopotherapon plumbeus* Kner (Terapontidae). Metaphase chromosomes were collected from regenerating blastemas of the caudal fin following the modified procedure of Vallejo (1982). The cut caudal fin was first allowed to regenerate for 2-3 days, and then the fishes were transferred to a beaker containing a 0.003% colchicine solution for 4 hours. The regenerated fin was severed from the fish, transferred to distilled water and treated with Carnoy's solution each for 30 minutes. All the smears were stained with either 20% Giemsa or 2% aceto-orcein. The search for 20 C-metaphase cells per species is ongoing using light microscopy. Expected outputs for the first year of the project include the chromosome numbers and karyograms of the selected endemic fishes in order to provide baseline information for biodiversity and evolutionary researches. **(Author's abstract)**

Biology. Karyotype. *Glossogobius celebius*. *Glossogobius giuris*. *Leiopotherapon plumbeus*. Karyogram.

- 0150** Cytologic and mitogenic effect of topical minoxidil on the skin of *Mus musculus*. Domingo, Doreen D., Espiritu, Majal Rani O.. **Transactions of the National Academy of Science and Technology**, , 34(1):52

Mice and humans share the same gene for growing and shedding hair. But when it is faulty, hair doesn't grow back normally and over time people go bald, to varying degrees. Hence, topical application of minoxidil had guaranteed many users for hair growth without necessarily looking at the effect it may contribute to the skin. To evaluate the effect of minoxidil on the (skin) epidermal cells of white mice, cytologic and mitogenic characteristics were considered. Findings revealed that skin epidermal cells' width and length in the MTM-minoxidil treated mice {male  $\bar{x}$ , = 3.85  $\mu$ m (w); 3.95  $\mu$ m (1) / female:  $\bar{x}$ , = 4.14  $\mu$ m (w); 4.02  $\mu$ m (1)} were comparable in size with the MUM - minoxidil untreated mice, {male:  $\bar{x}$ , = 4.45  $\mu$ m (w); 4.66  $\mu$ m (1) / female:  $\bar{x}$ ,=4.90  $\mu$ m (w); 4.77  $\mu$ m (1)}. However, the size of the epidermal cell nucleus in the MTM (male:  $\bar{x}$ ,=2.32  $\mu$ m; female:  $\bar{x}$ , =2.38  $\mu$ m) were smaller compared to the MUM (male:  $\bar{x}$ , = 2.86  $\mu$ m; female:  $\bar{x}$ , = 2.65  $\mu$ m). Considering the hair follicles in the skin of MTM(male), the hair follicles significantly showed higher values in width ( $\bar{x}$ , =23.67  $\mu$ m) and length ( $\bar{x}$ , = 87.17  $\mu$ m) as compared to the control (width  $\bar{x}$ , =6.85  $\mu$ m and length  $\bar{x}$ , = 15.17  $\mu$ m). Moreover, increase in hair diameter (male:  $\bar{x}$ , = 6.16  $\mu$ m; female:  $\bar{x}$ , = 5.04  $\mu$ m) was also observed in the MTM. As regards mitotic index, MTM obtained lesser values (male:  $\bar{x}$ , = 0.44; female:  $\bar{x}$ , = 0.52) as compared to MUM (male:  $\bar{x}$ , = 0.61; female:  $\bar{x}$ , = 0.79). Indeed, topical minoxidil had explicitly shown cytologic and mitogenic impact on skin (epidermal) cells of female and male mice. **(Author's abstract)**

Biology. Cytologic. Mitogenic. Minoxidil. Skin. White mice.

- 0151** Cytotoxicity of five anti dengue plants using *Artemia salina*. Domingo, Doreen D., Gamet, Febee Rose D.. **Transactions of the National Academy of Science and Technology**, , 33(1):96

The quest to prevent and cure dengue is continuous. Various researches show that *Uncaria tomentosa* or cat's claw (Yano, 2009); *Ipomoea batatas* or sweet potato (Villafuerte, 2010); *Euphorbia hirta* L. or tawa-tawa (Cabral, 2011); *Azadirachta indica* or neem tree (Parida, 2002); and *Carica papaya* or melon tree (Ahmad et al, 2011) are all potential anti-dengue plants. These plants have been exposed to efficiently fight the disease. *Artemia salina* toxicity bioassay was used to determine and compare the mortality and LC50 (Lethal Concentration 50) of the roots, stem and leaves of the plants. Treatment concentrations of the plant parts extract were: 10,000ug/mL, 1,000 ug/mL, 100 ug/mL, 10 ug/mL, 1 ug/mL and 0.1 ug/mL. Regression of Toxicity Line and Graphical Interpolation Method were used in the calculations of LC50.

Results show that 100% mortality of *Artemia salina* was obtained in the 10,000 µg/mL concentrations of each leaf extract in the five anti-dengue plants. Overall mean percentage mortality of the leaf extract concentration in *Ipomoea batatas* (47.76%), had the highest while *Uncaria tomentosa* (36.67%) being the lowest. Roots and stem extracts in all the five anti-dengue plants revealed no significant differences on the mortality of *Artemia salina*. Considering cytotoxicity of the vegetative organs among all the anti-dengue plants. *Carica papaya* (LC50 21.73 µg/mL), *Ipomoea batatas* (LC50 24.48 µg/mL) and *Azadirachta indica* (LC50 41.03 µg/mL) leaf extracts were found to be the most toxic and comparable as to its effect to *Artemia salina*. Toxicity of stem and roots were found comparable with each other among all the plants. Hence, the leaves considered as the most toxic. Leaves of the said plants can be further explored serving as benchmark on the formulation of possible drugs to prevent and treat dengue. **(Author's abstract)**

Biology. Cytotoxicity. LC50. Antidengue plants. *Artemia Salina*. Mortality.

- 0152** Cytotoxicity test and phytochemical screening of crude ethanolic and hexane extract of the aerial part of *Hydrocotyle verticillata* (whorled marshpennyworth). Daminar, Nathalie L., Bajo, Lydia M.. **Transactions of the National Academy of Science and Technology**, , 33(1):140

The crude ethanolic extract of the aerial part of *Hydrocotyle verticillata* was subjected to solvent partitioning according to increasing polarity: n-hexane, ethyl acetate (EtOAc), dichloromethane (DCM) and water. Brine shrimp lethality test was conducted to the four partitioned solvent extracts and result showed that n-hexane and EtOAc have significant cytotoxic potentials having LC<sub>50</sub> of 50.35 and 76.98 ppm respectively. Hence, n-hexane extract showed to be the most bioactive since it has the lowest LC<sub>50</sub> among the four solvent extracts.

The phytochemical screening of ethanolic extract of *H. verticillata* showed the presence of bioactive components like alkaloids, saponins, steroids, flavonoids, tannins and anthraquinones. While the phytochemical test on hexane extract (the most bioactive among the partitioned solvent extract) revealed only the presence of alkaloid and saponin. **(Author's abstract)**

Biology. *Hydrocotyle verticillata*. Cytotoxic. Phytochemicals. Brine shrimp.

- 0153** Detection of white spot virus in *Penaeus monodon* and *Metapenaeus dalli* from Hagonoy, Bulacan. Aleton, Rod Russel R., Aniag, Anna Dominique M., Bulaong, Marie Veronica G., Reblando, Geormae Anne K., Urayenza, Annie Grace V., Yasuda, Jean Kathleen V., Maningas, Mary Beth B.. **Transactions of the National Academy of Science and Technology**, , 33(1):113

Shrimp aquaculture is an integral source of revenue in developing tropical countries of Southeast Asia such as the Philippines. In the early 1990s, the country ranked 3<sup>rd</sup> in the shrimp international market, however the industry slid back to the 13<sup>th</sup> as it is presently plagued with outbreaks of diseases which causes massive decrease of production. Among these diseases, White Spot Virus (WSV) remains one of the most potent and infectious for most known species of cultivated penaeid shrimps. It is in this light that the presence of the White Spot Virus (WSV) in *Penaeus monodon* and *Metapenaeus dalli*, both species were collected in three commercial ponds in Hagonoy, Bulacan. In every sampling site, five shrimps of each species were collected, and from each shrimp tissue samples from gills, hemolymph, heart and hepatopancreas were obtained. DNA were then extracted from each organ and were used in the detection through Polymerase Chain Reaction (PCR) amplification. Elongation factor 1-alpha (EF1- $\alpha$ ), primers was used to check for DNA integrity and as an internal control. Only the hemocyte samples yielded positive among all the tissues tested. Hence, homocyte was utilized in all the 30 samples. Twenty percent (20%) of the sampled tissues of *P. Monodon* shrimps were found to be positive. However, *M. dalli* shrimps from the same sampling sites were all found negative for WSV. These results, coupled with the fact that both species were collected from the same pond, suggest that *M. dalli* is more resistant to WSV compared to *P. monodon*. (Author's abstract)

Biology. *Metapenaeus dalli*. *Penaeus monodon*. White spot virus. Shrimp polyculture. Polymerase chain reaction. Virus detection.

- 0154** Determining the efficiency *Talinum paniculatum* (Jacq) Wild as a phytoremediator and its morpho-anatomical responses to iron in lateritic soils. Tolentino, Vivian S., Bautista, Jill Mary J.. **Transactions of the National Academy of Science and Technology**, , 34(1):48

Mining sites in the Philippines may pose possible deleterious effects to society both in the economic and health sector due to water and soil contamination, thus decontamination of polluted soil and water is necessary. This study aims to evaluate the effectiveness of *Talinum paniculatum*, commonly called "Jewels of Opar", as a phytoremediator for Fe in lateritic soil from Brooks Point, Palawan. This study will also establish its leaf anatomy and its morpho-anatomical effects on the leaves using different histological techniques for tissue processing, and determine the uptake of Fe in leaf through plant tissue analysis. Data gathered was statistically tested using repeated Analysis of Variance (ANOVA). Five soil treatments (garden soil, 25%, 50%, 75% and 100% lateritic soil) with *T. paniculatum* cuttings were set up. For morphological responses, leaf color was approximately at 3 (medium green), with the use of the leaf color chart, which indicated neither deficiency nor over-dosage of Fe. The number of leaves and nodes, plant height, and leaf surface area were relatively

high (13 leaves, 9 nodes, 107 mm in height and 279.7 mm leaf surface area) in 75% lateritic soil. The leaf anatomy is of the "Kranz" type, and it exhibited the typical anatomy of the leaf, which implies normal metabolism and chlorophyll functioning due to Fe. Uptake of Fe in the leaves showed that amounts of Fe in garden soil are 2555 ppm, 2338 ppm for 25% lateritic soils, 1485 ppm for 50% lateritic soils, 3720 ppm for 75% lateritic soils and 4232 ppm for 100% lateritic soils. These signify higher amounts of Fe in the leaves grown in 75% and 100% lateritic soil. This study will add to the baseline information in anatomy and its potential use as phytoremediator and as guide to consumers since the leaves are edible in certain parts of the world. **(Author's abstract)**

Biology. Iron. *Talinum paniculatum*. Lateritic soils. Morpho-anatomy. Phytoremediation. Kranz leaf anatomy.

- 0155** Development of probiotic vegetable juice fortified with *Lactobacillus plantarum* BS. Saguibo, Jennifer D., Elegado, Francisco B.. **Transactions of the National Academy of Science and Technology**, , 33(1):106

Preference for raw and minimally-processed foods and probiotic products is increasing due to obvious nutritional and non-nutritional health benefits. The country is endowed with local plant and microbial resources that can be develop into functional food products.

Various formulations of indigenous Philippine vegetables/herbs namely *alugbati* (*Bacella rubra*), *saluyot* (*Corchorus olitorius*), *okra* (*Abelmoschus esculentus*), *malunggay* (*Moringa oleifera*) and *avocado* (*Persea Americana*) leaf extracts, strained, pasteurized, flavored with *calamansi* (*Citrofortunella microcarpa*) or lemon grass (*Andropogon citrates*), and fortified with *Lactobacillus plantarum* BS were subjected to microbial stability and sensory testing. The selected formulation with 2% (w/v) air-dried vegetable/herb in different proportions flavored with *calamansi* and lemon grass were stored at refrigerated temperature for three months. Both flavored vegetable juice maintained a pH range of 4 - 4.5 after 14 days in contrast with the control (without flavor and *Lb. plantarum* BS only) that initially decreased to pH 4.0 at day 10 but began to elevate at day 14. *Calamansi*-flavored vegetable juice maintained a higher lactic acid bacterial count of  $10^7$  cfu/ml, up to 70 days of storage. In contrast, the lemon grass flavored vegetable juice maintained the lactic acid bacterial count of  $10^7$  cfu/ml only until day 14 but declined thereafter. However, sensory evaluation revealed that lemon grass-flavored vegetable juice was more preferred than *calamansi* flavored. Its flavor/taste, aroma and general acceptability were also significantly different at  $p=0.05$  compared with the control after six days. This results suggests the possibility of developing vegetable/herb beverage fortified with probiotic lactic acid bacteria with enhanced health benefits. **(Author's abstract)**

Biology. Probiotic juice. Lactic acid bacteria. *Lactobacillus plantarum*. *Alugbati*. *Saluyot*. *Avocado*. *Okra*. *Malunggay*. *Calamansi*. *Lemon grass*.

- 0156** Diversity and status of butterflies across vegetation types of Mt. Hamiguitan, Davao Oriental, Philippines. Mohagan, Alma B.. **Transactions of the National Academy of Science and Technology**, , 33(1):77

An inventory was conducted to determine the diversity and status of butterflies of Mt. Hamiguitan, wildlife Sanctuary, Davao Oriental using quadrat method in five vegetation types namely; agroecosystem (10-400 masl), dipterocarp (500-900 masl), montane (900-1400 masl), mossy (1400-1500 masl) and pygmy (1500-1675 masl). Two 20m x 20m plots were established per vegetation type. These inventory techniques revealed 141 species of butterflies plus one subspecies described and illustrated . Diversity assessment using Shannon-Weiner index showed high level (4.1) in the Montane forest as compared to other vegetation types. Bray-Curtis similarity index shows low species similarity in pygmy, mossy and agro-montane forest (<40%). Furthermore, this study revealed 3 possible new species, 44 endemics: 2 eastern Mindanao endemic (very rare), 4 Mt. Hamiguitan endemic (very rare), 16 Mindanao endemic and 22 Philippine endemic. Seven new species were recorded in Mindanao. Mt. Hamiguitan wild life Sanctuary is the home of diverse and endemic butterfly species. The study recommends further monitoring to established population and species richness trend. It further recommends that policies and ordinances should be formulated by PAMB and LGUs. **(Author's abstract)**

Biology. Butterflies species richness trend pygmy vegetation types Mt. Hamiguitan.

- 0157** Diversity in our midst. Cayabyab, Bonifacio F., Katimbang, Genaro A.. **Transactions of the National Academy of Science and Technology**, , 33(1):128

The Dividivi, *Caesalpinia coriaria* (Jacq) Wild is an exotic plant from South America. This leguminous medium sized tree is usually found in windswept seashores. At a glance it looks like a tamarind tree. It is noted for its horticultural and medicinal value. The lone Dividivi tree between Biological Science and the new College of Arts and Sciences buildings at UP Los Baños exemplifies the diversity of life forms in our midst through the nectaring butterflies on its flowers.

We studied the butterfly nectar feeder of the Dividivi tree from August 2010 – December 2010 in order to contribute to the documentation of diversity inventory at Los Baños. Observations were done at 0800 hours – 0900 hours. Counts were accomplished at least once a month.

We documented the species that visited the flowers based on their flight pattern and morphological appearance. We also use sweep net to examine closely the butterflies and release them later.

A total of 36 species from 6 families were observed. The order of decreasing density of the families of butterflies was: Nymphalidae (10) > Papilionidae (9) > Pieridae (8) > Danaidae (5) > Hesperidae (2) = Lycaenidae (2).

We plan to continue observing the butterflies of Dividivi tree on a monthly basis to enable us to have a whole year perspective of the diversity of butterfly nectar feeders of this tree. **(Author's abstract)**

Biology. Diversity. Butterfly. Nectar. Feeders. Dividivi.

- 0158** Diversity of bats in the montane forest of Mt. Hilong-hilong, Diwata Range, Agusan del Norte. Leaño, Emmanuel Pacheco, Joven, Joanne Ruth Paano. **Transactions of the National Academy of Science and Technology**, , 34(1):44

The study describes the diversity of bats in the montane forest of Mt. Hilong-hilong, Diwata Range, Agusan del Norte. Specifically, it aimed to a) compare the species diversity of bats captured in three net heights, b) determine species richness of bats, c) assess the conservation and ecological status of bats; and d) describe the different species of bats sampled in the montane forest of Mt. Hilong-hilong. The sampling was done on October 22-29, 2006 within the the montane forest of Mt. Hilong-hilong, Diwata Range, Agusan del Norte. This study used netting and harp trapping techniques for capturing bat species. Mist nets were set in three net heights: the low net (0-4 high), medium net (4-8 high) and high net (8-12 high). Mist nets were established for the determination of species diversity and harp traps were established to increase the species richness. The study revealed the presence of 137 individual of bats belonging to three (3) families (Pteropodidae Vespertilionidae and Rhinolophidae) at the total of twelve (12) species. Species diversity of bats was found highest in low net (2.197) as compared to high net (1.792) and medium net traps. Four (4) of the captured bats were Philippine endemic (*Ptenochirus jagori*, *Haplonycteris fischeri*, *Hipposideros obscures*, *Rhinolophus inops*, and *R. virgo*) and one (1) was Mindanao endemic (*P. minor*), some were nearly threatened (*Hipposideros obscures* and *R. virgo*), of least concern (*Kerivoula pellucida* and *K. hardwickii*) and vulnerable (*P. jagori*, *P. minor*, *H. fischeri* and *Rousetus amplexicaudatus*). Local status showed that most Megachiropteran species were common and Microchiropteran species were rare. Morphometry and diagnostic characters were used to identify the species of bats. Furthermore, the study shows that most species of bats have low flying activity (0-4 m high) above the ground. (Author's abstract)

Biology. Diversity. Bats. Montane forest. Mt. Hilong-hilong. Diwata range.

- 0159** DNA barcoding of fruit flies *Bactrocera occipitalis* (Bezzi) and *Bactrocera philippinensis* Drew and Hancock (Diptera:Tephritidae) from Cavite and Davao del Norte using the 5' region of the mitochondrial cytochrome C oxidase I (*cox1*). Delomen, Michael Leonardo, Mendiolo, Merlyn S.. **Transactions of the National Academy of Science and Technology**, , 33(1):105

Analysis of the 5' region of the mitochondrial cytochrome oxidase 1 gene was done to compare the pest fruit flies *Bactrocera occipitalis* (Bezzi) and *Bactrocera philippinensis* Drew and Hancock. Adult fruit flies and larvae-infested dropped mango fruits were collected from selected orchards at Cavite and Davao del Norte. Collected adults were immediately identified while larvae from infested fruits were reared to adulthood then identified. Identification was done thru the visual analysis of six diagnostic morphological characters originally described by White and Hancock (1997) and utilized by Iwahashi (1999) to differentiate between the two species.

Genomic DNA was extracted and mitochondrial *cox1* gene was amplified using custom primers. PCR products were verified thru agarose gel electrophoresis and shipped to Macrogen Inc, South Korea for sequencing. Consensus sequences were

derived and analyzed using the sequence analysis softwares Clustal W2 and MEGA 4.

The generated phylogenetic trees showed that there were no significant sequence differences between *B. occipitalis* and *B. philippinensis*. Divergence values were from zero to 0.0018%; values obtained were significantly lower than the set standard of 0.5% to establish species delineation. Analysis of the 5' region of the mitochondrial *cox1* gene did not show species delineation between *B. occipitalis* and *B. philippinensis*. It is recommended that further analysis be done on more samples from other locations in the Philippines. **(Author's abstract)**

Biology. DNA barcoding. Cytochrome oxidase 1. *Bactrocera occipitalis* (Bezzi). *Bactrocera philippinensis* Drew and Hancock. Species delineation.

- 0160** The effects of *Aglaia loheri* blanco, *Aleurites moluccana* Linn. and *Ardisia pyramidalis* (Cav.) Pers. plant extracts on hepatic histology and lipid peroxidation activity in carbon tetrachloride-treated mice. Catap, Elena S., Ragudo, Michelle Alisa DC.. **Transactions of the National Academy of Science and Technology**, , 33(1):75

Three plant species, *Aglaia loheri*, *Aleurites moluccana*, and *Ardisia pyramidalis* were evaluated for their antioxidant properties by employing lipid peroxidation assays and histological analysis in carbon tetrachloride (CCl<sub>4</sub>)-treated mice. Sixty mice were divided into six treatment groups: 1) PBS-injected mice; 2) corn oil injected mice; 3) 30% CCl<sub>4</sub> in corn oil intraperitoneally injected in mice every 72 hrs; 4) *A. loheri* extract + CCl<sub>4</sub>; 5) *A. moluccana* + CCl<sub>4</sub>; 6) *A. pyramidalis* + CCl<sub>4</sub>. Each of the plant extract was injected intraperitoneally on a daily basis. After two weeks, liver tissue were dissected out and subjected to lipid peroxidation assays. Liver samples were also processed for histopathological examination. Lipid peroxidation in both control groups was significantly lower than in CCl<sub>4</sub>-treated mice. Malondialdehyde (MDA) levels in *Ardisia*-treated and *Aleurites*-treated mice are higher than the CCl<sub>4</sub>-treated mice but the *Aglaia*-treated mice had lower MDA levels than the CCl<sub>4</sub>-treated mice. However, the difference was not statistically significant. In the histological examination, the extracts from *Ardisia* and *Aleurites* seemed to induce cellular regeneration in CCl<sub>4</sub>-treated mice. Higher degree of vacuolization and nuclear pyknosis, ballooning degeneration and multifocal necrosis were prominent in CCl<sub>4</sub>-treated liver tissue. Based on these results, it is recommended that further studies to confirm the antioxidant capacity of these plant species should employ varying extract dosages and longer treatment periods. **(Author's abstract)**

Biology. Antioxidant. Histopathology. Lipid peroxidation. Carbon tetrachloride. Malondialdehyde. Ethanol plant extracts.

- 0161** Effects of mykovam, BioN and inorganic fertilizers on growth, yield and nutrient status of sweet sorghum [*Sorghum bicolor* (L.) Moench]. Aggangan, Nelly S., Calayag, Miguel Luigi L., Salvan, Austin Japeth R., Velandres, John Carlo. **Transactions of the National Academy of Science and Technology**, , 33(1):103

Sorghum is an important crop to dryland farmers and can be utilized for feeds and

biofuel. This study was conducted to determine the effects of biofertilizers Mykovam and Bio-N on growth, yield and nutrient uptake of Sweet Sorghum. The efficiency of biofertilizer was also compared with that of chemical fertilizers. Sweet sorghum was applied with biofertilizers Mykovam (containing mycorrhizal fungi) or BioN (containing nitrogen fixing bacteria), with or without half or full rate of the recommended rate of chemical fertilizer (RRC = 60-60-60 NPK). The experiment was conducted at the Demonstration farm of BIOTECH, UP Los Baños following a RCBD with four blocks. Growth was monitored periodically and plant samples were harvested at 102 and 154 days. Fresh and dry biomass, juice from the stalk, brix level and plant N and P status were measured. Results show that Mykovam+BioN promoted the largest root collar diameter. Mykovam alone and BioN+Mykovam promoted the highest fresh and dry weights of leaves, roots and cane, cumulatively, the highest total biomass. Mykovam treated sorghum had the highest total N and P concentrations and consequently, the highest N and P uptake (1,707 g N/plant and 269 g P/plant) and the lowest was obtained from the control plants (999g N/plant and 214 g P/plant). The highest fruit yield was obtained from plants treated with RRC (16.10 g/cane) comparable with BioN+Mykovam+1/2RRC (13.24 g/cane) and the lowest was the control (3.97 g/cane). In terms of brix level at 102 days, RRC gave the highest (9.36) comparable with BioN+Mykovam+1/2RRC treated plants (8.80) and the lowest was (6.20). At 145 days, Mykovam+BioN+½RRC treated plants had the highest (14.52) brix and the lowest was the control (13.72). The high nutrient status and brix level due to Mykovam+BioN+½RRC suggests that sweet sorghum can be a feasible source of feed and biofuel. **(Author's abstract)**

Biology. Biofertilizers. Sweet sorghum. Mykovam. BioN. Mycorrhizal fungi. Nitrogen fixing bacteria.

- 0162** The effects of *Tabernaemontana pandacaqui* POIR. leaf extract on some nonspecific immune response of cyclophosphamide-treated balb/c mice. Peredas, Charmaine R., Catap, Elena S.. **Transactions of the National Academy of Science and Technology**, , 34(1):71

The immunomodulatory effects of *Tabernaemontana pandacaqui* POIR. ethanolic leaf extract were determined in immunosuppressed Balb/C mice using nonspecific immune assays. Thirty-six (36) mice were grouped into: (1) negative control mice, given with sterile phosphate-buffered saline, 50 mL/kgBW; (2) positive control mice, injected with cyclophosphamide as immunosuppressant, 30 mg/kgBW, at days 1, 4 and 7 of the treatment period; and (3) plant-extract treated mice, orally-gavaged (5 mg/kgBW) daily for 7 days, and injected with cyclophosphamide one hour after the extract administration at days 1, 4, and 7 of the treatment period. Production of reactive oxygen species (ROS) or superoxide anion, proliferation of T and B lymphocytes and plasma lysozyme level were determined in the three groups of mice. Results showed that the plant extract-treated mice exhibited the lowest ROS production ( $0.1181 \text{ nmol O}_2^-/2 \times 10^5 \text{ cells/30 min}$ ) after 30 min incubation of macrophages. This suggests that the leaf extract inhibited this response which could indicate its potential as antioxidant. The plant extract-treated mice had the least percentage of cell proliferation with the addition of either lipopolysaccharides (LPS, 80% < control) and concanavalin A (ConA, 60% < control). The mitogens failed to stimulate the proliferation of T and B lymphocytes, which means that the plant extract has a potential anti-inflammatory and anti-cell proliferation. For the lysozyme activity assay, the plant extract had higher activity than the cyclophosphamide-treated mice but it was not significantly different. In general, the leaf extracts of *T. pandacaqui* had immunosuppressive effects on Balb/C, which were consistent with reported studies on

the genus *Tabernaemontana*. It is recommended that further studies be undertaken to determine effective dose and modulatory effects of the plant by using other immune response assays. **(Author's abstract)**

Biology. *Tabernaemontana pandacaqui*. Immunomodulation. Balb/C mice. Immunosuppression. Cyclophosphamide.

- 0163** Efficacy of formulated anti-mosquito gel from eucalyptus (*Eucalyptus globules*) and carrageenan. Alcon, Charie Mayne, Blanco, Ma. Teresa A., Agrupis, Shirley C.. **Transactions of the National Academy of Science and Technology**, , 33(1):80

The *in vitro* and *in situ* biocidal property of Eucalyptus gel formulation against larval mosquitoes was evaluated. This study aimed to (1) determine the effects on the morphology of mosquitoes; and (2) determine the mosquito repellent effect of the gel formulation.

Eight (8) different treatments were prepared for the *in vitro* test namely: T1 (combination of carrageenan and eucalyptus oil; T2 (combination of carrageenan and eucalyptus powder; T3 (pure carrageenan); T4 (pure eucalyptus oil); T5 (pure eucalyptus powder); T6 and T7 (positive control, commercial anti mosquito lotion for kids and adult); and T8 (negative control). Morphological effects of formulated treatments on the larval mosquitoes include the loss of body fluid, antennae and cut hair-like structures. In terms of mortality rate, eucalyptus oil formulation was not significantly different from the positive control, which both achieved 100% mortality. Based on the *in vitro* test, pure eucalyptus oil was observed as the most effective in attaining 100% mortality in just 29.33 minutes after application. The first three (3) formulations that gave the best result were used in the *in situ* evaluation namely T1, T2 and T4.

The *in situ* evaluation revealed that the combination of carrageenan and eucalyptus oil (T1) and commercial anti-mosquito lotion gave the best result in which no mosquito bites were observed by the human samples. Coefficient of Variation (CV) revealed that there are no significant differences between the formulated treatments and positive control on the number of mosquito bites.

The abundance of eucalyptus plant in the country can be tapped for the production of environment-friendly anti-mosquito product. **(Author's abstract)**

Biology. *In vitro*. *In situ*. Biocidal property. Repellent. Anti-mosquito.

- 0164** Elastic properties of a biopolymer. Ayade, Heev, Licup, Albert James, Bernido, Christopher, Carpio-Bernido, Ma. Victoria, Otadoy, Roland, Bacabac, Rommel. **Transactions of the National Academy of Science and Technology**, , 33(1):175

The mechanical and dynamical properties of a cell are primarily determined by the network of biopolymers in the cytoplasm and the nucleus. Furthermore, these constituent biopolymers play an important role in biological functions, such as in facilitating molecular transport within the intracellular environment, in changing

structure for movement, and in providing mechanical support to maintain shape. The cell's physiological behaviour, which collectively contributes to the organism's health, is therefore linked with the interplay of intracellular biopolymers. Since each biopolymer in a cell contributes to cell mechanical properties, understanding the physics behind the adaptive elasticity of individual biopolymers is crucial in gaining biological insights on emergent cellular behaviour. In this study, the elastic properties of a single biopolymer under tensile stress were investigated, deriving an elasticity model that is valid beyond thermal regimes.

This novel elastic model was shown to predict the behaviour of stretched double-stranded deoxyribonucleic acid, single-stranded deoxyribonucleic acid, single-stranded ribonucleic acid, and titin in recent experiments. The model uses the persistence length, which is proportional to the bending rigidity, considering thermal fluctuations, and is validated at minimum bending mode of truncated polynomial expansion. Our newly derived elasticity model fits a broader range of force-extension relations in various types of biopolymers, compared to existing wormlike chain and freely jointed chain models. Therefore, our approach is generically applicable to biopolymers and is applicable to industrial polymers of similar properties. **(Author's abstract)**

Biology. Elasticity. Biopolymers. Cell mechanics. Persistence length. Bending rigidity. Wormlike chain. Freely jointed chain. Double-stranded. Single-stranded. Titin. Bending mode.

- 0165** Establishing the leaf anatomy of *Tamarindus indica* LINN. (tamarind) and its implication to harsh environments. Chuidian, Paulina G., Tolentino, Vivian S.. **Transactions of the National Academy of Science and Technology**, , 33(1):72

Tamarind (*Tamarindus indica* Linn.) has not received sufficient research attention over the years though it is one of the minor fruit crops in the Philippines, with a great potential for commercialization. It is an important crop because of its varied food and medicinal uses. The young green leaves are used for tasty dishes. Crushed leaves are put on wounds and abscesses. Juice from crushed leaves is taken with porridge to stop vomiting. Several studies are reported on its taxonomy, description and distribution; properties of the species; uses and products; ecological requirements; agronomy and production areas; reproductive biology; genetic improvement; genetic resources; harvest, postharvest and processing; economics of production; marketing and trade; and current situation and needs for research and technology. None so far is reported on the anatomy of the leaves which maybe responsible for the structural responses of tamarind in environments that make it durable, robust, easy to grow and cultivate. Thus, this study aims to establish the anatomy of the leaves and other structures, and therefore contribute and hopefully complete the baseline information on tamarind. Histological techniques such as freehand, sliding, clearing and paraffin techniques on the leaves were done. The leaf anatomy is of the "non-Kranz" type. The upper and lower epidermises is uniseriate, with stomata on both epidermises (amphistomatic). The mesophyll is differentiated into three layers of long slender, compactly arranged palisade mesophyll, and a few spongy mesophyll cells. The multiseriate palisade mesophyll may be one of the reasons why tamarind is very resistant to strong winds, can tolerate violent typhoons and cyclones (von Maydell, 1986; von Carlowitz, 1986), and hurricane resistant (NAS, 1979). Its strong and pliant branches and a deep and extensive root system, which anchors it to the ground (Coronel, 1986) may also account for the overall tolerance to harsh environments.

**(Author's abstract)**

Stomata. Amphistomatic. Spongy mesophyll. Palisade. Epidermis. Non-Kranz. Biology.

- 0166** Evaluation of the immunomodulatory activity of *Macaranga mapp* (euphorbiaceae) ethanol extracts in balb/c mice. Alcantara, Mellissa C., Catap, Elena S.. **Transactions of the National Academy of Science and Technology**, , 34(1):70

Plant bioactive products have been used as medicine for as long as man's history, from being a cure to the common cold to being chemopreventive agents. This study focuses on the immunomodulatory activity of the ethanolic extract of *Macaranga mapp*, in immunosuppressed Balb/C mice. Thirty-six mice were divided into three groups, and treatments were orally administered through gavage for seven (7) days. The negative control group was treated with phosphate -buffered saline (PBS), while the positive control group was treated with cyclophosphamide (CP), an immunosuppressant. The mice in the plant extract group (M + CP) were gavaged with CP at days 1, 4 and 7 at one hour post-administration of the plant extract, which was done daily at 50 mg/kgBW. Lymphocyte proliferation, reactive oxygen species (ROS) production, and plasma lysozyme levels were measured at day 8 of the experiment. Cell proliferation was significantly higher in the Cp+M group compared with the positive control group (with LPS,  $p=0.003$ ; ConA,  $p=0.000$ ). However, the addition of the mitogens, lipopolysaccharide and concanavalin A, specific for B and T lymphocytes, respectively, had minimal effects in cell proliferation. ROS production was likewise highest in the plant extract group (CP+M,  $0.57 \text{ nmol O}_2-/2.5 \times 10^5 \text{ cells/30 min}$ ) but the difference was not statistically significant. The plasma lysozyme level in the plant extract group was only comparable to that of the positive control group. This suggests that ROS production is the preferred pathway for bacterial killing instead of cell lysis via lysozyme, and further indicates the antimicrobial activity of the plant extract. Overall, the results show that *M. mapp* could be an effective microbicidal agent, and has potential immunostimulatory actions, but further screening of the plant's bioactive products are required to validate these effects. **(Author's abstract)**

Biology. Macaranga  
mice. Antioxidant. Cyclophosphamide.

mapp. Immunomodulation. Balb/C

- 0167** Fermentation kinetics of gelatin-immobilized *Lactobacillus plantarum* BS using skim milk as substrate. Esmeris, Caryl Joy, Calapardo, Marilou R., Del Barrio, Marilyn C., Elegado, Francisco B.. **Transactions of the National Academy of Science and Technology**, , 33(1):198

Probiotics should at least have  $10^7$  CFU/ml count for more effective health benefits. However, a common problems with probiotic products is cell viability especially at ambient conditions. Cell entrapment or immobilization may promote viability.

A local lactic acid bacteria isolate, *Lactobacillus plantarum* BS, showed good probiotic properties in previous studies. Entrapment in gelatin was thought to enhance cell viability and create a different form of probiotic drink. The growth kinetics of gelatin-immobilized *L. plantarum* was investigated using 8, 10, and 12% (w/v) skim

milk as substrates. Batch fermentation was done at 37°C and agitation speed of 100 rpm. Total sugar consumption, biomass production, titratable acidity, pH and viability of immobilized cells during storage were determined. Maximum growth of *Lb. plantarum* BS was observed at its logarithmic phase, which was  $6.5 \times 10^7$  CFU/ml,  $6.0 \times 10^7$  CFU/ml and  $6.1 \times 10^7$  CFU/ml for 8, 10 and 12% (w/v) skim milk concentrations, respectively. Its stationary phase was observed after 6 h of fermentation. Highest rate of substrate consumption and biomass production were observed at 8% (w/v) skim milk concentration, suggesting substrate inhibition at higher concentrations.

Results also showed that through time, the pH of the substrate dropped while the total titratable acidity increased, suggesting an increase in the lactic acid production. The viability of the microbial cells during storage was also investigated and results showed that the viability of gelatin-immobilized cells was higher than that of the free cells during storage at refrigerated conditions. The growth of gelatin-immobilized *L. plantarum* was best described by the Moser Model yielding a  $\mu_{\max}$  value of 0.3556 hr<sup>-1</sup> and Ks value equal to 3.2E+7 µg/ml. **(Author's abstract)**

Biology. Lactobacillus plantarum. Viability. Probiotics. Lactic acid bacteria. Skim milk. Kinetic study.

- 0168** Foliar anatomy of jade vine *Strongylodon macrobotrys* A. Gray (fabaceae). Robil, Jan Lorie M., Tolentino, Vivian S.. **Transactions of the National Academy of Science and Technology**, , 34(1):86

Foliar anatomy of threatened tropical vine *Strongylodon macrobotrys* was investigated, focusing on its stem, petiole and leaflets. Leaves and stems of the vine were collected from Lucban, Quezon. Tissue sections of stems and leaves were processed and their structures were observed under light microscope. Findings reveal that ground and vascular tissue characteristics have implications to the growth and development of the vine. The stem has thin uniseriate epidermis, compact mesophyll and wide pith, with large isodiametric cells. The vascular cylinders are very distinct, with well developed xylem tissue. Firm xylem tissue in young stem of *S. macrobotrys* is of great mechanical advantage for its twinning habit since the vine is lacking of other support structures. Transverse sections of *S. macrobotrys* petiole revealed one distinct ridge vascular bundle which runs from the medial to the distal region of the petiole before reaching the attachment of the first two leaflets. It is suggested that this vasculature pattern has anatomical implications to the plant's trifoliar leaf development. Leaves are dorsiventral with collateral midvein. Four to eight layers of large isodiametric to polyhedral transition parenchyma cells are sandwiched between the palisade and spongy parenchyma which houses most of the lateral veins. The ground tissue organization of the leaves that can be related to the plant's physiology (i.e. metabolism and water storage) is uncommon in the family. It is concluded that the foliar anatomy of *S. macrobotrys* generally conforms to the anatomy of other plants under Fabaceae. Several anatomical features of the vine have implications to its growth and development, reflecting morphological adaptations, particularly for mechanical support. **(Author's abstract)**

Biology. Fabaceae. Foliar anatomy. Included vascular bundle. Transition parenchyma. *Strongylodon macrobotrys*.

- 0169** Functional activities of two strains of *Pleurotus cystidiosus*. Juganas, Daryl, Kalaw, Sofronio P., Reyes, Renato G.. **Transactions of the National Academy of Science and Technology**, , 33(1):137

*Pleurotus cystidiosus* is an edible mushroom widely distributed in subtropical and tropical countries growing on decaying logs and other agricultural wastes. In the Central Luzon, wild strains of this mushroom were collected in upland community of Llanera, Nueva Ecija and Central Luzon State University (CLSU) campus. The Center for Tropical Mushroom Research and Development has developed production technology for the cultivation of this mushroom. Because of its potential in the nutraceutical and pharmaceutical industries, our research team determined the functional activities of the basidiocarp and mycelial hot water extracts of two wild strains of *P. cystidiosus*. Carageenan induced edema and charcoal tracing method were performed to determine the anti-inflammatory and the anti-spasmodic activity, respectively, using Swiss albino mice.

Carageenan induced edema test revealed that the mycelia and basidiocarp extracts of the two strains can reduce inflammation. Basidiocarp extract of CLSU strain recorded the highest percentage of inhibition of inflammation with means of 26.47% and 66.18% one and three hours after the application, respectively. On the other hand, charcoal tracing assay for antispasmodic activity showed that the mycelial extract of Llanera strain registered the lowest percent traveled by charcoal in the intestine of mice with a mean of 41.83%. **(Author's abstract)**

Biology. *Pleurotus cystidiosus*. Functional activity. Anti-spasmodic. Anti-inflammatory.

- 0170** Functional studies of WSSV-shrimphomologs by DS-RNA interference in the shrimp *Marsupenaeus japonicus*. Maningas, Mary Beth B., Kondo, Hidehiro, Hirono, Ikuo. **Transactions of the National Academy of Science and Technology**, , 33(1):89

Global shrimp production tripled over the past decade from 750,000 tonnes in the 1990s to more than three billion tonnes over the past five years, severely affecting ecosystems and livelihoods. White spot syndrome virus (WSSV) is a deadly pathogen for shrimp and a major threat to shrimp farming for the last two decades. Elucidation of the underlying mechanism of shrimp virus interaction will be of enormous help in the prevention and management of shrimp viral diseases.

Double stranded RNA interference (ds-RNAi) is a powerful tool in elucidating gene function in invertebrates. ds-RNAi allows interference with the expression of a gene in a highly sequence specific manner and thus essential genes can be targeted by design, with little or no risk of undesired off-target effects.

Eight (8) WSSV-shrimp homologs ORFs (MjORF13, MjORF17, MjORF20, MjORF23, MjORF24, MjORF31, MjORF34, MjORF37) from kuruma shrimp previously identified to have significant homology with WSSV were studied using dsRNA interference technology.

The eight WSSV-shrimp homologs were successfully amplified, sequenced and dsRNA have been produced. Interestingly, initial results showed that shrimp injected

with MjORF31- and MjORF34-dsRNA significantly increased mortality compared to that of the PBS injected group, highlighting their importance in shrimp survival.

Challenge test results with white spot virus syndrome (WSSV) as pathogen showed that shrimp injected with MjORF17-, MjORF20-, MjORF23-, and MjORF34-dsRNA have higher survival rate than those of the control. Hence, dsRNAs of these four WSSV-shrimp homologs may have protective effect on shrimp against WSSV infection. It would be interesting to pursue or assess the stability and the possible therapeutic application of dsRNAi in shrimp. **(Author's abstract)**

Biology. Shrimp. dsRNA interference. Homologs. White spot virus syndrome. Shrimp-virus interaction.

- 0171** Geographic variation in vegetative and flower morphometry among populations of *Lilium philippinense* Baker (liliaceae), an endemic species in the Philippines. Balangcod, Teodora D., Cuevas, Virginia C., Balangcod, Kryssa D.. **Transactions of the National Academy of Science and Technology**, , 34(1):84

*Lilium philippinense* is an endemic species with a narrow geographic distribution along the southwestern part of the Cordillera Central Range, Luzon, Philippines. Recently, its population is decreasing due to over collection and habitat loss. This study aims to establish if the populations of this species represents a single population. Morphometric analyses of vegetative and floral characteristics were studied in 23 populations of *L. philippinense*. Morphometric features of the vegetative and floral organs were measured from five plants that were randomly collected from each of the 23 populations. Correlation analysis reveals that most morphometric traits are correlated among the 23 populations. This is supported by principal components analysis suggesting that there is morphometric association among the populations. Elevation significantly correlates with corolla diameter. Using analysis of variance with post hoc tests on the four cluster showed that the populations significantly differ only in corolla diameter and leaf length. Generally, statistical analyses suggests that the 23 *L. philippinense* populations are closely associated with each other and probably represent a single population. The variation in leaf width and corolla diameter can be considered as a start of differentiation among the populations possibly implying selection on these two traits. **(Author's abstract)**

Biology. Cordillera Central Range. Geographic variation. Morphometry. Luzon, Philippines. *Lilium philippinense*.

- 0172** Histochemical study on *Hibiscus rosa-sinensis* L. (gumamela) flower and the effect of its extract on white mice fetus. Dunay, Metchie T., Yadao-dela Cruz, Reggie, Porquis, Heidi C.. **Transactions of the National Academy of Science and Technology**, , 34(1):53

*Hibiscus rosa-sinensis* L. (gumamela) has been valued for its medicinal uses. There are however reports of it being abortifacient. This study determined the presence of phytochemicals in the flower and evaluated the effect of gumamela flower extract on the morphological development of white mice fetus. The following were the treatments replicated five times in a Completely Randomized Design (CRD): T1 (2g/ml

aqueous extract); T2 (1g/ml aqueous extract); Negative control (distilled water); Positive control (5.5 mg/ tetracycline). The treatments were administered to pregnant mice orally at 0.2 ml for two weeks. Results of histochemical tests revealed the presence of alkaloids, arbutin, tartaric acid, fats and oils in the epidermis, vascular bundle and cortex of the petals of gumamela flower. Morphological examination of the fetuses showed no abnormalities except for the significantly smaller body weight in T2 (0.36 g) and T1 (0.50 g) compared to the negative control (1.26 g). The fetuses of the treated pregnant mice also had smaller body length of 1.6 cm compared to the negative control with 2.2 cm. The computed implantation index was highest in the negative control (8.8) and least in T1(5.8). It is concluded that the gumamela petal extract has a potential detrimental effect on the fetus of white mice. **(Author's abstract)**

Biology. Hibiscus rosa-sinensis L.. Gumamela. White mice. Pregnancy. Histochemical test.

- 0173** Histocompatibility assessment in the chicken colonies closed for several years. Valdez, Jr., Marcos B., Kinoshita, Keiji, Mizutani, Makoto, Fujiwara, Akira, Yazawa, Hajime, Yamagata, Takahiro, Shimada, Kiyoshi, Namikawa, Takao. **Transactions of the National Academy of Science and Technology**, , 33(1):84

Despite the numerous calls for the conservation of avian genetic stocks, there is still continued elimination of chicken research populations. The core objective for conservation of farm animal genetic resources is to maintain access to the adaptive genetic potential of collection of valuable research resources. The closed colonies of chicken used in this experiment are well characterized. However, assessment of isogeneity of these closed colonies has not been performed, thus, immunological methods to assess the status of the histocompatibility antigens were employed. The RIR-Y8/NU, BL-E, YL and WL-G chicken closed colonies were assessed by hemagglutination test using anti-red blood cell (RBC) antibodies (HT), skin transplantation test (STT) and formation of isohemagglutinins (FIHs) during STT. The YL individuals all showed the survival of skinrafts with no FIHs in STT and no RBC antigenic variations in HT, indicating high homogeneity at the serological loci. The BL-E as well as WL-G closed colonies were also found to be histocompatible in the STT with no FIHs, although the HT showed heterogeneities at serological locus/loci other than the B and C blood group loci which have significant effects on histocompatibility. In the RIR-Y8/NU closed colonies, STT showed early skinraft rejection with positive FIHs caused by different B locus alleles, suggesting relatively high heterogeneities. The YL, BL-E and WL-G are isogeneic lines, however, RIR-Y8/NU needs further selection. **(Author's abstract)**

Biology. Chicken closed colony. Chicken genetic resources. Hemagglutination. Isohemagglutinin. Skin transplantation.

- 0174** Histopathological changes in the arcuate nucleus of the hypothalamus in 'MSG-mice'. David, Anne Marjorie E., Nalo-Ochona, Cynthia, Salunga, Thucydides L.. **Transactions of the National Academy of Science and Technology**, , 32(1):43

A new non-genetic model of diabetes, obesity, and fatty liver was developed, called MSG-mice. This model is induced with the injection in newborn mice of monosodium glutamate (MSG). More importantly, MSG-mice are regarded as the most comprehensive model described thus far based on the co-existence of multiple aspects of the human metabolic syndrome. However, the mechanisms responsible for the effects of MSG on the ICR mice remain unknown but we hypothesize that MSG may affect the brain specifically the hypothalamus. The aim of this experiment is to observe developmental changes in the hypothalamus caused by MSG and attempt to make a model of how the lesions progress through its postnatal days during critical stages of brain development. In this study MSG was subcutaneously injected (2mg/g body weight) to the treated groups (MSG-mice) for live consecutive days starting at day of birth, while the control group (Ctrl) did not receive any treatment. Mice were sacrificed after every five days until day 36. Formalin-fixed, paraffin-embedded brain tissues were processed and 4-mm thick serial sections were cut and stained with hematoxylin and eosin (HE). Lesions were quantified based on cellular aberrations such as cellular vacuolations, shrinkage of neurons and pyknosis. The results showed that the arcuate nucleus of the hypothalamus of MSG-mice have more lesions than those of the control group (at  $\alpha = 0.05$ ,  $t_{\alpha} = 2.447$  and  $t = 4.053$ ). Lesions become more pronounced as the mice ages and peaks at day 26. However, improvement was observed after day 26. Possible repair mechanism at this stage may be activated from day 26. No significant difference was seen between the weights of two test groups; however, BMI of control mice was slightly higher than those of MSG-mice but not statistically significant. **(Author's abstract)**

Biology. Hypothalamic lesions. MSG-mice.

- 0175** Identification and characterization of the chalcone synthase gene (CHS) in *Curcuma longa* L. and *Curcuma zedoaria* Rosc. rhizomes. Panes, Vivian A., Adriano, Emilio Serafin, Redota, Mennold Archee P., Tan Gana, Neil H.. **Transactions of the National Academy of Science and Technology**, , 34(1):67

Chalcone synthase catalyzes the production of a number of secondary metabolites in *Curcuma longa* L. and *C. zedoaria* Rosc. The objective of this research is to identify the chalcone synthase gene which encodes for Chalcone synthase enzyme. Gene specific primers for chalcone synthase (CHS) gene were designed using the software vectorNTI. The sense primer has the sequence 5' -CAAGGACCTGGCGGAGAACA-3' and the antisense primer 5' -CGCTTCCTCACCTCGTCCAT-3'. Both primers have 20 base pairs with an optimum melting temperature of 57°C. Genomic DNA of *C. longa* L. and *C. zedoaria* Rosc. were extracted. PCR amplification settings were optimized. Different DNA template dilutions of 1:20, 1:50, and 1:100 were used. At 60°C melting temperature (denaturation 1:00; annealing 1:00; elongation 2:00), there were no distinct PCR products that were produced. In the second PCR trial, 61°C was used as the melting temperature (denaturation 0:30; annealing 0:30 elongation 1:00). Faint bands were observed at the 1:100 dilutions for both *C. longa* L. and *C. zedoaria* Rosc. The 1:100 dilution was subjected to MgCl<sub>2</sub> gradient concentration. Different concentrations of MgCl<sub>2</sub> (0.5 nM, 1.00nM, 2.00 nM and 2.5 nM) were used. Distinct bands emerged in the agarose gel after electrophoresis at the 2.00 mM and 2.5 mM MgCl<sub>2</sub> for *C. longa* L. and 2.00 mM MgCl<sub>2</sub> for *C. zedoaria* Rosc. The primers designed were able to amplify the chalcone synthase gene (CHS) gene in *C. longa* L. and *C. zedoaria* Rosc. at the optimum PCR profile and the optimized concentration of MgCl<sub>2</sub> in the second PCR trial. Hence, the chalcone synthase gene for *C. longa* and *C. zedoaria* was identified using a gene specific primer. **(Author's abstract)**

Biology. Chalcone synthase gene. Zingiberaceae. Curcuma. Curcuma longa. C. zedoaria.

- 0176** Identification and cloning of ribosome inactivating protein (RIP) genes in *Jatropha pandurifolia* Andr. and *Jatropha podagrica* hook. Panes, Vivian A., Corpuz, Maricel Q.. **Transactions of the National Academy of Science and Technology**, , 33(1):73

Ribosome -inactivating proteins inhibit protein synthesis in eukaryotes by catalytically damaging ribosomes and been proven to have antiviral and antitumour activity because it can truncate the translation of viral coat proteins. The presence of RIP genes in *Jatrophapandorifolia* Andr., *Jatropha podagrica* Hook. was screened using 5 primer sets. *Jatrophacurcas* L. was used as the control because it already has a known RIP gene as determined by Lin *et al.* (2003). PCR products obtained were analyzed through BLASTs and Clusta Wof MEGA4. Cloning of the genomic DNA PCR products and RT-PCR products were performed. Sequence analysis of the cloned PCR products through BLAST showed 87%-90% homology of *J. pandurifolia*'s RIP gene sequence to *J. curcas* precursor gene, while 87%-89% homology of *J. podagrica*'s RIP gene sequence to *J. curcas*' curcin precursor gene. Nucleotide sequence and deduced amino acid sequence revealed possible ORFs in *J. podagrica* and *J. pandurifolia* 's cloned PCR products of *J. podagrica* and *J. pandurifolia* to *J. curcas*' curcin revealed the presence of RIPs conserved regions such as SYFF, ALD and EAA which are putative active sites. Identification of the RIP genes in *J. pandurifolia* and *J. podagrica* will shed light on the medicinal properties of the ribosomal inactivating proteins (RIPs) in these plants. It will serve as a guide for those who might be interested in the isolation and purification of these proteins which have known antitumour and antiviral properties. **(Author's abstract)**

Antitumour. Cloning. Ribosome inactivating proteins. Biology.

- 0177** Immunomodulatory effects of dried *Curcuma longa* powder on the expression of crustin and lysozyme in *Macrobrachium rosenbergii dacqueti*. Alambra, Jennifer R., Alenton, Rod Russel R., Gulpeo, Pia Clarisse R., Mecnas, Christine L., Miranda, Abigail P., Thomas, Rey C., Velando, Maden Krista S., Vitug, Lawrence D., Maningas, Mary Beth B.. **Transactions of the National Academy of Science and Technology**, , 33(1):114

Turmeric, a derivative of the plant *Curcuma longa*, exhibits several pharmacological properties and its extracts were found to have a high potential to inhibit some pathogenic bacteria of shrimp and chicken. In this study, eighty (80) *Macrobrachium rosenbergii dacqueti* juvenile shrimps were used for the entire experiment. Purchased turmeric was properly identified at the UST Herbarium. The turmeric was dried and pulverized; and its powder was incorporated into commercial feeds. The shrimps were divided into three groups, D0, D1 and D7. D0 were fed with commercial feeds while D1 and D7 were fed with the enhanced shrimp feeds for one (1) and seven (7) days respectively. These were challenged with *Vibrio alginolyticus*. Relevant tissues were dissected from shrimp samples and total RNA was isolated, quantified by UV spectrophotometry and synthesized into cDNAs. RT-PCR was performed using crustin and lysozyme for target genes and EF-1 $\alpha$  as standard control. Quality and quantity of RNA was assessed by measuring the A<sub>260</sub>/A<sub>280</sub> ratio and by

agarose gel electrophoresis. An increasing intensity of crustin and lysozyme PCR bands relative to the duration of feeding was observed suggesting that shrimps fed with enhanced feeds after bacterial challenge had an induced expression of the mentioned antimicrobial peptides (AMPs). A remarkable increase in the expression of the two AMPs was also observed from D0 to D1 but not from D1 to D7. The results suggest that turmeric powder enhances the expression of these two peptides, but its rate of effectivity is yet to be studied. **(Author's abstract)**

Biology. Shrimp biotechnology. *Curcuma longa*. Turmeric. *Macrobrachium rosenbergii*. Crustin. Lysozyme.

**0178** Immunostimulatory effects of *Uncaria perrottetii* (A.RICH) merr. (rubiaceae vinebark extract *in vivo*. Catap, Elena S, Nudo, Leonora P.. **Transactions of the National Academy of Science and Technology**, , 33(1):67

The immunostimulatory effects of *Uncaria perrottetii* ( A. Rich) Merr. vinebark aqueous extract was evaluated by employing a number of immune response assays *in vivo*. Initially, the optimum concentration was determined *in vitro* to be 50µg/mL. This concentration was then assessed for the immunoprotective effects of the extract against immunosuppressed Balb/C mice.

Thirty-six (36) mice were divided into 3 groups: (1) Phosphate-buffered saline (PBS)-injected mice; (2) *U. perrottetii* extract and Cy-treated mice (*U*+Cy); and (3) cyclophosphamide (Cy)-induced immunosuppressed mice. Group 1 was injected intraperitoneally with 0.2mL of 30mg/kg body weight of cyclophosphamide (Endoxan®) at days 1, 4, 7, and 10 of the treatment period. Cyclophosphamide was also administered to group 2 one hour after each administration of the plant extract. 50mL/kg body weight of PBS and *U. perrottetii* extract (2.5 mg/kg body weight) was administered daily.

In all immune assays undertaken, group 3 showed significantly lower response when compared with group 1. Group 2 showed significant improvement in phagocytic activity (27%), proliferation of cells with (29.61%) and without (44.57%) lipopolysaccharide, superoxide production ( $P<0.05$ ), and plasma lysozyme activity ( $P<0.05$ ) compared with the group 3.

The study showed that the extract could potentially reverse the immunosuppressive effects of cyclophosphamide *in vivo*. There is, therefore, a great potential of the plant as a source of bioactive products and metabolites for drug development. **(Author's abstract)**

Murine macrophages. Rubiaceae. Immunostimulation. *Uncaria perrottetii*. Balb/C mice. Biology.

- 0179** Industrially important bacterial isolates from sweet sorghum. Layaoen, Heraldo , Franco, Samuel S., Soliman, Remelyn, Acosta, Rowena, Gaoat, Cecile A., Franco, Prima Fe R.. **Transactions of the National Academy of Science and Technology**, , 33(1):69

In an effort to search for industrially important enzyme producing bacteria, specially needed for biofuels production, sweet sorghum was used as the inoculum. Three varieties of sweet sorghum namely SPV 422, NTJ2 and ICSV93046 were used in this study. Sweet sorghum flour were inoculated in Nutrient Broth and incubated overnight. Pure cultures were obtained and grown in Nutrient Agar. Colonies were morphologically and biochemically characterized. They were further screened for production of enzymes needed in the industry. Three isolates are protease producers, one is a lipase producer and one has the ability to hydrolyze starch All the isolates are Gram positive coccus except the starch hydrolysis positive which is Gram negative coccus. They can tolerate up to a maximum of 36% to 39 sugar concentration%, an indication that they are osmophiles. All the isolates are present in all of the sweet sorghum varieties. They are at present molecularly characterized to further elucidate their taxonomical positions. these are potential isolates for biotechnological production of industrially important enzymes. **(Author's abstract)**

Sugar hydrolysis. Protease. Enzymes. Lipase. Sweet sorghum. Bacteria. Industry. Biology.

- 0180** Inoculation of dipterocarps *Anisoptera thurifera* and *Shorea guiso* with Ectomycorrhizal fungi in Philippine red soil. Aggangan, Nelly S., Aggangan, Jenny S., Bulan, Joy Charisse O., Limos, Cheryl Anne S.. **Philippine Journal of Science**, , 141(2):229-241

Dipterocarpaceae is the most important tree family in the tropical forest of Southeast Asia and the Philippine dipterocarp forests are famous for their high diversity and for the dominance of this family in its lowland forests. Unfortunately some of the species in the country are already considered as endangered. This experiment aimed to develop protocol in the production of quality rooted cuttings of *Anisoptera thurifera* (Blanco) Blume and *Shorea guiso* (Blanco) Blume for plantation experiments in red soil of Caliraya, Laguna, Philippines using controlled inoculation with ectomycorrhizal (ECM) fungi. Rooted cuttings of *A. thurifera* and *S. guiso* were prepared and inoculated with mycelial beads containing vegetative mycelia of ECM fungi: *Pisolithus* sp.1 (from *Acacia* coded internationally as PTG), *Pisolithus* sp.2 (from *Eucalyptus* coded internationally as H6394) or *Astraeus* sp.(from dipterocarps) and grown under nursery conditions. After four months *Astraeus* sp. and *Pisolithus* sp.2 gave the highest levels of root colonization and height increments in *A. thurifera*, *Pisolithus* sp.1 promoted the highest fine root P concentration (1.37 mg/g) and P uptake (0.273 mg/root) while *Astraeus* sp. promoted the highest (0.199 mg/root) coarse root P uptake. In *S. guiso*, *Pisolithus* sp.2 promoted better growth and root P uptake than *Pisolithus* sp.1 *Pisolithus* sp.2 increased height increment (116%), root (26%), shoot (36%), and total (54%) plant dry weight over the control treatment. This fungus increased root P concentration and uptake by 15% and 153%, respectively, relative to the uninoculated control counterpart. Uninoculated cuttings had the lowest height increment, dry weight and root P concentration and uptake. In conclusion, *Pisolithus* sp.2 and *Astraeus* can be used to inoculate *A. thurifera* and *Pisolithus* sp.2 for *S. guiso* rooted cuttings in order to have quality planting materials for plantation establishment in red soil in Caliraya, Laguna and other reforestation sites in the Philippines with similar soil conditions. **(Author's abstract)**

Biology. *Astraeus*. *Cuttings*. *Dipterocarps*. *Ectomycorrhiza*. *Pisolithus*.

- 0181** An interactive identification key. Yap, Sheryl A., Bourgoïn, Thierry. **Transactions of the National Academy of Science and Technology**, , 33(1):132

Identification is the process of finding unknown organism to which an organisms belongs. There are several methods that are available for aiding this process. The most common is the use of a conventional paper-based identification keys - a tedious and time consuming work. The other one is with the help of a computer-aided identification keys - with more options, support back-tracking, provide pictures of excluded species as well as of those that are still under consideration, and provides drawings or pictures of characters or body parts that is/are being described (Yap and Froese, 2005).

With about 160 genera and 1500 species, Derbidae represents the third larger family of the Fulgoromorpha (FLOW, 2010). F. Muir (1917) was able to comprehensively collect and study them in the Philippines. He identified and described a total of 39 genera and 98 species based on the large collection of prof. C. F. Baker and his own. Most hemipterist have paid less attention to the derbid fauna of the Philippines, aside from those that are found attacking economically important plants. The high endemicy of the derbids was noted by Muir (1917), and clearly showed that many more species remain to be discovered.

Using Xper2 - an open e-tool to manage descriptive data - we present here the first illustrated computer-aided identification key for the known Philippine derbid genera based on Diagnostical morphological characters. This computer-aided key would facilitate much faster identification of Philippine derbids in the field and would be helpful to those studying derbids with limited access to foreign literature. **(Author's abstract)**

Biology. Derbidae. Computer-aided identification key. Interactive identification key. Identification.

- 0182** Inventory of earthworms in Mt. Hilong-hilong Range, Agusan del Norte, Philippines. Murro, Mary Alona L., Mohagan, Alma B., Ibanez, Jayson. **Transactions of the National Academy of Science and Technology**, , 33(1):78

Earthworms play an important role in the ecosystem as keystone species on soil formation. They plough the soil, mix, till and build topsoil as they burrow through the earth. They consume large quantities of soil and fresh or partially decomposed organic matter from the soil surface, depositing it as fecal matter/casts in the lower soil horizons. They loosen and aerate the soil as they tunnel the ground affecting the hydrology cycle. Earthworms in their natural habitats improve soil structure, fertility, and the rate that organic matter gets broken down. Yet, they are less known in the Philippines. Here, inventory of earthworms in the mossy and montane forests of Mt. Hilong-hilong, Diwata Range, Agusan del Norte was conducted for 15 days to provide information on species composition and richness using digging, hand sorting and

counting methods. Twenty six species were identified and 6 were undetermined. These were placed in 32 genera. Twenty species were disconcordant in the mossy and seventeen species in the montane forest. Only six species of earthworms were concordant in both vegetations. Species diversity was higher in the mossy forest  $H' = 2.788$  compared to montane forest  $H' = 2.674$ . Similarity of species composition showed low  $Si=25.33\%$  between the mossy and montane forests which implies that mossy and montane forest are two unique habitats for earthworms in Mt. Hilong-hilong. It is recommended that cast formation and biology of these earthworms be studied as future source of vermicast organic fertilizer production rather than using exotic stocks. **(Author's abstract)**

Biology. Inventory. Earthworm. Mt. Hilong-hilong, Philippines. Species diversity.

- 0183** Isolation and characterization of microsatellites in selected Philippine native and endemic gobiidae species. Punongbayan, April S., Diaz, Ma. Genaleen Q., Bulasag, Abriel S., Reamillo, Ma. Cecilia S., Ocampo, Pablo P.. **Transactions of the National Academy of Science and Technology**, , 33(1):95

Microsatellite markers enable species and parentage identification, assessment of genetic diversity and population genetic structure, determine relationships between populations and species and are widely used in marker-assisted breeding. These highlight the significance of the isolation, characterization and development of microsatellite markers from our own, Philippine endemic and native freshwater fishes. Five Philippine native and endemic Gobiidae species were collected. These include *Glossogobius celebius*, *G. giuris*, *Rhinogobius sp.*, *Gobiopterus lacustris*, and *Mistichthys luzonensis*. A modified protocol for the construction of microsatellite enriched genomic library was used. Genomic DNAs from each species were pooled, digested with *Rsa*I, size-selected, purified and ligated to *Mlu* I adaptors. DNA containing microsatellite fragments were captured by biotinylated oligo probes [(TC)<sub>10</sub>, (CA)<sub>10</sub>, and (TG)<sub>10</sub>] and recovered using streptavidin magnetic particles. After PCR, the product was ligated to pGEM-T Easy vector, transformed into JM109 competent cells and plated on Luria-Bertani (LB) agar medium. Recombinant plasmids identified through blue-white screening were sequenced. However, there was low efficiency. To increase efficiency in selecting clones containing microsatellites, more stringent hybridization procedures are now being explored including the hybridization of colonies with non-radioactively labelled repeat oligonucleotides. **(Author's abstract)**

Biology. Microsatellites. Library construction. *Glossogobius celebius*. *Rhinogobius sp.*. *Glossogobius giuris*. *Gobiopterus lacustris*. *Mistichthys luzonensis*.

- 0184** Isolation and identification of CDNA encoding a midgut trypsin-like enzyme in the cigarette beetle *Lasioderma serricorne* Fabricius (coleoptera:anobiidae). dela Fuente, Angelo A., Aquino, Vermando M.. **Transactions of the National Academy of Science and Technology**, , 34(1):83

The use of enzyme inhibitors either from direct processing of natural sources or from transgenic crops has become promising in the biological control of stored product pests. This strategy however requires knowledge of the target enzymes because of

their diversity and relative activities in different species of pest arthropods providing a range of specific responses that may influence the success or failure of the control strategy. The current study aims to explore a digestive trypsin-like enzyme in the gut of the cigarette beetle *Lasioderma serricorne*, an important emerging pest of agricultural commodities. The study involves isolation of mRNA from the insect gut, complementary DNA (cDNA) synthesis, isolation of the target enzyme cDNA using CODEHOP-PCR technique. Total RNA was isolated from the midgut dissected from the fourth instar larvae of *L. serricorne*. Reverse transcription-polymerase chain reaction (RT-PCR) was conducted to convert mRNA into cDNAs. The cDNAs were subjected to cDNA-ends amplification using CODEHOP-PCR and designed degenerate primers based on the conserved sequence of homologous protein sequences of the target enzyme. A 3' -end DNA fragment of ~828 bp was generated and cloned in p-GEM-T easy vector and sequenced. The result suggests that *L. serricorne* may have a single digestive trypsin-like enzyme relatively ideal for biological control. **(Author's abstract)**

Biology. Midgut trypsin-like enzyme. *Lasioderma serricorne*. mRNA. cDNA. cDNA synthesis. Reverse-transcription-polymerase chain reaction (RT-PCR). cDNA-ends amplification. CODEHOP-PCR.

- 0185** Isolation and screening for bacteria with amylolytic, proteolytic or lipolytic activity from pitcher plant (*Nepenthes sp.*). Elazegui, Erwin P.. **Transactions of the National Academy of Science and Technology**, , 33(1):131

Microorganisms possess many different enzymes. The activities of these enzymes determine the nature of the organism; microbe's physiological properties by its enzymatic activities and ecological relationships. Enzymes are proteins that speed up chemical reactions. The traditional sources of many enzymes are plants and animals. These sources are no longer adequate to meet the growing demands for enzymes. Consequently, manufacturers and scientist are turning to microorganisms as sources.

Several studies have dealt with the isolation of enzymes producing bacteria from different sources. However, no similar studies have been conducted on Pitcher plant (*Nepenthes sp.*) or several plants which are indigenous and endangered plant to the Philippines. Enzymes produced from microbial metabolism can be useful raw materials for industrial and environmental applications.

The study focus on the isolation and screening of bacteria from the phytotelmata or digestive fluid of pitcher plant. Thirty-two bacteria were isolated in which ten were screened for enzymatic activities.

Results showed that four of the five isolates were positive for amylolytic activity as indicated by clear zones on Starch Agar. Nine isolates were lipolytic as indicated by zones of clearing and precipitation on Egg Yolk Agar while ten isolates exhibited proteolytic activity on Skim Milk Agar.

Partial characterization of bacterial isolates screened were gram positive, endospore forming, aerobic to facultatively anaerobic rods which probably belong to the Family Bacillaceae. **(Author's abstract)**

Biology. Bacteria. Amylolytic. Lipolytic. Proteolytic. Phytotelmata.

- 0186** Isozyme analysis of selected native and endemic Philippine freshwater fish species. Laude, Rita P., Reyes, Roberto C., Rogelio, Diana Rose O., Ocampo, Pablo P.. **Transactions of the National Academy of Science and Technology**, , 33(1):94

In an attempt to establish the genetic relationship and to assess the genetic variation within and in between populations of selected endemic and native Philippine freshwater fishes, isozyme analysis was done using starch gel electrophoresis for four different enzyme systems namely: esterase, alkaline phosphatase, malic enzyme and,  $\alpha$ -glycerophosphate dehydrogenase. A total of 285 fish individuals were used that include *Leiopotherapon plumbeus* ("Ayungin"), *Glossogobius celebius* (Biyang Bato"), *Glossogobius giuris* (Biyang Bato") and *Ophieleotris aporos* ("Bangayngay"). The crude protein extracts were loaded onto the starch gel and the electrophoretic run followed. After the run was finished, the gel was sliced into four and each slice was soaked in a specific enzyme staining solution. The resolved bands were then scored and the relative mobility (Rf) values were computed for each band. Preliminary results include the banding patterns observed for each population and the temporarily assigned presumptive loci and alleles based on the Rf values. The loci and alleles assigned are still temporary until all the bands are confirmed for their presence and position which is now underway. These loci and alleles will be the basis for the statistical analysis using the POPGENE32 software. However, to have a more effective analysis, four more enzyme systems namely: acid phosphatase, lactate dehydrogenase, phosphogluconic acid, and isositric dehydrogenase will be added.  
(Author's abstract)

Biology. Isozyme. Starch gel electrophoresis. Esterase. Alkaline phosphatase. Malic enzyme.  $\alpha$ -glycerophosphate dehydrogenase. Acid phosphatase. Lactate dehydrogenase. Phosphogluconic acid. Isositric dehydrogenase. *Leiopotherapon plumbeus*. *Glossogobius celebius*. *Glossogobius giuris*. *Ophieleotris aporos*.

- 0187** Mandibular shape variation in the ants *Diacamma rugosum* and *Pheidologeton diversus philippinus*. Manting, Muhmin Michael E., TaÃ±edo, Jr., Eugene Vernon V., Torres, Mark Anthony J., Demonyo, Cesar G.. **Transactions of the National Academy of Science and Technology**, , 34(1):85

This study was conducted to determine mandibular shape variation in two species of ants that vary in their life history and social adaptation patterns. These includes the ant *Diacamma rugosom* which still retains the primitive faculties as solitary hunter and the ant *Pheidologeton diversus* which lives in a caste system complete with a queen and various type of workers. The specimens used in this study were collected from Initao National Park, Initao, Misamis Oriental and stored in 70% ethyl alcohol solution. Body size measurements of each worker were taken. The mandibles of the ants were dissected from 150 randomly selected worker ants and photographed prior to Geometric Morphometric analyses. A total of 100 points were digitized from images of the mandibles using TpsDig ver. 2.12. The X and Y coordinates of the outline points were saved in Matlab format and were subjected to Relative Warp Analysis to remove non-shape components. Results showed that size-dependent shape variation was observable only in the eusocial ant *P. diversus* and not in the solitary species *D.*

*rugosom*. Plots of the effective principal components for *P. diversus* showed that forty-seven percent of the shape variation could be attributed to allometry and that minor workers have slender sharp mandibles while the major workers and soldiers have thicker and more robust club. Pearson correlation values for shape variables against body size in *D. rugosom* ranged only from  $r=0.006$  to  $0.197$ . These results show that age- and size- related changes in the shapes of the mandible may accompany task partitioning in ants and may be important in studying the evolution of sociogenesis in ants. **(Author's abstract)**

Biology. Eusocial ants. *Diacamma rugosom*. *Pheidologeton diversus*. Solitary ant. Mandible.

- 0188** Microbial enumeration and detection of *Staphylococcus aureus* from the selected dried fishery products. Macachor, Corazon P.. **Transactions of the National Academy of Science and Technology**, , 34(1):73

Taboan Market in Cebu City, Philippines is the most famous source of dried *danggit*, *pusit* and *mangsi* which serve as *pasalubong* for local and foreign tourists in Cebu City. The Cebu Technological University researchers visited the dried processing firms located near the coastal areas of Cebu City and Talisay City, Cebu. The study revealed that the processors were not aware of good manufacturing practices for fish drying. Samples of the top three best seller dried products at Taboan Market were analyzed as to bacterial and fungal total plate count with the detection of *Staphylococcus aureus*, in colony forming unit, using 3M-Petrfilm and pour plate method. The pH and water activity levels of the products were determined. The dried *danggit*, *pusit* and *mangsi* had bacterial total plate count of  $1.0 \times 10^4$  cfu/g,  $2.5 \times 10^4$  cfu/g and  $5.0 \times 10^4$  cfu/g, respectively; mold count of  $2.3 \times 10^1$  cfu/g,  $2.0 \times 10^1$  cfu/g, and  $1.5 \times 10^1$  cfu/g. The *S. aureus* count of 30, 50 and 100 cfu/g sample for dried *danggit*, *pusit* and *mangsi*, were within the acceptable standards of Bureau of Food and Drug Administration. The pH level of dried fish samples was within 6.1 to 6.5, while the water activity of the dried products is 0.98 based on Lupin's water activity (Aw) mathematical calculation. Continuing studies on packaging and good manufacturing practices of dried fish products will be conducted to ensure microbial reduction. **(Author's abstract)**

Biology. Microbiology. Dried products. Water activity. Danggit. Pusit mangsi.

- 0189** Molecular detection and phylotyping analysis of *Ralstonia solanacearum* isolated from white potato and reduction of its population by biofumigation. Concepcion, Danah Jean A., Balendres, Mark Angelo O., dela Cueva, Fe M., Vergara, Michelle J., Ardales, Edna Y., Justo, Valeriana P., Pathania, Nandita, Trevorrow, Peter. **Transactions of the National Academy of Science and Technology**, , 34(1):77

*Ralstonia solanacearum* strains infecting *Solanum tuberosum* (white potato) in the Philippines were analyzed for genetic variation at the level of phylotype and pathogenicity on tomato or potato. Isolates were confirmed *R. solanacearum* by polymerase chain reaction using the 759/760 primer pair specific to *R. solanacearum* which generated a 280 bp diagnostic fragment. Phylotype analysis divided the isolates

into two phylotypes, phylotype I and phylotype II, that corresponds to two genetic groups based on the ITS region. Variation in phylotypes was associated with elevation of the geographic origin of the isolates. Phylotype II which contains the race 3 potato pathogen and isolated primarily from America, was observed among the isolates collected from the highlands in Benguet and one site in Bukidnon while phylotype I, which includes all strains isolated primarily from Asia, was mainly observed among the isolates collected from Bukidnon, Davao del Sur and one site in Benguet with a low elevation. This is the first report of the presence of *R. solanacearum* phylotype II identified from white potato in the Philippines and strains belonging to phylotype I that are pathogenic to potato. Moreover, management of *R. solanacearum* was also explored using radish and sunflower plant under greenhouse condition to determine its effect on population as well as the subsequent reduction in tomato wilting incidence and severity. Bacterial populations in sunflower and radish-treated soil were significantly lower than the untreated soil one (1) month after incorporation. Likewise, there was a significant reduction in disease incidence and severity of wilting in plants treated with radish (34.50-40.50%) and sunflower (10-40%) relative to the control (75%). The results revealed suppression of the bacterium in the soil that consequently lowered the disease incidence. **(Author's abstract)**

Biology. *Ralstonia solanacearum*. White potato. Phylotypes. Polymerase chain reaction. Biofumigation.

- 0190** Molecular phylogeny and a novel species of the Philippine endemic *Antherostele* (Rubiaceae), with implications on its conservation and biochemical properties. Obico, Jasper John A., Alejandro, Grecebio Jonathan D.. **Transactions of the National Academy of Science and Technology**, , 33(1):83

*Antherostele* Bremek. is an understudied genus of Rubiaceae endemic to the Philippines comprising four species of small to medium sized trees distributed in Luzon and Visayas. All species of the genus are threatened and categorized by the DENR (2007) under vulnerable status. Since its segregation from *Urophyllum* Wall. on the basis of morphology of limited herbarium materials, *Antherostele* has not been challenged by any molecular study to test its monophyly and determine its phylogenetic placement within Rubiaceae. To address these gaps, field collection of all *Antherostele* species was done and sequences of the Internal Transcribed Spacer (ITS) region (nrDNA) were utilized for phylogenetic analysis. Parsimony analysis of the ITS data showed that *Antherostele* is monophyletic with strong support (BS=100%) and is nested within the tribe Urophylleae. The genus is united by hairy corolla lobes and syngenesious stamens. The montane *A. luzoniensis* is found to be sister to the rest of shaded understory *Antherostele* species. The present study recognizes five *Antherostele* species including a new species ( *A. samarensis* Obico & Alejandro). Three *Antherostele* species (*A. luzoniensis*, *A. callophylla* and *A. samarensis*) have restricted distributions and are considered rare based on field observation. Hence, a sustainable conservation management is herein urged for the three species of the endemic genus. By its placement under subfamily Rubioideae, *Antherostele* is a potential source of anthraquinones, an organic compound with many industrial and medicinal applications. **(Author's abstract)**

Biology. *Antherostele*. Conservation. nrDNA. Philippine

endemic.

Rubiaceae. Urophylleae.

- 0191** Molecular sequence characterization of the glycolytic regulatory enzyme, phosphofructokinase in *Cocos nucifera* L.. Yadao-dela Cruz, Reggie. **Transactions of the National Academy of Science and Technology**, , 34(1):68

Normal coconut and mutant *makapuno* endosperms profoundly differ in their carbon metabolism. In an attempt to explore the makapuno phenomenon the most important regulatory enzyme of glycolysis, phosphofructokinase (PFK), was cloned and characterized. cDNA from isolated total RNA was used as a template during PCR with the designed primers. The cloned *cnpfk* partial sequence is composed of 1230 bp and found most similar to a bamboo *Phyllostachys edulis* cDNA clone (FP093159.1) with 80% maximum identity (=1070 bits; E=0.0) upon BLASTn analysis. It has 79% maximum identity (E=0.0) to sequences of *Vitis vinifera*, *Oryza sativa*, *Ricinus communis*, *Sorghum bicolor* and *Zea mays*. The 1230-bp sequence designated as *cnpfk* is 59.6% of the 2067-bp *P. edulis* cDNA clone and 62% of the 1988-bp sequence of the *R. communis* phosphofructokinase (XM\_002514143.1). It codes for a 410-amino acid protein sequence with conserved domains characteristics of the PFK superfamily. The translated protein has several active sites, binding sites for fructose-1, 6-biphosphate, binding sites for ADP/pyrophosphate binding, allosteric effector sites and a dimerization interface. BLASTP analysis of the translated protein revealed its highest homology (736 bits; E=0.0) to *R. communis* phosphofructokinase. High homology was also seen with similar sequences from *V. vinifera* (733 bits; E=0.0); *Arabidopsis thaliana* (733 bits; E=0.0); *O. sativa* (723 bits; E=0.0) and *Z. mays* (715 bits; E=0.0). BLAST analyses of five other genes involved in carbon metabolism from previous studies - enolase, glyceraldehyde-3-phosphate dehydrogenase (GAPD), pyruvate kinase, beta-ketoacyl carrier protein synthase I (KASI) and pyruvate decarboxylase - were carried out. Results pointed to *R. communis* as another oil-storing plant whose data can be used as basis for further studies on coconut molecular genetics and physiology and most especially in exploring the molecular basis of the makapuno phenomenon (**Author's abstract**)

Biology.

- 0192** Morpho-anatomical investigation on stipules, colleters and leaves of *Rhizophora* spp. in Pagaspas Bay, Calatagan, Batangas, Philippines. Endonela, Leah E., Dionisio-Sese, Maribel L., Altoveros, Nestor C., Borrromeo, Teresita H.. **Transactions of the National Academy of Science and Technology**, , 33(1):88

The morphology and anatomy of stipules, colleters and leaves of four identified *Rhizophora* species: *R. apiculata*, *R. mucronata*, *R. stylosa* and putative hybrid *R. x lamarckii* in Pagaspas Bay, Calatagan, Batangas, Philippines were investigated. Stipule color and size vary within species. The stipule has mono-layered epidermis covered with thick cuticular wax, distinct aggregated sclereid ideoblasts, well-developed vascular bundle, and multilayered hypodermis. The variations in color, exudates consistency and series number of aggregated colleters were elucidated. Colleters have central axis composed of slender, elongated cells surrounded by palisade-like epidermis. Differences in leaf morpho-anatomy including leaf shape, leaf structure, mucus cells, vascular bundle, stomata apparatus and corkwarts were also observed in

the four *Rhizophora* species. In general, *Rhizophora* leaf consists of thick cuticle, single layer epidermis, 6 to 7 layers of hypodermis, funnel-shaped mucus cells, parallel columns of four layers of palisade mesophyll, and varied layers of spongy mesophyll. The presence of druse crystals in stipule and leaves is common. Features of the stomatal apparatus including guard cells lignin thickness, subsidiary cells arrangement and stomatal aperture are considered diagnostic. Guard cells have a pair of inner and outer cuticular ridges. Stomata and corkwarts, which developed from stomata as the leaves mature, are concentrated only in abaxial leaf surface. These morpho-anatomical characteristics of *Rhizophora* species exemplified the structural modifications that enabled them to adapt to the physiologically dry, saline mangrove environment. **(Author's abstract)**

Biology. Colleter. Leaf anatomy. Leaf morphology. *Rhizophora* spp.. Stipule.

- 0193** Morphogenesis of *Lentinus sajor-caju* Fr.. Santos, Karen Kae, Dulay, Rich Milton R., Kalaw, Sofronio P., Reyes, Renato G.. **Transactions of the National Academy of Science and Technology**, , 34(1):79

*Lentinus sajor-caju* is commonly known as white rot fungus and one of the wood decaying fungi that usually grows in clusters on fallen logs during the onset and middle part of rainy season. It is tough with a well developed central stalk or stipe with whitish to grey fan shaped mushroom and become brown and curled when it is totally matured. The CLSU Mushroom Center has domesticated this species of mushroom from the wild. With the desire to develop production technology for the commercial cultivation, we studied the morphogenesis of this mushroom on different indigenous culture media and physical factors. Corn grit decoction recorded the highest spore germination with a mean of 76.66% while sweet sorghum decoction had the lowest spore germination with a mean of 46.66% after 10 hours. Among the physical factors evaluated pH 8.0, air condition temperature (23°C) and total light recorded the highest spore germination. The basidiospores have unusual type of germination. The spore coat was retained which ultimately become part of the hypha and later grew and developed to a fully grown basidiocarp. The process of spore germination of *L. sajor-caju* consisted of five major stages, namely: liberation of the basidiospores from the basidiocarp; swelling of the basidiospore (after 7 hours); elongation of the hypha (after 10 hours); septation of the hypha (after 16 hours) and; branching of the monokaryotic primary mycelia (after 20 hours). **(Author's abstract)**

Biology. *Lentinus sajor-caju*. Morphogenesis. Indigenous culture media. Basidiospores. Physical factors.

- 0194** Morpho-histochemical testing, antibacterial study and propagation of *Equisetum ramossisimum* subsp. *ramossisimum* Hauke (Fern Ally). Amoroso, Cecilia B., Tagaylo, Zenith B., Buenavista, Dave P.. **Transactions of the National Academy of Science and Technology**, , 32(1):47

In the Philippines the natural distribution of *Equisetum ramossisimum* subsp. *ramossisimum* Hauke, a fern ally, is quite limited and reported to occur only in the Mountain Province and Mindoro and in Lantapan, Bukidnon and Calinan, Davao. The plant is reported to have some medicinal use. This study was conducted to determine

the presence of active principles in the aerial stem and rhizome of *E. ramossisimum subsp. ramossisimum*; to test the efficacy of the plant extract against bacterial growth; and to propagate the plants outside of their natural habitat. Through histochemical tests, alkaloids, arbutin, fats and oils were found very abundant in both aerial stem and rhizome of *Equisetum ramossisimum subsp. ramossisimum*. Saponins, tartaric acid, tannin, and amygdalin were absent in the aerial stem. The epidermis of the rhizome showed abundant amygdalin and saponin. Tartaric acid and Tannin were absent in the rhizome. For antimicrobial assay, the aerial crude stem extract of the plant had a high antimicrobial index against *E. coli* of 1.22, while the rhizome crude extract had only 0.83. Spores of *E. ramossisimum subsp. ramossisimum* sown in agar culture medium with 2.0 percent glucose germinated and formed gametophytes after three months in culture. Propagating the plants in potting media: P1 (soil from its natural habitat), P2 (garden soil and soil from its natural habitat 1:1), showed 100 percent survival. The results revealed that both the aerial stem and rhizome of *Equisetum ramossisimum subsp. ramossisimum* contained active principles which could be potential sources of medicine; the aerial stem's extract had high antimicrobial index against *E. coli* and the plants could be easily propagated outside of their natural habitat as long as there would be enough moisture in the soil. **(Author's abstract)**

Biology. Antimicrobial assay. Culture. Histochemical . Medium.

- 0195** Multigene-locus cpDNA bayesian frameworks in resolving conflicts within Philippine endemic *Gardenia ellis* (Rubiaceae). Chavez, Jayson G., Alejandro, Grecebio Jonathan D.. **Transactions of the National Academy of Science and Technology**, , 33(1):111

The Philippine *Gardenia* species form a highly heterogeneous assemblage, leading to several taxonomic transfers to other Rubiaceae genera (*Ceriscoides*, *Discospermum*, *Fagerlindia*, *Sulitia*, *Vidalasia* & *Villaria*). In spite of these taxonomic rearrangements, three remaining Philippine endemic *Gardenia* species (*G. lagunensis* Merr., *G. merrillii* Elmer & *G. negrosensis* Merr.) still exhibit disparate features against the current circumscription of the genus and remain unresolved. In order to evaluate their true generic affinities with more certitude, we conducted separate and combined Bayesian Inference (BI) of the *rps 16* intron and *trnT-F* region sequences of cpDNA. The majority rule consensus tree of the combined dataset is more congruent with the *rps 16* intron tree but with much higher Posterior Probabilities (PP). The four sampled Philippine *Gardenia* species including *G. elata*, appeared in two different groups of the tribe Gardenieae. *Gardenia elata* grouped within the *Gardenia* clade with high support (PP=1.00), while *G. lagunensis*, *G. merrillii* and *G. negrosensis* nested within a clade with *Rothmannia annae* and *R. capensis* with strong support (PP=0.96). These molecular findings are congruent with morphology such as the 3:3 nodal pattern of leaves, absence of domatia, bilobed stigmas, 2-locular ovaries, globular indehiscent fruits and seeds that are embedded in a pulp forming a single mass. Therefore, we recognized three novel combinations under *Rothmannia* Thunb., which established for the first time the genus to the archipelago. In relation to this taxonomic breakthrough, implications on their conservation status and possible medicinal use are presented. **(Author's abstract)**

Biology. Bayesian inference. cpDNA. Gardenia. Philippine endemic. Rothmannia. rps 16

intron. trnT-F region.

- 0196** Multivariate analysis of net phytoplankton community structure and physico-chemical conditions in Panguil Bay, Northern Mindanao, Philippines. Canini, Nelfa D., Metillo, Ephrime B.. **Transactions of the National Academy of Science and Technology**, , 32(1):36

The species composition of net phytoplankton and environmental parameters were studied in Panguil Bay in Northern Mindanao on four sampling occasions (November 2008, February 2009, August 2009, May 2009) representing changes in monsoons. Samples were collected from 21 stations across the bay by vertical towing of a 20- m conical plankton net. Phytoplankton abundance was estimated by direct counting following the Utermohl method. The relationship between environmental factors and the phytoplankton community structure was analyzed using multivariate techniques in the CANOCO software. Deeper and more saline stations near the mouth of the bay were more species diverse but lower in abundance while the inner shallower and less saline stations showed the opposite. A total of 60 net phytoplankton species were identified, and the abundance was dominated, in decreasing order, by three major groups: diatoms > dinoflagellates > cyanobacteria. The centric diatom *Coscinodiscus wailesii* dominated in almost all samples from all four sampling periods. Depth was significantly correlated with November, February, and May phytoplankton assemblages; salinity with February and May; tide with May and August; and temperature with May. This study demonstrates the strong influence of monsoon-associated environmental parameters on the net phytoplankton community structure in Panguil bay, one of the fishery priority bays in the Philippines. **(Author's abstract)**

Biology. *Coscinodiscus wailesii*. Depth. Ecology. Multivariate analysis. Nitrate concentration. Phytoplankton. Salinity. Tide.

- 0197** Mycochemical analysis, nutritional characterization and toxicity of *Lentinus tigrinus*, a Philippine edible mushroom. Dulay, Rich Milton R., Kalaw, Sofronio P., Reyes, Renato G., Cabrera, Esperanza C., Alfonso, Noel F., Eguchi, Fumio. **Transactions of the National Academy of Science and Technology**, , 34(1):66

*Lentinus tigrinus* is a wood-rotting fungus that is usually found growing on fallen logs during the onset and middle part of the rainy season where moisture is abundant. This mushroom has a great potential for cultivation. Its relative, *Lentinula edodes* was introduced in the country due to its aroma and applicability for gourmet purposes. Though most preferred, cultivation of *L. edodes* in the country is being delimited due primarily to its semi-temperate requirement for growth. One of the best alternatives is to search a nutritious local counterpart. In this study, we determined the proximate nutritional and mycochemical contents of fruiting bodies of *L. tigrinus* harvested in the formulation of rice straw-sawdust based substrate. The lyophilized extract of *L. tigrinus* was tested in female ICR mice following the single dose toxicity test by oral gavage for its biosafety. Both air-dried pileus and stipe of *L. tigrinus* hold promising nutritional contents. The pileus had higher amount of crude protein (25.90%), crude fat (2.12%), ash (7.41%) and moisture (12.20%), while the stipe had higher amount of carbohydrates (43.02%) and crude fiber (24.74). Moreover, flavonoid was the only chemical constituent detected in the hot water extract. Acute single oral toxicity test in mice confirmed that *L. tigrinus* is toxicologically safe. Altogether, *L. tigrinus* is an

addition to the newly recorded safe, edible and nutritious mushroom of the Philippines.  
(Author's abstract)

Biology. *Lentinus tigrinus*. Mycochemical. Nutritive. Toxicity. Edibility.

- 0198** Nickel tolerance of three isolates of ectomycorrhizal fungus *Pisolithus* inoculated onto *Eucalyptus urophylla* S.T. Blake seedlings. Aggangan, Nelly S.. **Transactions of the National Academy of Science and Technology**, , 34(1):47

Nickel is one of the toxic heavy metals common in soils of ultramafic origin in the Philippines, which is seriously affecting plantation establishment and tree growth. Ectomycorrhizal fungi such as *Pisolithus* are found worldwide, and are known to have tolerance to heavy metals. Three isolates of *Pisolithus* collected under eucalypts growing in Western Australia, Philippines and in a mining residue in New Caledonia, were compared for their ability to increase the growth of *Eucalyptus urophylla* seedlings in the presence of nickel (Ni) in pots in a glasshouse. Seedlings, aseptically infected with mycorrhizal fungi and uninoculated, were transplanted into pots containing 3 kg steam pasteurized yellow sand amended with five rates (0, 6, 12, 24 and 48 mg Ni kg<sup>-1</sup> soil coded as Ni-0, Ni-6, Ni-12, Ni-24 and Ni-48 respectively) of Ni (as NiC12). A few days after transplanting, all seedlings subjected to Ni rates greater than Ni-12 died. After 12 weeks, uninoculated Ni-6 and Ni-12 seedlings had reduced root growth and exhibited severe toxicity symptoms (chlorosis on young leaves and shoot tips). Ni-12 reduced the length of roots colonized by *Pisolithus*. However, *Pisolithus* infected seedlings grew better at Ni-6 and Ni-12 than the uninoculated counterpart. Inorganic plant analyses revealed that inoculation increased plant growth through improved P uptake but did not prevent Ni uptake. Ni toxicity, however, was minimized by dilution due to an increase in plant biomass. Inoculation partially overcame depression of Fe uptake to the shoot at Ni-6 but not at Ni-12. In conclusion, the three isolates of *Pisolithus* differed in their tolerance to Ni and that the New Caledonian isolates from a Ni mine site was the best and may have greater potential to improve the growth and survival of *E. urophylla* seedlings in ultramafic soils in the Philippines. (Author's abstract)

Biology. Ectomycorrhiza. *Eucalyptus urophylla*. Heavy metals. Nickel. Ultramafic.

- 0199** The occurrence of mangrove brachyuran crabs and observation on the feeding ecology of some taxa of the grapsoid families grapsidae and sesarmidae *sensu* Schubart *et al.* (2002) from selected mangals of Luzon, Philippines. Masagca, Jimmy T.. **Transactions of the National Academy of Science and Technology**, , 33(1):138

Despite the obvious importance of mangrove brachyurans to ecosystem functioning in relation to their roles in retaining a large proportion of mangrove leaf-litter, the most prominent groups belonging to the grapsoid families (Grapsidae and Sesarmidae) are less studied in the Philippines. Occurrence and some observations on the feeding ecology of selected grapsoid sesarmids as to their dependence on mangrove trees as habitats, burrowing behavior and arboreal climbing skills were considered in this study. A total of 6 families, 17 genera and 21 species (9 grapsoid sesarmids and 12 non-grapsoids) of mangrove brachyurans are reported from

Pagbilao (Quezon); Manila Bay area (Cavite); and Palnab-Pajo and Agojo Inlet (Catanduanes). Sesarmidae is represented by *Perisesarma*, *Episesarma*, *Selatium* and *Sarmatium*; while Grapsidae is represented by *Hemigrapsus*, *Pseudograpsus* and *Metopograpsus*. Non-grapsoids consist of Varunidae (*Ptychognathus*); Ocypodidae (*Dotilla*, *Ocypode*, *Uca*); Portunidae (*Charybdis*, *Portunus*, *Scylla*, *Thalamita*); and Eriphiidae (*Epixanthus*). The sesarmids (*Selatium elongatum* and *Episesarma versicolor*) are exclusive mangrove tree climbers or EMTC, while *Metopograpsus latifrons* and *Sarmatium germaini* are occasional mangrove tree climbers or OMTC and non-arboreal or non-mangrove tree climbers or NMTC are *Neosarmatium smithi*, *Perisesarma bidens*. **(Author's abstract)**

Biology. Brachyurans. Mangroves. Catanduanes. Quezon. Cavite. Grapsidae. Sesarmidae.

- 0200** Pandan (*Pandanus amaryllifolius* Roxb.). Cuaresma, Graciela R., Aguinaldo, Henedine A.. **Transactions of the National Academy of Science and Technology**, , 33(1):133

The antidiabetic activity of pandan (*Pandanus amaryllifolius* Roxb) was determined in this study. Pandan is widely grown and is used for many purposes. It is known to have useful properties as antiviral, anti-allergen, antiplatelet, anti-inflammatory and anti-oxidant. Pandan contains volatile compounds, alkaloids (pandamarine, pandamerilactones) and essential oils. In this study, the antidiabetic activity of pandan leaf extract was determined in hyperglycaemic induced guinea pigs (*Cavia porcellus* Gesner K., after introduction of varying concentrations of pandan leaf extract (PALE) at 0.3 ml per 100 grams of body weight. Hyperglycaemia was induced by giving 0.3 ml glucose solution per 100g body weight after base line blood glucose determination was done.

Insulin and distilled water (DW) served as the positive and negative control, respectively. Blood glucose levels (BGL) of test animals were determined prior to hyperglycemia, at the onset of hyperglycemia and also 1, 3 and 5 hours after treatment administration of PALE.

Results showed that the PALE concentrations initiated BGL reduction in hyperglycaemic-induced guinea pigs. Significant hypoglycaemic effect was observed with different PALE concentrations: 100% PALE is as effective as insulin, followed by 30% and 50% PALE. The negative control gave a minimal decrease in BGL.

Hence, *Pandanus amaryllifolius* Roxb. Leaf extract (PALE) was found to be an effective agent in reducing blood glucose level. Economic analysis revealed 97.2% lower expense than what is incurred if insulin injection is administered. Furthermore, the use of PALE is 89.68% to 92.4% lower than the administration of Glucophage alone or Glucophage and Euglucon, respectively. **(Author's abstract)**

Biology. Pandanus amaryllifolius. Pandan. Antidiabetic. Hypoglycaemic . BGL.

- 0201** A pCambia expression vector containing the bunchy top virus movement protein (MP) gene. Zaulda, Fides Angeli DLC., Española, Jasca Gayle G., Aquino, Vermando M.. **Transactions of the National Academy of Science and Technology**, , 34(1):82

Among nano viruses such as the bunchy top viruses of both abaca and banana, the movement protein facilitates the transfer and movement of viral genome or particles from cell to cell. The protein is restricted to the cell periphery and increases the size-exclusion limit of the plasmodesmata. Exogenous expression of such protein in abaca may control virus infection and disease through pathogen-derived resistance (PDR). In this study, the movement protein (MP) gene of the Banana bunchy top virus (BBTV) is cloned into a plant expression vector. Primers specific for the MP gene were designed and appended with restriction endonuclease sites. PCR amplification of genomic DNA from BBTV-infected abaca plants from Bicol yielded an approximately 380bp product. The amplified product was subsequently cloned in pCR2.1®-TOPO® vector and was shown to have 95% sequence identity to the BBTV MP gene. The pCR2.1®-TOPO®-MP construct was digested with *Bgl*II and *Bst*EII and yielded the 380bp digest of interest. This was ligated with pCAMBIA 1302 treated with the same restriction endonucleases. The pCAMBIA 1302-MP construct was transformed into DH5α *E. coli* for selection and propagation. PCR amplification using pCAMBIA 1302-specific primers yielded an approximately 600bp product for three clones MP4, MP5 and MP10. Plasmids extracted from these clones all contained a 350bp region with 99% sequence identity to the BBTV MP gene. **(Author's abstract)**

Biology. Abaca. Banana bunchy top virus (BBTV). Movement protein (MP). Molecular cloning. Vector construction. pCAMBIA1302.

- 0202** A pCAMBIA expression vector containing the bunchy top virus nuclear shuttle protein (NSP) gene. Polido, Mary Ann Robelle L., Aquino, Vermando M.. **Transactions of the National Academy of Science and Technology**, , 34(1):81

The nuclear shuttle protein (NSP) in the nanoviruses is responsible for the transfer of the viral genomic DNA from the nucleus, where replication occurs, to the cell periphery. NSP is an important component of the virus life cycle and works together with the movement protein which facilitates transport of virus particles from cell to cell. The study aims to isolate, clone and elucidate this viral component. The Banana bunchy top virus nuclear shuttle protein gene (BBTV DNA-N) was isolated, subcloned for propagation in bacteria and cloned into a plant expression vector. PCR amplification was used to isolate BBTV DNA-N using total genomic DNA from BBTV infected abaca leaves as template and BBTV6F\_ *Bgl*II/BBTV6R\_ *Bst*EII primer pair. The 479 bp PCR product was cloned into pGEM® T-easy vector and transformed into *E. coli* DH5α cells. Positive bacterial colonies with the 479 bp product via PCR colony screen was selected for plasmid extraction and sequencing. Sequencing analysis revealed 99% nucleotide similarity to BBTV DNA-6 or DNA-N. After restriction endonuclease digestion with *Bgl*II and *Bst*EII, the released insert BBTV DNA-N and the cut plant expression vector, pCAMBIA 1302 was ligated and subsequently transformed in *E. coli* DH5α cells. Using the plant vector specific primers CaMV35SF and NosTerR, positive colonies showed a 643 bp PCR product. The pCAMBIA BBTV DNA-N construct was then extracted and sequenced. Sequence analysis showed 99% nucleotide similarity to BBTV DNA-6 or DNA-N. **(Author's abstract)**

Biology. Abaca. Banana bunchy top virus (BBTV). Cloning. Nuclear shuttle protein gene (DNA-N). Nuclear shuttle protein (NSP). pCAMBIA.

- 0203** Perithecial and ascospores development of *Haematonectria haematococca* causes twig blight disease of citrus in the Philippines. Dulnuan, Jomar L., Yago, Jonat I., Peng-ont, Danuwat, Aroonrungle, Sunchai. **Transactions of the National Academy of Science and Technology**, , 34(1):78

This is the first report of a teleomorph stage of *Fusarium solani* that infect citrus in the Philippines. *Haematonectria haematococca* isolated from twigs of citrus plants with twig blight disease proved to be the ascoma stage of *F. solani*. A single ascospores culture produced sporodochia with masses of brown macroconidia and macroconidia. Ascospores were didymospore with thallic conidiogenesis, bitunicate, septated hyphae and germinated bipolarly. The ascoma was orange in color containing asci and ascospores. The asci were bitunicate operculate and the the ascal apex is extremely thick and pierced by a narrow canal. The asci vary in shape from cylindric to spherical. Each ascus contains four 2-celled hyaline spores. Ascoma was produced 22 days after inoculation and conidia with few paraphyses were seen on the ostiole portion at 25 days after inoculation. Matured conidia were released from the ascoma at 27 days after inoculation and started to disperse for the next cycle of infection. **(Author's abstract)**

Biology. Perithecia. Ascospores. Haematonectria haematococca. twig blight disease. Teleomorph.

- 0204** Phosphorus and mycorrhizal fungi affect growth, nutrient and heavy metal accumulation in transgenic poplar. Aggangan, Nelly S., Han, Sim-Hee, Choi, Young-Im, Noh, Eun-Woon, Lee, Yongsuk. **Transactions of the National Academy of Science and Technology**, , 33(1):104

Heavy metal transgenic poplars had been developed in Korea for the immediate rehabilitation of mine tailing sites. Phosphorus fertilizers are applied to counteract the toxic effects of heavy metals on plant growth and survival in mine tailings. However, the amount of P. fertilizer to be applied that conforms with the beneficial effects of mycorrhizal inoculation is not known. This experiment was conducted to determine the growth, nutrient status and translocation of heavy metals in tissue cultured transgenic *Populus alba* x *P. glandulosa* uninoculated or inoculated with a mixture of ectomycorrhizal (ECM) fungi *Pisolithus tinctorius*, *Paxillus involutus* and *Amanita pantherina* during *ex vitro*. Treated plantlets were transplanted in cups filled with 50g autoclaved peat perlite vermiculite (PPV) medium and incubated under growth room conditions. One month later, the seedlings were transferred in pots filled with 150g PPV amended with 0, 8 or 16 mg P ( $\text{CaH}_2\text{PO}_4$ )<sub>2</sub> kg soil<sup>-1</sup> and nil or mixture of lead (Pb), zinc (Zn) and arsenic (As). Pb, Zn and As are the top heavy metal contaminants in a closed mine tailing area in Bonghwa, South Korea where rehabilitation activities has been concentrated for the last five years. After four months in a glasshouse, total plant dry weight of non-mycorrhizal plants grown at P8 and P16 was comparable with mycorrhizal plants grown at P0. Heavy metals amendment reduced plant growth and biomass but increased concentrations of all nutrients measured. Except for N, Zn and Pb, mycorrhizal plants had higher P, Ca, Mg, Na, and As than non-mycorrhizal counterpart. P16 increased plant growth and N, P, Mg and Na concentrations but reduced Zn and Pb. Highest Zn, Pb and As were in the fine roots and lowest in the stem of mycorrhizal plants. Highest (34%) mycorrhizal colonization was at P16 and reduced to 22% in the presence of heavy metals. **(Author's abstract)**

Biology. Mine tailing sites. Populus. Ectomycorrhizal fungi. Pisolithus. Paxillus. Amanita.

- 0205** Phytochemical screening and evaluation of an indigenous plant species, papait (*Mollungo oppositifolia*) as a potential anti-diabetic plant.. Guillermo, Leny I., Estira. Flordeliz R.. **Transactions of the National Academy of Science and Technology**, , 33(1):82

The development and exploration of the remaining Philippine indigenous plants as a botanical resource remain a researchable area not only in medicine but also in biodiversity conservation. Papait (*Mollungo oppositifolia*) is very common weed indigenous to the Philippines. The whole plant is eaten as a vegetable by local folks and is claimed to have anti-diabetic effects and is reported lately as exceptionally rich in iron and calcium. The study aimed to determine the phytochemicals present in Papait leaf extract and evaluate its potentials to lower blood glucose level of white mice. The study was laid in Completely Randomized Design (CRD) in 5 treatments: T1 (0.0025 m1PLE/g wt of mice), T2 (0.005 m1PLE/g wt of mice), T3 (0.0075 m1 PLE/g wt), T4 (0.01 m1 PLE/g wt) and T5 (control-insulin). The extract was orally fed to hyperglycemic mice. Phytochemical screening of the leaf extract showed this to be very rich in phytochemicals including alkaloids, saponins, steroids, fixed oils and proteins. All the treatments exhibited comparable degrees of potency in lowering blood glucose levels in both sexes of white mice. Percentage (%) reduction of BGL as affected by Papait leaf extract in all the mice was comparable to percentage reduction caused by insulin. The results remarkably demonstrated comparable effect of the plant with the anti-diabetic drug insulin. It is concluded that Papait Leaf Extract can be used as a component materials for the preparation of anti-diabetic drugs. It likewise confirms claims of folkloric medicine that the Papait plant can lower blood sugar level hence, it can be a very good complement or substitute for the expensive commercially available anti-diabetic drugs. **(Author's abstract)**

Biology. Phytochemical chemistry. Hypoglycemic effects. Papait (*Mollungo oppositifolia*). Antidiabetic.

- 0206** Preliminary estimation of genetic variation through isozyme analysis in freshwater sardines, *Sardinella tawilis* (Herre), from two different sites near Taal Lake. Adajar, Joan Christine O., Tandang, Rosalina N., Reamillo, Ma. Cecilia S., Manuel, Ma. Carmina C.. **Transactions of the National Academy of Science and Technology**, , 34(1):69

Genetic variation in freshwater sardines, *Sardinella tawilis* (Herre), from two sites near Taal Lake: Lemery and Talisay, was determined through isozyme analysis using four enzyme systems: acid phosphatase (ACP), alkaline phosphatase (ALP), esterase (EST), and malic enzyme (ME). The eye, heart, and muscle tissues were collected. Results revealed four presumptive loci in both populations (ACP-1, ALP-1, EST-1, ME-1). An interpopulation variation was noted between the eye and muscle tissues of the two populations in terms of EST-1. The degree of genetic variability within each population was determined by calculating the proportion of polymorphic loci (P), average number of alleles (A), and average heterozygosity (H). The genetic variation between organs and between populations was assessed through the estimates of genetic identity (IN), genetic distance (D), and genotypic similarity (IH). Among the

organs, the heart showed the highest genetic variability based on the P (0.75), A (1.75), and H (0.369-0.371) values in both populations. Isozyme variation in the organs could be attributed to the differences in their physiological functions. The computed IN, D, and IH showed the same trend in the two populations, wherein the eye tissues had greater relatedness with muscle tissues. The two populations when compared revealed the same values for P(0.75) and A (1.75). However, the average heterozygosity was slightly higher in the Talisay population (H=0.291) than the Lemery population (H=0.249). The computed values for IN (0.929), D (0.074), and IH (0.869) implied high relatedness between the two populations showing that the geographical distance between Lemery and Talisay is not enough to produce significant isozyme variation based on the enzyme systems used. **(Author's abstract)**

Biology. *Sardinella tawilis*. Isozymes. Starch-gel electrophoresis. Genetic variation. Isozyme polymorphism.

- 0207** Procrustean analysis of wing shape divergence among sibling species of *Neurothemis* dragonflies. Harun, Stephenson A., Torres, Mark Anthony J., Martinez, Joey Genevieve T., Tabugo, Sharon Rose M., Adamat, Liza A., Manting, Muhmin Michael E., Demayo, Cesar G.. **Transactions of the National Academy of Science and Technology**, , 33(1):92

Dragonflies under the genus *Neurothemis* are the common red- and brown- winged dragonflies that one sees often in drains, small ditches and ponds. There are more than four confusing *Neurothemis* species that are easily mixed up by their similar color and pattern. These species are difficult to identify in the field. The present study determined wing shape divergence in three species of *Neurothemis* dragonflies collected from Northern Mindanao, Philippines. These include *N. terminata terminata* Ris (29 females, 7 males), *N. fluctuans* Fabricius (9 females, 4 males), and *N. ramburii ramburii* Kaup & Brauer (6 females, 7 males). A generalized least square fitting analysis was done via Procrustes superimposition of landmarks from the wings. Relative warp analysis showed significant variation among the *Neurothemis* species. The first extracted relative warp showed differences in the shape of the pterostigma and disparity in the distance between the distal end of the radial planate supplement and the distal margin of the wing. Differences in the shape of the pterostigma and disparity in the distance between the distal end of the radial planate supplement and the distal margin of the wings bounded by the end points of the intercalary vein and the radial branch. This accounted for 26.78-42.28% of the variation in the shapes fore wing. Differences in the shape of the pterostigma were also observed and accounts for 27.98-44.18% of the variation in the shape of the hind wing. Distance matrices were constructed for the four data sets: left and right fore wing; left and right hind wing. Then, comparison was done via correlation analyses of the four matrices of distances among the species. Results showed that the shape of the fore wing contributed more in discriminating among species when compared to the hind wing. The result of the study is discussed in relation to the utility of wing morphology in the taxonomy and discrimination of sibling species of *Neurothemis* dragonflies. **(Author's abstract)**

Biology. *Neurothemis*. Procrustes analysis. Dragonfly. Wings. Sibling species.

- 0208** Protective effects of formalin-and heat-killed *Aeromonas hydrophila* in nile tilapia (*Oreochromis niloticus*) infection. Roldan, Eufemio Jesus R., Golez, Phillip Sebastian Serafin J., Pimentel, Stephanie S.. **Transactions of the National Academy of Science and Technology**, , 33(1):71

*Aeromonas hydrophila* is an opportunistic bacterial pathogen of a number of aquatic animals that causes hemorrhagic septicemias, erythrodermatitis, fin and tail rot in fish. The pathogen affects *Oreochromis niloticus* (Nile tilapia), an economically important cultured fish in the Philippines. In this study, the protective effects of formalin- or autoclave-killed *A. hydrophila* or bacterin were injected via intraperitoneal on *O. niloticus* then challenged with live *A. hydrophila*. Data on mortality rates, serum lysozyme levels and histopathology of immune related organs, head kidney and spleen, generated responses in the challenged fish. Though fish were not entirely protected from the live form, autoclaved-killed bacteria showed stronger immune responses compared to formalin-killed bacteria. **(Author's abstract)**

Tilapia infection. Histopathology. Formalin-and autoclave-killed *A. hydrophila*. Biology.

- 0209** Random amplified polymorphic DNA-polymerase chain reaction (RAPD-PCR) primer design for the detection of *Listeria monocytogenes*. Perez, Maria Teresa M., Torralba, Daryl Ann Steffanie G., Mendoza, Joel C., Elegado, Francisco B.. **Transactions of the National Academy of Science and Technology**, , 33(1):108

*Listeria monocytogenes* is a major foodborne pathogen recognized worldwide by food industries and public safety institutions because of its high fatality rate and various complications such as acute diarrhea, meningoencephalitis, septicaemia and abortion. USFDA imposes "zero tolerance" regulation for *L. monocytogenes* in raw and ready-to-eat foods. The National Meat Inspection Services of the Department of Agriculture is strictly monitoring it in processed meat.

This study reports on the design of primers through hybridization, cloning and sequencing of RAPD-PCR amplification products identified to be specific for *L. monocytogenes* reference strains (Lm2, Lm3 and Lm4) against closely related isolates: *Listeria* spp. and *Enterococcus* strains isolated from different food samples at the Food and Feed Laboratory, BIOTECH, UPLB.

Gene amplification using RAPD primer 066 resulted in a potential specific 1.2 kb marker. Molecular cloning of the isolated RAPD marker for *L. monocytogenes* was done to facilitate sequencing of the amplicon. Twenty-three presumptive positive clones were subjected to plasmid DNA extraction and restriction enzyme analysis to determine the presence of the target insert fragment. Two plasmid clones confirmed the presence of the target insert fragment through hybridization. The plasmid clone (5a1) was sequenced using the universal primers, M13. Multiple sequence alignment analysis of the 950-base marker sequence using BLAST-N revealed 100% homology with *L. monocytogenes*. The primers designed using the *Primer3* Plus design software had good specificity with acceptable melting temperatures and GC content except that of possible formation of secondary structures. **(Author's abstract)**

Biology. *Listeria monocytogenes*. RAPD-PCR. Primer design. Foodborne pathogen detection.

- 0210** Selection of a suitable internal control gene for relative RT PCR-based expression analysis in normal and mutant 'makapuno' endosperms of coconut (*Cocos nucifera* L.). Yadao-dela Cruz, Reggie, Laude, Rita P., Diaz, Ma. Genaleen Q., Laurena, Antonio C., Mendiolo, Merlyn S., Tecson-Mendoza, Evelyn Mae. **Transactions of the National Academy of Science and Technology**, , 33(1):86

Makapuno is an abnormal coconut with over-proliferating endosperm that is softer and fluffy due to galactomannan accumulation. To perform relative RT-PCR for expression analyses of important genes possibly involved in the makapuno phenomenon, an internal control gene was initially determined for normalization purposes. Three genes were studied, namely, glyceraldehyde-3-phosphate dehydrogenase (GAPDH), enolase and actin. GAPDH and enolase were found to have considerably varied expression level in all the samples and are not recommended to be used as internal control genes. The actin gene has a uniform detectable expression in all the samples studied and is recommended for use as reference gene for normal coconut and mutant makapuno solid endosperm samples at stages 5-6, 6-7 and 7-8 months. **(Author's abstract)**

Biology. Actin. Coconut endosperm. Endosperm overgrowth. Internal control. Makapuno. Relative RT-PCR.

- 0211** Sequence analysis of the kappa-casein gene in water buffalo (*Bubalus bubalis*). Herrera, Jesus Rommel, Villanueva, Amie, Flores, Ester. **Transactions of the National Academy of Science and Technology**, , 33(1):110

The aim of the present study was to determine the sequence of the coding region of the kappa-casein gene of the water buffalo and detect potential exonic polymorphisms that are associated with milk production traits. Twenty-five genomic deoxyribonucleic acid (DNA) samples of unrelated buffalo cows coming from extremes of the population (ten high, five medium and ten low milk producers) were used in the study. Since the buffalo genome has not yet been sequenced, primers used to amplify the coding regions were based on the gene sequence of cattle. Polymerase chain reaction (PCR) amplification yielded products of similar size to that of cattle. Direct sequencing results revealed that the kappa-casein gene sequence of the water buffalo was 96% similar to that of cattle. Two potential polymorphisms were also found in nucleotides 467 and 471 located at the fourth exon. The cytosine 'C' to thymine 'T' change of nucleotide 467 resulted to an amino acid change from threonine (T) < ACC > to isoleucine (I) < ATC > at codon 156. Preliminary association studies revealed that choosing animals with 'CC' and 'CT' genotypes will be advantageous since the milk yield at 305 days (MY305D), fat yield at 305 days (FY305D) and protein yield at 305 days (PY305D) are higher ( $P < 0.001$ ) compared with animals carrying the 'TT' genotypes. The methodology above can be used to determine the coding sequence and potential polymorphisms of other genes not only of the bubaline, but also of other ruminant species whose genome has not yet been sequenced such as the swamp buffalo, sheep, goat, anoa, cape buffalo and deer. **(Author's abstract)**

Biology. Water buffalo. Milk production. Kappa-casein. Sequence analysis. Polymorphisms.

- 0212** A single stage model for cellulosic ethanol production using carabao rumen microorganisms. Agrupis, Shirley C., Ulep, Roque A., Samsam, Charito L., Abenes, Florelia B.. **Transactions of the National Academy of Science and Technology**, , 32(1):48-49

Among various forms of plant matter, cellulosic biomass has the biggest potential to supply the energy needs of the Philippines. However, commercial production of cellulosic ethanol is impeded by the absence of low-cost technologies to overcome the recalcitrance of cellulosic biomass to deconstruction, saccharification and fermentation processes. Consolidated bioprocessing (CBP) is a processing strategy for cellulosic biomass that consolidates into a single process step. The main objective of our study was to develop a single-stage, consolidated bioprocess system for the production of ethanol from biodegradable waste using co-culture of Carabao rumen microorganism and yeast. Mixed market wastes were used as substrates in the study. The rumen fluid was collected from cannulated carabao (*Bubalus bubalis carabanesis*). Three treatments were studied. In the first experiment: T-1 was a single stage, consolidated bioprocess where both rumen fluid and yeast were inoculated on day 1 of the experiment; T-2 was a two-stage bioprocess where rumen fluid was inoculated on day 1, followed by yeast after 72 hr; and T-3 served as negative control. In the second experiment, T-1 to T-8 under different conditions were carried out to determine the peak period for glucose and ethanol production. Glucose and ethanol were measured at specified time periods using standard procedures. Under non-optimized conditions substrate saccharification and fermentation occurred in as little as 5 days both in the single and two-stage processes. The saccharification efficiency of the single-stage (33.88%) was higher than the two-stage process (29.94%). Ethanol conversion efficiency in 120 were 41.71%, 34.85%, and 38.06% in single, two-stage process, and control, respectively. These yields are equivalent to 23.89 L of ethanol per ton of waste biomass for the single stage process, and 19.26 L for the double stage and 17.91 L in the control. Peak period for glucose and ethanol production was at day 5 (120 hr). Our study successfully demonstrated that CBP, using co-cultures of rumen microorganisms and yeast, can produce ethanol from waste biomass. (Author's abstract)

Biology. Biomass. Cellulose ethanol. Consolidated bioprocess. Rumen fluid. Saccharification.

- 0213** Species composition and vegetation analysis of mangrove forests along Butuan Bay, Philippines. Jumawan, Jess H.. **Transactions of the National Academy of Science and Technology**, , 34(1):43

Mangrove forests along Butuan Bay, Philippines have deep cultural significance to the Butuanons for a thousand years. Habitat destruction has continued to threaten the existence of remaining mangroves. There was no reported inventory of mangrove loss in the area. This study attempts to determine the species composition of mangroves in the four coastal barangays along Butuan Bay. Vegetation analysis was

also conducted using sampling plots in the study sites. A total of 16 sampling plots with an area of 100 m<sup>2</sup> were non-randomly established. Within the main plots were 3 smaller 1m x 1m regeneration plots distributed equally for the counting of sapling and seedlings. There were a total of 28 species of mangroves belonging to 11 different families recorded. The highest number of species was observed in Abilan with 27 species while Pagatpatan had the lowest with 9 species. Vegetation analysis showed that *Avicennia rumphiana* has the highest density, frequency, dominance and importance value (IV). The species *A. rumphiana*, *Rhizophora mucronata* and *R. stylosa* have the highest regeneration of saplings and seedlings. The data generated from the study could be used as baseline information for mangrove conservation. **(Author's abstract)**

Biology. Density. Frequency. Dominance. Importance value. Butuanons.

- 0214** Species diversity and productivity of algae in a littoral area of Ilocos Norte, Philippines. Valdez, Miriam Donna T., Estira, Flordeliz R.. **Transactions of the National Academy of Science and Technology**, , 32(1):44

The study aimed to determine the diversity and rate of production of macrobenthic algae in a littoral area of Ilocos Norte. It also aimed to quantify the major biomass constituent of the most dominant algal species and evaluate their possible application for pulp and paper. Three stations were considered. Station I had an average depth of 0.7 m, 28.17°C bottom water temperature, 2800  $\mu\text{Em}^{-2\text{S}_2}$  light intensity, 0.93 m water transparency and 0.068 m/sec water speed. Station II had an average depth of 2.6 m, 26.67°C bottom water temperature, 2700  $\mu\text{Em}^{-2\text{S}_2}$  light intensity, 2 m water transparency and 0.1048 m/sec water speed. The area is inhabited by 22 species of microbenthic algae: 7 species of *Chlorophyta* (green algae); 6 species of *Phaeophyta* (brown algae) and 9 species of *Rhodophyta* (red algae). In terms of diversity (H), the shallower waters of the area were more diverse in species composition with H becoming lower with increasing water depth (Station I, 16 species; Station II, 15 species and Station III, 16 species). Primary production (biomass) of the algal seaweeds in these areas was observed to be greatest at deeper waters (Stations II and III) and was dominated by *P. crassa*, *S. cristaefolium*, *S. polycystum* and *E. E. serra*. Among these four dominant species, *S. cristaefolium* and *S. polycystum* contained the highest amount of cellulose and hemicelluloses and the lowest amount of lignin as determined by TAPPI standard T4m, hence these have high potentials for pulp and paper applications. **(Author's abstract)**

Biology. Biomass composition. Littoral area. Macrobenthic algae. Primary production. Species diversity.

- 0215** Stabilimentum structure of the orb-web of the garden spider, *Argiope luzona*, (Walckenaer, 1841) (Araneae: Araneidae: Argiopinae). Adamat, Liza A., Torres, Mark Anthony J., Bedoya, Nelieta Narajo, Barrion, Adelina A., Barrion-Dupo, Aimee Lynn A., Demayo, Cesar G.. **Transactions of the National Academy of Science and Technology**, , 32(1):50-51

Spiders in the genus *Argiope* Audouin 1826 (Araneidae) add a highly visible white zigzag silk decoration, originally called stabilimentum at the center of the web whose

function and significance are still unclear. This study was conducted to describe the stabilimentum structure of the garden spider *Argiope luzona*, (Walckenaer, 1841). A total of twenty (20) penultimate and adult females were collected from selected agricultural areas in Iligan City. In the laboratory, spiders were housed in wooden frames and occurrence and design of stabilimentum were observed for 15 days. Results show that web decorations are not an obligatory component of the orb-webs since not all spiders add stabilimenta on their webs. There are remarkable variations in stabilimentum structures among *A. luzona* individuals. Penultimate and adult female *A. luzona* produced strictly cruciate stabilimenta which could be 1-armed, 2-armed, 3-armed, or 5-armed. Stabilimenta with 1 arm, 3 arms and 5 arms were the least frequently observed while 4 arms and 2 arms were the most frequently observed. **(Author's abstract)**

Biology. *Argiope luzona* (Walckenaer, 1841). Cruciate. Penultimate. Stabilimentum. Web.

- 0216** Synergistic hypoglycemic effect of *Lactobacillus pentosus* 3G3 and banana (*Lagerstroemia speciosa*) on diabetic-induced Swiss Webster mice. Saguibo, Jennifer D., Elegado, Francisco B.. **Transactions of the National Academy of Science and Technology**, , 33(1):107

Intake of herbal medicines may lead to the accumulation of toxic and anti-nutritional factors. Studies have shown that microbial action by generally regarded as safe (GRAS) and probiotic bacteria may help degrade these factors into non-insidious forms.

The hypoglycemic effect of *Lactobacillus pentosus* 3G3 pure cells on diabetic-induced male Swiss-Webster mice was tested. A saline suspension of  $10^8$ - $10^9$  CFU/ml pure cells was orally administered to mice previously fed with 20 ml condensed milk and 30 ml melted butter in 50 ml sterile distilled water to induce high blood glucose levels. Results showed that *L. pentosus* 3G3 significantly decreased blood glucose level and body weight after two weeks feeding period.

In a previous study, *Lb pentosus* 3G3 was found resistant to any antimicrobial effect of banana (*Lagerstroemia speciosa*) leaf extract, reported to contain anti-diabetic compound. In this study, *Lb. pentosus* 3G3 was inoculated in 4% (w/v) banana leaf and 5% (w/v) muscovado decoction, fermented for overnight, cells adjusted to  $8.2 \times 10^9$  CFU/ml, and administered orally at 30 ml/kg body weight to the mice with elevated blood glucose level induced by injecting hydrochlorothiazide intraperitoneally. Glibenclamide and distilled water were also administered as positive control and negative control, respectively. Single ingestion of the banana decoction, fermented with *Lb. pentosus* 3G3, showed comparable potency in decreasing blood glucose level than the unfermented banana decoction, but not significantly different at  $p=0.05$  after 240 min monitoring of blood glucose level.

Prolonged feeding period and monitoring is being done in order to determine the long term effects of *Lb. pentosus* 3G3, mixed with banana leaf decoction, in lowering blood sugar levels on mice and other positive effects of the probiotic lactic acid bacteria, such as minimizing the anti-nutritional effects of banana. **(Author's abstract)**

Biology. Diabetes. *Lactobacillus pentosus*. Probiotic lactic acid

bacteria. Banaba. Lagerstroemia speciosa. Hypoglycemic effect.

- 0217** Systems analysis of x-chromosomal miRNAs and their target genes using informatics tools. Mendoza, Ronie B., Labastilla, Evelyn M., Endriga, Marla A., Deocarís, Chester C., Deocarís, Custer C.. **Transactions of the National Academy of Science and Technology**, , 33(1):141

In an attempt to investigate the potential roles of miRNAs in human intelligence, miRNAs located in the X-chromosome were identified by mining the miRBase database. Out of the 77 miRNAs, 10 were chosen for further analysis based on their differential levels in the various functional parts of the brain: cortex (executive functions, long-term/immediate memory and speech), hippocampus (learning and working memory) and the midbrain (visual and auditory systems, and body movement). Target genes of these ten brain-expressed X-chromosomal miRNAs were predicted and compared with the following randomized miRNAs: ten nonbrain-expressed X-chromosomal miRNAs, ten nonbrain-expressed miRNAs that are not found in the X-chromosome and ten brain-expressed miRNAs that are not found in the X-chromosome. For the brain-expressed X-chromosomal miRNAs, a total of 221 target genes were predicted based on their common targets from three public prediction algorithms: MiRanda, TargetScan and MiRTarget2. These target genes were then annotated and compared according to their gene ontologies (GOs). Chemo- and Bioinformatics analyses indicate that the X-chromosome has potential roles in human intelligence as indicated by the statistically significant GO terms associated with learning, memory and brain development by the target genes of the brain-expressed X-chromosomal miRNAs. **(Author's abstract)**

Biology. Molecular systems analysis. miRNAs. Gene ontology. MiRanda. TargetScan.

- 0218** Taxonomic and ecological studies of vascular plants at entrances of selected caves in Polillo Island, Quezon, Philippines. Hadsall, Annalee S., Cariño, Grace Angelique F., Lambio, Ivy Amor F., Cajano, Mary Ann O., Larona, Ariel R., Lit, Jr., Ireneo L.. **Transactions of the National Academy of Science and Technology**, , 33(1):97

Partial results of on-going taxonomic survey and ecological studies of vascular plants found at entrances of caves on Polillo Islands, Quezon, Philippines are presented. This is the first study that specifically focuses on cave entrance plants in the Philippines. The limited availability of light in cave environments consequently limits primary productivity therein. Hence, photosynthetic organisms are found mainly at the entrances and to a very limited extent, in the twilight zones of caves. Photographs were taken for documentation and common or familiar plants were identified during field surveys. Samples of uncommon as well as unidentified species were collected, brought and preserved for further study and verification at the Botanical and Forestry Herbaria of the UPLB Museum of Natural History. Species include hoyas, begonias, several aroids, ferns, palms, strangling figs, urticaceous plants, etc. Several are known lithophytes whereas a few are also known as invasive or weedy. The taxonomic list of these plants is very important as baseline information for biodiversity and conservation of Philippine caves. **(Author's abstract)**

Biology. Polillo Island. Taxonomic survey. Lithophytes. Philippine caves.

- 0219** Taxonomic status and leaf epidermal features of *Amomum* Roxb. (Family zingiberaceae) recorded from Mindanao, Philippines. Acma, Florfe M., Gruezo, William Sm.. **Transactions of the National Academy of Science and Technology**, , 33(1):134

The taxonomic evaluation of some *Amomum* species (Family Zingiberaceae) reported from Mindanao Philippines was conducted using both field and herbarium studies supplemented with leaf epidermal characters.

Botanical field studies were conducted and specimens were identified using taxonomic keys, protologues and by doing herbarium studies at the Philippine National Museum (PNH), College of Agriculture, University of the Philippines, College, Laguna (CAHUP) and Herbarium of the Singapore Botanical Gardens (SING).

Results of the study showed that a number of species originally placed under the genus *Amomum* are currently classified under the genera as *Etlingera* Giseke [*E. dalican* (Elm) Poulsen *E. philippinensis* (Ridl.) R. M. Smith] *Geocharis* [*G. fusiformis* (Ridl.) R. M. Sm.] and *Hornstedtia* Retzius [*H. conoidea* Ridl.] Examination of the leaf epidermal features revealed that the both *Amomum* and *Geocharis* have broad subsidiary cells while *Hornstedtia* and *Etlingera* had narrower subsidiary cells. *Amomum* have more stomata located near the veins than halfway between veins. In contrast, the stomata for *Hornstedtia* and *Etlingera* are scattered between the parallel veins of the leaf. The leaf epidermal data support the current placement of the above-listed formerly considered species of *Amomum*. Finally, this study showed that previous taxonomic treatment for the Philippine *Amomum* is quite unsatisfactory. (Author's abstract)

Biology. Zingiberaceae. Amomum. Epidermal features. Clearing technique. Stomata.

- 0220** Taxonomy of vegetable oils based on fatty acid composition. Deocaris, Chester C., Deocaris, Custer C.. **Transactions of the National Academy of Science and Technology**, , 33(1):139

A scheme for classifying vegetable oils based on fatty acid composition is proposed. Heatmap and dendrogram were constructed from gas-fatty methyl ester (FAME) chromatograms of vegetable oils obtained from Codex Standards 210-1999 and 33-1981; and from published and experimental data. The vegetable oils analyzed formed 5 major clusters designated as lauric (Cluster 1); linoleic (Cluster 2), high-oleic (Cluster 3); palmitic (Cluster 4) and mid-oleic (Cluster 5). Coconut oil including, the virgin coconut oil (VCO) and the refined, bleached and deodorized (RBD-CO) variants are classified under the "Lauric Cluster" along with Babassu and Palm kernel oils. This group is unique as most of its fatty acids are fall under the medium-chain (C6:0 to C12:0) category. This food oil taxonomy can be correlated with the nutritional properties attributed to specific fatty acid, fatty acid group or vegetable oil. More importantly, our simplified chemo-informatic based classification scheme can be adapted to the existing food classification systems, such as the EuroFIR and of the USDA. (Author's abstract)

Biology. Fatty acid. Vegetable oil. Coconut oil. Chemo-informatics. Cluster analysis.

- 0221** Teratogenic effect of *Datura metel* leaf aqueous extract on the embryo of *Danio rerio*. Untalan, Suzzeth M.. **Transactions of the National Academy of Science and Technology**, , 34(1):55

Gross morphological observation was done on the embryos of *Danio rerio* (zebrafish) treated with leaf aqueous extract of *Datura metel* (talampunay or talongpunai). Since talampunay has been known for its medicinal importance as well as its narcotics effect, its teratogenic effect was evaluated using zebrafish embryo. The embryos were subjected to leaf decoction with a ratio of 1 gram of leaves to 1 ml of water. Treatments were 0.01%, 0.05%, 0.1%, 0.5%, 1%, 5%, 10% and a negative control. The experiment was done in two replicates with ten embryos per treatment. After five days of observing and examining the gross morphology and development, it was found out that it greatly affected the development of the embryos as the concentration increases by delaying its maturity by 75% or even kill the embryos (all embryos at the 10% concentration). Thus, *D. metel*, especially the leaves, is a potential teratogen. This study may be useful in evaluating potential teratogens as well as the development of new therapeutic drugs safe for pregnancy. **(Author's abstract)**

Biology. Teratogen. Teratogenicity. Talampunay. *Datura metel*. Zebrafish embryos.

- 0222** Testing a preliminary metagenomic approach to screen for alkaline protease and xylanase-producing bacteria. Rosal, Karen G., Hedreyda, Cynthia T.. **Transactions of the National Academy of Science and Technology**, , 33(1):100

Metagenomics is an emerging field in biotechnology that allows the genomic analysis of entire communities of microorganisms even before the need for culture of individual bacterial isolates. The objective of this study is to assess the feasibility of metagenomics as a preliminary step in screening for enzyme-producing bacteria. Luria Broth was inoculated with soil samples taken from agricultural, oil-contaminated, forest, and roadside soil as an enrichment step to increase the concentration of DNA template from viable microorganisms. The DNA extract from each sample served as templates for polymerase chain reaction using different primers that target genes for industrially- important enzymes alkaline protease and xylanase. The presence of distinct and intense bands of amplicons in the soil samples were observed, suggesting that bacteria producing such target enzymes could be present in the samples. Sequence analysis revealed that the gene from the different soil samples shows 99% homology with the endo-1,4-beta xylanase gene of two strains of *Bacillus subtilis*, *Bacillus cereus*, *Bacillus pumilus* and *Bacillus amyloliquefaciens*. Furthermore, the gene from the different soil samples also shows 99% homology with the *Bacillus licheniformis* bacillopeptidase gene, an alkaline serine protease. Results reveal that the preliminary metagenomic approach could be useful to provide information as to which samples will be subjected to further conventional screening to isolate enzyme-producing bacteria. Sequence analysis of amplicons could result in the isolation of novel genes exhibiting significant sequence variation from the reported genes. **(Author's abstract)**

Biology. Metagenomics. Enzymes. Alkaline protease. Xylanase. PCR.

- 0223** Toxicity of arsenic, aluminum, chromium and nickel to the embryos of the freshwater snail, *Radix quadrasi* von Möellendorf 1898. Factor, Catrine Jell B., de Chavez, Emmanuel Ryan C.. **Philippine Journal of Science**, , 141(2):207-216

Heavy metals are one of the major toxicants affecting different organisms including freshwater snails. To examine this problem, the effects of arsenic ( $\text{As}^{3+}$ ), aluminum ( $\text{Al}^{3+}$ ), chromium ( $\text{Cr}^{6+}$ ), and nickel ( $\text{Ni}^{2+}$ ) on the embryonic development of the freshwater pulmonate, *Radix quadrasi*, were determined. For the acute toxicity of individual metals, a total of 100 egg masses were subjected to static renewal test for 96h. Sublethal toxicity test based on adjusted  $\text{LC}_{10-96\text{h}}$  concentrations was conducted for 14 days. Based on the  $\text{LC}_{50-96\text{h}}$ , the toxicity trend for embryos was  $\text{Cr}^{6+}$  (0.0263 mg/L) >  $\text{As}^{3+}$  (1.0147 mg/L) >  $\text{Ni}^{2+}$  (1.5877 mg/L) >  $\text{Al}^{3+}$  (1.8787 mg/L). Sublethal toxicity test showed growth retardation as the most common abnormality among embryos exposed to  $\text{As}^{3+}$ ,  $\text{Al}^{3+}$  and  $\text{Ni}^{2+}$ , followed by edema and thinning of the shell. The hatchability and incubation period were also significantly decreased and prolonged in all treatment groups as compared to the control. The lowest observed effective concentration which induced abnormality was lower than the criteria continuous concentration and comparable to the detected field levels in polluted Philippine freshwater system. The present study demonstrated *R. quadrasi* embryos as a general sensitive bioindicator for trace levels of  $\text{As}^{3+}$ ,  $\text{Al}^{3+}$ ,  $\text{Ni}^{2+}$ , and  $\text{Cr}^{6+}$ .  
(Author's abstract)

Biology. Embryos. Freshwater snail. Heavy metals. Pollution. Toxicity.

- 0224** Transcript profiling of selected genes in normal and mutant makapuno endosperms of coconut (*Cocos nucifera* L.) using relative RT-PCR. Yadao-dela Cruz, Reggie, Laude, Rita P., Diaz, Ma. Genaleen Q., Laurena, Antonio C., Mendiolo, Merlyn S., Tecson-Mendoza, Evelyn Mae. **Transactions of the National Academy of Science and Technology**, , 33(1):135

Makapuno is an abnormal coconut with characteristic endosperm overgrowth. It has softer, fluffy endosperm compared to the hard, crisp solid endosperm of normal coconut. To gain insights on the molecular basis of the makapuno phenomenon, ten selected genes were cloned, characterized and their expression determined through Relative RT-PCR with actin as internal control gene. The ten genes showed conserved domains and have 75-98% identity to other plant sequences when analyzed with Interproscan and BLAST. Four of the ten genes were found to have lower expression in makapuno including an isopentenyl transferase gene that controls the first rate-limiting step in cytokinin biosynthesis. Three glycolytic genes, cytosolic glyceraldehyde-3-phosphate dehydrogenase, cytosolic pyruvate kinase and enolase were also downregulated in makapuno. On the one hand, three regulatory genes namely, protein kinase CK2 regulatory subunit, polyA binding protein, myb-like transcription factor were upregulated in makapuno. There was also altered expression of pyruvate decarboxylase,  $\alpha$ -D-galactosidase, and ketoacyl-acyl carrier protein synthase 1 (KAS1). These data support previously reported differences in cytokinin levels, carbon metabolism and respiratory levels in the normal and makapuno coconut endosperms. These also provided further insights into the elucidation of the molecular mechanisms regulating gene expression in normal and makapuno endosperms of

coconut. (Author's abstract)

Biology. Endosperm overgrowth. Gene expression. Altered carbon metabolism. Relative RT-PCR. Coconut.

- 0225** Ultrastructural predatory activity of *Arthrobotrys oligospora* on parasitic juvenile stages of citrus nematode, *Tylenchus semipenetrans*. Dizon, Gina Leah A., Yago, Jonar I, Torres, Liberty G.. **Transactions of the National Academy of Science and Technology**, , 34(1):64

This experiment tried to harness nematode trapping fungi as biological control agent against the causal organism of citrus decline, *Tylenchus semipenetrans*. *Arthrobotrys oligospora* was taxonomically characterized and they belong to a group of nematode-trapping fungi, which possessed specialized structures in the form of rings, which are extensions of the mycelium to capture, kill and digest nematodes. Initial population density (IPD) was recorded and population build up started on the month of February and reach the peak in the month of May and eventually declined in August. The time of effective parasitism was noted between 4 to 8 days after inoculation. *T. semipenetrans* starts to capture 24 hours after inoculation. Ultramicroscopic study revealed that the presence of ring-nets adhesive conidia and hyphae are the structures for predaceous ability of *A. oligospora* against *T. semipenetrans*. *In vitro* and *in vivo* study proved that there was a significant reduction of juvenile stage of *T. semipenetrans* when a nematode-trapping fungus was used. (Author's abstract)

Biology. Predatory activity. *Arthrobotrys oligospora*. *Tylenchus semipenetrans*. Parasitic juvenile stage.

- 0226** Unique nucleotide difference of two putative Ty1/copia-like long terminal repeat retrotransposons of abaca (*Musa textilis* Nee). Yllano, Orlex B., Lalusin, Anton, Castro, Sheryl D., Laurena, Antonio C., Tecson-Mendoza, Evelyn Mae. **Transactions of the National Academy of Science and Technology**, , 33(1):115

Retrotransposons or transposons through RNA intermediates are ubiquitous mobile genetic elements that can amplify themselves in the eukaryotic genomes. It harbors regulatory signals that are responsible for chromosomal rearrangements, fragmental gene movements, alteration of gene expression and genome evolution. In this study, the putative abaca retrotransposons were cloned, verified, sequenced and characterized. The resulting PCR products were cloned using degenerate primers. Restriction digestion of the purified recombinant plasmid using EcoRI revealed a distinct band (~950 bases). Sequence analysis revealed an 868-base perfect alignment insert. Comparing and aligning the two sequences revealed a nucleotide substitution at 779 from T in Retroclone 1 to C in Retroclone2. Using sequence alignment and phylogenetic analysis, the cloned putative retrotransposons of *M. textilis* grouped with Ty1-copia retrotransposon of *M. ABB*, *M. AAB* and *M. acuminata*. High homology to known retrotransposon protein of *Oryza sativa*, putative polypeptide of *Oryza australiensis*, gag-pol of *Zea mays*, integrase core domain of *O. sativa* and reverse transcriptase was noted using Blastx. This result supports the generalized structure of retrotransposon which is characterized with gag, pol and env domains in

between the long terminal ends (LTRs). To our knowledge, this is the first report on the cloning and sequence analysis of putative abaca retrotransposon. These results provide insight in understanding the genome composition of the Philippine's indigenous fiber crop — abaca. **(Author's abstract)**

Biology. Retrotransposons. Long Terminal repeats. Cloning. Single nucleotide polymorphism. Musa.

- 0227** An updated taxonomic account of Limnetic Crustacean Zooplankton in Lake Taal, Philippines. Papa, Rey Donne S., Tordesillas, Dino T., Mamaril, Sr., Augustus C.. **Philippine Journal of Science**, , 141(2):243-252

Limnetic crustacean zooplankton are the preferred prey of the economically important and endemic zooplanktivore *Sardinella tawilis* (Clupeidae) of Lake Taal. In this paper, we update the species composition, morphology and distribution of limnetic crustacean zooplankton in Lake Taal based on samples collected from 2008 through 2010. A total of nine species belonging to copepoda (3 spp.) and Cladocera (6 spp.) have been documented including *Arctodiaptomus dorsalis*, a Neotropical species and *Pseudodiaptomus brehmi*, which was previously thought to be restricted to Lake Naujan, Mindoro Is. Information on these relatively understudied taxa is an important contribution to the on-going re-assessment of Lake Taal biodiversity in the light of aquaculture and eutrophication impacts, as well as the presence of introduced species. **(Author's abstract)**

Biology. Crustacean zooplankton. Freshwater. Southeast Asia. Systematics. Tropical caldera lakes.

- 0228** Use of *Salmonella* DAS<sup>TM</sup> kit for detection of *Salmonella* spp. in swabs of contact surfaces. Sapin, Arsenia B., Ramirez, Teresita J., Saguibo, Jennifer D., Sedano, Susan A.. **Transactions of the National Academy of Science and Technology**, , 34(1):76

Pathogenic bacteria, like *Salmonella*, should be routinely monitored in contact surfaces of food production plants, establishment and laboratories to ensure hygienic status and microbial quality of products for consumers. This study was conducted to test the applicability of the PCR-based *Salmonella* DAS<sup>TM</sup> kit developed at BIOTECH in monitoring *Salmonella* on contact surfaces of equipment, utensils, work place and workers' hands. Collaboration with Lipa Quality Control Center (LQCC) and Peter Paul Corporation was conducted to validate the *Salmonella* DAS<sup>TM</sup> kit. *Salmonella* monitoring was subjected to two detection protocols- the *Salmonella* DAS<sup>TM</sup> kit protocol and the culture method using Bismuth Sulfite Agar. Results showed that the protocol of *Salmonella* DAS<sup>TM</sup> kit recommended and validated for foods and feeds can be used to monitor *Salmonella* in swab of contact surfaces. In 58 samples analyzed, a relatively high 89.65% agreement between the two methods was obtained. However, more contact surfaces samples of different food processing establishments/companies have to be tested to further improve method agreement. **(Author's abstract)**

Biology. Contact surface. Percent agreement. PCR-based. Salmonella DASâ„¢ kit.

- 0229** Viability of immobilized lactic acid bacteria in different culture diluents and various coconut-based food products. Ramirez, Teresita J., Saguibo, Jennifer D., Sapin, Arsenia B., Sedano, Susan A., Tavanlar, Mary Ann T.. **Transactions of the National Academy of Science and Technology**, , 33(1):102

There is considerable interest in providing physical barrier against adverse environmental conditions to protect probiotic bacteria and improve their survival in food products. Immobilized cell technology applied to lactic acid bacteria (LAB) and probiotic cultures offers many advantages over the use of free cells.

This study investigates the use of immobilization technique using sodium alginate to determine the viability of *Bifidobacterium* strain. Cells were immobilized in different concentrations of sodium alginate with bead formation accomplished by dropwise addition of the alginate cell mixture into  $\text{CaCl}_2$ . Formed beads were suspended in different solutions that include coconut water, formulated coconut beverage, peptone water (0.1%) and saline solution (0.85%). They were also incorporated in reconstituted skim milk (RSM) and coconut based food products such as ice cream and yoghurt. Viability of the probiotic strain was monitored with time.

The viability of LAB was maintained in beads, regardless of the concentration of sodium alginate used. The survival of immobilized LAB suspended in saline solution and peptone water was lower compared with the immobilized LAB suspended in coconut water and formulated coconut beverage. After two weeks storage at refrigerated temperature, there was a difference of around 2.5 log per bead in the total LAB count between beads suspended in coconut water and in the other diluents.

With incorporation into various food products, the viability of immobilized LAB was maintained at around 6 log per bead up to three weeks in coconut beverage and up to one week in yoghurt. However, this was not achieved when the beads were incorporated into RSM, a standard culture medium for LAB, and into coconut ice cream with a reduction in population to 4 log per bead after a week of storage. These preliminary results showed the potential of incorporating immobilized LABs in formulated coconut-based products. **(Author's abstract)**

Biology. Immobilized cells. Lactic acid bacteria. Coconut-based food products. Bifidobacterium. Sodium alginate.

- 0230** In vitro culture and enzyme production of plasmodial myxomycetes (Slime molds) collected from Lubang Island, Occidental Mindoro. Macabago, Sittie Aisha B., dela Cruz, Thomas Edison E.. **Transactions of the National Academy of Science and Technology**, , 33(1):136

Plasmodial myxomycetes or slime molds are often studied for the unique and interesting stages of their life cycle. Recently, these organisms were tapped for the production of anticancer metabolites. However, with their minute sizes, *in vitro* culture offers the possibility for the mass production of their natural products. In our research study, we collected plasmodial myxomycetes from ground leaf litter and twigs cultivated on moist chambers. *In vitro* culture showed spore germination of 13

species: *Craterium atrolucens*, *C. concinnum*, *Diderma effusum*, *Didymium ochroideum*, *D. squamulosum*, *Diachea leucopodia*, *Lamproderma scintillans*, *Oligonema schweinitzii*, *Perichaena microspora*, *Physarum bivalve*, *P. cinereum*, *P. compressum* and *P. melleum*. Ten of these species developed into amoebflagellates while seven further grew into plasmodia. Both of these are part of the life stages of myxomycetes. The amoebflagellates of these myxomycetes were then preserved and stored for 3 months. Revival of preserved amoebflagellates resulted in 82% success rate. Production of extracellular enzymes was also tested from the *in vitro* grown myxomycetes. Plasmodia of *P. compressum* and one plasmodium derived from a hardened sclerotium, a resting stage of myxomycetes, showed *in vitro* the presence of amylase and protease indicating perhaps an alternative mode of nutrition for these myxomycetes in addition to the phagotrophic mode of nutrition known for these organisms. This research study is the first report of *in vitro* culture and enzyme production of plasmodial myxomycetes in the Philippines. **(Author's abstract)**

Biology. Slime molds. In vitro culture. Culture preservation. Extracellular enzymes. Mode of nutrition.

- 0231** In vitro rooting of *Nepenthes truncata* MACF.. Rasco, Jr., Eufenio T., Oguis, Georgianna Kae R.. **Transactions of the National Academy of Science and Technology**, , 33(1):98

In vitro grown *Nepenthes truncata* plantlets need a well-developed root system to become hardy enough to withstand changes in the environment during transfer from laboratory to nursery. The effects of rooting media, indole-3-butyric acid (IBA) concentration, method of IBA application and source of plantlets for rooting in vitro grown *N. truncata* plantlets were studied. *N. truncata* plantlets were grown in agar, vermiculite and Silvosa medium (2:1:1 coir: charcoaled rice hull:osmunda fiber). Plantlets grown in vermiculite produced the longest and the most number of roots. The number of roots in vermiculite was also significantly higher than those in agar. Apparently, the Silvosa medium can be used as a substitute for vermiculite, but vermiculite has the advantage of being easier to prepare and more aseptic. Effects of IBA concentrations, 3 mg L<sup>-1</sup>, 6 mg L<sup>-1</sup> and 9 mg L<sup>-1</sup> IBA, on *N. truncata* plantlet tips and bases were investigated after a month. Root count, root length and root color ratings of shoots which were taken from the base and were placed in media supplemented with 9 mg L<sup>-1</sup> IBA were constantly highest. *N. truncata* plantlets grown in vermiculite and supplemented with 9 mg L<sup>-1</sup> were compared to plantlets with cut-ends dipped for 10 mins in 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 500 and 1000 mg L<sup>-1</sup> IBA prior to growing in IBA-free vermiculite. After a month, root count in all treatments except in plantlets dipped in 50 mg L<sup>-1</sup> were found to be significantly higher than those grown in vermiculite supplemented with 9 mg L<sup>-1</sup> IBA. Dipping was only effective at concentration range: 10 mg L<sup>-1</sup> to 100 mg L<sup>-1</sup>. *N. truncata* plantlets dipped at 40 mg L<sup>-1</sup> IBA prior to growing in vermiculite yielded the most number of roots and the highest root length rating. **(Author's abstract)**

Biology. *Nepenthes truncata* Macf.. Rooting. Indole-3-butyric acid. Vermiculite. In vitro.

## CHEMISTRY

- 0232** Effect of functional iron oxide nanocrystals on the arsenic level in drinking water. Paragas, Danila S., De Guzman, Aileen G., Paragas, Danika Jade S., Imbag, Mark Dale S., Dela Cruz, Laurenz O.. **Transactions of the National Academy of Science and Technology**, , 33(1):196

Arsenic is a semi-metal element in the periodic table and a naturally occurring element in the earth's crust. It enters drinking water supplies from natural deposits in the earth or from the agricultural and industrial practices. It has created serious contamination of the environment, causing many mass poisonings throughout the world. This study was designed to prepare functional iron oxide nanocrystals (a nanomagnet) and be used in the treatment of water contaminated with arsenic. The synthesis of functional iron oxide nanocrystals was divided into three parts: soap making process, extraction of oleic acid from soap with commercial vinegar, and preparation of magnetite or functional iron oxide nanocrystals from rust and fatty acids. The functional iron oxide nanocrystals (0.5 g per liter of water) was placed in water contaminated with arsenic and stirred for 5 minutes. The formation of bubbles on the surface of nanocrystals was observed. The water samples before and after treatment was brought to the Natural Science Research Institute for the analysis of arsenic using THGA Graphite Furnace Atomic Absorption Spectroscopic method.

Results of the analysis showed that the functional iron oxide nanocrystals was able to remove 85.89% of arsenic. The removal of arsenic is through nanomagnetism. Further studies on the effect of different amounts of iron oxide nanocrystals and concentration of arsenic in water must be conducted. **(Author's abstract)**

Chemistry. Nanocrystal. Arsenic. Rust. Oleic acid. Nanomagnet.

- 0233** Electrochemical properties of PtRuSn ternary electrocatalyst dispersed on poly (3,4-ethylenedioxythiophene) (PEDOT) for fuel cell application. Suasini, Lourdes P., Supan, Aaron John M., Fulo, Harris M., Garcia, Jonyl L., Tongol, Bernard John V.. **Transactions of the National Academy of Science and Technology**, , 33(1):144

Fuel cells have been considered as an effective alternative energy source due to its efficient energy conversion and low pollutant emissions. Therefore, improvement in alcohol oxidation is important in fuel cell technology and this can be achieved by developing modified platinum as electrocatalyst. Electrocatalytic oxidation of ethanol in acidic medium was studied using PtRuSn-PEDOT-modified polycrystalline and (111)-oriented single crystal electrodes of Au and Pt electrodes. In this study, potential cycling from -400 to 850 mV (vs. Ag/AgCl) was employed in depositing the Pt particles. Spontaneous deposition of Ru at 120 seconds with reduction at a constant potential (50 mV) was observed to be the most effective method in depositing Ru. This method was also used to deposit Sn particles for the preparation of PtRuSn ternary electrocatalyst. It was observed that 1 mM exhibits the most effective concentration towards ethanol oxidation. The developed ternary electrocatalysts had shown higher electrocatalytic activity by 15.00% – 21.22% than the binary catalysts. The same surface modification methods were employed on Au(111) and Pt(111) single crystal electrodes. It was observed that (111) single crystal substrates exhibit higher electrocatalytic activity by 10.69% (for Au(111)) and 72.63% (for Pt(111)) than their

polycrystalline counterparts. As revealed by SEM, PEDOT electrochemically grown on the well-defined single crystal electrode surface was more ordered and smoother than on the polycrystalline substrate. This gave a better dispersion of the electrocatalysts in the PEDOT matrix, leading to more catalytic active sites. **(Author's abstract)**

Chemistry. Fuel cells. Alcohol oxidation. Electrocatalyst. Cyclic voltammetry. Spontaneous deposition.

- 0234** Fabrication of electrocatalyst based on PEDOT-PSS supported Pd nanoparticles for ethanol electro-oxidation. Climaco, Maria Ivona F., Telan, Giovanna Janina D., Malijan, Frederick M., Garcia, Jonyl L., Fulo, Harris M., Tangol, Bernard John V.. **Transactions of the National Academy of Science and Technology**, , 33(1):153

Studies related on the search for an effective yet less expensive catalyst and support material for fuel cells, constitute a step on the development of possible solutions to increase the efficiency of a Direct Ethanol Fuel Cell while lowering its cost. Palladium nanoparticles were synthesized via oleylamine-mediated synthesis and precursor method to achieve a mean particle size of  $3.78 \text{ nm} \pm 0.45 \text{ nm}$  and  $3.63 \text{ nm} \pm 0.59 \text{ nm}$ , respectively as revealed by transmission electron microscopy (TEM). Poly(3,4-ethylenedioxythiophene) doped with poly(styrene sulfonate) (PEDOT-PSS) was prepared by a simple chemical synthesis procedure and was used as a supporting matrix for the Pd nanoparticles (PdNPs). Two different methods to remove the capping agent during the synthesis of metal nanocatalysts were studied, i.e. acetic acid washing and thermal annealing. It was found out that both thermal annealing and acetic acid washing were effective in removing the capping agent, oleylamine. The study was successful in developing an electrode based on PEDOT-PSS supported Pd nanoparticles which gave a current density of  $0.90 \text{ mA/cm}^2$  for ethanol oxidation in alkaline medium, which is relatively lower compared to the activity of PdNPs–CNTs (carbon nanotubes)/Na $\phi$ on–GCE (glassy carbon electrode) reported in the literature. The prepared electrode showed electrochemical stability even up to 50 oxidation cycles. This study is an effort pointing towards the development and possible commercialization of non-platinum based fuel cell anode dispersed on a conductive polymer matrix. **(Author's abstract)**

Chemistry. Fuel cell. Electrocatalyst. Pd nanoparticles. PEDOT-PSS. TEM.

- 0235** Synthesis of glycerol-crosslinked poly(methylmethacrylate) microparticles for the controlled delivery of mosquito repellent. Sala, Leo Albert G., Villanueva, Keith Michael A., Chua, Modesto T., Chakraborty, Soma. **Transactions of the National Academy of Science and Technology**, , 33(1):152

Cross linked polymers can act as controlled release device to serve as sustained release source of mosquito repellent for a long period of time. One such polymer is poly(methylmethacrylate)(PMMA). However, being relatively hydrophobic it shows limited swelling in amphiphilic and polar solvents and hence limits its encapsulation and release application. This can be remedied by the use of a more hydrophilic moiety in the polymer network such as glycerol which is highly hydrophilic due to the presence of three hydroxyl (–OH) groups. Hence the research focused on the

fabrication of glycerol crosslinked poly(methyl methacrylate) (GXPMMA) nano particles that can be used for the controlled release of mosquito repellent DEET (N, N-diethyl-m-toluamide). GXPMMA was synthesized by polymerization and crosslinking MMA with glycerol in one step in the presence of biocatalyst Novozyme 425, initiator benzoyl peroxide in tolerance peroxide in toluene. It was observed that increase in reaction temperature from 50 to 70 °C, and decrease in the amount of toluene resulted in the formation of the product in shorter period of time. GXPMMA showed maximum swelling in amphiphilic solvent acetone. GXPMMA was converted into nanoparticles of size 200 nm by nanoprecipitation technique. DEET was incorporated into nanoparticles by dispersing the particles in acetone containing DEET. It was observed that when the nanoparticles: DEET was in the ratio of 1:0.5, 80% of free DEET got incorporated in 4 h. DEET was released at a controlled rate for 6 h. **(Author's abstract)**

Chemistry. Nanoparticles. Glycerol. Poly(methyl methacrylate). DEET. Mosquito repellent.

## COMPUTER

## SCIENCE

- 0236** Strong spanned patterns generation using subsequence cover problem reduction and the term-product operation. Malinao, Jasmine A., Juayong, Richelle Ann B., Hernandez, Nestine Hope S., Adorna, Henry N.. **Philippine Journal of Science**, , 141(2):127-139

The Strong Spanned Patterns-Trie Construction (SSP-TC) algorithm is introduced to efficiently generate a set of strong spanned patterns of a given conflict-free binary  $k$ -tagged data set obtained by the use of the Approximate Crisp Theory Set Formation (ACTSF) methodology that we proposed in our previous work. In our previous work, we have shown that such a set with this characteristics can be obtained using the SSP-trie data structure in  $O(mn^2)$ . In this paper, we present and prove the correctness of the SSP-TC algorithm that generates this set through parallel computations in  $O(mn)$  implemented in this trie structure. We were also able to reduce the problem of generating a set of strong spanned patterns into a problem known as the Subsequence Cover Problem (SubCP). we obtain a solution to this reduct through the use of the SSP-TC algorithm and the SSP-Trie data structure whose input is from the components of the Term-Product Matrix introduced in this paper. To illustrate the classification performance of the generated set of patterns using the proposed concepts and methods, we use two data sets publicity-made-available in University of California Irvine (UCI) Machine Learning Repository and show that we achieve better rates of classification on the test sets of the two data sets compared with the results in literature. **(Author's abstract)**

Computer science. SSP-TC. Strong Spanned Paterns. SubCP. Term-Product. Tries.

## ECOLOGY

- 0237** Aquatic insects' diversity at Taytay falls in Barangay Taytay, Majayjay, Laguna. Yara, Kristian

Rodrigo A., Agudilla, Mary Ann R.. **Transactions of the National Academy of Science and Technology**, , 34(1):46

The aquatic insects thriving at Taytay Falls were identified and classified accordingly to its Orders and Families. Assessment of the presence of indicator species was done to determine the water quality of the falls based on the tolerance value and scale of aquatic insects to pollution adopted from Bouchard, 2004. Descriptive method of research was used in the study. Two sampling sites were established using GPS. Three sampling methods of collection were utilized namely; D-net and surber sampler for larvae and naiads and light traps for the adults. Collected insects were brought to the Museum of Natural History for identification. Insect diversity was analyzed using Shannon-Weaver Diversity Index. Findings revealed 22 species of aquatic insects belonging to 19 families distributed in seven Orders were found thriving in the falls. Family Philopotamidae got the highest number of individuals for both sites. Upstreams has the higher number of intolerant species to pollution compared to the downstreams. The presence of species from Orders Plecoptera, Ephemeroptera, Trichoptera and Coleoptera from both sites reflect that the water in Taytay Falls is still in good quality since these indicator species require high dissolved oxygen level in order to survive. The diversity index was high with a value of 3.09. **(Author's abstract)**

Ecology. Indicator species. d-net. Surber sampler. Diversity index.

**0238** Biodiversity assessment of Mt. Banahaw de Dolores. Gascon, Cecilia N., Garcia, Ronald C., Beltran, Francisco N., Faller, Wilfredo C., Agudilla, Mary Ann R.. **Transactions of the National Academy of Science and Technology**, , 34(1):42

A study was conducted to assess the diversity of biological communities in Mt. Banahaw de Dolores, Sitio kinabuhayan, Sta. Lucia, Dolores, Quezon from 700masl to its peak at 2155masl. The area was characterized by identifying the forest trees and wildlife, their species richness and diversity and dominance. This study is the first biodiversity assessment conducted in the site after a 5-year moratorium on visitation. The forest tree and wildlife inventory including insect collection were conducted and analyzed using Shannon-Weiner, Evenness and Dominance Indices. Result revealed a total of 455 trees representing 92 species and 37 families. For wildlife, a total of 30 species of birds representing 16 families, 5 species of bats, 3 species of amphibians and 2 reptiles were recorded. There were a total of 285 insects identified representing more than 104 families and 17 orders. High values for Shannon-Weiner index (H), and Evenness index (e) and low values of dominance (C) index indicated even distribution of individuals among the species and high species variation and diversity. **(Author's abstract)**

Ecology. Mt. Banahaw de Dolores. Biodiversity. Mt. Banahaw. Species richness. Shannon-Weiner index.

**0239** Some butterflies of Boracay Island. Cayabyab, Bonifacio F., Alcantara, Edwin P.. **Transactions of the National Academy of Science and Technology**, , 33(1):130

Boracay Island, Malay Aklan is one of the well known and busiest tourist destination in the country at present. Owing to the increasing demand for space for commerce and domiciles, the butterflies habitat and range in this island resort are rapidly diminishing. We conducted a rapid survey of the butterflies at Boracay last April 2010 to document the butterfly fauna and contribute in the biodiversity inventory of the locality.

We noted down the species that we observed based on their flight pattern and morphological appearance. In other cases we use sweep net to examine closely the butterflies and release them later after confirming our identification.

A total of thirty two species from seven families were noted. The order of decreasing density of the seven families was: Papilionidae (8) > Nymphalidae (7) > Pieridae (6) > Danaidae (3) > Hesperidae (4) = Lycaenidae (4).

Additional counts particularly in the watershed will be included in the future to be able to record the species that are strictly present in forested areas. We will also invite partners in the locality. **(Author's abstract)**

Ecology. Butterflies. Boracay. Tourist. Island. Resort.

- 0240** The culture of bloody cockles (*Anadara Antiquata* Linnaeus) in diferent water levels at the marine waters of Northern Poblacion, San Francisco, Cebu. Lucero, Nathaniel E., Wenceslao, Emelyn, Muaña, Eva, Tanduyan, Serapion N.. **Transactions of the National Academy of Science and Technology**, , 32(1):46

*Anadara antiquata* Linnaeus is one of the bivalves frequently gleaned in Camotes Islands and other parts of the country; hence, this experiment was conducted to find out its growth rate in off-bottom conditions placed in trays/cages divided into 3 layers representing the surface, middle and bottom water levels of the water with shell weight, length and width as indicators of its growth. Survival and mortality rates were also taken to determine the efficiency of the methods. In this study, we used the Complete Randomized Design (CRD) which was composed of 4 treatments and 3 replicates, namely: T<sub>0</sub> (control-the bloody cockles raised in the sea bottom), T<sub>1</sub> (surface layer), T<sub>2</sub> (middle layer) and T<sub>3</sub> (bottom layer) with a stocking density of 15 individual cockles in each tray in each water level. After 4 months of culture, results show that T<sub>3</sub> and T<sub>2</sub> gained the highest average shell length of 4.21 cm and T<sub>1</sub> has 4.17 cm. For shell width, T<sub>3</sub> got the highest (3.11 cm) followed by T<sub>2</sub> (3.08 cm) and T<sub>1</sub> (3.05 cm) and for shell weight, T<sub>3</sub> got the highest (16.02 grams) followed by T<sub>2</sub> (15.44 grams) and T<sub>1</sub> (14.72 grams). Survival and mortality results show that T<sub>3</sub> and T<sub>1</sub> have survival rate of 93.33% (14 pcs. of the animal) and T<sub>2</sub> has survival rate of 86.67% (13 pcs.). Results from Analysis of Variance (ANOVA) show that on 5% level of confidence it revealed that there are no significant differences on various treatments and replications based on the shell length, width and weight of the bloody cockles. **(Author's abstract)**

Ecology. *Anadara antiquata*. Cebu. Complete randomized design. Off-bottom. San Francisco.

- 0241** Ecological assessment of mangrove coastal areas of Mulanay, Quezon, Philippines. Abantao, Sherwin C., Yllano, Orlex B., Apacible, Theodore Clyde, Orijola, Ma. Lourdes, Mediavillo, Gerry C., Pereda, Linar T., Ojeda, Joselito A.. **Transactions of the National Academy of Science and Technology**, , 34(1):57

Mangroves are productive coastal ecosystems threatened worldwide. Rehabilitation of these mangroves is a priority of Mulanay municipality. Since there is no baseline information available to guide land managers and policy makers in implementing proper rehabilitation initiatives, this research aims to assess the species diversity, population density, species importance value, degree and type of impact and physico-chemical properties of the mangrove areas in Mulanay. Results revealed eleven species of mangroves belonging to five families. Dominant species is *Avicennia marina* (0.28). Three species from Patabog have higher importance value (IV), *Ceriops decandra* (1.97), *Rhizophora apiculata* (1.80), and *A. marina* (1.48). Six coastal barangays were disturbed by anthropogenic activities. Two showing rather high impact, one showing moderate impact. Soil analysis revealed that eight sites have 0.01 - 0.02% nitrogen, 0.4 – 6 ppm phosphorus. Soil potassium ranges from 0.9-3.4 ppm and electrical conductivity from 2.92-11.15 mmhos/cm, respectively on all barangays. Sta Rosa had the highest organic carbon (0.42%)/organic matter (0.72%). Ibabang Yuni had the lowest (0.11%)/ (0.19%). Sagongon and Butanyog had the highest pH (8.6), Patabog had the lowest (7.8). Coastal water monitoring showed that July had the highest temperature ranging from 29.9 - 32.3°C while January had the lowest (25.3 – 28.5°C). These results provide the information Mulanay needs on proper rehabilitation of mangroves. Currently, local government units adhere to the serious implementation of environmental laws for proper protection and conservation of mangroves. **(Author's abstract)**

Ecology. Mangroves. Diversity. Conservation. Rehabilitation. Ecological assessment.

- 0242** Ecological status of Camatian river in Lucban, Quezon. Enal, Maria Luisa A., Magallanes, Ma. Joeylynn V., Quindoza, Ann Joy P., Babia, Shiela A., Bañal, Jacquilyn A., Maranan, Florence C., Villenas, Fidesmarie A., Comia, Wilma L.. **Transactions of the National Academy of Science and Technology**, , 34(1):59

Lucban, Quezon has seven rivers that drain to Laguna de Bay; Camatian River is one of them. The increasing population in the vicinity makes it and other tributaries exposed to rising environmental impacts due to domestic and agricultural wastes. This study was conducted to assess the ecological health of Camatian River which is hope to serve as an awakening call to the people of the consequent total impairment of this resource and public health problems. Epilithic algae were collected from three sampling stations from June to November 2008 and were analyzed for species abundance and diversity. Water samples were analyzed for physico-chemical parameters and fecal coliform. Biological indices were also determined. Results showed high levels of fecal coliform bacteria ( $1.4 \times 10^7$  MPN/100 ml sample), total dissolved solids (291  $\mu$ S/cm),  $\text{NO}_3\text{-N}$  (1.63mg/L) and dissolved  $\text{PO}_4$ -(0.98 mg/L) but low level of dissolved oxygen (4.46 mg/L). Microscopic analysis revealed that of the 32 algal species in Camatian River, seven were moderately to highly pollution tolerant with *Nitzschia palea* as the most dominant. For biological indices, it has high algal pollution index (16-28) and low Shannon diversity index (1.404-2.349). Parameters

imply that Camatian River is moderately to heavily polluted. The quality of water falls under Class D according to National Standards and threatens the remaining aquatic organisms present. Data obtained were presented to the Local Government Unit as baseline information for the development of a comprehensive rehabilitation, conservation and monitoring program for Camatian River. **(Author's abstract)**

Ecology. Ecological assessment. Lucban, Quezon. Epilithic algae. Water quality. Algal pollution index.

- 0243** Floristic composition and physiognomy of mangrove forest in Pagbilao, Quezon, Philippines. Almazol, Amalia E., Cervancia, Cleofas R., Buot, Jr., Inocencio E., Gruezo, William SM., Pampolina, Nelson M.. **Transactions of the National Academy of Science and Technology**, , 34(1):40

The species composition and physiognomy of the mangrove forest in Pagbilao, Quezon Province were studied. Vegetation analysis was done within a 20 x 20 m-quadrat established in each of the three zones (landward, middleward and seaward) of the mangrove forest. A total of 37 species were identified in all zones comprising 744 individuals belonging to 28 genera and 18 families. Using Shannon Index of diversity ( $H'$ ), the landward zone had the highest diversity ( $H' = 2.70$ ) followed by the seaward zone ( $H' = 2.56$ ). The least diverse was the middleward zone ( $H' = 1.47$ ). There was a similar trend in the proportion of various tree heights and diameters in the seaward middleward and landward zones. The density of small trees was higher than those of the large ones. In terms of diameter at breast height (dbh) classes, there are 237 individuals belonging to 3-30 cm, no individual belonging to 31-40 cm and 2 individuals with 41 cm and above. The height classes of 2.5 m have 177 individuals, 61 individuals belonging to 6-15 m and only one individual with height class of 16 m and above. The Importance Value (I.V.) of the species varied within each zone. In the order of decreasing I.V., *Avicennia marina* > *Aegiceras floridum* > *Sonneratia alba* in the seaward zone. In the middleward zone. *Avicennia officinalis* > *Ceriops decandra* > *Scyphiphora hydrophyllacea*. At the landward zone, *Xylocarpus granatum* > *A. officinalis* > *Rhizophora mucronata* > *A. marina* var. *rumphiana*. The current floristic composition of Pagbilao mangrove indicates that this ecosystem is still diverse. **(Author's abstract)**

Ecology. Mangrove. Floristic composition. Physiognomy. Species composition. Importance value.

- 0244** Grazing drives spatial variation in the abundance and distribution patterns of autotrophs in tropical rocky shore. Macusi, Edison D.. **Philippine Journal of Science**, , 141(2):141-156

Grazing is known as a fundamental process that shapes the community structure of many rocky shores. In this study, the impact of molluscan grazing on autotroph assemblage at different scales in Hong Kong rocky shores were assessed to test whether grazing have different impacts at different spatial scales. The recruitment of various autotrophs in the grazer manipulation experiments were monitored regularly. Most of the treatment plots were colonized by various macroalgae with ephemeral erect algae increasing in abundance in various mollusc exclusion plots throughout the

study period. Erect algal cover increased abundantly in shores during the coldest month of winter. The most conspicuous effect of grazing was at the two Stanley sites and to a lesser degree at the Cape d' Aguilar that were reflected in the low values of chlorophyll *a* and autotroph covers in the control and grazer access plots. Complete exclusion was not possible in the two Stanley sites because of the high number of grazer intruders that entered the plots. This strong grazing pressure kept the algal cover in the exclusion and control treatments similar and dominated by encrusting algae throughout the experimental period. Because of this, it appears that the observed growth of erect algae in the mollusc exclusion plots and its patchy distribution near the sites and in rock pools support the hypothesis that molluscan grazers are the major causes of low settlement and recruitment of erect algae in these shores during winter. **(Author's abstract)**

Ecology. Autotrophs. Grazing. Herbivory. Hongkong. Macroalgae. Spatial variation. Tropical rocky shore.

- 0245** Habitat determinants of Philippine-endemic and Mindanao-endemic bird communities on Canticol and Mt. Hilong-hilong, Philippines. Paz, Sherryl L., Ngoprasert, Dusit, Nuneza, Olga M., Mallari, Neil Aldrin D., Gale, George A.. **Transactions of the National Academy of Science and Technology**, , 34(1):45

The study focused on the richness, abundance, diversity and habitat use of Philippine-endemic and Mindanao-endemic birds of two mountains in Agusan del Norte – Canticol, Tubay and Mt. Hilong-hilong, RTR from September to November, 2008. Birds were surveyed using eight-minute fixed-radius point counts. Habitat variables estimated included vegetation structure, elevation, slope and the degree of anthropogenic disturbance. Non-linear regression analysis was used to determine the habitat variables that influenced the richness and abundance of endemics in the two sites. Canticol had lower mean density of large and medium trees and higher degree of anthropogenic disturbance than Mt. Hilong-hilong. There were 32 Philippine-endemic birds (five threatened) and three Mindanao-endemics (one threatened) on Canticol while there were 40 Philippine-endemics (eight threatened) and five Mindanao-endemics (three threatened) on Mt. Hilong-hilong. The diversity of endemics was significantly higher on Mt. Hilong-hilong ( $H' = 2.31$ ). Vegetation structure and elevation had greatest influence on the endemic bird communities in the two sites. The study suggests that the two sites need conservation attention to prevent forest loss and endangerment of the threatened endemics. Equally important, adequate regeneration of the disturbed sites in the region must also be prioritized as part of a long-term management strategy. **(Author's abstract)**

Ecology. Anthropogenic disturbance. Philippine-endemics. Mindanao-endemics. Birds. Diversity.

- 0246** Population assessment of butterfly host plants in selected sites near Mt. Banahaw de Lucban, Lucban, Quezon, Philippines. Agudilla, Mary Ann R.. **Transactions of the National Academy of Science and Technology**, , 34(1):39

This study investigates the population of butterfly host plants thriving in Mt.

Banahaw de Lucban Botanical Garden and the College of Agriculture campus in Lucban Quezon, primarily as a prerequisite for the conservation of endemic butterfly fauna and its host plants through butterfly farming. Quadrat method of sampling techniques was utilized in the study. Ten quadrats of 20m x 20m were established in Mt. Banahaw Botanical Garden and ten 10m x 50m quadrats in the College of Agriculture. Results revealed 36 species of host plants belonging to 21 families thriving in the Botanical Garden and 39 species belonging to 21 families comprised the host plant population on campus. Family Fabaceae had the highest representation with 4 species followed by Annonaceae, Euphorbiaceae and Rutaceae with 3 species each. Majority of the host plants in the study sites were not randomly distributed and had low density and frequency values ranging from 0.00003 to 0.0008/m<sup>2</sup> mostly represented by 1-3 individuals. Percent abundance ranged from 0.0789 to 0.2368%. Most plant species were associated with 2 or more species of butterflies for nectar feeding and/or as hosts of butterfly larva while some butterflies depended on one species of plant as its larval host. The results reflect the rarity of host plants in the study sites suggesting the inability to support the food requirements for a butterfly breeding project, perhaps even the wild population of butterflies. It is recommended that a nursery for host plants be established in both sites, an enhancement planting of endemic host plants be implemented and similar study of the same be conducted in the other areas of Mt. Banahaw. **(Author's abstract)**

Ecology. butterfly farming. Population assessment. Host plants.

- 0247** Species diversity of lizards along elevational bands of Mt. Hilong-Hilong, Diwata Range, Agusan del Norte. Carrillo, Jacqueline R., Lea, Emmanuel Pacheco. **Transactions of the National Academy of Science and Technology**, , 34(1):41

This study aimed to determine species diversity of lizards along elevational bands of Mt. Hilong-hilong, Agusan del Norte. Specially, it aimed to: compare the diversity of lizards along the the elevational bands of Mt. Hilong-hilong, describe lizard species, determine the distribution of lizards along elevational bands and assess the status of lizards of Mt. Hilong-hilong. Only the adult forms of lizards were considered in this study. Sampling and collection methods used were transect, opportunistic and random collection techniques, refuge examination and pitfall traps along the seven elevational bands established in mossy (1,500-1,900 masl) and montane forest (1,200-1,500 masl). Alpha Index of Diversity was highest on fifth (1,600-1,700 masl) elevational band and lowest on the rest of the elevational bands. *Sphenomorphus mindanensis* was the only species that was aggregated. *S. coxi coxi* is the most dominant species. *S. coxi coxi* is the most abundant of the 7 species collected since it can be found in most of the elevational bands (second, fourth, fifth, sixth and seventh elevational bands). Results revealed 2 families with 1 genus, *Luperosaurus* which the species remains to be identified, 7 species and 25 individuals. Every species differs slightly with their SVL, tail length and weight which suggest that every species has its distinctive feature. Elevational bands 1,700-1,800 masl and 1,800-1900 masl had higher similarity indices on lizard species composition compared to other elevational bands. For the ecological status, Philippine endemic species were *S. decepiens* and *S. cf. jagori* and the Mindanao faunal region endemic were *S. mindanensis*, *S. coxi coxi*, *S. cf. diwata* and *S.cf. abdactus abdactus*. **(Author's abstract)**

Ecology. Species diversity. Lizards. Elevational bands. Mt. Hilong-hilong. Diwata range.

## EDUCATION

- 0248** Core curriculum for undergraduate clinical pharmacology. Manigbas, Guillerma. **The Medical Journal of De La Salle University**, , 11(2):33-37

The profile of pharmacology teaching in the Philippines presented in this paper is very similar to the previous report published by Villar and Cuison in October 1993. Majority of the medical institutions are not addressing the needs of the medical students to prepare for clinical practice in terms of teaching clinical pharmacology as a formal discipline. The best that the schools could offer was to integrate the principles of clinical pharmacology curriculum which is given in the second year.

The feedback regarding the output of the PSCEP Task Force on Clinical Pharmacology and Therapeutics was encouraging and there seems to be some hope that this discipline will soon be recognized as an important aspect in the undergraduate medical curriculum in most, if not all medical schools in the country.

Each school has its own peculiarity, and flexibility has to be observed based on the constraints and other limitations.

As Nierenberg has emphasized in all his works, we owe it to our patients to be sure that all of our students graduate with a firm understanding of the core facts, skills, and attitudes that will enable them to practice rational therapeutics throughout their professional careers. This core curriculum hopes to serve as guideline for every medical school, although the exact timing and format of instruction may vary from one institution to another, depending on their needs and availability of resources.  
**(Author's summary)**

PSCEP Task Force. clinical pharmacology. pharmacology teaching. Education.

## ENGINEERING

- 0249** Assessment of renewable energy resource potential and application for decentralized rural electrification using geographic information system (GIS). Opiso, Earl M., Kumar, Sivanappan. **Transactions of the National Academy of Science and Technology**, , 33(1):191

One consequence of massive economic development across the globe since the industrial revolution is the depletion of fossil fuel and global climate change. Countries increase its energy demand to sustain their economic growth. However, this relationship between energy demand and economic growth greatly affects our environment. It is already a given fact that fossil fuels will eventually run out, thus the move towards alternative sources of energy which are renewable and at the same

time eco-friendly.

This study evaluates solar and biomass energy sources in Bukidnon, a province located at the southern part of the Philippines, by means of analyzing the theoretical and the technical potential of these renewable sources of energy using geographic information system (GIS).

Various scenario analyses were also carried out to show the effects of different financial parameters (initial costs, operations and maintenance cost and electricity export rate) to the renewable energy systems financial viability using RETScreen software.

Results show that Bukidnon has an estimated technical solar energy potential of 55 MW power plant capacities that could be added to the grid and 69 MW of installed capacity power plant can be set-up from the technical potential of agricultural crops.

In conclusion, the study was able to provide a GIS-based support system for the government in the formulation of policies and strategies with regards to finding interested investors that could develop a suitable site for renewable energy system in the province and thus, could help avert future energy crisis and at the same time reduce GHG emissions. **(Author's abstract)**

Engineering. Renewable energy resources. Solar energy. Biomass resource. RETScreen. GIS.

- 0250** A bi-level multi-period optimization model for multiple feedstock bioenergy supply chains. Barile, Ivan Dale U., Tan, Raymond R.. **Transactions of the National Academy of Science and Technology**, , 33(1):192

This paper presents a bi-level optimization model for bioenergy supply chains that integrates a multiple-feedstock, multi-period framework for determining the best trajectories of such systems with time. The resulting model gives a more accurate interpretation of the different scenarios that could face real world energy systems. The upper level decision maker, the government, seeks to maximize the total amount of bioenergy that is produced by setting the appropriate desired range of production; whereas the lower level decision maker, the bioenergy producers, strives to maximize its profit, while subject to the economic and environmental limits imposed by the government. This interaction results in a Stackelberg game which is equivalent to a bi-level programming problem. Inclusion of a multi-period approach allows the growth and development of the different bioenergy sources to be specified for a fixed time horizon from the perspective of multiple decision makers. This approach can pave the way to obtain a rational prediction and allow for the optimization of resources being consumed, which can increase public awareness and assist decision makers in choosing the best path to choose. A numerical case study is used to assess the effects of key system parameters on the growth trajectories of the bioenergy systems and key policy implications of the results are discussed. **(Author's abstract)**

Engineering. Energy planning. Bi-level optimization. Sustainability. Importation. Bioenergy system. Stackelberg game.

- 0251** Effects of antioxidant extracted from leaves of "banaba" (*Lagerstroemia speciosa*, L.), mangosteen (*Garcinia mangostana*, L.) and "tsaang gubat" (*Ehretia microphylla* L.) on the oxidation stability of biodiesel . Movillon, Jovita L., Demafelis, Rex B., Bautista, Ramer P., Lacsa, Marinella C., Viray, Donna Marie C., Cordova, Karel J.. **Transactions of the National Academy of Science and Technology**, , 33(1):189

The stability of biodiesel is relatively inferior to petrodiesel due to its unsaturated fatty acids which may lead to the formation of gums. In the presence of air or oxygen, alcohol and acid may be produced which can reduce the flash point and increase the total acid number, thus causing damage to the engines. The effects of the antioxidant extract from "banaba" (*Lagerstroemia speciosa*, L.), mangosteen (*Garcinia mangostana*, L.) and "tsaang gubat" (*Ehretia microphylla* L.) on the oxidative stability of biodiesel from *Jatropha curcas*, L. were determined based on the induction period (IP) of the samples using the Rancimat method of oil stability index. The data obtained for the "banaba", mangosteen and "tsaang gubat" extracts had regression coefficients ( $R^2$ ) of 0.687, 0.804 and 0.886, respectively, indicating a linear positive correlation between the loading rates (mg total polyphenol in the extracts /L biodiesel; ppm) and the IP (hours). To meet the European standard of 6-hour IP, the loading rates (g antioxidants per 100 L biodiesel) were found to be: 983.4, 110.9, 1124.9, and 206.3 for "banaba", mangosteen, "tsaang gubat" and the commercial antioxidant respectively. The antioxidant extract from mangosteen leaves had actual loading rate of 260.4 g/100L, with induction period of 17.52 hours, greatly exceeding the American, European and Japanese standards. **(Author's abstract)**

Engineering. Antioxidant. Banaba. Mangosteen. Tsaang gubat. Biodiesel. *Jatropha curcas*.

- 0252** Fabrication and characterization of spin-assisted and dip-coated PEDOT:PSS and poly(diallyldimethylammonium chloride) nanofilms for organic light-emitting diode. Quesada, Maria Gabriela B., Binag, Christina A.. **Transactions of the National Academy of Science and Technology**, , 33(1):

Organic light emitting diodes (OLED) have extended its domain of applications in the area of flat panel displays due to their potential properties, brightness efficiency, extended lifetime and low production cost. The study aims to prepare and characterize nanofilms of Poly (3,4-ethylenedioxythiophene):Poly (styrenesulfonate) (PEDOT:PSS) and Poly (diallyldimethylammonium chloride) (PDADMAC) for the fabrication of an OLED.

EDOT:PSS was chemically polymerized using  $(\text{NH}_4)_2\text{S}_2\text{O}_8$  oxidant and  $\text{FeCl}_3$  catalyst. Absorbances of different solutions of synthesized PEDOT:PSS were determined using a UV-visible spectrophotometer. The glass slides and ITO-coated slides (10x20 mm) substrates were degreased and functionalized. In dip-coating, the treated substrate was then initially immersed in 0.01M PDADMAC solution for 15 min, followed by immersion in 3% (w/v) PEDOT:PSS solution. In spin-coating, PDADMAC and PEDOT:PSS were deposited alternately on the substrate with spin speed of 2500 rpm for 30 sec. The cycles for two techniques were repeated until 10 bilayers were achieved.

Each bilayer exhibited absorbance peaks at 370, 560 and 850 nm due the dark blue PEDOT. The SEM micrographs of PEDOT:PSS surfaces revealed globular structures. Atomic force micrographs showed average roughness of 1.000 nm and 14.697 nm, for spin-assisted and dip-coated films, respectively. An OLED was fabricated using PEDOT:PSS/PDADMAC films as the hole transport layer. The current-voltage graph of prepared OLED showed a diode characteristic. **(Author's abstract)**

Engineering.

- 0253** Greenhouse gas emissions of tobacco flue-curing process in the Philippines. Franco, Samuel S.. **Transactions of the National Academy of Science and Technology**, , 33(1):194

The production of flue-cured tobacco is one of the major agricultural production systems in the Philippines specifically in Northwestern Luzon. It is considered high value cash crop that could offset the cost of production of food crops. The production of the crop is energy intensive especially in the flue-curing process which is done in natural convection flue-curing barns made of different materials like concrete and galvanized iron sheets in various configurations with fuelwood as the primary source of energy.

The annual production of flue-cured tobacco for the past five decades is fluctuating between 45,000 to 75,000 tons. The amount of fuelwood to cure this volume of tobacco was determined by statistical models developed and it ranges from 157,500 to 262,500 tons per year. This volume of fuelwood was estimated to be equivalent to trees grown in 6,750 to 7,500 hectares of woodland depending on growth density.

Mathematical models were developed utilizing previous research data in establishing the greenhouse gas emission levels in relation to the different tobacco flue-curing barn configurations. The amount of carbon dioxide (CO<sub>2</sub>) and carbon monoxide (CO) emitted were obtained in the mathematical models developed at different conditions. The range of annual CO<sub>2</sub> and CO emission computed using the mathematical model are, 55,460 to 83,460 tons and 4,560 to 6,970 tons. **(Author's abstract)**

Engineering. Carbon dioxide. Carbon monoxide. Emissions. Energy. Flue-curing. Fuelwood. Greenhouse gases. Tobacco.

- 0254** Investigation of arsenate uptake by hydrotalcite at hyperalkaline and elevated temperature conditions. Opiso, Einstine M., Sato, Tsutomu. **Transactions of the National Academy of Science and Technology**, , 33(1):195

Hydrotalcite is known to retain large amounts of anionic species due to its positive charge characteristics. Hence, investigating its role for the retention of long-lived dissolved anionic nuclides during an intrusion scenario in radioactive disposal facilities is necessary.

This study examined the Mg-A1 type hydrotalcite (Mg<sub>6</sub>A<sub>12</sub>(CO<sub>3</sub>)(OH)<sub>16</sub>•4(H<sub>2</sub>O))

(Mg/A1 ratio = 2) as possible sorbent of anionic nuclide using arsenate as an analogue. The sorption experiments were carried out at alkaline pH condition (pH 11) and elevated temperature of 75°C to simulate the intrusion scenario at radioactive waste repositories. Arsenate sorption was conducted during and after hydrotalcite formation.

The results showed that hydrotalcite was able to remove more than 90 and 70% of arsenate during and after mineral formation, respectively even in the presence of competing anions. The co-precipitated arsenic was more resistant to release and showed a significant irreversible fraction of sorbed arsenate of more than 30%, which could be attributed to the inner-sphere complexation with the Mg or Al in the octahedral sheets by displacing their coordinated hydroxyl group and stronger interlayer fixation.

Overall, the immobilization of arsenate by hydrotalcite could possibly ensure the long term immobilization anionic nuclides. Hence, controlling the pore water chemistry of cement to ensure the significant precipitation of hydrotalcite during hydration must be considered in cementitious systems used in geological waste repositories. **(Author's abstract)**

Engineering. Hydrotalcite. Arsenate. Sorption. Radioactive repositories. Cementitious systems.

waste

- 0255** Nanowire formation and polymer conformations of electropolymerized poly(3,4-ethylenedioxythiophene) (PEDOT) on iodine-modified Au(111) single crystal electrode as probed by *in-situ* STM. Lapitan, Jr., Lorico DS., Tongol, Bernard John V., Yau, Shueh-Lin. **Transactions of the National Academy of Science and Technology**, , 33(1):154

In the field of nanotechnology, there is a growing interest in the synthesis of conjugated polymer nanowires because of their promising applications in nanodevices and molecular electronics. In this study, the electrochemical polymerization of 3,4-ethylenedioxythiophene (EDOT) ( $E_{ox} = 1.20$  V) on iodine-modified Au(111) single crystal electrode in aqueous 0.10 M  $HClO_4$  was investigated by cyclic voltammetry (CV) and electrochemical scanning tunneling microscopy (EC-STM). The Au(111) single crystal electrode was fabricated using the *Clavilier's* method. The iodine adlayer was prepared by dipping a freshly annealed Au(111) single crystal electrode in a 0.10 M potassium iodide (KI) solution.

Cyclic voltammetric and EC-STM data revealed the iodine adlayer was stable from  $E = 0.0 - 1.40$  V vs Reversible Hydrogen Electrode. This provided a suitable potential range for EDOT electropolymerization at 1.20 V vs. RHE. EC-STM was used to examine the formation of EDOT adlayer on iodine-modified Au(111) electrode. The iodine adatoms on Au(111) surface were prominent at negative potentials but EDOT molecules gradually appeared as bright spots when the potential was shifted more positively. However, the formation of an ordered adlayer of EDOT molecules was not observed. *In-situ* electropolymerization of EDOT was carried out at 1.20 V and showed the formation of single-molecular chains of PEDOT with diameter and lengths of 0.9 nm and 5-7 nm respectively. Extensive STM imaging further revealed PEDOT having bended polymer backbones of 105°, 144° and 180° (i.e. hairpin folding). The growth of PEDOT multi-layers is observed when the potential was held for a longer time. **(Author's abstract)**

Engineering. Poly(3,4-ethylenedioxythiophene). nanowire. Iodine. Au(111) single crystal electrode. Scanning tunneling microscopy.

- 0256** Preparation and investigation of spin self assembled multilayer film of poly(3,4-ethylenedioxythiophene). Lapinid, Ezra Abigail C., Binag, Christina A.. **Transactions of the National Academy of Science and Technology**, , 33(1):148

The preparation and characterization of thin-film materials is a dominant area of research. These films have found several applications as thin-film and field effect transistors, touch displays and electroluminescent devices such as organic light-emitting diodes. The organic light-emitting diode (OLED) has received a lot of attention because of its attractive features for display applications. This study aims to chemically prepare poly (3,4-ethylenedioxythiophene):poly (styrenesulfonate) (PEDOT:PSS) and fabricate a polymer multilayer film with poly(allylaminehydrochloride) (PAH) by spin self-assembly method and to investigate the properties of the multilayer film as OLED.

EDOT was polymerized with PSS using  $\text{FeCl}_3$  oxidant with several monomer to oxidant molar ratios (1:1, 1:2.5, 1:5, 1:7.5), with the 1:7.5 ratio giving the highest yield of polymer. The optical absorptions of several PEDOT:PSS solutions (0.05, 1, 3 and 5% w/v) showed 3% w/v with the highest and most stable reading with absorption peaks at 325 nm and 750 nm indicative of PSS and 990 nm for the blue-colored PEDOT. The PAH/PEDOT:PSS solution was spin-coated (2500 rpm for 30s) to form a film on glass slide and indium tin oxide substrates (1.0 x 2.5 cm). The film coating with a total of 15 bilayers showed an increasing absorbance as bilayer increases. SEM and AFM micrographs of PEDOT:PSS showed relatively smooth surface. The OLED characteristic of the multilayer film gave a current-voltage curve of a diode even if no light was emitted. **(Author's abstract)**

Engineering. OLED. PEDOT. LBL films. Spin self-assembly. AFM. SEM.

## ENVIRONMENTAL

## SCIENCE

- 0257** Assessing water quality and larval mosquito abundance in Caloocan City, Philippines. Sia Su, Glenn L.. **Transactions of the National Academy of Science and Technology**, , 34(1):63

This study aims to examine the relation of the water quality parameters of the breeding habitats of mosquitoes from randomly selected communities of Caloocan City, Philippines to the abundance of the larval mosquitoes inhabiting these breeding habitats. Water samples obtained from the breeding habitats were assessed for dissolved oxygen, pH, conductance, and salinity. Mosquito larva surveys were conducted in all breeding habitats. The 4th instar mosquito larvae obtained were identified at the genera level. The relationship between the abiotic variables (dissolved oxygen, pH, conductance, and salinity) and the abundance of mosquito larvae was investigated through a regression analysis. Results showed that there are three common genera of mosquito larvae surveyed in all the breeding habitats: *Aedes* sp.,

*Anopheles sp.*, and *Culex sp.* Among the three genera, *Aedes* was the most common genus among the larval mosquitoes identified. All water samples obtained from the breeding habitats were within the water quality standards. Results of the multiple regression analysis suggest that dissolved oxygen is the best predictor variable associated with the abundance of mosquito larvae ( $Y = -37.92 + 8.00 [\text{DO}]$ ,  $r^2 = 0.145$ ,  $P < 0.05$ ). The dissolved oxygen in the waters plays an important role in the abundance of larval mosquitoes in breeding habitats. **(Author's abstract)**

Environmental science. Mosquito larva. Water quality. Abundance. Dissolved oxygen (DO).

- 0258** Assessment of mangroves in Enclaro, Binalbagan, Negros Occidental. Taleon, Heide G., Carian, Daisy G., Malo, Rosebella L.. **Transactions of the National Academy of Science and Technology**, , 34(1):61

This study was a descriptive survey on the assessment of mangroves conducted to identify the mangrove structures in the coastal areas of Barangay Enclaro. There were four sampling sites namely: Sitio Serena, Sitio Vietnam Rose, Sitio Alo and Sitio Tap-ok. The mangroves were assessed in terms of species, diversity, abundance, density and stages of life cycle. The quadrat method and the transect plots were used to perform floristic inventory of mangrove stands. There were 10, 4, 6 and 6 species of mangroves in Serena, Vietnam Rose, Alo and Tap-ok sites, respectively. *Rhizophora mucronata* comprised 55.22% of the total stands in Serena and *Avicennia marina* which covered 72.21% in Vietnam Rose, 81.19% in Alo and 40% in Tap-ok. Serena had the most diverse mangrove species. *A. marina* was the most abundant and dominant mangrove species which covered 66.47% of the total population. The mangroves in Vietnam Rose had the highest density of 15.94 mangroves/m<sup>2</sup>. The stages of mangroves' life cycle were 50.67% seedlings, saplings comprised 25.20% and mature mangroves composed 24.13% of the total population. Sitio Alo had the least mangrove stand and the results of this study would serve as baseline information for the local government units for mangroves and coastal ecosystems' conservation, management and development. **(Author's abstract)**

Environmental science. Ecological mangroves assessment. Species. Abundance. Density. Diversity stages of life cycle.

- 0259** Assessment of resiliency of intertidal mangrove communities to nutrient fluxes and climate change. Del Rosario, Teri S., Conanan, Aida P., Sugang, Benelita R., Sugang, Raymond J.. **Transactions of the National Academy of Science and Technology**, , 34(1):56

This study investigated the effects of the different factors such as variations in the amount of sunlight, ambient temperature, soil and water nutrients (sodium, potassium, and phosphorus), rainfall, and tidal events which potentially affect productivity and resiliency in intertidal mangrove communities. The following study sites were selected: Site 1: intertidal zone affected by nutrient discharges of proximate agricultural activities and hardly rinsed by tidal waterlogging; Site 2: primeval/pristine intertidal community recurrently rinsed by tidal inundation; Site 3: intertidal zone receiving nutrient loads from residential communities but instantaneously dispatching nutrients

in recurrent tidal flooding. The study evidently indicated that variability in light (100 to 5,000 fc), temperature (25-32°C), and relative humidity (30-50%) caused very minute effects in chlorophyll production in *Avicennia marina* mangroves. The mangroves' productivity, growth and development (estimated from O<sub>2</sub> production ~ ranged from 16.5 to 36.3 μ moles/1/hr) turned out to be resilient to the effects of humidity, temperature, and light. Rainfall events caused potassium surges in certain areas. Increase in the amount of rainfall did not upsurge soil nitrate and phosphorus concentrations in almost all of the sites. Likewise, fluctuations and outpouring of potassium and nitrate ions did not emerge to be the limiting or supplementing factor in the primary productivity of the mangrove community. The lone variable that established significant effects on chlorophyll production/photosynthetic activity was the soil phosphorus concentration. Seasonal reserve storage of phosphorus by mangroves during phosphorus outpouring in the rainy season has been established to intensify resiliency of the intertidal community by ensuring availability of phosphorus throughout episodes of phosphorus depletion during tidal waterlogging. **(Author's abstract)**

Environmental science. Intertidal zone. Resiliency. Nutrient fluxes. *Avicennia marina*. Mangroves.

- 0260** Biosorption of lead, copper, cadmium, and mercury by brown seaweeds (*Sargassum sp.* and *Turbinaria ornata*). Ingeniero, Riel Carlo, Boren, Michaela, Tan, Emee, Perez, Teresita. **Transactions of the National Academy of Science and Technology**, , 33(1):120

Biosorption is a process that uses inexpensive biomass to sequester toxic heavy metals and is particularly useful for the removal of trace levels of contaminants from industrial effluents. Several types of biomass have been tested for heavy metal sorption capacity which includes bacteria, fungi, algae, and aquatic macrophytes. Marine macroalgae are one of the organisms proven to have high heavy metal adsorption capacity due to the functional groups such as carboxyl groups from amino acids and polysaccharides and sulfhydryl groups present in the biomass of the seaweeds. In this study, dried biomass of *T. ornata* and *Sargassum sp.* were tested for its heavy metal absorption capacity. The maximum adsorption capacity of *Sargassum sp.* and *T. ornata* (q<sub>max</sub> range=84.09-129.87) exceeded many previously reported uptakes by other types of biomass such as that of granulated activated carbon (q<sub>max</sub>=5.08mg/g) and *Chlorella vulgaris* (q<sub>max</sub>=58.8mg/g). *T. ornata* adsorbed higher amounts of copper while *Sargassum* adsorbed significantly higher amounts of cadmium and mercury. Results of the experiments also showed that pH and contact time affected the adsorption of heavy metals from aqueous solutions. Based on the FTIR analysis conducted, the carboxyl and hydroxyl groups were the functional groups responsible for sorption of the heavy metals. *Sargassum* and *Turbinaria* were proven to be effective metal biosorbents. **(Author's abstract)**

Environmental science. Biosorption. Brown seaweeds. Heavy metals. *Sargassum*. *Turbinaria ornata*.

- 0261** Detection of dermatophytes from different body sites of farmers in selected barangays of Amadeo, Cavite. Cruzate, Sherine M., Cupino, Ninibeth B., Ilagan, Yolanda A.. **Transactions of the National Academy of Science and Technology**, , 33(1):127

A total of 600 skin scrapings from hands, arms, legs and feet and 300 nail clippings of toenails and fingernails were collected from 150 farmers of Halang, Banay Banay, Pangil, Tamakan and Dagatan in Amadeo, Cavite. Eighty five of the 150 farmers exhibited symptoms of dermatophytosis. All clinical samples were subjected to direct microscopic examination using potassium hydroxide (KOH) to detect the presence of fungal hyphae. Positive KOH cases were cultured on Saboraud Dextrose Agar (SDA) with streptomycin to determine the fungi that invaded the tissues.

KOH mount revealed that 79.49% of the skin scrapings and 92.31% of nail clippings from farmers with dermatophytosis were positive for the presence of fungal elements. However, opposite result was obtained on samples from farmers without dermatophytosis. Only 43% and 66.55% from skin scrapings and nail clippings, respectively, were positive in KOH mounts. Not all KOH positive samples were culture positive.

Based on the culture, 333 fungal isolates were obtained. They were commonly found in toenails, feet, legs, hands and fingernails. The least number of isolates were found in the arms. *Trichophyton* was the only dermatophyte while the rest of the fungi were non-dermatophytes belonging to the *Aspergillus*, *Penicillium* and *Fusarium*.

Statistical analysis revealed that there was a significant relationship between the age ( $p < 0.05$ ) and gender ( $p < 0.01$ ) on the occurrence of fungi to farmers with and without dermatophytosis. However, no significant correlation was found with medical history. **(Author's abstract)**

Environmental science. Dermatophytes. Dermatophytosis. KOH mounts. Trichophyton . Hyphae.

- 0262** Effects of agrochemicals on endomycorrhizal dynamics for a sustainable soil in Tampakan Mountain Ecosystem. Arnaiz, Metchie Gay R., Pampolina, Nelson M., Sebua, Jose. **Transactions of the National Academy of Science and Technology**, , 33(1):119

Agrochemicals used in upland farms and nurseries in Quezon mountain range from Tampakan, South Cotabato were identified using Key Informant Interview and investigated to evaluate their effects on the dynamics of endomycorrhizal fungi. Endomycorrhizas are important link in plant nutrition and health. Population of endomycorrhizal fungi was assessed to determine soil productivity and sustainability in the area through wet-sieving decanting technique for isolation, characterization, and examination of endomycorrhizal colonization. About 95% of upland farmers extensively used fertilizers (Complete, Urea), herbicides (Power, Atrazine), fungicides (Ridomil, Daconil), and pesticides (Malathion, Lannate) for agricultural, agroforest and forest crops. Endomycorrhizas identified were *Glomus*, *Gigaspora*, and *Entrophospora*, where *Glomus* sp. mostly dominating disturbed grasslands and agricultural areas. Endomycorrhizal density isolated under Corn that received low to moderate levels of agrochemical application revealed 113-129 spore/100 g dry soil compared to only 17 spores at high level. There was also lower endomycorrhizal colonization where application of agrochemical was higher. Results suggest that heavy agrochemical use have significant effects on dynamics of endomycorrhizas, hence a good soil indicator. It is advisable to regulate the use of agrochemicals to

maintain soil productivity without harming beneficial role of endomycorrhizas. Cultural practices and integrated pest management are encouraged to reduce dependency on expensive agrochemicals. Isolation, characterization, testing, and mass production of indigenous endomycorrhizas are further recommended to produce alternative organic fertilizers for upland farmers in Tampakan mountain ecosystem. **(Author's abstract)**

Environmental science. Agrochemicals. Endomycorrhizas . Soil indicator.

- 0263** Environmental conditions influencing daytime abundance of mesozooplankton and ichthyoplankton in marine reserves in Iligan Bay, Northern Mindanao, Philippines. Metillo, Ephrime B., Faith Ravelo, Stephanie P., Duyaguit, Jan Alfred P., Diaz, Leomir S.. **Transactions of the National Academy of Science and Technology**, , 34(1):60

Coral reef associated zooplankton provide nourishment to larvae and juveniles of resident fish and invertebrate species. Eggs, larvae and juveniles of many reef species of prime ecological and economic importance recruit in the zooplankton. The clean waters of marine reserves are assumed to contain nutritious zooplankton, but the ecology of reef zooplankton in marine reserves is rarely studied. This study utilised multivariate redundancy analysis in order to discern possible relationship between selected environmental conditions and zooplankton abundance in five established marine reserves in Iligan Bay. Daytime quantitative sampling of zooplankton and environmental variables were conducted in marine reserves located in Initao, Dalipuga, Buruun, Kauswagan and Bacolod. We found statistically significant relationship in all five reserves, and evaluation of the importance of various environmental conditions using a Monte Carlo permutation yielded significant values for chlorophyll a, depth, pH, time and tide. For instance, peaks in abundance of fish eggs and fish prey copepods coincided with high chlorophyll a values, deeper depths, rising tides, and sampling times close to sunset (1700H). However, this was not explicitly shown by peaks in fish larvae abundance as unstudied variables like predation and hydrodynamics may be most important explanatory variables. In conclusion, this study demonstrates the usefulness of multivariate analysis in ascertaining environmental variables that influence peaks of abundance of mesozooplankton and fish eggs and larvae which are important indicators of the role and status of marine reserves. **(Author's abstract)**

Environmental science. Marine reserve. Iligan Bay. Ichthyoplankton. Ecology. Zooplankton.

- 0264** Growth performance and phytoremediation potential of *Pongamia pinnata* (L.) Pierre, *Samanea saman* (Jacq.) Merr. and *Vitex parviflora* Juss in copper-contaminated soils amended with zeolite and vam. Tulod, Adrian M., Castillo, Arturo SA., Carandang, Wilfredo M., Pampolina, Nelson M.. **Transactions of the National Academy of Science and Technology**, , 34(1):49

A pot experiment was conducted to investigate the growth performance and phytoremediation potential of *Pongamia pinnata*, *Samanea saman*, and *Vitex parviflora* in a Cu contaminated soil obtained from an abandoned mined out area amended with VA mycorrhiza and zeolite. Best growth response among the species varies in the following order: *P. pinnata* > *S. saman* > *V. parviflora*. Addition of zeolite

and VAM were not significant to enhance height, diameter and biomass production of the three species indicating their practical applicability in reclaiming copper contaminated soils. The exposure, however, causes retardation of root growth as large proportion of the total biomass yield was observed in the shoots. Even so, root to shoot ratio values are generally within the ideal ratio of healthy or quality seedlings. Beneficial effects of zeolites were observed in the uptake of soil Cu but vary with species. The phytoremediation benefits from VAM are not yet clear because of the very low root infection observed in the study. Interestingly, despite the very low percent Cu uptake, both *V. parviflora* and *S. saman* have the ability to transport Cu at an average of 37.0 and 78.25  $\mu\text{g g}^{-1}$  dry wt, respectively, from roots to shoots beyond the toxicity threshold (20-30  $\mu\text{g g}^{-1}$  dry wt) indicating their high level of tolerance to Cu toxicity. All the three species limited high amounts of Cu translocation within the roots; hence, are highly suited for phytostabilization or for delimiting areas with Cu contamination. **(Author's abstract)**

Environmental science. Vesicular arbuscular mycorrhiza. Zeolite. Bioremediation. Heavy metals.

- 0265** The identification of fern species as metallophytes and their implications to mine rehabilitation. Claveria, Rene Juna R., de Leon, Eryn Gayle E., Teodoro, Katrina B.. **Transactions of the National Academy of Science and Technology**, , 33(1):121

Ultramafic and hydrothermally altered terrains are geographic areas that are anomalously high in metal concentrations and these are influenced by their underlying extreme geology. Plants that grow under such conditions are called metallophytes and to study them, plant and soil samples were taken in tandem at selected sites. The plants were sent to the Botany Division of the National Museum for identification. The plants and soil samples were processed for AAS analyses.

Hydrothermally altered terrains are relative high in Cu. At Lepanto, Benguet, *Nephrolepis hirsutula*, *Dicranopteris linearis*, *Pteridium aquilinum* and *Pteris* sp were the dominant fern species. Similarly at Philex, Baguio, *Histiopteris incisa*, *Onychium siliculosum*, *Pityrogramma calomelanos*, *Pteris* sp and *Sphenomeris chinensis* were abundant. Cu analysis of the roots yielded high values of about 488.00  $\mu\text{g/g}$ , 371.00  $\mu\text{g/g}$  in the stems and about 23.90  $\mu\text{g/g}$  in the leaves. These ferns accumulated higher amounts of Cu than what the soils contain, In ultramafic terrains, such as Acoje, Zambales and Brooks Point, Palawan, laterites are anomalously high in Fe. *Pteridium aquilinum* and *Sphenomeris retusa* were abundant at Acoje, while at Brookes Point, *Dicranopteris linearis* was dominant. Fe analysis of the roots yielded high values up to about 9,358.24  $\mu\text{g/g}$ , about 1,935.59 in the stem and about 199.10 in the leaves. These ferns thrived well in areas with Fe reaching to about 102,803.75  $\mu\text{g/g}$  in the soil.

Ferns are characteristically good metal accumulators and are able to survive in very toxic soils, thus they could be used for mine rehabilitation. Most of them are pioneering plants, and the propagation of these ferns for phytoremediation and reforestation is worth considering. **(Author's abstract)**

Environmental science. Ferns. Metallophytes. Phytoremediation. Mine rehabilitation.

- 0266** Molluscan species associated with holothurian habitats in Camotes Islands, Central Philippines. Tanduyan, Serapion N., Andriano, Berenice T., Gonzaga, Ricardo B., Anoos, Wilfredo B., Garciano, Lourdes M.. **Transactions of the National Academy of Science and Technology**, , 33(1):126

Mollusks inhabiting the holothurian habitats were studied. There were 3 habitats surveyed, the sandy, muddy and grassy flats.

This study used the transect quadrat method where transect was laid in the three habitats: sandy, muddy and grassy flats of Camotes Islands.

It was found out that there were nineteen species of mollusks belonging to the fifteen families namely, Family *Conidae*, *Phasianellidae*, *Strombidae*, *Buccinoidae*, *Cypraeidae*, *Volutidae*, *Cassidae*, *Littorinidae*, *Harpidae*, *Pectinidae*, *Mytilidae*, *Pinnidae*, *Arcidae*, *Octopodidae* and *Aplysiidae*.

Results show that there are six species found in sandy areas; one species in muddy and grassy areas; two in rocky areas.

Results further show that there are three species found in both sandy and grassy areas and six species in both rocky and sandy areas. **(Author's abstract)**

Environmental science. Molluscan species. Holothurian habitats. Camotes Islands. Transect-quadrat method.

- 0267** Plant diversity, status and conservation initiatives in three mountain ecosystems in Mindanao, Philippines. Amoroso, Victor B., Coritico, Fulgent P.. **Transactions of the National Academy of Science and Technology**, , 33(1):124

This research describes the vegetation types, determines the diversity, assesses the conservation status and records the distribution of vascular plants in three mountain ecosystems in Mindanao, Southern Philippines. Representative specimens were pressed, dried, poisoned and mounted as herbarium vouchers. To determine the index of general diversity for trees, 20x20 m sampling plots were established per vegetation type, and in each sampling plot, a 5x5 m sub-plot was laid to determine the species diversity for pteridophytes. Transect walk and sampling plots in 3 mountain ecosystem revealed several vegetation types with Mt. Malindang having 9 types, Mt. Hamiguitan with 5 types and Mt. Kitanglad with 3 types. Species richness was highest in Mt. Malindang (1,164 spp.), followed by Mt. Hamiguitan (878 spp.) and the lowest in Mt. Kitanglad (661 spp.). The same trend was observed when the diversity values of the 3 mountain ecosystems were computed. Regardless of the kind of mountain ecosystem, the montane vegetation had high species richness and diversity values than the dipterocarp and mossy forests. Assessment of conservation status revealed that Mt. Kitanglad had the highest number of threatened species (92 spp.) while the two other mountain ecosystems, Mt. Malindang and Mt. Hamiguitan had 34 and 35 threatened species each, respectively. As to endemism, it showed that Mt. Hamiguitan had high endemism (34%) than Mt. Kitanglad (21%) and Mt. Malindang (16%). Moreover, the 3 mountain ecosystems showed 64 species as new record in Mindanao and 21 species in the Philippines while 2 species of *Nepenthes* are new to science. Ex-situ conservation initiatives were done to protect the remaining threatened and endemic species of plants and their habitats. **(Author's abstract)**

Environmental science. Species richness. Assessment. Ex-situ and in-situ conservation. Protected areas.

- 0268** Polluters and water quality of Cebu City rivers. Cuizon, Pedro P., Baga, Cecilio S., Villanueva, Bonifacio S.. **Transactions of the National Academy of Science and Technology**, , 34(1):62

The study was conducted to determine the water quality of the Palma river in Cebu City and the main causes of the river's severe water pollution. Laboratory technique and Contingent Valuation Method (CVM) were used in this study, with the Barangay officials and purok leaders as trained respondents. The findings revealed that the waters of the river had opaque to black color emitting bad odor; a pH value of 7.4; Dissolved Oxygen at zero (0); BOD at 150 mg/L; TSS at 27 mg/L; temperature at 29°C. Soil of the river bed is black. Waste disposal practices of riverbank residents (95%) and industries and commercial establishments (5%) within the runoff area were the causes of pollution of river water. The major source of waste water discharges that directly drains into the river were residential, commercial and industrial effluence. Sickness occurrence per year per were fever (22% of the households); cough and colds (27%); allergies (9%); asthma (8%). Respondents were not aware (80%) on what a waste treatment facility is. Respondents were willing to pay an amount of PhP50.00 a month as charge per household for wastewater treatment fee based on the volume of water consumption gauged on Metropolitan Cebu Water District meter system. Policy for the tariff system shall be necessary. **(Author's abstract)**

Environmental science. Pollutants. Environment. Contingent valuation method.

- 0269** Priority protection, conservation and development areas of Makiling-Banahaw Geothermal Area, Philippines. Maligalig, Susana M., Abraham, Emmanuel R.G., Luna, Amelita C.. **Transactions of the National Academy of Science and Technology**, , 34(1):24

As one of the environmental stewards of the area, CHEVRON Geothermal Philippines Holdings, Inc. (CGPHI) and Aboitiz Power Renewable Inc. (APRI) intends to pursue its important role of fostering responsible use of this area's life sustaining ecological resources for present and future generations through community-based ecological initiatives, pollution prevention activities, resources management programs, awareness and education. The general spatial distribution of priority protection, conservation and development areas within the ecological influence areas of Mak-Ban was determined by analyzing slope, elevation, vegetation cover and location of facilities. The study map of priority protection, conservation and development areas such as soil and water conservation and forest biodiversity areas. Areas with slope of more than 50% should be considered as priority protection areas and these areas are concentrated in the Sipit headwaters in Mt. Makiling, which are still with natural forest cover. Potential conservation areas or areas that have moderate to steep slopes and may or may not adequate vegetation cover. Relative to CGPHI facilities, all slopes at Mt. Bulalo poses threat, with the greatest towards the western slopes because of more facilities that would be affected. Vegetation cover can help mitigate the risks inherent in steep areas. As these areas are being cultivated, farming and land use strategies that promote soil and water conservation and promote biodiversity should

be encourage and sustained. Strict protection would be necessary for these areas and risk reduction studies may be appropriate for potential impact areas. **(Author's abstract)**

Environmental science. Ecological areas. Priority protection. Conservation. Development areas. Headwaters.

- 0270** Species diversity of seagrasses in Camotes Islands, Central Philippines. Tanduyan, Serapion N., Gonzaga, Ricardo B., Andriano, Berenice T.. **Transactions of the National Academy of Science and Technology**, , 33(1):125

Seagrasses of camotes Islands were studied to determine its species diversity A transect-quadrat method was used where 3 transects were laid in each station taking into account its species in the four municipalities of Camotes Islands which are San Francisco, Poro, Tudela and Pilar.

Results show that there were 11 species of seagrasses found in the four municipalities of Camotes Islands which are *Halophila decipiens*, *Thalassia hemprichii*, *Cymodocea rotundata*, *Cymodocea serrulata*, *Halodule pinifolia*, *Halodule uninervis*, *Halophila minor*, *Halophila ovalis*, *Halophila ovata*, *Enhalus acoroides* and *Syringodium isoetifolium*.

*Halophila decipiens* and *Thalassia hemprichii* are the distinct species of seagrass found in the municipalities of Poro and San Francisco, respectively while there are 9 species that are common in all the municipalities that include: *Cymodocea rotundata*, *Cymodocea serrulata*, *Halodule pinifolia*, *Halodule uninervis*, *Halophila minor*, *Halophila ovalis*, *Halophila ovata*, *Enhalus acoroides* and *Syringodium isoetifolium*. **(Author's abstract)**

Environmental science. Seagrass. Species diversity. Camotes Islands. Transect-quadrat method.

- 0271** Status of butterflies in Dinagat, Philippines. Mohagan, Alma B., Mohagan, Dave P.. **Transactions of the National Academy of Science and Technology**, , 34(1):65

Information on the status of butterflies in the three habitat types of Dinagat is herewith provided. Belt transect, light and malaise traps and time constraint samplings were employed in the three mountains namely: Mt. Paragua, Mt. Redondo and Mt. Kimbinliw. Data revealed 102 species of butterflies. Of these, 72 or 71% were endemic: ten rare Philippine endemic, 18 common Philippine endemic , 1 very rare Philippine endemic, 3 rare Mindanao endemic, 6 common endemic and 2 rare Dinagat Island endemic. Three of the species are new record to the Philippines, 4 new record to Mindanao namely: *Cephrènes ocalle chrysozoma*, *Hyarotis iadera*, *Tagiades gana elegans* and *Taractrocera luzonensis luzonensis*, 58 new record to Dinagat and 28 recorded species in Dinagat islands in the previous study. The 102 species with 71% endemism and the presence of newly recorded and possible new species to science are noteworthy for conservation. Fifty percent of the species found in each habitat are disconcordant and most of the endemics were found in the forest habitats. These

simply suggest that forests are important in sustaining the lives of the endemic butterflies in the area. **(Author's abstract)**

Environmental science. Diversity. Butterflies . Dinagat Islands.

- 0272** Terrestrial arthropods in selected caves of Polillo Island, Quezon Philippines. Lit, Jr., Ireneo L., Yap, Sheryl A., Corpuz-Raros, Leonila A., Barrion-Dupo, Aimee Lynn A., Encinares, John Mark A., San Juan, Veverle dA., Galvan, Rexele Jean F., Alviola, Philip A., Eusebio, Orlando L., Larona, Ariel R., Cosico, Edison A., Eres, Eduardo G.. **Transactions of the National Academy of Science and Technology**, , 33(1):118

The first set of results from the series of fieldwork focusing on the taxonomy and ecology of terrestrial arthropods found inside selected caves of Polillo Island, Quezon, Philippines are reported. The results presented and the work involved is largely pioneering as most of the existing data on cave biology have always been limited to bats, swiftlets and other vertebrates. Philippine cave arthropods from Polillo Island constitute new faunal records and probably new species that belong to various classes, orders and families. They include springtails (Collembola), cockroaches (Blattodea), ants and fairy flies (Hymenoptera), parasitic, predatory and saprophytic mites (Acari), carabid beetles and water pennies (Coleoptera), guano moths (Lepidoptera), bat flies and midges (Diptera), earwigs (Dermaptera), millipedes (Diplopoda), centipedes (Chilopoda), bat fleas (Siphonaptera), spiders (Araneae), vinegaroons (Uropygi), scorpions (Scorpionida), pseudoscorpions (Chelonethida), etc. The unique conditions and microhabitats inside cave ecosystems (most importantly the very limited availability of light, high moisture and carbon dioxide, and generally nutrient poor underground setting) have been selected by some organisms to evolve with strikingly unique adaptations to this kind of extreme environment. The number and nature of groups and species encountered further attest to the great diversity of terrestrial arthropods on Polillo Island and in the entire Philippine archipelago. These sets of data on cave biodiversity also provide bases for protection and conservation of Philippine caves. **(Author's abstract)**

Environmental science. Terrestrial arthropods. Microhabitats. Cave ecosystem. Cave biodiversity.

- 0273** Toxicological and histopathological evaluations of the effects of synthetic hormones– 17a-ethinylestradiol and levonorgestrel – on tilapia (*Oreochromis niloticus*). Espiritu, Emilyn Q., Pimentel, Stephanie S., Marquez, Norman Dennis E., Roxas, Ma. Cathrina Margarita R., Domingo, Felix Antonio T.. **Transactions of the National Academy of Science and Technology**, , 33(1):122

Due to incomplete removal in most conventional biological sewage treatment plants, human excretions containing synthetic hormones from birth control pills find their way into sewage, agricultural runoff and surface waters. In sufficiently high concentrations, these can affect the physiology and reproductive functions of exposed organisms. Unfortunately, information on their potential effects mostly comes from temperate habitats, thus, limiting their application to tropical environments.

Acute toxicity tests (i.e. 96 hrs) and histopathological analyses of gills and liver tissues were performed to determine the effects of varying concentrations of 17a-Ethinylestradiol (EE2) and Levonorgestrel on juvenile *Oreochromis niloticus* (i.e. "Tilapia"). Fish mortality increased as toxicant concentration and exposure period increased with Mean 96-hr LC<sub>50</sub>s ± S.D. of 0.47 ± 0.062 mg/L for EE2 and 6.03 ± 1.03 mg/L for Levonorgestrel (p=0.05). Histopathological examinations also showed massive cellular damage – e.g. disorganizations of lamellae, epithelium hyperplasia and hypertrophy, and blood congestion in gill tissues as well as nuclear hypertrophy, cytoplasmic vacuolation, and cytoplasmic degeneration in the liver – relative to the controls.

The information generated in the study can be used as an aid in establishing proper waste water protocols, in risk and impact assessments of xenoestrogens and in policy formulation for public health and the environment. **(Author's abstract)**

Environmental science. Toxicity. Histopathology. 17a-Ethinylestradiol. Levonorgestrel. Tilapia.

- 0274** Unusual population increase of wooly bear caterpillars, *spilosoma* sp. (Arctiidae:Lepidoptera) at Los Baños and vicinity in 2010. Cayabyab, Bonifacio F.. **Transactions of the National Academy of Science and Technology**, , 33(1):129

The wooly bear caterpillars, *Spilosoma* sp. are usually found in *Ipomea obscura* (L.) Ker-Gaw). In 2010, there was sudden and unusual increase in population of this pest. The caterpillars attacked various crops such as eggplants, corn, okra, patola, ube, paayap and a number of weeds species. The caterpillars even entered homes and pupated in ceilings, cracks and crevices. It caused anxiety to many people due to the menacing thick hairy appearance.

The prolonged dry spell in 2010 could have triggered the aggregation of adults in remaining green areas and led to subsequent population increase. We compared the 2010 agrometeorology data from that of 2005-2009 at the Central Experiment Station, UP Los Baños. The results showed low rainfall from February (3.0 mm) up to May (9.1 mm) in 2010 as compared to the previous four years. The rainfall also increased in June to July 2010 at 171.2 mm and 762.5 mm respectively. This dry spell followed by two wet months could have led to the population increase of *Spilosoma* sp. This phenomenon is similar to the locust outbreak in Central Luzon in the 90's where dry environment due to ash fall predominated in breeding areas followed by strong rainfalls led to population increase and subsequent migration/infestation in the central plains.

The population increase of wooly bear caterpillar coincided with the population outbreaks of armyworms, *Spodoptera* sp. semi-loopers and other lepidoterous species in various parts of the country. **(Author's abstract)**

Environmental science. *Spilosoma* sp. population. Unusual. Increase. Wooly bear. Caterpillars.

## FISHERIES

- 0275** The effect of diet supplementation with *Cnidaria Scyphozoa Aurelia* soft tissue on the molt death syndrome of *Scylla Serrata* mud crab. Morco, Ryan P., Dawal, Micah C., Parco, Joena B., Bolivar, Ramil, Laurente, Dan R., Sugang, Raymond J.. **Transactions of the National Academy of Science and Technology**, , 33(1):10

Molt-death-disorders crop up during molting of the mud crab, *Scylla serrata*, and the probable cause of such mortality is typically attributed to inappropriate sustenance. The effects of supplementation using dried jellyfish, *Cnidaria Scyphozoa Aurelia* soft tissue on survival and molting success of *Scylla serrata* was investigated. One hundred *S. serrata* with body weights between 100-150 grams, were captured from coastal estuaries in Batan, Aklan, using baited traps and maintained communally at a stocking density of 3 heads/m<sup>2</sup>, in bamboo pens constructed in a mangrove mudflat. One group (50 heads) was fed with trash fish for two weeks, starved for two days, prior to experimental feeding with trash fish complemented with dried *Cnidaria Scyphozoa Aurelia* jellyfish meat; control group was fed with trash fish for two weeks, starved for two days, before returning to trash fish diet without jellyfish supplementation. Feeding rate was computed at 10 percent of a average body weight once daily for both groups. The test group was given jellyfish meat supplementation at satiety once daily in the morning. The duration of the research lasted for 60 days since the 2 day fasting phase. Individual weight was obtained by dividing the weight measured by the number of heads in the population. There were no significant differences (  $P>0.05$  ) in growth, apparent feed conversion ratio (FCR), among the two groups, following the 60 day experimental period. In both the control and supplemented groups, the crabs weighed between 330-350 g after 60 days of rearing. Survival rate after molting, was 85% in the supplemented group and was significantly (  $P>0.05$  ) higher than 65% observed in the control group. The mean carapace radius was appreciably (  $P>0.05$  ) higher in the supplemented group (3.2 in) than in the non-supplemented group (3.0in). **(Author's abstract)**

*Scylla serrata*. Molt-death-syndrome. Fisheries.

- 0276** The effect of green mussels (*Perna viridis*) as biofilters in the reduction of turbidity in prawn pond. Abeto, Mario N.. **Transactions of the National Academy of Science and Technology**, , 33(1):5

Green mussels (*Perna viridis*) at average weight of 10 g were tested as biofilters for 45 days inside the prawn nursery ponds at 12,000 pcs of mussels /ha. stocking rate. Mussels in clutches were placed in net bags and were hanged along the series of bamboo plots installed in the middle of the pond. Water transparency and other parameters like pH, temperature, salinity, and dissolved oxygen were monitored twice daily at 7:00 - 7:30 am and 5:00 - 5:30 pm. Results of the study showed that average transparency readings in the treated ponds (stocked with mussels) were 56 cm for Nursery Pond-2 and 45 cm for Nursery Pond-13 while in the control ponds (without mussels) showed 26 cm for Nursery Pond-1 and 32 cm for Nursery Pond-14. In NP-2, transparency reading greater than 56 cm was observed in 21 consecutive monitoring days. Transparency was only reduced when organic fertilizer was applied to hasten plankton growth. It was apparent that planktons grew densely in the control ponds as

indicated in the low transparency of greenish to yellowish green color of the water. Average DO reading however, was lower in the treated ponds. The decrease of DO could have been the effect of mussels as additional biomass and competitors of oxygen. Moreover, metabolic wastes from green mussels resulted to additional organic loads which caused the increase of chemical oxygen demand. There were no marked difference on pH, salinity and temperature in all ponds. The study suggested that to efficiently filter water, mussels should be placed in the ponds' reservoir or in the water supply canal instead of placing them inside the nursery or rearing ponds. **(Author's abstract)**

Dissolved oxygen. Biomass. Planktons. Transparency. Biofilters. Fisheries.

- 0277** Financial analysis and risk assessment of grouper cage culture systems in Negros Occidental. Abeto, Mario N.. **Transactions of the National Academy of Science and Technology**, , 33(1):4

The study assessed the financial and risk exposures of grouper cage farming in Negros Occidental. Through survey questionnaires administered to 68 grouper cage growers in the four grouper growing areas in Banalbagan, Himamaylan, Hinigaran, and Sagay, the study appraised the feasibility and viability of grouper cage farming and established a benchmark for cage farmers in making crucial investment decisions in mariculture development. Data on the financial analysis and risk indicators were analyzed using the mean, range, and standard deviation. Data were presented by province and by LGUs. Results of the study showed that a return of investment (ROI) of 29.95% was realized which was far behind the ROI of some aquaculture projects like shrimp hatchery (40%) and grouper culture in ponds (82%). Further, the analysis showed a payback period of 3.88 years which seem not economically feasible as it posed a high risk of payment default when capital is sourced from banks. It was also noted that the length of the cropping cycle is prolonged from normally 8 months to 10.6 months average and had a long recovery period (3 years and 6 months) for the capital invested. Though the project is not financially attractive in some variables, the project was still feasible in most important variables like profit per crop (Php26541.76) and profit margin (29.91%). Among the four LGUs, Binalbagan showed to have the best performance in both financial analysis and risk indicators- indicating that the area is attractive for mariculture project. To promote competition in the buying and selling of groupers so that the best price of groupers could benefit the farmers, government should take steps to invite more businessman to get involved in the live fish trade by providing incentives in the form of negotiated freight rates, tax discounts and soft loans. **(Author's abstract)**

Risk exposure indicators. Grouper cage culture. Mariculture. Risk assessments. Financial analysis. Fisheries.

- 0278** Fisher folk organizations and resource rehabilitation. Gayosa, Vivian D.. **Transactions of the National Academy of Science and Technology**, , 33(1):9

The study, using a questionnaire, surveyed the participation and capability of fisher folk organizations to rehabilitate coastal resources in three coastal towns of Fifth

Congressional District of Negros Occidental during the second quarter of 2010. Results will serve as bases to formulate a unified thrust for coastal resources rehabilitation. The results of the study showed that the vision, mission, goals, and objectives of the fisher folk organizations were well stated and agreed with the provisions of R.A. 8550; the most notable problems met by the fisher folk were illegal fishing, overfishing, and pollution; the fisher folk's extent of participation in coastal resources rehabilitation was generally moderate; they assessed themselves as highly capable in coastal resources rehabilitation. The conclusions: the fisher folk were not as well-involved in coastal resources rehabilitation as they ought to be; and their capabilities and potentials not fully tapped. Recommendations included involvement of all the members in resource rehabilitation activities including attendance to training and seminars, and the creation of a federation of fisher folk organizations in the Fifth Congressional District for a unified thrust. **(Author's abstract)**

Resources rehabilitation. Coastal resources. Fisher folk organizations. Survey. Fisheries.

- 0279** Good aquaculture practices at resources production technology, incorporated. Manzano, Roger Ray S.. **Transactions of the National Academy of Science and Technology**, , 33(1):6

The study was conducted in 2009 to the employees of the Resources Production Technology (REPROTECH), Inc. in Manjuyod, Oriental Negros to find out the company's level of compliance to good aquaculture practices (GAqP) in marine fish cage and fish ponds as preliminaries of accreditation. The questionnaire, a five-point Likert Scale, had been used in similar studies. The areas in the fish cages rated, based on principles and guidelines in Fisheries Administrative order (FAO) 214 s. 2001 (the Code of Practice for Aquaculture) and on certification guidelines for Best Aquaculture Practices (BAP), were the following: site selection, design and construction; feeds, feeding, and seed health management; seed selection, stocking; harvesting and product handling; farm management; records; traceability; and workers safety and employees' relations. The computed grand mean obtained by the company when assessed in areas for good aquaculture practices in fish cages, based on tabled range values and interpretations, was 4.12 or highly satisfactory. The areas in fish ponds rated , based on the mentioned guidelines, were the following: site selection; pond design and construction; water usage and effluent management ; use of drugs, chemicals, toxic pesticides and fertilizers; seed selection; seed health and farm management; records; traceability; mangrove conservation and biodiversity protection; feeds, feeding, and water management; harvesting and product handling; worker's safety and employees' relations. The grand mean obtained by the company when assessed under areas for good aquaculture practices in fishponds was 4.06 or highly satisfactory. When taken together, REPROTECH's performance on good aquaculture practices in fish cages and in fish ponds was highly satisfactory, much better than its moderately satisfactory performance obtained before this study. The recommendation was to develop Sanitation Standard Operating Procedures (SSOP) as another step of the company to conform to Hazard Analysis Critical Control Point (HACCP) to satisfy its quest for accreditation. **(Author's abstract)**

Aquaculture practices. Marine fish cage. REPROTECH, Inc.. HACCP. GAqp. Fisheries.

- 0280** Low-volume, high-density culture of milkfish (*Chanos chanos*, Forsskal) in marine net cages at North Bais Bay, Oriental Negros. Ganancial, Jr., Renato H., Lebrilla, Noel N.. **Transactions of the National Academy of Science and Technology**, , 33(1):7

The study was conducted in 2008 at Resources Production Technology (REPROTECH), Incorporated, an integrated aquaculture business in the north Bais Bay (Manjuyod side), Oriental Negros. It aimed to find out the feasibility and viability of milkfish (*Chanos chanos*, Forsskal) cultured in five 180-m<sup>3</sup> (6m x 6m x 5m) low-volume high density (LVHD) marine net cage and to establish a benchmark for cage milkfish farmers using a promising technology that can have significant contribution to socio-economic growth and food security. The result show that the cultured milkfish attained an average body weight of 376.32 grams after 163 average culture days, a survival rate of 100%, and a 2.4 feed conversion ratio- satisfactory enough to generate a point in a cropping period. The average production per 180-m<sup>3</sup> cage reached 2,480 kg or 13.78 kg/m<sup>3</sup>. The profit was Php 34.94 per kilogram, indicating an earning event if milkfish price per kilogram dropped by 10%. Milkfish production in high- volume, low density (HVLD) floating cages was economically viable fro small- and medium-enterprice fish farmers and offered an estimate 64.18% return of unvestment and a 0.4 year payback. It was recommended that generated technology on milkfish culture in LVHD marine net cages be shared through training and extension programs of Carlos Hilado Memorial State College, Binalbagan. **(Author's abstract)**

LVHD. Marine net cage. Milkfish culture. Mariculture. Stocking density. Fisheries.

- 0281** Microwave-assisted extraction of carrageenan from red seaweed (*Kappaphycus Spp.*). Bala, Glaiza L., Torres, Lilia D., Paragas, Danila S.. **Transactions of the National Academy of Science and Technology**, , 33(1):11

This study compared the efficiency of the conventional heating procedure and the relatively rapid microwave-assisted technique in extracting carrageenan from red seaweeds. Different combinations of microwave power level and exposure time were employed in the microwave-assisted extractions (ME): ME<sub>1</sub> (80 watts, 1 min); ME<sub>2</sub> (80 watts, 2 min); ME<sub>3</sub> (80 watts, 3 min); ME<sub>4</sub> (240 watts, 1 min); ME<sub>5</sub> (240 watts, 2 min) and ME<sub>6</sub> (240 watts, 3 min).

Microwave-assisted extraction yielded carrageenan extracts ranging from 31.35 to 43.14%. Conventional heating method produced only 26.72% extract.

All the carrageenan extracts were dried into chips and were subjected to physical and quality tests. Physical analyses of the carrageenan in terms of color, odor, texture and solubility were done. Meanwhile, the quality of the carrageenan was evaluated in terms of gel formation, viscosity, gel strength, type of carrageenan produced and microbial test.

The carrageenan chips were odorless, yellow to brown and had a coarse texture. Solubility test showed that carrageenan samples were soluble in water, milk solution and salt solution at temperature above 80°C. All samples showed formation of gels. Both the conventional heating and microwave-assisted extraction produced good quality of carrageenan gel in terms of viscosity and gel strength. The carrageenan is safe for human consumption based on methylene blue test.

Based from the result, carrageenan can be extracted with high percentage yield, high viscosity and gel strength by exposure of *Kappaphycus* species to microwave extraction at 240 watts for one (1) minute. **(Author's abstract)**

Gel. Seaweed. Extraction. Microwave-assisted. Carrageenan. Fisheries.

**0282** Risk assessment of saltwater intrusion. Taclan, Lorcelie B.. **Transactions of the National Academy of Science and Technology**, , 33(1):59

A study was conducted to investigate the current status of saltwater intrusion in the northern coastal aquifers of Ilocos Norte. Specifically, the study aims to determine the following: the degree of possible salt water intrusion; to identify the possible causes of risks associated with salt water intrusion and to come up with mitigation measures suitable in the locality.

The study area was characterized based on its geophysical and hydrological factors. The cropping pattern practiced is predominantly rice-garlic-vegetables. Groundwater resources are being used both for domestic and agricultural purposes.

Groundwater samples were collected from the farmers 21 existing shallow tubewells (STW) in three coastal barangays of Pasuquin, Ilocos Norte. Collection of samples were done using a portable sampling pump wherein the STWs were purged for 10 minutes prior to collection to pump out possible impurities. Groundwater samples collected were placed in 1 liter nalgene bottles, properly labeled and kept in an ice chest. The samples were immediately submitted to the Regional Testing Center of DOST-I, San Fernando, La Union for chloride and calcium analyses.

Results of analyses showed alarming results especially on chlorides content of groundwater samples. Average chloride content of seven STWs per barangay reached 650.0 mg/liter which is above the recommended limit of 250.0 mg/liter (Ayers, 1976) for irrigation water and 5.0 mg/liter for domestic purposes.

Therefore, the chloride content of groundwater samples analyzed posed an alarming threat to the coastal aquifer under study. There is a possible encroachment of saltwater intrusion to the STWs in farmers' field. A recommendation to undertake a mitigation technique to reduce saltwater intrusion using freshwater technology both in a hypothetical and actual coastal aquifer system is deemed necessary. This would serve as source of management strategies to solve if not to halt the saltwater intrusion landwards, thus protecting the coastal aquifer systems. **(Author's abstract)**

Chloride. Coastal aquifer system. Saltwater intrusion. Fisheries.

**0283** Species preference of fish pen farmers in Himamaylan City. Perante, Imee R.. **Transactions of the National Academy of Science and Technology**, , 33(1):8

The study surveyed the species preference of fish pen farmers in Himamaylan City, Negros Occidental in 2009 as basis to enrich the extension program of Carlos Hilado Memorial State College-College of Fisheries. The questionnaire gathered

selected personal variables of the respondents for profiling, their culture practices, species preference, the factors affecting their species choice, and their fish-farming problems.

The results were as follows: the fish pen farmers were middle-aged, dominantly male and married; majority reached college; their experience in fish pen farming was reasonably long but not very long; with a sizable combined average annual family income above poverty line; all engaged in monoculture with intensive production scale; stocked between 16 to 20 fishes per square meter; used commercial feeds; culturing their stock between 5 to 7 months; sourced their fry from the wild and hatchery; fed their stock to satiation twice daily; commonly practiced partial or selective harvesting; sampled their stock irregularly; most grew milkfish. The influencing factors modifying species preference were environmental parameters like pen location, economics like feed supply and harvest prices, biology of the cultured species, and technical factors like site proximity to markets. The occurring problems but seldom encountered were turbidity, salinity, low dissolved oxygen, and unstable supply of fry. The recommendations: extension program for fish pen farmers in Himamaylan City should focus on providing education and information on modern fish culture methods, perils of overstocking, effects of overfeeding, etc.; and stocking manipulation to avert mass mortality likely to occur during neap tides. **(Author's abstract)**

Surveys. Fish farming. Extension program. Fish pens. Species preference. Fisheries.

- 0284** Use of the aquatic weed *Pistia stratiotes* for earthworm and vermicompost production. Guerrero, Luzviminda A., Guerrero, III, Rafael D.. **Transactions of the National Academy of Science and Technology**, , 33(1):13

The aquatic weed *Pistia stratiotes* is a major plant pest in lakes and ponds in the Philippines. No economical use from the harvested weed is available. The study was conducted to determine the usefulness of the plant for the production of earthworm biomass and vermicompost through vermiculture.

Plastic-lined outdoor beds were used for the vermicomposting of fresh *P. stratiotes* collected from infested ponds with the "African night crawler" (*Eudrilus eugeniae*). Earthworm breeders were stocked in the beds and cultured for 30 days. A comparative analysis of the compost (without earthworms) and vermicompost (with earthworms) was done. The compost and vermicompost were also tested in a pot experiment using upland **kangkong** (*Ipomea reptans*) as the test plant.

The result showed that there was a mean increase of 173% in the production of *E. eugeniae* in the beds. Mean vermicompost recovery was 46%. The percentages of the N, P, K, Ca and Mg were higher in the compost than those in the vermicompost as a result of their incorporation into the earthworm biomass. The plants fertilized with vermicompost had better survival and more uniform growth compared to the plants fertilized with compost possibly because of better nutrient availability.

Considering the results and the value of the earthworm biomass and vermicompost produced, it is concluded that the use of the aquatic weed for vermiculture is efficient and economical. **(Author's abstract)**

Vermiculture. Vermicompost. Earthworm. Pistia stratiotes. Aquatic weed. Fisheries.

## FOOD SCIENCE AND TECHNOLOGY

- 0285** Determination of *Trans* fatty acid in virgin coconut oil and other fats and oils by gas chromatography. Dumag, Rosemarie J., Ardeña, Julita G., de Leon, Marco P., Portugal, Teresita R.. **Transactions of the National Academy of Science and Technology**, , 33(1):157

*Trans* fatty acid (*tFA*) in fats and oils were identified to be a risk factor for CHD and was made mandatory requirement under the Nutrition Labeling (US NLEA, 2000 and Canada, 2003). The study aims to validate/verify the AOCS Ch2a-94 Gas Chromatography (GC) method of *tFA* analysis for virgin coconut oil (VCO) and other fats and oil.

Precision and accuracy were determined using in-house food reference material (IFRM, Grape seed oil), 2 Food Analysis Proficiency Assessment Scheme Quality Control Test Material (FAPAS QCTM, Vegetable oil and Breakfast Cereal), and inter-laboratory test with foreign laboratory. Linearity, LOD and LOQ were determined by 5 level concentration using 10 different *tFA* standards. Twenty five VCO samples and 5 refined, bleached and deodorized (RBD) oils were studied.

The method was found to be precise and accurate with Horrat value of 1.8 which is within the acceptable criteris ( $<2$ ) and %recovery of 78.03% (addition method) and 112% (QCTM). Inter-laboratory test showed 0.09% difference in IFRM analysis. The calibration curve was linear (0.9786 – 0.9992) at a concentration tange of 0.0044 – 0.38 mg/L. The LOD was 0.00255 mg/mL and the LOQ was 0.00851 mg/mL. Using the US NLEA guidlines, all VCO samples contained zero *tFA* while the RBD oils contained of up to 2.2g/100g oil *tFA*.

In conclusion, VCO contains zero *tFA* and the AOCS method can be used for *tFA* analysis in VCO and other fats and oils. The method can be recommended for *tFA* analysis of fats and oils from food products. **(Author's abstract)**

Food science and technology. *Trans* fatty acid. Virgin coconut oil. Method validation. Gas chromatography.

- 0286** Fish freshness analysis using a polyaniline/nylon composite-based chemiresistor sensor. Santiago, Karen S., Chua, Charles Patrick B., Sevilla, III, Fortunato B.. **Transactions of the National Academy of Science and Technology**, , 33(1):146

Food safety assurance is an important factor in building confidence to consumers when choosing a particular product. In the fish sector, freshness of fish is placed into a great consideration in order to ensure the health and safety of the consumers, and to maintain the quality of their products. Trimethylamine (TMA), a volatile amine compound responsible for the pungent, fishy, ammonia like aroma in fish, is a typical marker for fish freshness detection. TMA is the toxic gas found after death of a fish. In previous studies, a series of inspections were performed to determine freshness of

fish, but methods are ineffective and found to be time consuming.

In this study, a chemiresistor sensor based on polyaniline (PANI)/nylon composite was developed for the headspace analysis of trimethylamine. The polymer composite was prepared by an *in situ* chemical oxidative polymerization of 0.4 M aniline with an equimolar amount of HCl onto a nylon membrane using 0.6 M ammonium peroxydisulfate oxidant. The composite was mounted on a home-made assembly for resistivity measurement based on the four-point probe method. The assembly design allowed the membrane composite to be in contact with the head space of the measurand system. The measured resistance varied with the TMA concentration, exhibiting a sensitivity of 14.05 mA/- log ppb TMA and linearity (r) of 0.975 at a dynamic concentration range of  $10^{-9}$  to  $10^{-6}$  ppb TMA. It is repeatable showing a COV of 7.8% for the  $10^{-6}$  ppb sample cycled thrice. TMA in fish was detected on the 8<sup>th</sup> hour exposure. This type of gas sensor is attractive because it provides a promising low-cost means to monitor TMA at RT. **(Author's abstract)**

Food science and technology. Fish freshness. Polyaniline/nylon composite. Trimethylamine. Chemiresistor. Gas sensor.

- 0287** Method validation for the determination of iodine in urine by ammonium persulfate digestion with spectrophotometric detection of the Sandell-Kolthoff reaction. Serafico, Michael E., Ulanday, Joselita Rosario C., Perlas, Leah A.. **Transactions of the National Academy of Science and Technology**, , 33(1):156

Urinary iodine excretion (UIE) has been widely regarded as a biochemical marker for prevention and control of iodine deficiency disorders (IDD). To determine UIE levels, most methods require pretreatment of urine sample before its colorimetric detection based on the Sandell-Kolthoff reaction. In this study, a greener and safer oxidizing agent for the removal of iodide interferents in urine was used and validated. Three levels of pooled urine sample and a sample taken from the interlaboratory comparison used as control were analyzed for UIE using the ammonium persulfate method. Spectrophotometric detection of iodine in urine at 420 nm was performed after the addition of arsenous acid and ceric ammonium sulfate in the digested sample. The calibration curve was linear ranging from 0 – 800 µg/L. The detection limit was 0 µg/L and the quantitation limit was 0.2 µg/L urinary iodine. The method had an intra-assay coefficient of variation (CV) of 26.3% for the low, 4.1% for medium and 2.2% for high UIE level controls. The inter-assay CV resulting from inter-analyst and inter-instrument analyses were 15.7% and 3.8%, respectively. The validated method for urinary iodine determination is fast, safe and economical. **(Author's abstract)**

Food science and technology. Urinary iodine. Ammonium persulfate. Sandell-Kolthoff. Validation. Urine.

- 0288** Method validation of plasma or serum retinol analysis using high performance liquid chromatography UV/VIS detection. Trio, Phoebe Z., Perlas, Leah A., Ulanday, Joselita Rosario C.. **Transactions of the National Academy of Science and Technology**, , 33(1):158

Validation of analytical methods is essential in the generation of data for

biochemical assessment studies to obtain reliable results that can be satisfactorily interpreted. For this purpose, the validation of plasma or serum retinol using high performance liquid chromatography was performed according to the requirements of ISO 17025 by taking into consideration the different criteria such as linearity, instrument detection limit, limit of quantitation and detection, trueness, repeatability and reproducibility.

The validation was carried out by using 100 µL of plasma or serum with 100 µL of retinyl acetate in absolute methanol. It was mixed for 2 seconds and extracted twice with 500 µL of hexane. The combined extracts were dried up under the stream of nitrogen gas. It was redissolved in 100 µL of 4:1 methanol-dichloromethane and 50 µL aliquot was injected to HPLC-UV/Vis.

Results showed that elution time of retinol was at  $3.090 \pm 0.014$  minutes and calibration standards behaved linearly ( $R^2 = 0.9994 \pm 0.0001$ ) over the calibration range of 0.37-6.66 mg of retinol. The accuracy of the method evaluated from the analysis of the certified reference material was 102.89%. The % RSD of repeatability and reproducibility of the method were 3.35% and 3.76%, respectively. The detection limit was lower than the quantification limit and within the admitted performance range.

The results of the analysis performed to validate the analytical method for the determination of retinol in plasma or serum showed that they were within the performance criteria set for this method and they met the requirements of ISO 17025. (Author's abstract)

Food science and technology. Plasma or serum retinol. High performance liquid chromatography. Method validation.

- 0289** Stability of bioactive compounds and shelf life of resveratrol-enhanced peanuts. Sales, Jocelyn M., Resurreccion, Anna VA.. **Transactions of the National Academy of Science and Technology**, , 33(1):212

Phenolic compounds including resveratrol, have antioxidant properties that delay aging and reduce the risk of cancer, cardiovascular and Alzheimer's diseases. Previously, we showed that combined ultrasound (US)-UV processes enhanced resveratrol in peanuts better than US or UV alone, to levels 2.8 times greater than that in red wine, the major food source. This study aims to determine shelf life of roasted resveratrol-enhanced peanuts (REP) and to investigate the stability of *trans*-resveratrol (RES), total phenolics (TP) and trolox equivalent antioxidant capacity (TEAC) during storage.

Raw peanuts were washed, sanitized, imbibed, sliced, processed using optimum US-UV by exposing to US (70 mW/cm<sup>3</sup> power density for 10 min) followed by 50 min exposure at 40 cm distance from UV light (254 nm), incubated for 36 h at 25°C, dried, roasted and packaged in polyethylene bags. Untreated samples were prepared as controls. Packages were stored at 30, 35 and 40°C and at ambient, about 25°C. At pre-determined intervals, a total of six sampling times/temperature, samples were withdrawn from storage, and analyzed for RES, TP, TEAC, hexanal, descriptive sensory properties and consumer acceptance.

Lipid oxidation, critical to REP's shelf life was due processing and storage effects. Initially, REP had higher hexanal and oxidized/off-flavors intensities but lower roasted

peanutty flavor and overall acceptance (OA) than controls. During storage, oxidized/off-flavors increased as roasted peanutty flavor and OA decreased. REP's shelf life was 52 days at 25°C. Lipid oxidation in REP followed first-order reaction with 0.02/day rate constant at 25°C,  $Q_{10}$  of 2.2 and activation energy of 300 cal/mol. At the end of shelf life, *trans*-resveratrol, TP, and TEAC were reduced by 13, 8, and 27% to 3.29 µg/g, 1.76 mg GAE/g, and 6.06 µMTE/g, respectively, suggesting that *trans*-resveratrol and TP but not TEAC were stable in REP based on d" 80% retained required during shelf life. **(Author's abstract)**

Food science and technology. Bioactive compounds. Peanuts. Resveratrol. Antioxidant capacity. Ultrasound. UV. Shelf life.  $Q_{10}$ .

## FORESTRY

- 0290** Aboveground biomass estimation of timber resources in permanent field laboratory area (PFLA 2) in Mt. Makiling Forest Reserve, Philippines. Luna, Amelita C., Villanueva, Teodoro R., Baraquio, Jossa S.. **Transactions of the National Academy of Science and Technology**, 33(1):43

The potential role of tropical forests to sequester atmospheric carbon is considered to be the most practical and effective way to reduce the release of CO<sub>2</sub> in the atmosphere. The study focused on the estimation of the aboveground biomass of timber resources in PFLA 2 located at Mt. Makiling Forest Reserve which is characterized by moderate to steep topography. The elevation of the reference point is 261.371 meters above sea level and the vegetation is dominated by balobo, kaong, rattan, and shrubs. In the study, biomass estimate in PFLA 2 in the year 2008 was 402.62 tons per hectare, 351.88 tons/ha in 2006 and 217.44 tons/ha in 2004. The established database through Arc View 3.2a displays the map of PFLA 2 and the locations of the trees as well as the biomass per tree species. Points (individual tree) and polygons (grids) on the map can be associated with its various descriptions in the database.

This study aimed to: (1) to estimate the biomass of timber resources; (2) to determine the biomass changes in the area, and; (3) to develop a GIS assisted biomass database for PFLA 2. The data were collected from one hectare plot of PFLA 2 using grids of 10m x 10m where the diameter at breast height (e" 5 cm) of trees was measured. Secondary data in 2004 and 2006 were obtained from the Office of the Coordinators for Research Extensions and Linkages (OCREL). Biomass was estimated using the formula:  $Y = \exp \{-2.134 + 2.530 \cdot \ln(D)\}$ . The data were analyzed, stored and manipulated through Arc View GIS software. A database of trees in the PFLA 2 was produced.

The estimation of biomass or biomass density is necessary tool to explain the flow of carbon (energy) in the ecosystem. **(Author's abstract)**

Climate change. GIS. Biomass. CO<sub>2</sub>. Arc view. Forestry.

- 0291** Carbon sink potential of the Philippine mangrove forest. Im, Sangjun, Gevana, Dixon T.. **Transactions of the National Academy of Science and Technology**, , 33(1):60

The importance of mangrove for both human and coastal organisms has been well-documented in many literatures. Among which is the capacity to trap atmospheric carbon into its biomass and help mitigate the impacts of climate change such as tidal surge, erosion and salt water intrusion. Notwithstanding its smaller share in the global forest cover, it is one of the most productive and biodiverse ecosystems. On the average, mangrove contains as much as half of the old growth forest biomass, and represents 12 genera of plants. The Philippine mangrove forest currently accounts to 247,362 ha, and is gradually increasing because of the coastal rehabilitation programs being implemented by the government, NGOs and communities. Mangrove trees are very common in almost all coastal areas of the country. All regions, except the Cordillera Autonomous Region (CAR) harbor mangrove forest. Among the regions, MIMAROPA (Region 4B) has the largest share with 57,567 ha, followed by ARMM in Mindanao with 45,786 ha, and Region 8 (Samar and Leyte) with 38,781 ha. To estimate the potential of Philippine mangrove for carbon storage, carbon density estimates observed by the Environmental Forestry Programme of the University of the Philippines Los Baños were used. On the average, the country's mangrove could be storing as much as 28.56 to 35.05 megaton carbon (Mt C). Among the provinces, Palawan (53,678 ha) and Sulu (24,305 ha) have the largest carbon stocks with 6 to 7 Mt and 3 to 3.5 Mt, respectively. Indeed, Philippine mangrove has huge potential for carbon storage hence proper forest management is vital to sustain its ecological roles. **(Author's abstract)**

Conservation. Climate change. Philippine mangroves. Carbon sink. Forestry.

- 0292** Characterization and detection of forest landuse change in a small mangrove forest. Gevaña, Dixon T., Im, Sangjun. **Transactions of the National Academy of Science and Technology**, , 34(1):26

The lack of ample information about forest landuse and landuse change hampers our ability to come up with sustainable forest management plans and programs. Mangrove forest is among the forest ecosystem where geospatial information is often limited. This study was therefore conducted to provide practical techniques in characterizing landuse and detecting landuse changes in a small community-managed mangrove forest using remotely sensed data. Banacon Island in Bohol Province, Philippines was selected as a case for this study. Standard radiometric correction and maximum likelihood classifier were done using two Landsat 5 TM satellite images with a decadal interval 1993 and 2004. Available on-line global explorer programs such as Google Earth Plus and Bing Map were also used to supplement ground-truth data for better classification. Results of the classification were found accurate using standard error matrix procedure therefore suggesting that landuse changes observed could serve as vital inputs for future landuse planning. Three major forest landuses were identified namely, dense mature stand, dense intermediate stand and sparse mangrove area. Overall, mangrove forest of Banacon Island has improved as seen in the expansion of dense mature and intermediate forest stands. Apparently, large portion (60%) of the sparse mangrove has decreased and eventually developed into dense intermediate plantations. This is reflective of the continuous reforestation being done by local community in the area. However, some portions of dense intermediate stands also showed losses that can be attributed to

illegal timber poaching that were reported during those periods. Some themes to improve the current condition of the site were recommended. **(Author's abstract)**

Forestry. Bakawan. Forest conservation. GIS. Land use change. Local community. Remote sensing.

- 0293** Developing a georeferenced database of selected threatened forest tree species in the Philippines. Ramos, Lawrence Tolentino, Torres, Alfie Misena, Pulhin, Florencia Bacani, Lasco, Rodel Diaz. **Philippine Journal of Science**, , 141(2):165-177

Georeferenced species occurrence is a prerequisite in species distribution modeling and species-ecosystem correlation analysis and also aids in tracking plant species and prioritizing scarce resources for conservation. The Global Biodiversity Information Facility, legacy literature of biodiversity, contemporary literature, technical reports and biodiversity surveys are important sources of species occurrence data waiting to be georeferenced. In this paper, we discussed a method used to georeference occurrences of threatened forest tree species from the above sources. Locality descriptions were initially narrowed down in geographic information system using administrative maps and further confined using two criteria: 1) elevation and 2) surface cover information from remotely-sensed images. The result was a georeferenced database of 2,067 occurrence records of 47 threatened forest species on a national scale. Each record had a unique point feature per species and enough metadata directing the database user to the source of occurrence data. The database can be used as a tool in determining priority species for specimen or germplasm collection, for taxonomic identification and historical mapping. It also serves as an integral component in spatially modeling the distribution of tree species and forest formations in the past and in a possible future scenario. **(Author's abstract)**

Forestry. Database. Georeference. Species occurrence. Threatened forest trees.

- 0294** Dynamics of endomycorrhizas and associated forest wildlings in three permanent field laboratory areas in Mt. Makiling, Los Baños, Laguna, Philippines. Luna, Amelita C., Pampolina, Nelson M., Candano, Randolph N.. **Transactions of the National Academy of Science and Technology**, , 33(1):44

This study assessed the dynamics of endomycorrhizal fungi and estimated fine root biomass of forest wildlings through soil coring within 2x2 m regeneration plots in three permanent field laboratory areas of Mt. Makiling to determine the possible correlation among endomycorrhizal fungal diversity, percentage root colonization, fine root biomass, and diversity of forest wildlings. Four genera (*Acaulospora*, *Gigaspora*, *Glomus*, and *Scutellospora*) and 14 species of isolated spores of endomycorrhizal fungi were characterized. *Glomus* species was dominant comprising 90% of the total density of endomycorrhizal spores. The diversity of endomycorrhizal fungi in three PFLAs was relatively low to moderate, most probably due to good condition of the areas. Also, endomycorrhizal fungi were possibly more specific to soil type than to host type, thus, comprehensive studies of soil properties such as soil pH, texture, nutrients, organic matter, moisture and soil organisms should be made. Roots of forest wildlings collected from three PFLAs exhibited specialized structures such as

arbuscules and vesicles, and non-septated hyphal strands suggesting endomycorrhizal associations. Fine root biomass obtained from three permanent plots was comparatively low for a tropical rainforest. Although, the turn out could be attributed to certain procedural lapses. Therefore, in the estimation of fine root biomass procedures should be permutated and magnified to increase fine root recovery. A total of 46 species of forest wildlings were recorded in three PFLAs. The diversity of endomycorrhizal fungi was not significantly correlated to the diversity of forest wildlings. Overall, further studies should be undertaken to determine and established the relationship of endomycorrhizal fungi and forest wildlings to fully understand their dynamics. **(Author's abstract)**

Fine roots. Forest wildlings. Dynamics. Endomycorrhizas fungi. Forestry.

## LIVELIHOOD

- 0295** Parchment-like paper using water hyacinth pulp. Mari, Erlinda L.. **Philippine Journal of Science**, , 141(2):179-185

Water hyacinth pulps, obtained by open-vessel cooking of fresh, air-dried, and ground water hyacinth stems, were mixed with abaca and wastepaper pulps to form handsheets. The handsheets had natural glaze and those from pure hyacinth pulps were fairly translucent, with Cobb values of 38-40 g/m<sup>2</sup> that compare well with commercial parchment paper. Compared with either pure abaca or pure wastepaper pulp, replacement with water hyacinth pulp by 25 to 75% significantly improved burst index and tensile index, suggesting better formation and bonding of fibers. Inversely, however, any amount of the soft and short-fibered hyacinth pulp with either pulp reduced tear index, understandably because this property is dependent more on fiber length. With wastepaper pulp, water hyacinth pulp improves the tensile property to a level comparable with that of paper from abaca pulp as well as parchment paper. **(Author's abstract)**

Livelihood. Cobb values. Fiber formation. Tensile index.

## MATHEMATICS

- 0296** Some characterizations of the direct product of gassmann triples. Perez, Keneth P., Vilela, Jocelyn P.. **Transactions of the National Academy of Science and Technology**, , 33(1):169

In a finite group  $G$ , two subgroups  $H_1$  and  $H_2$  are Gassmann equivalent if each conjugacy class of  $G$  intersects  $H_1$  and  $H_2$  in the same number of elements. The triple  $(G, H_1, H_2)$  is then called a Gassmann triple. This definition is equivalent to the well-known Sheng Chen's criterion for Gassmann equivalence. This paper considers this said criterion and a result on transitivity of Gassmann triples as tools in investigating some of the properties a Gassmann triple may satisfy with respect to direct product of

Gassmann equivalent subgroups.

If  $(G, H_1, H_2)$  is a Gassmann triple, then Sheng Chen's Criterion guarantees the existence of a bijective functions  $\phi: H_1 \rightarrow H_2$  such that  $\phi(h)$  is in the conjugacy class of  $h$  for all elements  $h$  of  $H_1$ . It also shows that  $(G, H_2, H_1)$  is a Gassmann triple. With example of a Gassmann triple in hand, one asks whether the group in consideration contains another Gassmann triple and that the transition of these triples also form a Gassmann triple.

Results of this paper

1. If  $(G, H, K)$  and  $(G, H, L)$  are Gassmann triples, then  $(G, K, L)$  is also a Gassmann triple.
2. If  $(G, H, K)$  is a Gassmann triple, then  $(GxG, HxH, KxK)$  is a Gassmann triple.
3. If  $(G, H, K)$  and  $(G, H, L)$  are Gassmann triples, then  $(G, HxK, HxL)$  is a Gassmann triple.
4. If  $(G, H, K)$  and  $(G, H, L)$  are Gassmann triples, then  $(GxG, HxH, KxL)$  is a Gassmann triple.

The last result is extended into a finite number of factors as follows:

5. Let  $(G, H, K_1), (G, H, K_2), \dots, (G, H, K_n)$  be Gassmann triples. Then  $(\prod G, H, \prod K_i)$  is a Gassmann triple. **(Author's abstract)**

Mathematics. Conjugate subgroups. Conjugacy class. Sheng chen's criterion. Gassmann triple. Gassmann equivalent subgroups. Direct product of subgroups.

**0297** Convex domination in the composition and cartesian product of graphs. Labendia, Mhelmar A., Canoy, Jr., Sergio R.. **Transactions of the National Academy of Science and Technology**, , 33(1):165

The convex dominating sets in the composition and cartesian product of two connected graphs were characterized. It was shown that the convex domination number  $\gamma_{\text{con}}(G[H])$  of a composition  $G[H]$  of two non-complete connected graphs  $G$  and  $H$  is equal to the clique domination number  $\gamma_{\text{cl}}(G)$  of  $G$ . The convex domination number

$\gamma_{\text{con}}(G \times H)$  of the cartesian product of two connected graphs was also studied. It was found out that this number is related to the convex domination numbers of the graphs involved.

Some results in an earlier work on convexity were used to characterize the convex dominating sets in the composition and cartesian product of two connected graphs. The concept of cyclic domination number was also defined as this was needed to obtain an expression for the convex domination number of a composition of graphs.

The following results were generated in this study:

1. Let  $G$  be a connected graph and  $K_n$  the complete graph of order  $n$ . A subset  $C = \bigcup \{ \{x\} \times T_x : x \in S \}$  of  $V(G[K_n])$  is convex dominating in  $G[K_n]$  if and only if the  $S$  is convex dominating in  $G$ .

2. Let  $G$  be a connected graph and  $K_n$  the complete graph of order  $n \geq 1$ . Then  $\gamma_{\text{con}}(G[K_n]) = \gamma_{\text{con}}(G)$ .

3. Let  $G$  and  $H$  be connected non-complete graphs with  $\gamma_{cl}(G) \geq 2$ . Then a subset  $C = \bigcup \{ \{x\} \times T_x : x \in S \}$  of  $V(G[H])$  is convex dominating in  $G[H]$  if and only if the  $S$  is a clique dominating set in  $G$  and  $T_x$  is a clique in  $H$  for every  $x \in S$ .
4. Let  $G$  and  $H$  be connected non-complete graphs with  $\gamma_{cl}(G) > 2$ . Then  $\gamma_{con}(G[H]) = \gamma_{cl}(G)$ .
5. Let  $G$  and  $H$  be connected graphs of orders  $m$  and  $n$ , respectively. Then  $\gamma_{con}(G \times H) = \min \{n \gamma_{con}(G), m \gamma_{con}(H)\}$ . **(Author's abstract)**

Mathematics. Domination. Convex. Clique. Composition. Cartesian product.

- 0298** The minimal closed geodetic numbers of graphs. Aniversario, Imelda S., Jamil, Ferdinand P.. **Transactions of the National Academy of Science and Technology**, , 33(1):170

Given two vertices  $u$  and  $v$  of a connected graph  $G$ , the closed interval  $I_G[u, v]$  is the set of all vertices lying in some  $u$ - $v$  geodesic in  $G$ . If  $S \subseteq V(G)$ , then  $I_G[S] = \bigcap \{ I_G[u, v] : u, v \in S \}$ . A set  $S$  of vertices in  $G$  is called a geodetic cover of  $G$  if  $I_G[S] = V(G)$ . The geodetic number  $gn(G)$  of  $G$  is the minimum cardinality of a geodetic cover of  $G$ . A geodetic cover of smallest cardinality is called a geodetic basis of  $G$ . Suppose that in constructing a geodetic cover of  $G$ , we select a vertex  $v_1$  and let  $S_1 = \{v_1\}$ . Select a vertex  $v_2 \notin I_G[S_1]$  and let  $S_2 = \{v_1, v_2\}$ . Then successively select vertex  $v_i \notin I_G[S_{i-1}]$  and let  $S_i = \{v_1, v_2, \dots, v_i\}$ . The closed geodetic number  $cgn(G)$  and the upper closed geodetic number  $ucgn(G)$  of  $G$  is the smallest and the largest  $k$ , respectively, for which selection of  $v_k$  in the given manner makes  $I_G[S_k] = V(G)$ . A closed geodetic cover  $S$  of  $G$  is a minimal closed geodetic cover of  $G$  if no proper subset of  $S$  is a closed geodetic cover of  $G$ . The minimal closed geodetic number  $mecn(G)$  is the maximum cardinality of a minimal closed geodetic cover of  $G$ . In this paper, it is shown that  $ucgn(G) = mecn(G)$  if and only if  $G$  is complete, while  $cgn(G)$  and  $mecn(G)$  coincide among extreme geodesic graphs  $G$ . Moreover, for complete bipartite graphs  $K_{m,n}$ ,  $cgn(K_{m,n}) = mecn(K_{m,n})$  if and only if  $m = n$ . More interestingly, for every triple  $a, b, c \in \mathbb{Z}^+$ , with  $2 \leq a < b < c$ ,  $a$ ,  $b$ , and  $c$ , are realizable as closed geodetic number, minimal closed geodetic number, and upper closed geodetic number, respectively, of a connected graph. We also determined here the minimal closed geodetic numbers of graphs resulting from the join of graphs. **(Author's abstract)**

Mathematics. Geodetic number. Bipartite graph. Geodetic cover.

- 0299** Secure domination in a network. Canoy, Jr., Sergio R., Go, Carmelito E.. **Transactions of the National Academy of Science and Technology**, , 33(1):164

The concept of secure total domination in graphs was investigated further. The study particularly considered a result obtained by Benecke et al. in a recent article. A counter example showed that such result is faulty. A rectification of this result was provided and some quick consequences of the same were stated. Secure total dominating sets in the join of graphs were also studied and some characterizations were generated.

The aforementioned new type of protection strategy in a given network was considered in this study. This strategy which uses a variant of domination in a network is more secure than the ones studied previously. Just like other existing strategies, the objective in this strategy is to evaluate or determine the minimum number of guards needed to protect a graph or network.

The following main results have been generated in this study:

1. Let  $X$  be a total dominating set in a connected graph  $G$ ,  $v \in X$ , and  $u \in V(G) \setminus X$ . Then  $v$   $X$ -depends  $u$  if and only if  $\text{epn}(v;X)$  and  $\text{ipn}(v;X)$  are contained in  $N_G(u)$ .
2. If  $u \in \text{epn}(v;X)$  for some  $v \in X$ , then  $u$  is not  $X$ -defended.
3. Let  $X$  be a total dominating set in  $G$ . Then  $X$  is a secure total dominating set if and only if (i)  $\text{epn}(v;X) = \emptyset$  for all  $v \in X$ , and (ii) for each  $u \in V(G) \setminus X$ , there exists  $v \in X \setminus N(u)$  such that  $\text{ipn}(v;X) \subseteq N(u)$ .
4. Let  $G$  be a connected graph of order  $n > 2$ . Then  $\text{st}(G) = 2$  if and only if there exist  $x, y \in V(G)$  such that  $xy \in E(G)$  and  $N(x) = V(G) \setminus \{x\}$  and  $N(y) = V(G) \setminus \{y\}$ .
5. Let  $G$  and  $H$  be connected non-complete graphs of orders  $m$  and  $n$ , respectively. Then  $\gamma_{\text{st}}(G+H) = 2$  if and only if at least one of the following holds: (i)  $\gamma_{\text{st}}(G) = 2$  or (ii)  $\gamma_{\text{st}}(H) = 2$ , or (iii)  $\hat{\alpha}^+(G) = m - 1$  and  $\hat{\alpha}^+(H) = n - 1$ .
6. Let  $G$  and  $H$  be connected non-complete graphs of orders  $m$  and  $n$ , respectively, and suppose  $\text{st}(G+H) \neq 2$ . Then  $\text{st}(G+H) = 3$  if and only if at least one of the following holds: (i)  $\gamma(G) = 2$ , or (ii)  $\gamma(H) = 2$ , or (iii)  $\hat{\alpha}^+(G) = m - 1$  or  $\hat{\alpha}^+(H) = n - 1$  (but not both). **(Author's abstract)**

Mathematics.  $X$ -defended. Secure. Domination. Total domination. Join.

**0300** Strong annihilation of some closed Hilbert subspaces. Mohammad, Rhudaina Z.. **Research Journal**, , 31(1):1-11

This paper studies in depth the various equivalent characterizations of strong annihilation in an abstract Hilbert space based on Havin and Jorricke's [3, 4] functional analytic approach - using Hilbert space methods and some basic properties of Fourier transform - to the proof of the Amrein-Berthier Uncertainty Principle [1]. Under consideration are the two problems of strong annihilation of a pair of closed Hilbert subspaces regarding spanning sets and probabilities [5]. The main objective is to find necessary conditions for this concrete pair of closed subspaces of a Hilbert space to be strongly annihilating. The results are applied to problems in harmonic analysis, signal theory, and statistics. **(Author's abstracts)**

Mathematics. Hilbert subspaces. Amrein-Berthier. Havin and Jorricke's.

**0301** Vertex cover of some supergraphs of planar grid. Uy, Joselito A.. **Transactions of the National Academy of Science and Technology**, , 33(1):166

Let  $G$  be the cartesian product of paths  $P_m = \alpha_1\alpha_2\dots\alpha_m$  and  $P_n = b_1b_2\dots b_n$ . Vertex  $(\alpha_i, b_j)$  of  $G$  is denoted by  $c_{ij}$ . Let  $H$  be the supergraph of  $G$  formed by adding the edges  $c_{uv}c_{st}$  if  $|u - s| = |v - t| = 1$ . Vertex set of  $H$  has a subset  $U$  such that all the edges of  $H$  are incident to some elements of  $U$ . Such subset is called a vertex cover of  $H$ . The vertex covering number of  $H$ , denoted by  $\alpha(H)$ , is the minimum cardinality of a vertex cover of  $H$ . Let  $q$  and  $r$  be the quotient and remainder, respectively, when  $n$  is divided by 2. If  $n = 1$ , then  $\alpha(H) = \lceil m/2 \rceil$ . If  $n > 1$  and  $r = 0$ , then  $\alpha(H) = \lceil 3m/2 \rceil$ . If  $n > 1$  and  $r = 1$ , then  $\alpha(H) = \lceil 3m/2 \rceil + \lceil m/2 \rceil$ . **(Author's abstract)**

Mathematics. Planar grid. Cartesian product. Supergraph. Vertex cover. Vertex covering number.

## MEDICINE

- 0302** The accuracy of pyuria in determining urinary tract infection in asymptomatic diabetic women. Hernandez, Allan, Lim, Jodor. **The Medical Journal of De La Salle University**, , 12(2):13-15

One hundred diabetic women were studied in order to determine the accuracy of pyuria in the diagnosis of urinary tract infection in asymptomatic diabetic patients. Urine samples were submitted on two occasions, and the detection of abnormal pyuria ( $> 10$  leukocytes/ mm) was compared with the occurrence of significant bacteriuria ( $> 10$  CFU/ ml of urine of the same bacterial species on 2 separate occasions). The detection of abnormal pyuria had a sensitivity of 70%, a specificity of 73%, and an accuracy of 73%. it had a positive predictive value of only 21%, with a negative predictive value of 96%. Detection of abnormal pyuria alone was not sufficient to diagnose urinary tract infection in asymptomatic diabetic women, and a pre-treatment urine culture was necessary to diagnose urinary tract infection in this patient population. **(Author's abstract)**

Medicine. Pyuria. Asymptomatic diabetes. Diabetic women. bacteriuria.

- 0303** Alternative conceptions of human cardio-vascular systems concepts among BS Nursing students in Zamboanga City. Obra, Jr., Mario R.. **Research Journal**, , 31(1):12-24

The study determined the alternative conceptions of Human Cardio-Vascular Systems Concepts (HCVS) among BS Nursing Students in Zamboanga City. Students' alternative conceptions on essential content areas of HCVS, for example, heart structure and functions, nature and components of blood, blood circulations, blood functions, blood vessel structures and functions, HCVS general function and HCVS disorders were identified through the analysis of items and responses of the respondents on the Two-Tiered Diagnostic Test. The respondents of the study were 312 BS Nursing students from the three universities in Zamboanga City. A random multi-stage sampling design was used to select the respondents from each university.

Findings of the study revealed considerable percentage of BS Nursing students with alternative conceptions on HCVS. The top 5 topics include a.) Nature and Components of Blood (39%), b.) HCVS common disorders (32%), c.) Blood vessel Structure and Functions (30%), d.) HCVS General Function (17%) and e.) Blood Circulation (16%). Topics considered with least percentage include Blood Functions (8%) and Heart Structure and Functions (6%). These findings support the claim that HCVS is a topic in Biology with considerable number of alternative conceptions among students even after formal instruction. **(Author's abstract)**

Medicine. Alternative conceptions. Human Cardio Vascular Systems (HCVS) Concepts. BS Nursing Students. HCVS. Two-Tiered Diagnostic Test.

- 0304** Analysis of ecstasy in human urine by high performance liquid chromatography. Monlinong, Jason Paul C., Portilla, Ma. Cristina B., Reyes, Gian Carlo P., Pascual, Cherrie B.. **Transactions of the National Academy of Science and Technology**, , 33(1):159

Ecstasy or n-methyl-3, 4-methylenedioxymethamphetamine (MDMA) is one of the most popular club drugs. This drug was invented to treat obesity but is currently placed under Schedule 1 of controlled substances. It is a psychoactive drug like methamphetamine or shabu.

Ecstasy in urine was analyzed using High Performance Liquid Chromatography (HPLC) with UV detection set at 254 nm. Chromatographic analysis was carried out with a Luna 5 $\mu$  C18 reversed phase column and (87:5:5:3) water:methanol:acetonitrile:ammonium buffer as mobile phase at flow rate of 0.5 mL/min. Ephedrine was used as an internal standard. MDMA and ephedrine showed average retention times of ~2.5 min and ~2.8 min respectively. Analysis of 0.50 ppm MDMA had % coefficient of variation (% CV) of 0.57% for the retention time of MDMA and 6.6% for peak area. Inter-day analysis showed % CV of 2.2% for retention time and 3.68% for peak area. Linear response was obtained over the concentration range of 0.10 ppm– 1.00 ppm. The limit of detection (LOD) was 0.03 ppm.

Different concentrations of MDMA were spiked in certified drug-free urine and a linear response at the same concentration range after liquid-liquid extraction with ether was also obtained. Gradient elution using (87:5:5:3) water:methanol:acetonitrile:ammonium buffer as mobile phase A and 100% acetonitrile as mobile phase B was employed to improve separation of MDMA from ephedrine in urine matrix. Different spiked urine samples underwent the same extraction procedure with ether and recoveries ranged from 81 – 104%.

HPLC analysis of ecstasy could provide an alternative rapid method to detect this drug of abuse in human urine samples. **(Author's abstract)**

Medicine. n-methyl-3,4-methylenedioxymethamphetamine (MDMA). Ecstasy. Urine. HPLC. Liquid-liquid extraction.

- 0305** Antibacterial activities and diversity of marine fungi associated with seagrasses collected from Lubang Island, Occidental Mindoro. Dizon, Dianne L., dela Cruz, Thomas Edison E.. **Transactions of the National Academy of Science and Technology**, , 33(1):210

Marine fungi are commonly tapped for the production of novel secondary metabolites. However, in the Philippines, very few studies explore marine fungi associated with seagrasses in spite of the numerous species of seagrasses found in the country. Our research study assesses the diversity and antibacterial activities of marine fungi (MF) associated with decaying and healthy seagrass leaves collected from Lubang Island, Occidental Mindoro. A total of 61 MF strains belonging to 15 morphospecies were isolated from surface-sterilized leaf explants inoculated on Potato Carrot Agar supplemented with 33 g/L marine salts and antibiotics. Morphocultural and molecular characterization identified the MF isolates as belonging to the genera *Aspergillus*, *Fusarium*, *Cladosporium* and *Penicillium*. Assessment of species diversity showed highest value in the host seagrass *Thalassia hemprichii*, though, highest species richness was noted in *Cymodocea rotundata*. Cluster analysis resulted in the grouping of MF based on their host seagrass. Then, 15 MF morphospecies were grown on PDA for the production of secondary metabolites. The crude culture extracts were tested for their antibacterial activities using paper disc diffusion assay. Our results showed that only one isolate, *Penicillium* sp. 1, exhibited inhibitory activities against extended spectrum beta-lactamase (ESBL)-producing and non-ESBL strains of *E.coli* and *K. pneumoniae* while five MF strains exhibited inhibitory activities against *S. aureus*. The antibacterial activities though were considered as weak. Five MF were then grown on five different media and their crude culture extracts tested against ESBL(+) strains of *K. pneumoniae* and *E. coli* using the microtiter plate assay. Results showed that two morphospecies of *Penicillium* grown on four media exhibited the lowest MIC and MBC values between 7.14 to 71.43 mg/mL. Interestingly, cultivation of MF isolates on a different culture medium resulted in the production of bioactive secondary metabolites as observed in one morphospecies of seagrass-associated *Penicillium*. **(Author's abstract)**

Medicine. Marine fungi. Fungal diversity. Fungal natural products. Secondary metabolites. Antibacterial activities.

**0306** Approach to the antiphospholipid antibody syndrome. Alentajan-Aleta, Lara Theresa. **Philippine Journal of Allergy, Asthma and Immunology**, , 11(1):7-10

The article reviewed tackled the Antiphospholipid Antibody Syndrome (APAS), a condition that has been found to be “associated with recurrent pregnancy failure.” The discussion focused on the brief history on APAS, pathology, definition and diagnosis, as well as management. Though APAS has evolved since the 60s, at the time of this review (2006), its pathology “remains unclear.” APAS is defined as one that is “characterized by the production of moderate to high levels of APLs with special clinical features which include venous diseases, arterial diseases, cerebral and nervous system disorders and pregnancy complication which include early and late abortions, blighted ova, IUGR, Oligohydramnios, Pre-eclampsia, HELLP syndrome, and placental infarction.” Specialists that are identified to help managed an APAS patient can be any of these: immunologist, rheumatologist, or hematologist. APAS patients who received intravenous immunoglobulin (IVIG) treatment were observed to have better pregnancy outcome in terms of having lower pregnancy-related complications. The study concluded that an APAS patient will continue to suffer from APAS even after delivery, thus the need for continuous follow-up and monitoring for the patient to manage her condition.

Medicine.

- 0307** An assessment of the health status of the institutionalized and non-institutionalized elderly. Ramos-Conde, Alita. **Philippine Journal of Nursing**, , 69(3-4):45-46

**Statement of the Problem:**

To determine the health status of the institutionalized and non-institutionalized elderly, a total of two hundred fifty-one (251) elderly subjects were studied.

**Methodology:**

This institutionalized group consisted of one hundred fifteen (115) elderly taken from both government and non-government housing. The non-institutionalized group comprised one hundred thirty-six (136) elderly taken from the rural and urban setting namely, Pagalangan, Victoria Laguna and Sampaloc area, respectively.

This study utilized descriptive correlational design to attain its objectives. The respondents in the urban setting were obtained using randomized selection on a linear bisection plotting mechanism with every other house included as sample population. All elderly in the rural setting were included. For the institutionalized group, systematic random sampling was used.

To collect data, structured interviews using interview schedules were utilized by trained interviewers. To test the difference in the measured health status of the two groups, the parametric student's independent t-test was used. Level of significance was established at  $p = 0.05$ .

To correlate demographic variables with established health status scores, correlative measures (Pearson's Moment Coefficient and Point Biserial Technique) were used. Level of significance was established at two-tailed  $p$  value of 0.05.

**Summary of Findings:**

1. Both the institutionalized and non-institutionalized elderly groups rated their own health as good.

2. Majority of the institutionalized and non-institutionalized elderly perceived their own health as the same as their counterparts.

3. The most common symptoms presented by both elderly groups are depression, decreased eye sight, getting tired easily, hurting or aching in the body and poor memory.

4. Both the institutionalized and non-institutionalized elderly groups were not incapacitated by illness or injury as they claimed not being confined to bed or house or had restrictions of going out their homes.

5. The most common medical conditions experienced by both the institutionalized and non-institutionalized elderly were cataract, depression, arthritis, high blood pressure, and heart disease.

6. The most common assistive devices used by both elderly groups are eyeglasses and dentures.

7. The most common health personnel sought for their health problems are the doctors, then nurses.

8. Income correlated significantly with functional health for both groups such that those with higher income had higher functional health scores.

9. Age, sex, civil status, education, religion, type of housing, and area of sampling did not correlate significantly with functional health.

10. Variables sex, income, and area of sampling correlated significantly with socio-spiritual health. Males, lower income group, and non-institutionalized group had higher socio-spiritual health scores.

11. None of the demographic variables correlated with physical health and mental health.

12. There is a significant difference in the physical health status scores between the institutionalized and non-institutionalized group. The non-institutionalized elderly had lower physical health score than the institutionalized group such that the non-institutionalized group has lesser complaints of symptoms, of medical conditions, use of assistive devices, lesser bed days and lesser use of medical resources.

13. There are no significant differences in the functional health of both elderly groups. Both the institutionalized and non-institutionalized elderly group had high ADL rating.

14. There is a significant difference in the socio-spiritual health scores between the institutionalized and non-institutionalized group. The institutionalized elderly group had lower socio-spiritual health than the non-institutionalized group.

15. There was no significant difference in the mental health status of both elderly groups.

### **Conclusion:**

Implications of the study show that there are many factors which may affect health. Although age and sex may be fixed, the factors of income, educational status and environment may be modified to attain positive health outcome. The individual's social support system would have an important role for both the institutionalized and non-institutionalized group in maintenance of health.

### **Recommendation:**

There is a need for the government and the non-government agencies, professional, community organizations, church, and other institutions to study and formulate programs to enhance the elderly's health and financial status. **(Author's abstract)**

Medicine. elderly. institutionalized elderly. non-institutionalized elderly. health status.

- 0308** Bacteriologic activity of nata de coco in-vitro. Dominguez, Lynette, Versoza, Jesus. **The Medical Journal of De La Salle University**, , 12(1):17-20

**Objective:** To compare the antibacterial activity of nata de coco with distilled water, normal saline, and nutrient broth against *S. aureus*, *S. pyogenes*, *E. coli*, *P. aeruginosa* and *Enterobacter*.

**Materials and Methods:** Nata de coco was obtained from a common source, the public market, and pureed. Initial culture and sensitivity tests were negative for bacteria. Bacterial cultures were obtained from the Department of Microbiology and prepared and compared with MacFarlands standard. A set of 5 test tubes containing one kind of solution and 5 loopfuls of each of the 5 bacteria was prepared; after exposure to the different bacteria for 0, 30, 60, 120, and 180 minutes a loopful of material from each of the test tube was obtained and streaked on nutrient agar plate. The organisms were grown in a closed system. The plates were incubated for 24 hours at 37°C. Comparisons of growth of different organisms in different media were made during the time of peak growth. Results were analyzed using the Kruskal Wallis H test.

**Results:** There was significant decrease in growth of *S. aureus*, *E. coli*, *Pseudomonas* and *Enterobacter* in nata de coco media as compared to normal saline. There was no significant decrease in growth with *S. pyogenes* in all media.

**Conclusion:** Nata de coco can significantly inhibit the growth of four commonly seen hospital pathogens. Its moist environment promotes wound healing. It is advocated as a form of colloid dressing. Animal studies are recommended to determine its efficacy. **(Author's abstract)**

Medicine. nata de coco. MacFarlands standard. Kruskal Wallis H test.

- 0309** Biochemical and clinical findings in the first two cases of glutaric aciduria type I in the Philippines. Chiong, Mary Anne D., Balansay, Lorena S., Lanot, Vanessa O., Fodra, Esphie Grace D.. **Acta Medica Philippina**, , 45(4):70-72

We report the first two diagnosed cases of Glutaric Aciduria Type I (GA I) in the Philippines. The diagnosis was confirmed by urinary organic acid analysis by Gas Chromatography-Mass Spectrometry (GC-MS) which showed the characteristics metabolites for GA I. Review of their clinical features showed macrocephaly, developmental delay, seizures, dystonia and choreoathetotic posturing. Cranial CT scan findings were also compatible with previously reported cases. This paper emphasizes the usefulness of locally available biochemical tools in the diagnosis of inborn errors of metabolism as well as the importance of clinical recognition of these disorders. **(Author's abstract)**

Urine organic acid analysis. Cerebral organic aciduria. Glutaric aciduria type I. Medicine.

- 0310** Breast cancer metastasizing the placenta. Torres, Romerico F.. **Acta Medica Philippina**, ,

A 38 year old woman previously with lobular and invasive ductal carcinoma of the breast stage IV with clinical metastasis to the lung, skin, bone and liver in her 32<sup>nd</sup> – 33<sup>rd</sup> week of pregnancy, presents with left arm edema. She undergoes primary cesarean section for a transverse lie in advanced preterm labor and intraoperatively, metastasis to the left ovary is noted with multiple liver implants. The placenta is normal on gross inspection, however microscopic examination reveals intervillous tumor invasion. This on account of western literature, is only the 14<sup>th</sup> case worldwide and the 1<sup>st</sup> in the country. Discussed are the risk factors for breast cancer, effects of pregnancy on breast cancer, effects of breast cancer on the mother and fetus, diagnosis, treatment and review of literature on breast cancer metastasizing to the placenta. **(Author's abstract)**

Medicine. Breast cancer. Pregnancy. Breast cancer metastasis. Placenta.

- 0311** A case of spinal muscular atrophy type 1 in a Filipino infant. Modequillo, Margaret S., Reroma, Aubrey E., Cavan, Barba Charina V.. **Acta Medica Philippina**, , 45(4):63-65

We present a case of a 7-month-old Filipino who manifested with generalized muscle atrophy and areflexia. She had weak gag reflex and tongue fasciculations. She eventually developed feeding difficulty and recurrent pneumonia. Laboratory work-up showed a slightly elevated serum creatinine kinase (CK) and myopathic changes on electromyography and nerve conduction velocity (EMG-NCV) studies. Genetic study confirmed that the patient was homozygous for deletions on exons 7 and 8 of the survival motor neuron (SMN) 1 gene. Carrier testing on both parents revealed that only the mother was a confirmed carrier of the SMN1 gene deletion. The challenges for genetic counseling in this case are discussed. **(Author's abstract)**

SMN1 gene. SMN gene. SMA. Spinal muscular atrophy. Medicine.

- 0312** Challenges and issues in the control of rabies in the Philippines. Ambas, Cristina D., Bravo, Lulu C., Vinluan, Minerva A.. **Acta Medica Philippina**, , 40(2):49-53

Many significant activities and programs in the control of Rabies in the Philippines were already implemented with some success. However despite considerable advances in the development and availability of efficient tools to control this disease, there has been no substantial decline in the incidence and mortality rate of Rabies, with the number of cases showing an increase from the year 2004 to 2005.

The Philippines faces a number of important challenges and issues. First, there is a need for Information, Education and Communication Campaign (IEC) to make the public aware of the proper management of animal bite wounds and eliminate the use of traditional faith healers and herbal medicines like the use of "Tandok" and garlic. Second is the unavailability of mass vaccination for dogs and other susceptible animal due to lack of canine vaccine supply and funding. Third, is inadequate and oftentimes delayed surveillance system to collect epidemiological data which could be due to difficulty in reaching far-flung barrios and provinces and the lack of man-power to do

so. Fourth is lack of dog population management program because currently, the country has eight (8) million stray dogs to monitor and control its activity. Fifth, is the unavailability of pre- and post-exposure prophylactic treatment. 400,000 Filipinos consult for dog/animal bites or rabies exposure annually and more than 80% of them will require treatment, but only 15% will receive it. Sixth, is the need for relevant research studies to support the control and prevention of rabies.

The challenges and issues in the control, prevention and elimination of rabies in the Philippines are both government and private sector responsibilities. They must be addressed by the concerned agencies to decrease the morbidity and mortality of rabies and hopefully, the country will be declared rabies-free in the future. **(Author's abstract)**

Medicine. Rabies  
epidemiology. Immunoglobulin. Intradermal. Intramuscular. Parenteral. Pre-exposure prophylaxis. Post-exposure prophylaxis. Surveillance. Vaccine.

- 0313** Characterization of mutations and polymorphisms in the G6PD gene among Filipino newborns with glucose-6-phosphate dehydrogenase deficiency. Matsuo, Masafumi, Nishiyama, Kauru, Shirakawa, Taku, Silao, Catherine Lynn T., Cutiongco-de la Paz, Eva Maria, Abaya, Christian Eric S., David-Padilla, Carmencita. **Acta Medica Philippina**, , 45(4):53-57

**Background:** Glucose-6-phosphate (G6PD) deficiency is the most prevalent enzyme deficiency to date. The global prevalence of G6PD deficiency is estimated at around 330 million people affected with the disease worldwide. This 4.9 percent prevalence, correlates highly with geographic areas endemic to malaria. It is the most common among the disorders in the Newborn Screening (NBS) panel in the Philippines, with one confirmed case for every 52 newborns (1:52). This paper determines the molecular background of G6PD deficiency among Filipino newborns detected by newborn screening.

**Methods:** A total of 200 cases confirmed to have G6PD deficiency, 180 males and 20 females, were identified through the Philippine Newborn Screening Program from 2001-2003. Genomic DNA was extracted from dried blood spots followed by multiplex polymerase chain reaction using multiple tandem forward primers and a common reverse primer (MPTP) to detect previously reported common mutations and polymorphisms in exons 5, 6, 9, 11 and 12 of the G6PD gene.

**Results:** Of the 200 samples analyzed, mutations and polymorphisms in the G6PD gene were identified in 148 cases (74%). The most common mutation was a G to A transition on nucleotide 871 (Viangchan) of exon 9 in combination with a silent mutation on exon 11, accounting for 32.9% of the cases. This was followed by a C to T transition on nucleotide 1360 (Union) in 21.1% of the cases. Other mutations were Vanua Lava in 10% Chatham in 9.4% and Canton in 3.5% of the newborns. The silent polymorphism on nucleotide 1311 was present in 12.9% of cases. There were combinations of these mutations and polymorphisms present in a minority of cases.

**Conclusion:** Results of this study showed the molecular heterogeneity underlying G6PD deficiency among Filipino newborns. **(Author's abstract)**

Filipino. Mutations. G6PD. Glucose-6-phosphate dehydrogenase deficiency. Medicine.

- 0314** Chitosan poly(acrylic acid) semi-IPN patch for drug encapsulation and release. Gonzales, Christian, Leal, Mari Kaira O., Andalis, Ivy Marie C., Chua, Modesto T., Chakraborty, Soma. **Transactions of the National Academy of Science and Technology**, , 33(1):205

In recent years, the formulation of transdermal delivery patches using biopolymers has been given extensive attention. Chitosan, a derivative of chitin, has the ability to form strong films, hence forms a prime component of wound dressing patch. The research reports the fabrication of semi-interpenetrating network (semi-IPN) hydrogel patch from chitosan(Ch) and polyacrylic acid (PAA). PAA is a biocompatible, biodegradable, and bioadhesive and can absorb a large amount of water. Semi-IPN composed of PAA with Ch and Glycidyl Trimethyl Ammonium Chloride (Quat 188) modified Ch was synthesized by polymerizing AA and crosslinking it with N,N'-methylene biscarylamide in the presence of unmodified and modified Ch in deionized water at 70°C using potassium persulfate as the initiator. Ch was modified to improve its antimicrobial property. The strength of the semi-IPNs improved with increase of the crosslink density, molecular weight of Ch and Ch PAA ratio and by Quat 188 modification. Unmodified Ch semi-IPN swelled 400% in pH 7 and 325% in pH5.5 buffer in 2h. In 2h Quat 188 modified Ch semi-IPN swelled 1200% and 1000% in pH5.5 and 7 buffer respectively. Two drugs AgNO<sub>3</sub> and mafenide acetate(MFC) were encapsulated in the semi-IPNs. The semi-IPNs could incorporate 100% of free AgNO<sub>3</sub> in 10 minutes from its aqueous solution but showed negligible release. In case of MFC, pH dependent encapsulated 95% MFC from its solution in 2h and release 56% of MFC in 10h at pH 5.5 whereas unmodified chitosan semi-IPN encapsulated 86% MFC from its solution in 6h and release 35% MFC in 10h at pH 7. **(Author's abstract)**

Medicine. Chitosan. Poly(acrylic acid). Semi-ipn. AgNO<sub>3</sub>. Mafenide acetate.

- 0315** Choice of delivery after cesarean section. Mendoza, M., Reformado, L., Rillorta, G., Valle, D.. **The Medical Journal of De La Salle University**, , 11(4):18-22

**Objective:** In spite of the relative safety and medical advantage of vaginal delivery after cesarean section, the procedure continues to be under utilized in the private practice setting. This meta-analysis was conducted to compare the materials and fetal outcomes between a trial of labor and an elective repeat cesarean section.

**Methods:** All published articles from 1982 through 1995, identified through the National Library of Medicine (MEDLINE) were considered for the analysis. The medical subject headings, vbac, vaginal delivery and cesarean section, trial of labor, labor complications, and pregnancy outcome were used to obtain a list of articles for analysis. Additional articles identified from the bibliographies of these articles were also included in the analysis. An inclusion criteria was developed to arrive at a subgroup of these articles for complete analysis.

**Results:** A total of 60020 patients were included , 36115 women (60.1%) were eligible for a trial of labor of whom 28989 women (80.27%) delivered vaginally,

whereas 23905 women (39.83%) underwent an elective repeat cesarean section. A total of 185 women in the trial of labor group had uterine rupture or dehiscence whereas there were 109 women in the cesarean group. Two maternal mortalities were reported in the trial of labor and none in the repeat cesarean section. A total of 21 perinatal deaths were reported; nine was observed in the trial of labor group and six of which were rupture related perinatal deaths.

**Conclusion:** We concluded that trial of labor is an acceptable alternative to repeat abdominal delivery in the majority of women with previous cesarean births. **(Author's abstract)**

cesarean section. vaginal delivery. cesarean delivery. Medicine.

- 0316** Chromatographic analysis of ketamine and norketamine in human plasma and urine samples. Portilla, Ma. Cristina B., Monlinong, Jason Paul C., Sia, Bettina, Pascual, Cherrie B.. **Transactions of the National Academy of Science and Technology**, , 33(1):160

In recent years, the illegal use of ketamine in the Philippines has risen and this drug is now included in the list of dangerous drugs under the Comprehensive Dangerous Drugs Act of 2002. Ketamine is a fast acting anesthetic that is mostly administered by veterinarians as an animal sedative. It is also used by anesthesiologists for pediatric and elderly patients as surgical anesthesia. Complications from the use of ketamine include hallucinations and confused states which contributed to the abuse of this drug.

Chromatographic analysis of ketamine and norketamine, its metabolite, was carried out using high performance liquid chromatography (HPLC) with UV detection at 210 nm on a C<sub>18</sub> column. The mobile phase used was 30% acetonitrile and 70% phosphate buffer (0.03M, pH 7.2). Flow rate was 0.5 ml/min and oven temperature was set at 37 °C. The retention times of ketamine and norketamine were found to be at ~5.6 min and ~11.3 mins respectively. Reproducible results were obtained with CV (%) of 7.33 % or less. Linear response was obtained over a concentration range of 25 to 500 ppb. LOD for ketamine is 3.6 ppb while LOQ is 4.04 ppb. While for norketamine, LOD and LOQ values were 6.10 and 6.72 ppb respectively.

Ketamine and norketamine standards were spiked in blank urine samples or human plasma sample from volunteers with no ketamine use. Linear response was also obtained over the concentration range of 25 to 500 ppb. Liquid-liquid extraction was utilized for sample preparation. Average percent recovery of ketamine spiked in blank human urine was 85.0% while in spiked human plasma samples, it was 91.0%.

This HPLC method could be utilized for routine analysis of ketamine and norketamine in human urine or plasma samples. **(Author's abstract)**

Medicine. High performance liquid chromatography. Ketamine. Norketamine. Human plasma. Human urine.

- 0317** Chromosomal structural abnormalities among Filipino couples with recurrent pregnancy

losses. David-Padilla, Carmencita, Salonga, Edsel Allan G., Dion-Berboso, April Grace, Cutiongco-de la Paz, Eva Maria. **Acta Medica Philippina**, , 45(4):58-62

**Introduction:** Recurrent pregnancy loss is a devastating reproductive problem that affects 5% of couples trying to conceive. Majority of the cases are due to cytogenetic errors. This study determines the prevalence of chromosomal structural abnormalities in Filipino couples who presented with 2 or more pregnancy losses.

**Methods:** Results from chromosomal analysis of couples referred for 2 or more miscarriage done at the Institute of Human Genetics-National Institutes of Health-University of the Philippines, Manila on peripheral blood samples from 1991 to 2010 were retrospectively reviewed.

**Results:** There were 356 couples with a history of 2 or more miscarriages sent for chromosomal analysis from 1991-2010 included in this study. Among these 356 couples, 17 couples (4.8%) were found to be carriers of different chromosomal abnormalities, 1 of whom had both of them affected with chromosomal abnormalities. From a total of 18 cases, there were 13(3.6%) translocations, 1(0.3%) insertion, 2(0.6%) with marker chromosomes, 1(0.3%) pericentric inversion and 1(0.3%) deletion.

**Conclusion:** The overall frequency of chromosomal structural abnormalities among patients with RPL in this study is 4.8% with translocations being the most common type detected. The results of this study are similar to that of previous large-scale studies which have demonstrated that parental chromosomal abnormalities are associated with RPL. **(Author's abstract)**

Chromosomal structural abnormalities. Recurrent pregnancy loss. Medicine.

- 0318** Classical homocystinuria in two Filipino patients. Chiong, Mary Anne D., Capistrano-Estrada, Sylvia, Casis, Roxanne J., Abacan, Mary Ann R.. **Acta Medica Philippina**, , 45(4):81-83

Classical homocystinuria is an inborn error of metabolism caused by a deficiency of cystathionine  $\beta$ -synthase that converts homocysteine to cystathionine. This then leads to elevation of homocysteine which results in abnormalities of the eyes, skeleton, central nervous system and vascular system. We present two children with classical homocystinuria. Patient 1 presented with lens dislocation and mental retardation while Patient 2 presented with thromboembolism, mental retardation and lens dislocation. The elevated plasma homocysteine and methionine levels led to the diagnosis of homocystinuria. **(Author's abstract)**

Thromboembolism. Lens dislocation. Mental retardation. Cystathionine  $\beta$ -synthase deficiency. Homocystinuria. Medicine.

- 0319** A clinical and molecular cytogenetic study of Filipino patients with Williams syndrome. Cutiongco-de la Paz, Eva Maria, Abarquez, Conchita G.. **Acta Medica Philippina**, , 45(4):46-52

**Objective:** To study the clinical spectrum of Filipino patients with Williams Syndrome and to confirm the gene deletion by FISH analysis.

**Methods:** From June 2005 to September 2008, patients who were seen at the Genetics clinic of the UP-PGH and who met the clinical criteria for Williams Syndrome were analyzed for the 7q11.23 deletion through karyotyping and FISH studies. A detailed history and a thorough dysmorphicologic examination were performed. Relevant investigations included two-dimensional echocardiography, renal ultrasonography, ophthalmologic examination, developmental assessment and serum calcium determination.

**Results:** Eight patients were included in the study. The mean age at first diagnosis was 8.5 years. All cases were sporadic. The chromosomal analysis was normal for all patients and in the FISH analysis, a 7q11.23 deletion was detected in 100% of cases. Distinctive facial features, cardiac abnormalities and developmental delay were present in all patients. The typical behavior of overfriendliness was observed in the majority of cases. Hypercalcemia was documented in only one case and no renal anomalies were detected.

**Conclusion:** The craniofacial features were similar among patients but there is a broad spectrum of severity of clinical features in cardiovascular abnormalities, personality behavior traits and mental capacity. **(Author's abstract)**

Supravalvular aortic stenosis (SVAS). Elastin gene (ELN). Fluorescence in situ hybridization (FISH). Williams syndrome. Medicine.

**0320** A clinical profile of biliary tract diseases operated on at De La Salle University Medical Center. Adiviso, Shirard. **The Medical Journal of De La Salle University**, , 12(2):22-30

Biliary tract diseases are one of the most common health problems worldwide and may affect all age groups especially the elderly. Numerous studies have demonstrated a linear increase in their prevalence with advancing age. The actual frequency in any country or among certain group of patients varies considerably and depends upon a variety of factors.

This is a retrospective study of 403 patients with biliary tract diseases who underwent surgical intervention at De La Salle University Medical Center from June 1991 to June 1995. The objective of the study is to determine the clinico-demographic profile of patients with regards to age, sex, chief complaints, objective complaints, diagnostic modalities used, type, method and technique of procedure alone, histopath and final diagnosis, culture and sensitivity, duration of illness and length of hospital stay.

Majority of the population were adults (98%) most of them belonging to the 20-60 year old age group (53%). Female predominance (68%) was likewise noted with a ratio of 2:1. Most frequent complaints were abdominal tenderness (97%) and abdominal pain (90%). Ultrasound was the diagnostic examination (98%) frequently requested by most of the physicians. About 98% of the patients underwent open cholecystectomy, 81% were elective cases. Cholecystectomy with IOC was the most common surgical intervention done (54.59%). Chronic cholecystitis was the most

common final diagnosis (41.9%) and intraoperatively by histopath results (45.9%). Culture sensitivity was not routinely requested but in those patients whose bile samples were submitted for examination, majority yielded Enterococcus bacteria. Duration of illness was almost chronic with more than 70% occurring for more than one week. Approximately 65.5% of patients stayed at the hospital for 5 to 10 days. Morbidity rate was noted at 10.42% and mortality rate at 1.24%. Both rates were unrelated to the biliary procedure. **(Author's abstract)**

Medicine. biliary tract diseases. cholecystectomy. Enterococcus bacteria.

- 0321** Clinical profiles of hyperphenylalaninemia patients diagnosed by newborn screening. Chiong, Mary Anne D., Abacan, Mary Ann R., Dion-Berboso, April Grace. **Acta Medica Philippina**, , 45(4):84-87

Hyperphenylalaninemia is due to problems in phenylalanine metabolism caused by defects in phenylalanine hydroxylase enzyme and its co-factor, tetrahydrobiopterin (BH4). This paper presents a review of patients with hyperphenylalaninemia (HPA) diagnosed by Newborn Screening Center-National Institute of Health from 1996 to 2009. Thirteen cases were diagnosed: five classical phenylketonuria (PKU), one mild PKU, three 6-pyruvoyl tetrahydrobiopterin synthase (6-PTPS) deficiency, and four mild hyperphenylalaninemia (HPA). The clinical profile of the patients highlights the importance of early diagnosis and dietary treatment, good metabolic control and regular monitoring, for better outcome. **(Author's abstract)**

6-pyruvoyl tetrahydrobiopterin synthase (PTPS) deficiency. BH4 deficiency. Phenylalanine hydroxylase enzyme deficiency. Phenylketonuria. Hyperphenylalaninemia. Medicine.

- 0322** Clopidogrel and vitreous hemorrhage in patients with diabetic retinopathy. Uy, Harvey S., Chan, Pik Sha T., Santiago, Darby E.. **Acta Medica Philippina**, , 40(2):39-40

**Objective:** To report a series of patients with proliferative diabetic retinopathy (PDR) who developed vitreous hemorrhage (VH) while on clopidogrel.

**Patients and Methods:** Case series. The records of 7 PDR patients who developed VH while on clopidogrel therapy were reviewed and the following data retrieved: duration of diabetic retinopathy, clopidogrel intake, history of laser eye treatment, surgical eye procedure and VH recurrence.

**Results:** Spontaneous VH developed in 8 eyes. The average duration of clopidogrel intake was  $21 \pm 28$  weeks (range, 1-54); the average duration of diabetic retinopathy was  $18 \pm 7$  years (range 10-30). VH occurred in 7 eyes despite previous laser panretinal photocoagulation. None of the patients who discontinued clopidogrel experienced recurrent VH. Four (50%) eyes underwent vitrectomy to remove the VH.

**Conclusion:** Clopidogrel may be a risk factor for VH among patients with PDR. **(Author's abstract)**

Medicine. Clopidogrel. Diabetic retinopathy. Vitreous hemorrhage.

- 0323** Comparative bioavailability of three rifampicin preparations. Dalmacion, Godofreda V., De Ocampo, Esperanza J., Amarillo, Ma. Lourdes E.. **Acta Medica Philippina**, , 40(2):28-32

**Setting:** Because of its lower cost, the use of generic drug products is aggressively encouraged in the Philippines. However, local physicians are not confident about their quality and remain unsure of their therapeutic interchangeability with the branded preparations.

**Objective:** The objective of the study is to determine the bioavailability of generic – Rifampicin and Rifampicin in fixed dose combination (FDC) with INH against the innovator Rifampicin (Rifinah).

**Methodology:** Dissolution test using the basket stirring apparatus was done prior to the randomized crossover, three period, six sequence clinical trial using three preparations of rifampicin among 12 normal volunteers. Plasma drug concentration was measured by HPLC.

**Results:** Only the branded preparation passed the basket stirring test whereby 95% of its weight was recovered in 45 minutes. Standard Rifampicin has a Tmax of 1.9 hrs (SD=0.5), Cmax = 14.08 ng/ml (SD=6), and AUC= 60.45 ng/ml (SD=24.65). The Tmax of the Generic preparation is 2.75 hrs (SD=1.14), Cmax= 9.2 ng/ml (SD=4.09) and AUC=51.37 ng/ml (SD= 24.53) while that of Rifinah is 2.50 hrs (SD= 1.17), 9.52 ng/ml (SD=3.98) and 45.66 ng/ml (SD=19.9) respectively.

**Conclusion:** Both generic rifampicin and rifampicin in FDC were not bioequivalent with the branded preparation. There was statistically significant difference in Cmax and AUC for sequence. **(Author's abstract)**

Medicine. Bioavailability. Rifampicin. Tuberculosis.

- 0324** Comparative study of three types of chemical disinfection and six types of sterilization methods for acupuncture needles and guide tubes. de la Paz, Jennifer M.. **The Medical Journal of De La Salle University**, , 12(1):21-24

**Objective:** To compare the effectiveness of three methods of chemical disinfection and six methods of sterilization on used acupuncture needles and guide tubes.

**Materials and Methods:** Needles and guide tubes used during a community-based clinic were subjected to three chemical disinfectants five sterilization methods commonly used in the communities and the Acupuncture Therapeutic Research Center's standard autoclave method. Each method tested involved ten test tubes of acupuncture needles and one guide tube. Another set served as control and was not subjected to any method. The samples were immersed in Brain Heart Infusion broth and tested for bacterial growth at one, four, and seven days for those chemically

disinfected and up to four months for those sterilized. Results were run under the Chi-square subformat.

**Results:** No bacterial growth was seen up to seven days for controls and for all set that underwent the three chemical disinfectants and the six sterilization methods.

**Conclusions:** In this preliminary report only results of bacterial studies done up to 7 days are submitted. **(Author's abstract)**

Medicine. acupuncture. sterilization methods. chemical disinfection.

- 0325** A comparative study on the mycobactericidal effect of using 5% sodium hypochlorite and 2% glutaraldehyde in sputum processing for acid fast bacilli detection. Maiquez-Lota, Maria Margarita. **Acta Medica Philippina**, , 40(1):17-22

Improvements in acid fast bacilli detection in sputum smears have been the focus of various researches. Most of these involved sputum liquefaction to facilitate tubercle bacilli concentration and increase AFB detection in sputum microscopy. These improvements have the potential to increase case detection which is an essential component of the National Tuberculosis Program. There also exist a need to protect health care workers from the risk of TB exposure when processing sputum for microbiologic diagnosis. The study aimed to determine the mycobactericidal effect of using 5% sodium hypochlorite and 2% glutaraldehyde in sputum processing for acid fast bacilli detection.

Sixty-two sputum samples from tuberculosis patients were processed for culture using standard techniques and liquefaction with 5% sodium hypochlorite and 2% glutaraldehyde. Samples using the digestion method were stained using Ziehl Neelsen method. Results showed that the mycobactericidal effect of 5% sodium hypochlorite (100%) is better as compared to 2% glutaraldehyde (86.2%) and this difference is statistically significant ( $p < 0.001$ ). On the other hand, the yield of 2% glutaraldehyde in AFB detection is statistically greater ( $p = 0.039$ ). The use of disinfectants for mucus digestion in sputum processing improves AFB detection and can provide protection to health care workers from risk of laboratory TB exposure. **(Author's abstract)**

Medicine. Disinfectants. Sodium hypochlorite. Glutaraldehyde. Mycobactericidal. Tuberculosis. Sputum. Microscopy.

- 0326** Cost-effectiveness analysis of imidapril compared to metoprolol in the treatment of stage 1 essential hypertension among Filipino patients seen at the Philippine General Hospital. Wentian, He, Jimeno, Cecilia A., Panelo, Carlo Irwin A.. **Acta Medica Philippina**, , 40(1):29-36

**Objective:** To evaluate the cost-effectiveness of imidapril versus metoprolol as monotherapy in Filipino patients with Stage 1 essential hypertension.

**Study design:** Cost-effectiveness analysis from the perspective of the health care payer.

**Method:** Medical records of 94 out-patients aged 40-70 years old, with Stage 1 essential hypertension and follow-up treatment of 3 months at the Philippine General Hospital were reviewed. Effectiveness of each drug was based on: 1) percentage of patients achieving target blood pressure (<140/90 mmHg); and 2) mean reduction of systolic and diastolic blood pressure. Cost-effectiveness ratio (ICER).

**Results:** The mean cost of treatment with metoprolol was significantly lower than imidapril. However, treatment with imidapril resulted in a statistically significantly better blood pressure control compared to metoprolol; 77% of those given imidapril achieved the target BP vs 56% for metoprolol ( $p=0.03$ ). CER and the ICER showed that 3-months treatment with metoprolol is more cost-effective than the use of imidapril.

**Conclusion:** Use of metoprolol over a 3-month period is more cost-effective than imidapril in the treatment of Filipino patients with Stage 1 essential hypertension.  
**(Author's abstract)**

Medicine. metoprolol. imidapril. hypertension.

- 0327** A cross-sectional study of the clinical profile and management of patients with paronychia. Batac, Maria Christina R., Nicolas, Marie Eleanore O.. *Acta Medica Philippina*, , 40(2):33-38

**Research Question:** What is the clinical profile of patients diagnosed with acute and chronic paronychia? Do patients with acute paronychia differ from those with chronic paronychia according to sociodemographic factors, medical illnesses, history of repeated exposure to water and mechanical trauma?

**Background:** Paronychia is a superficial inflammation of the nail folds causing marked pain and discomfort. There are two basic types - acute and chronic. Although, a common cause of hand infection, it is a preventable dermatological problem as well. To date, epidemiological studies on acute and chronic paronychia in the Philippines does not exist

**General Study Design:** Cross-sectional, retrospective study

**Participants:** All patients who consulted at the Section of Dermatology, Out-Patient Department of the Philippine General Hospital between January 1999 to December 2003 in whom paronychia was diagnosed was included in the study. Chart review was done.

**Outcome measures:** The clinical profile of the patients diagnosed with acute and chronic paronychia was described. The patients with acute and chronic paronychia were compared according to sociodemographic factors, medical illnesses, history of repeated exposure to water and mechanical trauma. Consultation behavior and management were described.

**Analysis:** Qualitative variables were described in frequencies and percentage. The

mean and standard deviation of quantitative variables were computed. The comparison of acute and chronic paronychia patients according to the distribution of relevant factors was determined using the Chi-square test and the Fisher exact test.

**Results:** Hospital record show a total of 252 patients were diagnosed with paronychia (0.46% of new dermatological cases). A total of 193 (77%) charts were retrieved and included in the study. Acute paronychia commonly affected younger patients than chronic paronychia ( $36.71 \pm 23.51$  vs  $42.38 \pm 16.68$ ,  $p=0.08$ ). The female to male ratio is 3:1. Patients with acute paronychia did not differ from those with chronic paronychia according to sociodemographic factors, concomitant medical conditions or presence of localized skin lesions. The duration of illness was four months for acute and three years for chronic paronychia. History of nail manipulation was significantly more frequent among those with acute paronychia ( $p\text{-value} = 0.001$ ). The most common digits involved were the same for both acute and chronic paronychia, namely the 1st and 3rd digits of the right hand and both toes. Medical management of patients varied among dermatologists within the institution (from monotherapy to combination therapy, and use of antibacterials, antifungals or steroids). Majority of the patients with acute paronychia were given oral antifungals (46.6%). Notably, acute paronychia patients complied better with follow-up schedules.

**Conclusions:** Among the factors investigated, only trauma or nail manipulation was found to be significantly more frequent among patients with acute paronychia compared to those with chronic paronychia. A standardized form for charting acute and chronic paronychia patients, formulation of evidence-based treatment guidelines, and public education on paronychia are hereby recommended. **(Author's abstract)**

Medicine. Paronychia. Epidemiology.

**0328** Current and future touch researches in the Philippines. Cifra, Herminia L., Sancho, Melanie N.. **Acta Medica Philippina**, , 40(1):63-67

Indeed, touch therapy has opened many avenues both in health maintenance, promotion of health and prevention of disease and even its cure. Such diverse application of touch therapy have encouraged the medical world to further investigate and support such applications with clinical trials. It is already established that touch is critical to physiology and social development.

It cannot also be denied that modern endocrinology, neurology, gastroenterology, immunology and sociology laboratories have supported us in this work. What used to be just conjectures and observations have now been pathophysiologically substantiated. Medical science is really more than what meets the eye, because "the hand is feeling more evidences that were in the dark before".

Thus, modern scientific evidence is revealing what our ancestors have been telling us long time ago - that touch maintains and enhances health and heals us all. **(Author's summary)**

Medicine. touch therapy. touch. therapy.

- 0329** Death certificates. Tolabing, Ma. Carmen C., Tinio, Christine S., Carnate, Josephine M.. **The Medical Journal of De La Salle University**, , 12(3):3-8

**Objective:** To determine the completeness and acceptability of the cause of death statements on death certificates and to assess the factors that affect them.

**Setting;** Cavite Municipalities

**Design:** Cross sectional survey

**Outcome Measures:** Completeness was defined as all 3 cause of death items having been filled up. Acceptability was defined as all 3 cause of death items having been filled up in a casual, chronological sequence without an incorrect entry as listed in the International Classification of Diseases.

**Methods:** Multistaged sampling of 23 municipalities in Cavite was performed. Each death certificate was recorded in standard forms documenting the underlying, antecedent and immediate causes of death, certifying persons, whether autopsy was done and place of autopsy.

**Results:** Of the 3,000 death certificates from 10 of the 23 municipalities of Cavite, only 19.7% (95% CI=13%-26%) were complete. Of these only 12.5% (95% CI=8%-16%) were deemed acceptable. More than half of the death certificates (61.3%) were filled up by the public health officers (PHOs). Non-PHOs filled up more death certificates which were complete. PHOs filled up more death certificates which were acceptable ( $p=.000$ ). Deaths in hospital had higher completeness rates ( $p=.000$ ); deaths outside hospitals had higher acceptability rates. Performance of autopsy was associated with higher completeness rates ( $p=.000$ ) but not acceptability rates ( $p=.169$ ).

**Conclusions:** Death certificates are a poor source of data on causes of death. Type of physician, place of death and performance of autopsy affect the completeness and acceptability of death certification. (**Author's abstract**)

Medicine. Death certificates. Cross sectional survey.

- 0330** Work demands, musculoskeletal symptoms and carpal tunnel syndrome among workers in Philippine manufacturing industries. del Prado-Lu, Jinky Leilanie. **Acta Medica Philippina**, , 40(1):49-53

The study looked into musculoskeletal disorders, particularly hand and wrist pain, that may be associated with Carpal Tunnel Syndrome (CTS) among 495 workers in manufacturing industries. Questionnaires and physical assessment test were performed. Phalen's and Tinell's test were positive in 2.4% and 7.1% of respondents, respectively. Pain in the upper extremity was felt by 14.7% of respondents, while limitation of motion and affection of activities of daily living were present in 0.6% and

0.8% respectively. On Chi Square analysis, Phalen's and Tinel's test were significantly associated with pain and discomfort in the hands, wrists and shoulders, respectively ( $p=0.022$  and  $0.049$ ). Logistic regression showed that Phalen's test was 1.36 times more likely among those with upper extremity pain. Handling difficult to grasp items and performing high precision movements increased a positive Tinel's sign by 21 and 22 times, respectively. Interventional strategies and possibilities for future studies were also discussed. **(Author's abstract)**

Medicine. Carpal tunnel syndrome. Phalen's test. Tinel's sign.

- 0331** Different levels of confinement stress. Domingo, Doreen D., Saguid, Asuncion C.. **Transactions of the National Academy of Science and Technology**, , 34(1):72

Stress response occurs in an animal if it perceives an external condition (stressor) that threatens to compromise its well being. This involves: (1) release of catecholamines, associated with sympathetic stimulation causing physiological response called the fight-or-flight response; and (2) release of glucocorticoids, giving suppressive effects on the immune system specifically the white blood cell count. To demonstrate how different levels of confinement stress can affect the immune system of white mice differential white blood cell (WBC) count was performed considering with (experimental) and without (control) application of confinement stress to male and female mice using different PVC pipes with different chamber diameters: 2.0 in., 1.75 in, 1.5 in, and 1.25 in. As a result, lymphocytes decrease in number (male:  $\bar{x}_l = 38.00, 35.00, 33.50, 25.00$ , female:  $\bar{x}_l = 45.50, 44.00, 33.50, 29.50$ ) as the diameter of the confinement chambers decrease (from 2.0 in, 1.75 in, 1.5 in, 1.25 in). High magnitude of stress is shown in the smallest diameter (1.25 in) of confinement chamber. Ironically, the number of neutrophils increases (male:  $\bar{x}_n = 17.00, 23.50, 32.50, 40.00$ , female:  $\bar{x}_n = 17.50, 21.50, 32.50, 39.50$ ) as the diameter of the chambers decreases. Hence, as lymphocytes decrease, the neutrophil count increases in both male and female mice. The effect of the different levels of confinement chambers between male and female mice was comparable. Hence, confinement stress has a role impact on the immune system as demonstrated in the differential WBC of white mice. **(Author's abstract)**

Medicine. Confinement. Differential WBC. Stress. White mice. Neutrophil. Lymphocyte.

- 0332** Early diagnosis and specialist care in the management of congenital hypothyroidism. David-Padilla, Carmencita, Cordero, Cynthia P., Navarro, Jacqueline O., Capistrano-Estrada, Sylvia. **Acta Medica Philippina**, , 45(4):40-45

**Background:** Newborn screening for congenital hypothyroidism (CH) in the Philippines was introduced in 1996. It is universally accepted that early detection through newborn screening and timely treatment can improve the physical and neuro-cognitive development of patients. as of December 2010, the prevalence of CH is 1 in 3,324 among 2,389,959 newborns screened.

**Objective:** We sought to evaluate the role of timing of diagnosis, compliance with treatment, and specialist care on growth and development (mental and physical) of

patients with congenital hypothyroidism detected through newborn screening.

**Methods:** Of the 326 patients identified through newborn screening between July 1996-December 2008 at the Newborn Screening Center-National Institutes of Health, 86 patients participated in the study. With the parents' or guardians' consent, general physical examination and neuro-cognitive evaluation were done; FT4 and TSH were determined. Prevalence of poor control of disease (high TSH with normal or low FT4 or normal TSH with low FT4), stunting, and cognitive delay were each estimated at 95% confidence level and the associations of early diagnosis, initial and continuing specialist care with these conditions were determined by multiple logistic regression analyses.

**Results:** The prevalence (95% confidence interval) were: poor control of disease 63% (52-73%), stunting 24% (15-34%) and neuro-developmental delay 17% (8-25%), Delay in one aspect of neuro-development was seen in 54% (43-66%). Early diagnosis was protective against poor control of disease (adjusted Odds Ratio, ORa= 0.24 [CI: 0.08-0.77]). Trends towards protection were seen for initial and continuing specialist care. For delay in at least one cognitive aspect, early diagnosis was found to be protective (ORa=0.19 [CI 0.05-0.76]); results for specialist care were inconclusive. For stunting, low parent education was found to be a risk factor. (ORa of 5.45 [CI: 1.3-22.7]).

**Conclusion:** Fifty-four percent of the study patients had delay in one aspect of neuro-development. While other factors play a role in the outcome of CH, early diagnosis and treatment were shown to be protective of patients from poor control of disease and cognitive delays. Observed trends of positive benefits of specialist care at onset and continuing medical management , and the association of low parent education with poor growth should be considered in drafting specific guidelines for the long term follow-up care and monitoring of CH patients detected through newborn screening. The low percentage of participation and incomplete retrieval of information are major limitations of this retrospective study. This stresses the need for better monitoring tools that will ensure proper tracking, medical care and evaluation of CH patients. **(Author's abstract)**

Neurocognitive development. Compliance. Medicine. Congenital hypothyroidism.

- 0333** Efficacy of *Mycobacterium vaccae* as an immunotherapeutic agent in the management of susceptible and multi-drug resistant pulmonary tuberculosis. Montoya, Jaime C., Molina, Ernesto, Tan, Finaflor, Velmonte, Melecia A., Sombrero, Lydia, Ang, Concepcion F.. **Acta Medica Philippina**, , 40(2):20-27

Patients who consulted at the TB Clinic of the Section of Infectious Diseases, Department of Medicine, UP-PGH and the Quezon Institute from January 1993 to June 1997 with microbiologically proven pulmonary tuberculosis based on a positive AFB smear and culture were included in the study. A total of 78 patients were classified as susceptible or uncomplicated TB while 65 patients were classified as multi-drug resistant TB or complicated TB. Both of the susceptible and multi-drug resistant tuberculosis were randomly assigned to either the immunotherapy (given an intradermal injection of *Mycobacterium vaccae*) or the non-immunotherapy group (without the intradermal injection of *Mycobacterium vaccae*).

Using the time for sputum conversion to negativity in weeks as primary outcome, all of the patients were followed-up. Results show that for the susceptible or uncomplicated tuberculosis, there is an earlier conversion of sputum smear and culture to negativity in patients given the immunotherapy as compared to those who did not receive the immunotherapy (51.16% vs 40.00% at 2 weeks respectively). Conversion rates, however, became comparable by the 12<sup>th</sup> week of chemotherapy (90.70% vs 88.57% respectively).

Secondary parameters of weight gain were likewise higher for the Immunotherapy Group as compared to the Non-Immunotherapy Group. For the multi-drug resistant or complicated cases, the mean time for sputum conversion was also compared between the immunotherapy and the non-immunotherapy group. Utilizing the Kruskal-Wallis one way analysis of variance, there was statistical significance. When we analyzed the effect of resistance to each drug on the time for sputum conversion to negativity utilizing the chi-square, only ethambutol and pyrazinamide were shown to have significance. This means that immunotherapy had a more beneficial effect on earlier sputum conversion when the resistance was to ethambutol or pyrazinamide.

These results demonstrate the potential usefulness of *Mycobacterium vaccae* as an immunotherapeutic agent in the management of both susceptible *M. tuberculosis* or uncomplicated PTB and complicated or multi-drug resistant cases. The addition of *Mycobacterium vaccae* at one to two weeks after initiation of chemotherapy may lead to earlier sputum negativity by both smear and culture. **(Author's abstract)**

Medicine. *Mycobacterium vaccae*. immunotherapeutic agent. multi-drug. pulmonary tuberculosis.

- 0334** Factors influencing early termination of breastfeeding among mothers who delivered in a rural tertiary baby-friendly hospital. Lopez, Bettina K.. **The Medical Journal of De La Salle University**, 12(4):23-27

**Objective:** To determine the factors associated with the early termination of breastfeeding among mothers who delivered at a rural, baby friendly hospital.

**Materials and Methods:** Prospective cohort study at De La Salle University Medical Center Dasmariñas, Cavite. Two hundred fifty randomly selected mothers who delivered healthy singletons weighing more than 2500 grams, from June 1995 to April 1996 and who initiated pure breastfeeding during rooming-in period of hospital stay were included in the study. Excluded were mothers of babies who had to stay at the Neonatal Intensive Care Unit (NICU) or who initiated bottlefeeding during rooming-in due to various medical reasons. The demographic, family-related and clinical data were taken and the mothers were followed until the termination of breastfeeding. Early termination was considered to have occurred when the mother stopped breastfeeding before the end of the third month of her infant. The relative risk were calculated to determine whether the above mentioned variables were risk factors influencing the occurrence of early termination. The Mantel Haensel chi square test was used to determine any association between the factors and outcome.

**Results:** Mothers who were less than 15 years or more than 35 years old, working, without prior breastfeeding experience, delivered via Cesarean section, primis, with no breastfeeding orientation during prenatal visits, had their babies roomed-in after more

than six hours after delivery and had a longer hospital stay, were two to eight times more likely to terminate breastfeeding early. The factors were significantly associated with early termination of breastfeeding ( $p$  value  $< 0.05$ ), and thus, there is sufficient statistical evidence that the factors are related to early termination of breastfeeding.

**Conclusion:** Women with the factors found to be associated with early termination of breastfeeding in this study should be identified so that obstetricians and pediatricians may be able to anticipate premature cessation of breastfeeding.  
(Author's abstract)

Medicine. breastfeeding. Mantel Haensel chi. square test. baby friendly hospital.

- 0335** Factors influencing rooming-in and breastfeeding practices in private tertiary hospital. Frias, IV, Melchor Victor. **The Medical Journal of De La Salle University**, , 11(3):19-24

**Objective:** To determine and analyze the barriers to implementation of the Rooming-in, Breastfeeding and Breastmilk Feeding Policy in private tertiary hospitals.

**Design:** Semi-structured interview survey.

**Setting:** Private tertiary hospital in Metro Manila with Rooming-in and Breastfeeding Policies.

**Participants:** Random selection of 100 physicians for the main technical analysis and administrators, nurses, mothers, nutritional company executives and representatives for the preliminary data collection.

**Measurements:** Questions were focused on the applicability or implementability of the policy, possible barriers to implementation and possible solutions. Questions regarding major barriers to the adaption of the guidelines in clinical practice were asked. Specific vested interest and values were also determined.

**Main results:** Overall only 40% of the 100 physicians thought that it was feasible to implement the policy in their setting. The major barriers to establish behaviour or practice change in line with the legislated policy may be grouped in to 4 categories: (1) Patient factors-the common barrier noted was the predominance of working mothers as patients, (2) practice setting-where the predominance pay-patients was the most important barrier cited, (3) administrative system-where the problem of rooming-in was not considered as an established policy but a guideline, and (4) implementation instruments-where the use of passive methods were cited as barriers to effective implementation.

**Conclusion:** The study showed that there are many barriers to the implementation of rooming-in policy insofar as establishing practice change is concerned that it is impossible to expect a single effective solution. Some of the strategies used lack demonstrable impact. There should be an incorporation of various approaches to policy implementation to achieve the goal of appropriate behavior or practice change.  
(Author's abstract)

Medicine. rooming-in. breastfeeding. Breastfeeding policy.

- 0336** Familial cerebellar ataxia. Escobin, Ailsa A.. **The Medical Journal of De La Salle University**, , 12(4):36-40

Among the degenerative disorders of the nervous system, there exists a group of relatively rare progressive disorders or syndromes which are all genetically determined. In some families, these disorders are inherited as autosomal dominant traits, in others, despite similar clinical features, as autosomal recessive. A case of a 46-year old female with slowly progressing and worsening gait ataxia, dysmetria and dysarthria is presented. Similar clinical features occurring at about the same age are noted in several members of the family spanning five generation. This type of familial cerebellar ataxia is most probably inherited as an autosomal dominant trait. **(Author's abstract)**

Medicine. cerebellar ataxia. ataxia. autosomal recessive.

- 0337** Food allergy. Biñas, Vicky Eng-Wee, Gonzalez-Andaya, Agnes M.. **Philippine Journal of Allergy, Asthma and Immunology**, , 9(1):2-3

This brief report is about food allergy, the toxic and non-toxic reaction of an individual after eating a certain food or food additive. It discussed the case of a 6-month old infant who has been treated for "urticaria, vomiting, and diarrhea." Aside from taking the medical history of the patient, it is important to review the medical history of the lactating mother, as well. Review of the patient's history found that she had an "atopic dermatitis" when she was one-month old. On the other hand, her mother was found to suffer from asthma during childhood. Previous studies have found that usually, chicken egg causes food allergy, thus, in this case, the egg became the suspected "food allergen." Skin prick test was used on patients who are candidates for IgE-mediated food allergy; IgE being Type I hypersensitivity reaction. After the patient proved positive for food allergy, food that is causing the allergen was avoided. The report cited that children usually overcome their allergies when they get to be 2 or 3 years old.

Medicine.

- 0338** Functional health performance outcomes of compliance to home instruction program. Ocampo-Balabagno, Araceli V. **Philippine Journal of Nursing**, , 69(3-4):20-29

The home instruction program was prescribed as an intervention during recovery and adjustment after myocardial infarction. The intervention was based on the concepts of interaction, goal setting and information support. It included cognitive information on myocardial infarction, walking program and self-care monitoring strategies. It was posited that by increasing interaction between the client, the nurse and significant others, successful adjustment and recovery by complying with the

home instruction program will improve functional health performance outcomes. Compliance involved a transaction process that helped the client towards successful mastery of the adjustment process. Functional health performance was defined according to the weighted scores of quality of life indicators, perceived exertion to walking and treadmill exercise test in metabolic equivalent of a task scores.

Thirty male clients with mean age of 53.43 years participated in the study. The results based on a before and after analysis showed that the clients who completed the study were generally compliant and attained significant functional health performance scores ( $p=0.00066$ ). These were supported by better performance scores in the treadmill exercise tests ( $p=0.00016$ ). Majority of those who reported under exertion before the intervention perceived that they have attained a comfortable challenge when walking after the program. Although the findings were consistent with the literature, cautious interpretation is recommended. There were limitations to the study brought about by the limited sample size.

Compliance alone did not explain the improvement in functional health performance. An interaction of factors have contributed to the overall improvement. The data from the focus group discussion showed that clients derived emotional support primarily from their spouses and instrumental support from the home care services of nurses. The home instruction program provided for a gradually increasing area of interaction. Clients learned to utilize the information effectively that helped facilitate adjustment. The transaction process during the adjustment process was characterized by eight mastery attributes and indicators. These were on the following themes: better self-esteem, increased competence in problem solving, confidence in physical ability, a more giving self, enhanced capability to communicate with the nurse and the health team, improved family relationships, closer relationship with God, and improved self care. Triangulation of the data helped confirm quantitative findings.  
(Author's abstract)

Medicine. home instruction program. myocardial infarction. cognitive information.

**0339** Gene silencing of VP9. Alenton, Rod Russel R., Maningas, Mary Beth B.. **Transactions of the National Academy of Science and Technology**, , 34(1):80

White Spot Syndrome Virus (WSSV) remains the most widespread and devastating infectious agent that hit the shrimp aquaculture industry worldwide. To date, there are no available cost-effective remedies yet for WSSV infection. Hence, functional studies on genes critical for viral infection, is essential in elucidating shrimp-virus interaction. Here we report, a newly identified WSSV gene, VP9, a non-structural protein predicted to have possible involvement in viral transcription. This study utilized gene knock-down technology through RNA Interference, to elucidate the function of VP9 in shrimp-virus interaction. Three set-up using twenty-two (22) *Macrobrachium rosenbergii daqueti* shrimps were prepared for treatment of dsRNA-VP9, dsRNA-GFP, and Phosphate Buffer Saline (PBS). Each shrimp was challenged with WSSV and survival rate was recorded. Three (3) shrimps were sampled on day 0, 1, 3, and 7 post-infection for gene expression analysis by RT-PCR. The VP9- and GFP-dsRNA injected shrimps showed a significant survival rate at 60 and 50 percent survival, respectively, compared to that of the PBS injected shrimp. Silencing of specific WSSV genes was observed as early as day 1 post infection, which further corroborates our challenge test data. Results showed that VP9 is critical in WSSV infectivity to the shrimp host. Therefore, silencing of VP9 might pave the way in preventing WSSV

infection in shrimp. **(Author's abstract)**

Medicine. Gene silencing. Double-stranded RNA interference. White spot syndrome virus.

- 0340** Genetic polymorphism of CYP2D6\*10 gene among Filipinos. Baclig, Michael O., Predicala, Rey Z., Mapua, Cynthia A., Daroy, Maria Luisa G., Tiamson, Ma. Elena B., Palabrica, Maria Luisa D., Atillo, Roy P., Torres, Ronald Allan R., Tobias, Sheryl S., Javier, Francis O., Natividad, Filipinas F.. **Transactions of the National Academy of Science and Technology**, , 33(1):202

Cytochrome P450 9CYP2D6) is one of the major drug metabolizing enzymes involved in the biotransformation of many clinically important medications including opioid analgesics. CYP2D6 enzyme activity varies considerably within a population. Particularly, CYP2D6\*10 allele is more common among Oriental than among Caucasians. A recent study among Chinese individuals showed that the allele frequency of CYP2D6\*10 (C188T) was about 37-70%. Phenotypic expressions include individuals with ultrarapid, extensive, intermediate, and poor metabolizer status. It has been shown that the various phenotypes have profound effects on the efficacy of drugs as well as its adverse reactions.

In this study, we determined the allele and genotype frequencies of CYP2D6\*10 among Filipinos using PCR-RFLP and sequence analysis. Blood samples were obtained from healthy study participants and patients with chronic pain, with diagnosed cancer pathology stages 1 to 4.

The calculated allele frequencies in Hardy Weinberg equilibrium were 0.49 and 0.51 for the CYP2D6\*10 dominant and recessive alleles, respectively. Out of the seventy seven samples, 18 (23%) were identified as homozygous for the wild type, 40 (52%) were identified as heterozygous, and 19 (25%) were identified as homozygous for the mutant allele. Our results showed that majority of the Filipinos were heterozygous for the intermediate allele (52%).

PCR-RFLP and sequence analysis provides a useful tool for CYP2D6\*10 genotyping. The allele frequency of CYP2D6\*10 was comparable with other Asian populations. Individuals heterozygous for the intermediate allele were found to be the predominant genotype among Filipinos. **(Author's abstract)**

Medicine. Allele frequency. CYP2D6\*10. PCR-RFLP. Polymorphisms. Sequencing.

- 0341** Genotype-phenotype correlations in Filipino patients with type 3 gaucher disease. Silao, Catherine Lynn T., Chiong, Mary Anne D.. **Acta Medica Philippina**, , 45(4):30-34

Gaucher disease is an inherited glycolipid storage disorder caused by a deficiency of the lysosomal enzyme glucocerebrosidase. Clinical manifestations include hepatosplenomegaly, skeletal abnormalities, anemia and thrombocytopenia. We present here the corresponding genotype and the genotype-phenotype correlations of 3 Filipino patients. Clinical phenotypes and genotypes were documented by reviewing the charts of 3 Filipinos patients with Gaucher disease. Clinical parameters such as liver and spleen sizes, hematologic variables, disease types and response to enzyme

replacement therapy were compared. Likewise, quantitative enzyme assays and mutation analysis were reviewed.

All have the type III neuronopathic Gaucher disease. Patients 1 and 2 are twin sisters who both have mild mental retardation with Patient 1 having a concomitant seizure disorder. They have the corresponding genotype of p.L444/p.P319A. Patient 3 has global developmental delay, oculomotor apraxia, pyramidal tract signs and carries the p.L444P/p.G202R/p.G202R genotype. Genotype-phenotype correlations for the 3 patients showed that their genotypes are compatible with the severe neuronopathic type of disease. **(Author's abstract)**

Filipinos. Gaucher disease. Genotype - phenotype. Medicine.

**0342** Gestational trophoblastic diseases in the Philippines. Cagayan, Ma. Stephanie Fay S.. **Acta Medica Philippina**, , 40(1):7-12

**Objectives:** To describe the Philippine hospital-based prevalence rate of gestational trophoblastic disease (GTD) and to discuss changes in the management of GTD over the past decades.

**Study Design:** A retrospective descriptive study was done with the following as sources of data: published report on the national incidence of GTD from 1977-1984 and its management, the Philippine Obstetrical and Gynecological Society (POGS)-Committee on Nationwide Statistics Reports 1985-1994, the 1997-2001 POGS Annual Reports on Diseases and Procedures, the 1997-2001 POGS Trophoblastic Disease Registry, the 1991-2001 University of the Philippines-Philippine General Hospital (UP-PGH) Trophoblastic Disease Registry and Annual Reports and the 1991-2001 UP-PGH Dept. of Obstetrics and Gynecology Annual Reports on Diseases and Procedures.

**Results:** The prevalence rate of hydatidiform mole dropped from 7/1000 pregnancies in the early 80's to 2.7/1000 pregnancies from 1985-1994 with note of increase to 3.5/1000 in 1997-2001. At the UP-PGH the prevalence rate of hydatidiform mole is 13.96. This is because the hospital is a known tertiary referral center for GTDs. The national prevalence rate of choriocarcinomas and other trophoblastic neoplasias (GTN) has remained almost constant at 0.55 and 0.52 per 1000 pregnancies respectively from 1990-1994 and 1997-2001. Again, PGH showed a high prevalence for choriocarcinoma and other GTN at 8/1000 pregnancies. Because patients with GTD are invariably indigent modifications on standard treatment practices have been adapted to bring down the cost of chemotherapy without sacrificing survival and remission rates such as outpatient treatment with methotrexate as chemoprophylaxis and treatment for low risk GTN and use of modified EMA-CO for high risk GTN. Surgery has been widely used as an adjunct to treatment.

**Conclusion:** Despite advances in diagnosis and management of GTD, GTD remains a disease to reckon with in the country. Reasons for poor outcome such as poor patient compliance, inadequate/poor quality of reporting and inadequate resources in some areas should further be examined. **(Author's abstract)**

Medicine. Gestational trophoblastic disease. Chemotherapy. Surgery.

- 0343** Goodpasture's syndrome. Ramos, Josephine Diana D.. **The Medical Journal of De La Salle University**, , 12(3):20-22

The study described the case of a 16-year old female who exhibited fatigue and paleness of skin for three months prior to hospital admission from hemoptysis. She was initially admitted to a hospital in Cavite and a month later at a hospital in Manila, where she was diagnosed to have "anemia probably secondary to a renal disease." She was reported to be a non-drinker and non-smoker and similar condition was not common in her family. She was also observed to be "fairly nourished and fairly developed" upon admission. Her condition, medicine and laboratory tests results were outlined in the study during the entire duration of her treatment. She was discharged on the sixth day in the Manila hospital, but was admitted at the National Kidney Institute a week later. She expired after being admitted for 21 hours. The girl's condition revealed that she had what is called Goodpasture's syndrome, which possibly caused by "a viral infection that that the patient developed a week prior to admission."

Medicine. Goodpasture's syndrome. Hemoptysis. pulmonary hemorrhage.

- 0344** Hearing loss in a group of professional symphony orchestra musicians. Reyes-Quintos, Maria Rina, Gloria-Cruz, Teresa Luisa I.. **Acta Medica Philippina**, , 40(1):42-48

There are many conflicting reports about hearing loss among professional symphony orchestra musicians due to music. Foreign literature has shown prevalence rates ranging from 0 to 58%. Forty professional symphony orchestra musicians were surveyed and screened for hearing loss. Fifty percent of the musicians were determined to have hearing loss. Males were significantly more affected than females. Also, the musician's perceived hearing loss and his actual hearing sensitivity based on audiogram findings did not correspond. Additionally, factors such as the presence of tinnitus, length of time playing for the orchestra and type of instrument played were not able to determine whether or not the musician had hearing loss. The survey results and hearing screening test indicate that there is a need to educate the musician regarding noise, hearing protectors and the necessity to monitor their hearing. **(Author's abstract)**

Medicine. Hearing loss. Hearing protectors. Noise-induced hearing loss. Musicians.

- 0345** Hematological indices, nutrient intake and health status of older adults in selected suburban filipino community. Dungca, Julieta Z., Patron, Aileen C., Liwanag, Ma. Cristina S.J., Bermido, Charito M., Balintona, Veron, Yabut, Erna V.. **Philippine Journal of Science**, , 141(2):197-205

This study investigated the health status of 90 male and 169 female community-dwelling individuals  $\geq 60$  yrs in terms of the hematological values, nutritional status

and medical history. Hematological test results were obtained using an automated hematology analyzer. Interviews and pretested questionnaires were used to obtain the demographic profile, medical history and nutrient intake based on a 24-hour recall. Based on the WHO criteria of anemia (Hb < 120 g/L for female and < 130 g/L for male), 21.6% were anemic. Of these, 78.6% have normocytic normochromic type, while 10.7% have hypochromic microcytic type. Leukocytosis was observed in 8.1%, eosinophilia in 26%, and lymphocytosis in 7.7% of the participants. Age was found to be inversely correlated with the erythrocyte count ( $p < 0.01$ ) but positively correlated with the mean corpuscular volume ( $p < 0.01$ ). Arthritis (36%) and hypertension (29.3%) were the most common health complaints. Inadequate protein, energy and calcium intake were noted in 83.6%, 77.6%, and 91.1%, respectively. Almost all of those who were found anemic had deficiency in iron and thiamine. The findings of high proportion of older adults with abnormal hematological values and deficiencies in major nutrients, may suggest an impaired health status that warrants immediate medical attention. Likewise, the high incidence of anemia with eosinophilia and the very significant correlation between anemia and eosinophil count ( $p = 0.01$ ) may imply helminthic parasitic infection in this group of older individuals which has to be confirmed through fecalysis and allergy tests. **(Author's abstract)**

Medicine. Anemia. Eosinophilia. Hemoglobin. Leukocytosis. Nutritional intake. Older person (> 60 yrs).

- 0346** The immune response in allergic inflammation. Ong, Remedios C.. **Philippine Journal of Allergy, Asthma and Immunology**, , 9(1):4-7

The article is based on the premise that to be able to treat patients suffering from atopic diseases like asthma, allergic rhinitis and dermatitis, one needs to have a "basic knowledge of immune response." Thus, the paper outlines the origin of cells, the types of immunity, the subdivisions of cells, response to allergens and mediators of allergic inflammation. It also mentioned the third group of TH cells which may probably be the explanation on why given the same level of exposure to harmless environmental allergens, some people do not exhibit "hypersensitivity reactions" as exhibited by the atopic patients. The paper gives the following conclusion: "Allergic inflammation becomes self-perpetuating and begets more inflammation. And it is in understanding these molecular processes that will enable the clinicians to better understand what's going on with their atopic patients and how to treat them better through strategies that interrupt vicious and self-perpetrating cycle of allergic inflammation."

Medicine.

- 0347** Immunodeficiency and thymoma with uterine malignancy. Danguilan, Romina A., Padua, Florecita, R.. **Philippine Journal of Allergy, Asthma and Immunology**, , 11(1):4-6

This report is about the case of a 40-year old patient who suffered from a low grade carcinoma, with severe infection associated with Good's syndrome. "Good's syndrome is defined as thymoma in patients with adult-onset immune-deficiency that is characterized by hypogammaglobulinemia, reduced or absent B cells, variable

defects in cell-mediated immunity with CD4+ T lymphopenia and an inverted CD4:CD8+ T cell ratio. It usually occurs after the fourth decade of life." The patient's medical history shows that she had undergone thymectomy in 2005. The patient has been suffering from abdominal pain for about 2 weeks. Upon admission, she was feverish. Tests also showed an abnormal liver function. Eventually, the patient was confirmed to have a malignancy. However, it became difficult to control her infections. On the 32nd day, she suffered from rectal pain. Apparently, the low grade carcinoma spread to rectal mucosa and there was a need for chemotherapy. The proponent of the study recommended in the study: "Peripheral B cells, CD4+ and CD8+ T cell ratios and quantitative serum immunoglobulins should be considered in all patients presenting with recurrent infection and thymoma, to maintain appropriate IgG values that may prevent life-threatening complications."

Medicine.

- 0348** Intravenous pamidronate treatment in Filipino children with moderate to severe osteogenesis imperfecta. Cutiongco-de la Paz, Eva Maria, David-Padilla, Carmencita, Cavan, Barba Charina V., Chiong, Mary Anne D., de Dios, John Karl L., Alcausin, Maria Melanie B.. **Acta Medica Philippina**, , 45(4):35-39

**Objective:** To present preliminary data on the effects of intravenous pamidronate in children with moderate to severe Osteogenesis Imperfecta (OI).

**Methods:** This is a retrospective study wherein a review of medical records and available serial radiographs of children (N=14) with moderate to severe OI started on pamidronate from 2006 to 2010 was done.

**Results:** Two children have OI Type I, 8 have OI Type III and 4 have OI type IV. At baseline, 2 had normal height, 8 had height <-2SD and the rest with <-1SD. Twelve out of 14 had vertebral compression fractures. Mean age at start of pamidronate was 5.4 years (range 0.5- 11 years). First infusion fever in five patients and transient generalized macular rash in one child were noted. Serum calcium and phosphorus levels were normal at baseline and remained stable. Based on parental report, improvement of motor function was noted. In the 10 children who had at least a year of treatment, long bone fractures decreased from a mean annualized fracture rate of 2.6 at baseline to 0.9. In patients with vertebral compression fractures, serial radiographs showed improvement of vertebral shape.

**Conclusion:** This preliminary study show that treatment was generally well tolerated and led to decrease in long bone fractures, improved vertebral shape and improved function. **(Author's abstract)**

Primary osteoporosis. Bisphosphonate. Osteogenesis imperfecta. Medicine.

- 0349** An in-vitro study on Soro-soro plant vs Chloramphenicol in the treatment of Staphylococcal infections such as acute otitis externa. Acuin, Jose M., Vyingco, Jr., Antonio P.. **The Medical Journal of De La Salle University**, , 12(1):5-7

**Objective:** To determine the efficacy of soro-soro (Family Euphorbiaceae, genus *Euphorbia* linnaeus) plant juice for the treatment of acute otitis externa and to compare the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of crude and pure extracts of soro-soro plant juice with topical chloramphenicol.

**Materials and Methods:** Crude plant juice was prepared and diluted two and four-fold; 5-ml of pure extract was obtained from air-dried leaves and subjected to a rotary vaporization unit. Blank test discs were soaked with the crude extract in its pure and diluted forms. Chloramphenicol disc served as the gold standard and distilled water as control. Kirby Bauer disk diffusion method was used to determine the antibiotic sensitivity of plant juice and chloramphenicol; broth method determines also MBC. A standard growth of *S. aureus* was streaked in Mueller-Hinton agar adjusted to 0.5 McFarlands. Discs were placed in agar and incubated at 35°C for 24 hours. Zone of inhibition was measured in ml.

**Results:** Crude extract had one-third the size of the inhibition zone as the test drug and at 4-fold dilution its anti-bacterial property was abolished. Pure extract had two-thirds the size of the inhibition zone and was abolished only at the 18-fold dilution of the Kirby Bauer method and at the 2-fold dilution by the broth method.

**Conclusion:** The crude extract has low MIC against *S. aureus* while the pure extract has moderately high MIC and MBC compared to chloramphenicol. That the crude extract, the form which is actually used to treat acute otitis media externa has low activity suggest that there may be other chemical properties such as astringency which may account for its efficacy. **(Author's abstract)**

Medicine.

- 0350** Isolated pulmonic valve endocarditis in a patient with ventricular septal defect. Caoele, Imelda C., Amil, Walid. **Acta Medica Philippina**, , 40(2):58-61

Congenital Heart Disease is the substrate for 11% to 31% of Infective Endocarditis cases in the Philippines. There has been 5 cases reported worldwide of isolated pulmonic valve endocarditis in a patient with VSD and none in the Philippines. This is a case of an isolated pulmonic valve endocarditis in a patient with VSD, which was echocardiographically documented and monitored and initially treated medically. The case also demonstrates the importance of echo in IE management. **(Author's abstract)**

Medicine. pulmonic valve endocarditis. endocarditis. pulmonic valve.

- 0351** Isolation and identification of constituents from the antitubercular DCM fraction from the leaf extract *Premna odorata* blanco. Lirio, Stephen B., Macabeo, Allan Patrick G., Franzblau, Scott G., Wang, Yuehong, Aguinaldo, Ma. Alicia M.. **Transactions of the National Academy of Science and Technology**, , 33(1):201

In recent years, the resurgence of multi- and extensively-drug resistant strains has prompted the need to develop safe drugs as quickly and efficiently as possible. In a previous study, the dichloromethane sub-extract (PoMD) obtained from the leaf extract of the Philippine medicinal plant *Premna odorata* Blanco was found to be active against *Mycobacterium tuberculosis* H<sub>37</sub>Rv, exhibiting 99% inhibition at 128 µg/mL and 64 µg/mL concentrations. This study aims to purify the dichloromethane sub-extract and identify the constituents present therein. The PoMD extract was subjected to vacuum liquid chromatography (VLC) with gradient elution using hexane/dichloromethane and dichloromethane/methanol. Thin layer chromatographic monitoring resulted in 20 pooled fractions which were bioassayed using Microplate Alamar Blue Assay (MABA). The fractions PoMD.4,5,7,8,9 and 15 were found to be active, having a minimum inhibitory concentration (MIC) of 53.87, 119.71, 117.12, 113.12, 82.80 and 108.91 µg/ml, respectively. The high yielding PoMD.8 was further subjected to VLC as above and gave 7 pooled fractions. PoMD.8.2 and PoMD.8.4 were further purified by column chromatography with isocratic elution using hexane to obtain PoMD.8.2.1 and PoMD.8.4.1 as white flakes. Both isolates were characterized by spectroscopic methods and were found to be a mixture of  $\beta$ -sitosterol and stigmasterol. Purification of the other fractions is ongoing. **(Author's abstract)**

Medicine. *Premna odorata* Blanco. *Mycobacterium tuberculosis* H<sub>37</sub>Rv. Tuberculosis. Philippine Medicinal Plant. Steroids.

- 0352** The knowledge, attitude and practices of the Ibalois of Tublay, Benguet on diarrhea. Lim, Joseph, Luancing, Jennifer, Manoloto, Joan, Medina, Arnold, Mullin, David, Ruebenfeldt, Karen, Tinana, Jasmin, Villar, Vanessa. **The Medical Journal of De La Salle University**, , 12(1):12-16

**Objective:** To determine the traditional knowledge of the Ibalois of Tublay, Benguet, on the causes, signs and symptoms of diarrhea, their attitudes and treatment practices, and ways of prevention.

**Materials and Methods:** Cluster sampling was employed to identify the respondents for the interview. There was a total of 668 respondents coming from four of eight barangays which included all family-designated heads. Anthropologists and previous researchers who had studied the Ibalois were also interviewed. Descriptive statistics was used for analysis.

**Results:** Only 20% believed in the supernatural causes of diarrhea; 90% believed that diarrhea is caused by drinking contaminated water. 95% believed that diarrhea can be life threatening. Barangay health centers had substantial impact on the tribe's current knowledge and practices. 95% use herbal medicine for treatment. Rituals like the canao are currently reserved for cases that are protracted and perceived to be caused by supernatural beings and not for acute illnesses. Present level of knowledge is up to date with modern Western medicine.

**Conclusion:** Responses show evidence of knowledge of Western medicine. On the other hand, the medical professions should promote further studies on traditional knowledge and uses of herbal medicine and advocate its uses. **(Author's abstract)**

Medicine. diarrhea. traditional knowledge. treatment practices.

- 0353** Low grade endometrial stromal sarcoma. Nadal, Ma. Carmencita. **The Medical Journal of De La Salle University**, , 11(2):12-16

A case of a 35 year old G<sub>3</sub>P<sub>3</sub> (3-0-0-3) Filipino diagnose to have low grade endometrial stromal sarcoma (pure homologous type) is presented. Vaginal bleeding with abdominal pain were the only presenting symptoms. Pelvic examination revealed a symmetrically enlarged corpus, compatible to that of eight weeks gestation size with a 4.0 cms. mass palpated on its right posterior wall. Pelvic ultrasonography suggested myoma uteri. Patient underwent Total Abdominal Hysterectomy with myoma uteri as the pre-operative diagnosis. Histopathology report revealed low grade endometrial stromal sarcoma. Patient was re-opened and Bilateral Salpingoophorectomy with Bilateral Lymphadenectomy was done. No diagnostic abnormality was found in these tissues.

Patient belonged to stage 1b based on the 1988 surgical staging by the Cancer Committee of the International Federation of Gynecologists and Obstetricians. Grossly, the tumor was confined to the uterus, measured 3.5 cms. in diameter and showed minimal myometrial invasion, all of which point to a good prognosis and overall survival.

The significance of this disease lies not only in its rarity but poses a great challenge in the specialty of gynecologic oncology in understanding its spectrum.  
**(Author's summary)**

myoma uteri. endometrial stromal sarcoma. sarcoma. Medicine.

- 0354** Lower extremity amputation in diabetes mellitus - De La Salle University Medical Center five-year experience. Uy, Maris, Padilla, Benita. **The Medical Journal of De La Salle University**, , 11(2):2-5

What has been shown in this study is that a good number of patients with diabetic foot were not previously diagnosed to have DM, majority of the patients were not taking medications for blood glucose regularly, and majority of the foot lesions were already in an advanced stage at the time of consultation so that amputation was inevitable. These findings have not been noted in other studies and highlight apparent deficiencies in our delivery of health care. They may reflect lack of awareness on the part of both patient and physician and/or the effect of socioeconomic constraints. The design of this study is inadequate to elucidate the reasons behind these findings but these are important issues that need to be addressed in the future.

A diabetes clinic is currently underway in this institution to increase patient awareness on the signs and symptoms of diabetes and its complications. Physicians and patients alike should be made fully aware of the different risk factors for amputation and once identified in a diabetic patient, frequent follow-ups should be done. It is likely, however that the etiologic web of this incapacitating yet potentially

preventable condition is complex and that multiple interventions are necessary. The establishment of the DLSU Diabetes Clinic will hopefully lay the groundwork for more aggressive programmes particularly those dealing with the seemingly neglected aspect of diabetes - proper foot care. **(Author's summary and recommendations)**

Medicine. diabetes mellitus. Lower extremity amputation. amputation. diabetic foot.

- 0355** What matters most to a patient after a myocardial infarction. Mojica, Jose Alvin P., Ramiro, Renald Peter T.. **The Medical Journal of De La Salle University**, , 12(2):6-8

Seven post-MI patient, 6 males and 1 female, aged 57 to 74 years (mean  $\pm$  SD: 62  $\pm$ ), who previously underwent Phase I cardiac rehabilitation and attended the mid-year cardiac rehabilitation class for out-patients, participated in this study to identify the concerns important to the patient's quality of life and to determine perceptions of well-being using the Reker-Wong questionnaire. Results showed that majority of the patients expressed fear of MI recurrence and worsening of their present cardiac status. Also, the mean score for perceived general well-being was 58 out of a possible maximum score of 98. These findings suggest that patient education should emphasize the alleviation of the concerns and fears about the worsening of the patient's cardiac status as well as the reduction of the risk for the recurrence of MI. **(Author's abstract)**

Medicine. Myocardial. Myocardial infarction. Reker-Wong. Cardiac rehabilitation.

- 0356** Medical student venture into the out-patient department. Manlangit, Christina, Morton, Kamel, Nolasco, Ma. Cecilia, Nolasco, Ma. Lourdes, Pelaez, Robert, Pineda, Eric, Recientes, Vunelyn, Rosales, Claribel, Singh, Jacob, Sta, Ana, IV, Antonio Enrique, Tapia, Rhoel, Vivo, Mariannes, Maderazo, Leilani, Nievaes, Sheba O, Noblejas, Ma. Rapunzel, Noche, Erwin D., Pizarra, Rowena B., Punzal, Rhodora T., Purification, Leah M., Sevilla, Reynaldo, Umayan, May Dominica L., Valdez, Maria Cecilia, Vilgera, Anna Liza C.. **The Medical Journal of De La Salle University**, , 12(3):9-19

**Objective:** To determine and prioritize problems in the OPD as perceived by OPD personnel and patients and to plan, implement and evaluate projects directed towards the priority problems.

**Setting:** Outpatient department (OPD) of De La Salle University Medical Center.

**Design:** Cross-sectional survey and action research

**Participants:** OPD personnel and patients

**Outcome measures:** Prioritized list of problems; and project reports

**Methods:** OPD personnel and patients were surveyed on OPD problems using validated questionnaires. The problem lists were then prioritized according to magnitude, social concern, amenability to technology and existence of health policies.

Causes of identified problems were analyzed using problem trees. Projects were then planned and implemented to address the causes of these problems.

**Results:** Two problems were identified: lack of cleanliness and long waiting time. About half of the patients (46.6%) felt that the OPD was only slightly clean. About a quarter of the patients (29.2%) waited for 2 to 3 hours before being seen by their physicians. Trash cans, billboards and pamphlets were placed in the OPD to promote sanitation and hygiene. Leaflets and posters were distributed to patients on OPD regulations and policies; the OPD management was urged to install more seats and line guides and to remind doctors to be more punctual.

**Recommendations:** The projects must be evaluated and sustained using OPD resources. Leaflets, questionnaires and posters must be improved to enhance patient compliance. **(Author's abstract)**

Medicine.

- 0357** Menkes disease mimicking non-accidental injury in a Filipino child. Chiong, Mary Anne D., Melendres, Cerissa T., Madrid, Bernadette J., Dion-Berboso, April Grace. **Acta Medica Philippina**, , 45(4):73-75

We report an 11-month-old male who presented with recurrent seizures, subdural bleed, skull fracture, lightly pigmented hair, and fair lax skin. Copper and ceruloplasmin levels were low and gross deletion of ATP7A gene was found confirming the diagnosis of Menkes disease. The presence of subdural bleed and skull fracture prompted a referral to the Child Protection Unit to rule out child abuse. **(Author's abstract)**

Subdural hemorrhage. Abnormal hair. Seizures. Menkes disease. Ceruloplasmin. Copper. Medicine.

- 0358** Mitochondrial encephalomyopathy lactic acidosis and stroke-like episodes (MELAS) in a two-year-old Filipino child. Chiong, Mary Anne D., Abacan, Mary Ann R.. **Acta Medica Philippina**, , 45(4):88-92

MELAS is a mitochondrial respiratory chain disorder characterized by progressive neurodegeneration associated with stroke-like episodes, increased plasma lactate levels and distinctive findings on neuroimaging studies. Here we describe a 2-year-old female who presented with sudden onset of right-sided hemiplegia accompanied by lactic acidosis and CT Scan findings of diffuse hypodensity of the cerebral white matter at the time of the stroke-like episode. The diagnosis was confirmed by mutation analysis on blood and hair which showed the typical mtDNA A3243G mutation. This is the first local report of a confirmed case of MELAS. **(Author's abstract)**

Childhood stroke. Mitochondrial respiratory chain disorder. MELAS. Medicine.

- 0359** Mitochondrial respiratory chain disorder in two Filipino children. David-Padilla, Carmencita, Chiong, Mary Anne D.. **Acta Medica Philippina**, , 45(4):76-80

Mitochondrial respiratory chain disorders have very diverse manifestations and can present with any symptoms, in any organ at any time. Here we described two Filipino children confirmed to have a mitochondrial respiratory chain disorder after presenting non-specific neurologic symptoms. The first patient had Otahara syndrome, and was later on found to have complex I deficiency. The second patient had the m.8993T>G mutation that was consistent with a Leigh phenotype (**Author's abstract**)

Leigh syndrome NARP phenotype. m.8993T>G mutation. Otahara syndrome. Complex I deficiency. Mitochondrial respiratory chain disorder. Medicine.

- 0360** Neonatal outcome of multiple birth in a rural tertiary care center. Nadal, Carmencita. **The Medical Journal of De La Salle University**, , 12(4):16-22

**Objective:** To describe the neonatal outcome of multiple deliveries in a rural tertiary care center.

**Materials and Methods:** Retrospective case series at a rural tertiary care center in Dasmariñas, Cavite. A review of the registry of deliveries from 1991 to 1995 in a tertiary care center was done. Maternal and neonatal charts of multiple deliveries during this period were retrieved and studied. Data on maternal characteristics as to age, gravidity, family history of twinning, prenatal check-ups, manner of delivery and antepartum diagnosis were taken. Neonatal outcome as to presentation, maturity, sex, APGAR score, birthweight, appropriateness of weight for age, mortality and morbidity were reviewed. Descriptive statistics using frequency distribution, rates and ratios were taken. Odds ratio, Mantel Haensel chisquare test and Fischer exact tests were used to determine relationship of birthweight maturity, birth order, manner of delivery and presentation, to mortality in multiple births.

**Results:** Multiple births occurred at 1.2% of total deliveries. Mean maternal age was 28.26 years old. Family history occurred only on 38.5% of cases. Majority were malpresented. Female sex was predominant. Very low birthweight and low birth weight were 12% and 55% respectively. Causes of morbidity were respiratory distress syndrome, sepsis, hypoglycemia and twin-to-twin transfusion syndrome. The neonatal mortality rate and the perinatal mortality rate were 2.89/1000 and 3.2/1000 livebirths, respectively. Twins delivered vaginally were 2.5 times at higher risk of dying (p value = 0.03). The odds ratio for prematurity and low birthweight were 45.9 for prematurity and 12.5 for low birth weight. Appropriateness of weight or age, birth order, presentation and antepartum diagnosis were not statistically significant with p value of more than 0.05.

**Conclusion:** This study gave an overview of the demographic and clinical features, causes and the factors that influence mortality and morbidity in the multiple birth population of a rural tertiary care center. (**Author's abstract**)

Medicine. multiple birth. rural tertiary care center. neonatal outcome. neonatal.

- 0361** Normative tympanometric values in young Filipino adults. Gloria-Cruz, Teresa Luisa I., Majam, Jerial John C., Abes, Generoso T.. **Acta Medica Philippina**, , 40(1):13-16

**Objective:** To determine the normative tympanometric values of Static Admittance (Peak Y) and Equivalent Ear Canal Volume (Veq) in young Filipino adults.

**Methodology:** Subjects who fulfilled the inclusion criteria of: normal audiometry thresholds for 3 frequencies, no medical history of ear disease and no abnormal otoscopy findings, underwent tympanometry. Results of tympanometry parameters were subjected to statistical analysis.

**Results:** Twenty-one males and twenty-nine females were included, with age range of 21-29 years. Mean values were Peak Y=.4856 and Veq=1.3130. There was no significant difference between the right and left ears for both parameters. Between males and females, there was no significant difference for Peak Y but there was significant difference for Veq.

**Conclusion:** This investigation is one of the initial studies formulating audiologic standards in the Philippines. These standards will be used in the practice of audiologists, otorhinolaryngologists, audiologic research and education. Although the clinical utility of the tympanometric variables seem limited for otorhinolaryngologists, these have some characteristics that may supplement patient care decisions for the ENT specialist, family physician and audiologist. **(Author's abstract)**

Medicine.

- 0362** Nutritional guidelines for Filipinos 2000. Cuaderno, Felices C., Cabrera, Ma. Isabel Z., Cruz, Arsenia J., Florentino, Rodolfo F., Tanchoco, Celeste C. **Philippine Journal of Nursing**, , 71(1-2):8-15

The set of Nutritional Guidelines for Filipinos 2000 edition, developed by a Technical Working Group (TWG) consisting of multi-disciplinary group of experts from food and nutrition research, public health, academe, nutritional policy and nutrition education has 10 key Nutrition Messages. These Nutrition Messages are in the form of clear, advisory statements, written in simple and non-technical terms that can be understood by at least elementary graduates. Each nutrition message is presented and briefly discussed in this paper. **(Author's abstract)**

Medicine. nutritonal guidelines. nutritional policy. key nutrition.

- 0363** The observed to predicted CSF WBC ratio. Buencamino, Blesilda, Frias, IV, Melchor Victor. **The Medical Journal of De La Salle University**, , 11(3):14-18

**Objective:** To determine the accuracy of cerebrospinal fluid (CSF) parameters from traumatic lumbar puncture, specifically the Observed to Predicted CSF White Blood Cell (WBC) Ratio (O:P Ratio) in diagnosing bacterial meningitis in neonates.

**Study Setting:** Tertiary Care Center Patients: Consecutive patients aged less than one month suspected to have central nervous system infection. All should have undergone lumbar puncture which was traumatic and CSF quantitative and qualitative analysis, and CSF culture.

**Measurements:** To evaluate the accuracy of the O:P ratio, the study estimated the sensitivity, specificity, and likelihood ratios in detecting bacterial meningitis associated with traumatic lumbar puncture using CSF culture as reference standard. A corresponding receiver operating characteristic (ROC) curve was developed to determine the cutoff value at which the test is optimally accurate

**Results:** 45 out of 100 patients had a CSF positive culture and the most common isolated organism is coagulase negative staphylococcus. The predicted WBC overexceeded that actually observed in all patients. The range of calculated O:P ratio was 0.2-330. Using the O:P ratio > 0.5 >1, >5, >10, >15, and >20 the sensitivity and specificity were 100% and 87%, 93% and 91%, 89% and 96%, 87% and 98%, 78% and 100%, 64% and 100% respectively.

**Conclusion:** The best O:P ratio cutoff value for determining the presence of bacterial meningitis from a traumatic lumbar puncture was >1. **(Author's abstract)**

Medicine. cerebrospinal fluid. WBC ratio. bacterial meningitis. CNS infection. CSF. lumbar puncture.

- 0364** Occurrence of birth defects at the Philippine General Hospital. Cutiongco-de la Paz, Eva Maria, Sur, Aster Lynn D., Tumalak, Ma-am Joy R., Ty, Kathryn S., Abadingo, Michelle E., Dion-Berboso, April Grace, David-Padilla, Carmencita. **Acta Medica Philippina**, , 45(4):20-29

**Introduction:** Birth defects are a global problem with impact particularly severe in middle- to low- income countries. In the Philippines, there is limited data on birth defects despite the fact that congenital anomalies have been in the top 10 causes of infant mortality. The objectives of the study were: 1) to determine the occurrence of birth defects among patients admitted to the Philippine General Hospital (PGH); 2) to present the distribution of patients by geographic location and age group distribution; 3) to categorize birth defects by organ systems; and 4) to categorize birth defects as either isolated, part of a recognizable syndrome, chromosomal syndrome or multi-malformed case.

**Methods:** Patients admitted to the PGH from 2001-2010 and reported to have major structural defects were included in this study. Case ascertainment was done through a review of medical records of all admitted patients age 0 to more than 65 years old. Patients with birth defects were assigned codes of the International Classification of Diseases (ICD)-10 classification.

**Results:** Of the 438,944 admissions to the PGH from 2001 to 2010, there were 8,686 (2.0%) patients with a diagnosis of at least one (1) birth defect. The most common birth defects are as follows: digestive system (3,605/8,686 or 41.5%),

cardiovascular system (2,839/8,686 or 32.7%), nervous system (1,070/8,686 or 12.3%), and genital organ anomalies (755/8,686 or 8.7%). The most common digestive system anomalies were cleft lip and or palate (1,548/8,686 or 17.8%), imperforate anus (698/8,686 or 8%) and Hirschsprung disease (582/8,686 or 6.7%). Most of the cardiovascular system anomalies were congenital malformations of the cardiac septa (1,160/8,686 or 13.4%) and the great arteries (769/8,686 or 8.9%), while most of the nervous system anomalies were due to congenital hydrocephalus (347/8,686 or 4%) encephalocoele (303/8,686 or 3.5%) and spina bifida (193/8,686 or 2.22%). The most common genital organ anomalies were hypospadias (340/8,686 or 3.9%) and undescended testicle (233/8,686 or 2.7%). Majority (4,042/8,686 or 46.5%) of birth defects cases came from the National Capital Region (NCR) while 32.5% (or 2,827/8,686) of the cases came from Region IV-A or Cavute, Laguna, Batangas, Rizal and Quezon (CALABARZON) Region.

**Conclusion:** The results of this study show that the most common birth defects are digestive, cardiovascular, nervous system, and genital organ anomalies. This trend is similar to those reported internationally. The findings of the study can be the basis of policies toward the development and implementation of practical strategies for primary and secondary prevention of birth defects among Filipinos. **(Author's abstract)**

Surveillance. Major birth defects. Birth defects. Medicine.

- 0365** Occurrence of methicillin-resistant *Staphylococcus aureus* (MRSA) among the health workers of Rizal Provincial Hospital and characterization for the presence of *luks-lukf* PVL gene. San Juan, Joland A., Cabugao, Daniel Brian G., Dabbay, Bernard Ray F., Cabrera, Esperanza, C.. **Philippine Journal of Science**, , 141(2):157-163

Methicillin-resistant *Staphylococcus aureus* (MRSA) has become a major problem in the hospital as well as in the community setting. The resistance of MRSA to all  $\beta$ -lactam antibiotics, the most commonly prescribed group of antimicrobials for staphylococcal infections, poses a significant limitation on the treatment of diseases caused by this multiple drug resistant strain. The study determined the prevalence of MRSA among the hands and nasal cavities of hospital workers of the Rizal Provincial Hospital, their susceptibility to antimicrobial agents, and the occurrence of *mecA* gene and *luks-lukf* Panton-Valentine leukocidin virulence gene among the isolates. Methicillin resistance was determined using oxacillin and cefoxitin. *Staphylococcus aureus* was isolated from the nose of 26 (22.61%), from the hand of 1 (0.87%), and from both the hand and nose of 3 (2.61%) of the sampled 115 hospital health workers, giving an overall prevalence of *S. aureus* of 26.09%. Among the 30 health worker found to have *S. aureus*, 5 or 16.67% of them were found to have MRSA, with 4 health workers carrying the strain in the nasal cavity, and 1 health worker carrying the strain both on the hand and nasal cavity. The overall MRSA carriage rate is 4.35% among all the subjects sampled. All MRSA isolates were susceptible to doxycycline, gentamicin, vancomycin, erythromycin, ciprofloxacin, and linezolid. *mecA* gene was found in all MRSA confirming their methicillin resistance, while the *luks-lukf* Panton-Valentine leukocidin virulence gene was present in 50% of the 6 MRSA isolated. The results of the study identified the presence of a significant yet easily overlooked source for transmission of MRSA, which may also carry additional virulence genes, in the local setting - the hospital workers themselves. This underscores the need for the consistent review and strict implementation of the hospital policy on infection control, such as mandatory requirement for thorough hand washing by hospital workers before and after handling each patient, which remains the cornerstone of prevention.

**(Author's abstract)**

Medicine. Autotrophs. Grazing. Herbivory. Hong  
variation. Tropical rocky shore.

Kong. Macroalgae. Spatial

- 0366** Oral microbial diversity analysis of caries-free and caries-active healthy Filipino adults through the 16S rRNA gene. Reyes, Candids Patrice A., Dalmacio, Leslie Michelle M.. **Transactions of the National Academy of Science and Technology**, , 33(1):209

The oral cavity is inhabited by hundreds of bacterial species that play vital roles in maintaining oral health or in shifting to a diseased state like dental caries which is one of the most common oral problems that affect 92.4% of Filipinos. Due to the limitations that are posed by microbial identification through culture-dependent techniques, molecular techniques are currently being used to better understand the bacterial etiology of dental caries. This study aimed to assess the oral microbial diversity of caries-free and caries-active Filipino adults through the 16S ribosomal ribonucleic acid gene (16S rDNA).

Saliva, supragingival plaque samples from 6 caries-free and 6 caries-active adults together with carious teeth samples from the caries-active patients were used. Bacterial DNA from the samples were amplified using polymerase chain reaction. Diversity of the samples were assessed using denaturing gradient gel electrophoresis and the microorganisms were identified through sequencing of the 16S rDNA. Identified bacteria from saliva and plaque samples were compared between these groups as well as with carious teeth samples.

Based on the gathered data, the caries-active group exhibited a more diverse microflora compared with their caries-free counterpart. Several bacteria were found to be common to both groups comprising the resident microflora. *Neisseria subflava* and *Capnocytophaga* species were some of the identified potentially cariogenic bacteria since they were seen only among the caries-active adults. The partial clone library of the 16S rDNA included various species of *Leptotrichia*, *Streptococcus* and *Neisseria*.

This study showed the oral microbial diversity profile of caries-free and caries-active Filipino adults using culture-independent techniques. The saliva and plaque samples of the caries-free group exhibited greater biodiversity compared with the caries-active group. This results suggests that part of the microflora may be inhibited or absent in a caries-active state. **(Author's abstract)**

Medicine. Dental caries. 16S rDNA. Caries-free. Caries-active.

- 0367** The pathology of spontaneous abortion. Lasap-Go, Edna May, Avila, Jose Ma. C.. **Acta Medica Philippina**, , 40(1):23-28

Sixty consecutive curettage specimens from spontaneous abortions submitted at the Surgical Pathology Section of the Philippine General Hospital were examined for gross developmental disorders and microscopic developmental and inflammatory

lesions. On gross examination, fourteen of the specimens showed intact chorionic sacs. One case showed a normal embryo (Group1) and thirteen cases exhibited growth disorganized embryos (GD) divided as follows: three unembryonic chorionic sacs (GD1), nine nodular embryos (GD2) and one cylindrical embryo (GD3). Among the developmental lesions, hydropic villi were the most common (24%), followed by dysmorphic villi (22%), then villous trophoblastic hyperplasia (12%). Non-specific deciduitis was the most common inflammatory lesion (39%). Other inflammatory lesions observed were perivillous fibrin (38%), intervillitis (24%) and chronic villitis (4%). Many of the cases showed concurrences of these inflammatory and development lesions. This study has shown that gross and microscopic developmental lesions and inflammatory lesion are seen in cases of spontaneous abortions and warrant further investigations. **(Author's abstract)**

Medicine. Spontaneous abortion. Growth disorganized embryos. Hydropic villi. Dysmorphic villi. Villous trophoblastic hyperplasia. Deciduitis. Perivillous fibrin. Chronic villitis. Intervillitis.

**0368** Patient outcome after a myocardial infarct. Mojica, Jose Alvin P.. **The Medical Journal of De La Salle University**, , 12(2):9-12

Twenty two post-MI patients, 19 males (86%) and 3 females (14%), with ages ranging from 35 to 75 years (mean  $\pm$  SD: 58  $\pm$  11), underwent Phase I Cardiac Rehabilitation at the Department of Rehabilitation Medicine, Philippine General Hospital. The study determined how the patients were doing in terms of performance of activities of daily living, occupational status and resumption of sexual activity within 3 to 20 months from onset of myocardial infarction. The study used a structured questionnaire and interview.

Results showed that all patients were independent in activities of daily life. The majority (64%) returned to gainful employment and half of those who were unemployed opted for retirement. Almost 60% resumed sexual activity with about half (46%) of the patients resuming sexual activity within 3 months post-MI. In 54% of the patients, the frequency of sexual activity was  $\leq$  once a month while in the 23% the frequency was once a week.

The findings of the present study show that in the majority of cases, the Filipino post-MI patient is able to lead a productive lifestyle in terms of performance of activities of daily life, occupational status and resumption of sexual activity. **(Author's abstract)**

Medicine. Myocardial infarct. Myocardial infarction. Cardiac rehabilitation.

**0369** PCR patterns of the flagellin gene of local isolates of *Salmonella typhi*. Sarol, Lilen C., Victoriano, Ann Florence, Gloriani-Barzaga, Nina. **Acta Medica Philippina**, , 40(1):37-41

Typhoid fever is a systemic disease caused by *Salmonella typhi*. It is worldwide public health problem especially seen in developing countries with a disease burden of about 22 million cases per year. Because proper sanitation and hygiene practices are difficult to achieve and problems of drug resistance have emerged, vaccination is now being considered as an essential tool in the prevention and control of the disease. The present study is a preliminary undertaking in the development of an edible vaccine based on the flagellar antigen of the organism. Specifically, the study determined the similarity of the vaccine candidate with some of the local isolates. Using primers based on the vaccine candidate which spanned the 3' end of the hypervariable region VI up to the end of the flagellin gene, a 470 bp fragment was amplified in the 19 local isolates. Results showed that the different isolates have a high measure of similarity with the candidate strain. In spite of the presence of the hypervariable region VI of *S. typhi* flagellin gene, the lengths of the fragments are rather conserved among the isolates tested. The observation, even with the limited sample size, demonstrated that the candidate flagellin gene can be appropriately used for vaccine development. **(Author's abstract)**

Medicine. *Salmonella typhi*. Flagellin gene. Vaccine development.

**0370** Penetrating cardiac injuries. Martin, Gerardo. **The Medical Journal of De La Salle University**, , 12(4):8-15

. **Objective:** We reviewed all the trauma patients with penetrating cardiac injuries operated on at our institution during the period 1988-1996.

**Materials and Methods:** Retrospective Descriptive. All data regarding the age, sex, mechanism of injury, entrance wounds, initial presentation at the emergency room, initial diagnostic examinations, time taken to bring the patient to the operating room, operation performed, associated injuries, operative findings and outcome were recorded . This study was done at the De La Salle University Medical Center (DLSUMC) and Jose Rizal National Medical Research Center (JPRNMRC), Dasmariñas, Cavite.

**Results:** Twenty-three males and one female patient between 15 and 47 years of age were admitted for cardiac injuries. Most of them were in the 20- to 35-year age group with a mean of 28.4. Stab wounds (96%) predominated over gunshot wounds. In majority of cases, the entrance wounds were located on the left parasternal (42%) and left lateral chest wall (37%). Presentation in extremis was common. Hypotension was present in 20 cases (83%). The complete triad of hypotension, muffled heart sounds and neck vein engorgement (Beck's triad) was seen in only 37% of cases. Tube thoracostomy and chest x-rays were the most common initial investigation done. Most of the patients were subjected to an anterolateral thoracotomy and the right ventricle was noted to be the most common chamber involved. The most common associated injury was a liver injury. The overall mortality rate was 50%.

**Conclusion:** Prompt recognition, aggressive resuscitation, swift reaction time and immediate operative intervention will improve survival of patients. Patients who are life less or in extremis who do not respond to resuscitative measures should be subjected to emergency room thoracotomy. This study recommends the setting-up of facilities for performing a thoracotomy at the emergency room. **(Author's abstract)**

Medicine. cardiac injuries.

- 0371** Performance evaluation of tailor made microspheres as sensing layer responsive to residual chloramphenicol in food matrices. Ebarvia, Benilda S., Ubando, Isaiah, Sevilla, III, Fortunato B.. **Transactions of the National Academy of Science and Technology**, , 33(1):182

Antibiotics like chloramphenicol are banned in food products of animal origin. Analysis of trace levels of chloramphenicol usually by GC-MS is expensive and could require tedious samples preparation. In this work, chloramphenicol-imprinted microspheres were synthesized via precipitation polymerization at 60°C using chloramphenicol as the template, and methacrylic acid as the monomer. Different crosslinkers like trimethylolpropane trimethacrylate (TRIM), ethylene glycol dimethacrylate and divinylbenzene were tried to produce the polymer. Their binding characteristics were evaluated by Scatchard analysis using UV Vis spectrophotometer. Two classes of binding sites were obtained under the concentration studied. From these polymer microspheres bearing the imprinted sites, the one prepared with TRIM crosslinker showed the highest binding capacity than the non-imprinted polymer and polymers prepared using other crosslinkers. The maximum binding sites were estimated to be about 330 µg/g and 268 µg/g for the molecularly imprinted polymer and the non-imprinted polymer respectively. The adsorption isotherm of the imprinted polymer was fitted to the Freundlich equation and the heterogeneity index was estimated to be about 0.976. Molecular capability of the said polymer as sensing layer to trace amount of chloramphenicol was also confirmed by gravimetric technique using a mass sensor. Results of sensor measurement obtained shows good accuracy and acceptable percent recovery in real samples. Further characterization of the resulting polymers were also performed using BET surface area analyzer, particle size analysis, and microscopic techniques. The study gives merit to the quality of spherical particulates in nano to micro size range. The proposed integration of this polymerization technique and sensor technology can be carried out for very minute analysis of chloramphenicol much quickly with simple sample preparation. These polymers can also be utilized in sample screening and as effective adsorbent in separation processes. **(Author's abstract)**

Medicine. Chloramphenicol . Scatchard analysis. Molecularly imprinted microspheres. Precipitation polymerization. Chemical mass sensor.

- 0372** Pesticide exposure, risk factors and health problems among vegetable farm workers. del Prado-Lu, Jinky Leilanie. **Acta Medica Philippina**, , 40(2):12-19

This is a cross-sectional study on pesticide exposure and associated risk factors and health problems among vegetable growers in Benguet which is the vegetable capital of the Philippines. A walk through survey and questionnaire assessing pesticide use, risk factors to pesticide exposure, health problems and safety standards were administered . Of the 39 randomly selected vegetable farmers, majority (71.8%) were male and belonged to the 36-50 age group (41%). Analysis showed that illness in the past 12 months is associated with spills on the crotch and hands ( $p=.030$  and  $.019$ , respectively). Chest pain is positively related to wiping the face with a

contaminated cloth ( $p=.006$ ) and spills while spraying ( $p=.042$ ). Cough is positively correlated with having a pressurized backpack sprayer ( $p=.045$ ), wearing coveralls ( $p=.029$ ), on the buttocks ( $p=.019$ ) and negatively associated with wearing of goggles ( $p=.018$ ), gauntlet gloves ( $p=.018$ ) and boots ( $p=.043$ ). Muscle pain is highly associated with wiping the face with a contaminated cloth and spills in the crotch ( $p=.000$  for both).

Significant correlations were also found for breathlessness, weakness and easy fatigability. For safety practices, the height of containers and vats are significantly associated with the following: illness in the past 12 months ( $p=.014$ ), chest pain ( $p=.004$ ), cough ( $p=.007$ ), muscle pain ( $p=.009$ ) and eye redness ( $p=.038$ ). Other practices associated with pesticide spills and illness include spraying relative to the field's perimeter, proper body mechanics, distance between the nozzle and body, storage and guarding of containers, guards/markings on steep areas, tools/levers in mixing. Recommendations for future studies and policy formulation were discussed. **(Author's abstract)**

Medicine. pesticide exposure. health risk. pesticide.

**0373** Postterm pregnancy. Nadal, Ma. Carmencita. **The Medical Journal of De La Salle University**, , 11(4):6-12

**Objective:** Postterm pregnancy continues to be one of the unresolved difficulties in modern obstetrics since many aspects of postterm gestation remain controversial. The study determined the clinical profile of patients with postterm pregnancy in a five year period.

**Methods:** This is a five-year retrospective descriptive study of patients with postterm pregnancy admitted at De La Salle University Medical Center from August 1, 1990 to July 31, 1995. Charts of patients included number of postterm deliveries and socio-demographic profiles of patients; number of postterm pregnancies with history of previous postterm delivery, antepartum surveillance and type of most commonly used, those that were terminated abdominally or vaginally, and those that underwent spontaneous labor or elective inducing of labor; most common and effective methods in inducing labor; neonatal outcome and the incidence of Postmaturity Syndrome, and mortality rates.

**Results:** Out of the 7,614 total number of deliveries, 156 were postterm accounting for 2.05%. Majority belonged to the age range of 18-26 years old and were nulliparous. Fifty-six percent were single and 85% of them never had prenatal check up. No postterm pregnancy occurred among patients with at least four or more prenatal check-ups. Only 10 cases had a previous history of postterm delivery.

**Conclusion:** Postterm pregnancy was observed mostly in young, nulliparous and single women who never had pre-natal check-ups. Studies should focus on the attitudes of this particular group. Early and regular prenatal check-up is the key to the eradication of this preventable obstetrical condition. **(Author's abstract)**

postterm pregnancy. pregnancy. obstetrics. Medicine.

- 0374** A pregnant woman with a small uterus. Labios, Eric. **The Medical Journal of De La Salle University**, , 11(4):23-27

The report presents a case of primary ovarian ectopic pregnancy diagnosed and treated at the De La Salle University Medical Center. The case satisfied the criteria of Spiegelberg for the diagnosis of ovarian pregnancy. The paper is presented to raise the awareness of the practitioner regarding the occurrence of this ectopic gestation in order to provide the correct management as well as preserve the reproductive potential of the patient. **(Author's abstract)**

ovarian ectopic pregnancy. small uterus. Medicine.

- 0375** A preliminary study on the effect of red grape extract (*Vitis vinifera*) on the inhibition of angiogenesis on a nine-day old chick embryo. Asinas, Marxengel L., De Villa, Romulo S.. **Transactions of the National Academy of Science and Technology**, , 33(1):204

Cancer and tumor growth is the second leading cause of mortality worldwide and currently the third leading cause of death in the Philippines. Angiogenesis, or new blood vessel formation, is one of the major pathogenesis common in cancer formation and metastasis.

Studies have shown that phytonutrients found in a variety of fruits and vegetables offer many ways to offset cancer. One phytonutrient, called Resveratrol (3,5,4-trihydroxystilbene) found in red grapes, is believed to impede and prevent angiogenesis in tumor cells. Hence, the aim of this study is to determine the effect of red grape juice extract on the angiogenesis, utilizing nine days-old chicken embryos.

The experimental study employed a static group comparison where embryo egg assay was done on 50 nine-day old live embryonated chicken eggs, utilizing a modified procedure of yolk sac inoculation. Several preparations of the test agent was prepared using fresh red grapes as well as commercial grape extract and controlled amounts were administered in vitro to the each subgroup of the experimental group. The control group received same amounts of isotonic saline solution while blanks received none. All eggs were then incubated at 36-38°C and were examined after five days for any observable change.

Results showed that all three subgroups given with the test agent demonstrated angiogenesis inhibition. However, only the subgroup given with concentrated grape pulp extract showed statistically significant results at 95% confidence level. It is then concluded that red grape extracts demonstrated inhibition of angiogenesis on nine-day old chick embryos, but further studies are needed to demonstrate the said effect quantitatively, and to determine if this is specifically due to the phytonutrient resveratrol and/or other extrinsic/intrinsic factors. **(Author's abstract)**

Medicine. Cancer. Tumor. Tumor cells. Angiogenesis. Phytonutrient. Resveratrol. Red grapes. Embryo egg assay.

- 0376** Prenatal diagnosis and its role in reproductive risk screening, prevention and treatment of genetic diseases. Cutiongco-de la Paz, Eva Maria. **Acta Medica Philippina**, , 40(2):54-57

Prenatal diagnosis has been a vital part of reproductive risk screening. This method of genetic screening aims to identify fetuses with certain genotypes known to be associated with a genetic disease or predisposition to a genetic disease. The goals of prenatal diagnosis include providing a range of informed choice to couples at risk of having a child with an abnormality; providing reassurance and reducing anxiety among high-risk groups; allowing couples to begin a pregnancy with a knowledge that the presence or absence of the disorder in the fetus can be confirmed by testing; allowing couples the option of appropriate management for the birth of a child with a genetic disorder; and enabling prenatal treatment of an affected fetus. Prenatal diagnosis includes invasive and non-invasive approaches. The non-invasive forms of genetic screening consist of maternal blood biochemical screening and ultrasound scans; invasive techniques, on the other hand, include chorionic villi sampling, amniocentesis and fetal blood and tissue sampling. Newer reproductive technologies such as preimplantation diagnosis and determination of fetal cells in maternal blood have added to the array of genetic screening methods used in prenatal diagnosis. It should be recognized, though, that prenatal diagnosis remains controversial, particularly when the diagnosis leads to a decision to abort the pregnancy. Health professionals as well as families must continue to be alternative of advances in both genetic research to make the most educated, well informed and ethically well defined decisions possible. In the Philippines, prenatal diagnosis is practiced in a very limited way. Prenatal ultrasound is the only most widely used and accepted non-invasive procedure for prenatal diagnosis in the country today. **(Author's abstract)**

Medicine. prenatal. prenatal diagnosis. reproductive risk screening. genetic screening.

- 0377** Prevalence of adiponectin gene polymorphisms among Filipino patients with coronary artery disease examined at St. Luke's Medical Center. Luz, Mark Anthony D., Pasion, Khristine Amber C., Alfon, Jhoe Anthony R., Torres, Brian Carlmichael L., Maliglig, Aubrey Anne C., Villamejor, Shaila Lyn J., Diaz, Justin B., Mondragon, Miguel, Mararang, Marife P., Sabino, Fercival B., Asi, Joelloyd T., Mendoza, Michael Vincent S., Lacuesta, Christina Y., Mapua, Cynthia A., Matias, Ronald R., Daroy, Maria Luisa G., Posas, Fabio Enrique B.. **Transactions of the National Academy of Science and Technology**, , 33(1):206

The adiponectin gene located on chromosome 3q27 has been previously identified as a susceptibility locus for metabolic disorders and coronary artery disease (CAD). More than ten polymorphisms in the gene have been found and two of these, the rs2241766 (SNP45T>G) at exon 2 and in intron 2, rs1501299 (SNP276G>T), have been related to low circulating adiponectin levels that has been associated with obesity, insulin resistance, and CAD. The allelic distribution of the SNP45 and SNP276 polymorphisms was studied in Filipino patients with CAD using polymerase chain reaction-restriction fragment length polymorphism method. The observed allelic distribution was 0.71 and 0.29 for the T and G alleles respectively in 1,012 patients genotyped for the SNP45 polymorphism and was in accordance with the Hardy-Weinberg law using  $\chi^2$  test. Genotypic frequencies were 0.503, 0.41, and 0.10 for the TT, TG and GG genotypes respectively. In comparison, the allelic distribution of the G and T alleles were 0.57 and 0.43 respectively in 754 patients genotyped for the SNP276 polymorphism. Genotypic frequencies of 0.32, 0.49 and 0.19 for the GG, TG and TT genotypes respectively, were obtained. Linkage between the two

polymorphisms was determined. The association of these polymorphisms as a risk factor for the development of CAD and Type 2 diabetes is currently being determined.  
**(Author's abstract)**

Medicine. SNP. PCR-RFLP. Cardiovascular genomics. Coronary artery disease. Type 2 diabetes.

**0378** Priapism. Baybay, Suzette. **The Medical Journal of De La Salle University**, , 12(3):23-25

A patient diagnosed to have chronic myelocytic leukemia and priapism was presented primarily to emphasize that despite the rarity of this condition even among the adult population, it is nonetheless a worthwhile problem that demands our attention. Several etiological factors of priapism were discussed thus reiterating the need for immediate understanding of its specific pathophysiology/pathophysiological mechanism so as to administer definitive treatment as early as possible in order to avoid any life long debilitating complications that may also have psychosocial implications. **(Author's summary)**

Medicine. myelocytic leukemia. priapism. chronic myelocytic leukemia.

**0379** Reflux and allergy. Balotro, Maria Cristina V., Ong, Remedios C.. **Philippine Journal of Allergy, Asthma and Immunology**, , 13(2):33-35

The paper is about Gastroesophageal Reflux Disease (GERD) and Cow's Milk Allergy (CMA). It presented the case of a two-month old baby boy who was admitted at the pediatric Intensive care unit for Aspiration Pneumonia. The baby was consistently dependent on breast milk for three weeks until he was introduced to formula milk (infant cow milk) on the fourth week. By then, he regurgitated 1 to 2 hours after formula intake. "Gastroesophageal Reflux (GER) is defined as the involuntary passage of gastric contents through the lower esophageal sphincter (LES). Its mechanism involves transient relaxation of the LES, increased intragastric pressure and decreased basal LES tone." The infant in this case was given hydrolyzed casein milk formula (eHF-c) but he did not improve. However, he reacted positively to soy-based formula. The infant was found to have "had symptoms and signs of mixed immunoglobulin E (IgE) and non-IgE mediated food hypersensitivity reaction to cow milk who responded to a soy-based milk formula."

Medicine.

**0380** The relationship between stomach cancer and chronic *Helicobacter pylori* infection. Saragih, J. Boas, Akbar, Nurul, Sirait, S., Himawan, Sutisna, Soetjahyo, E.. **Acta Medica Philippina**, , 40(2):66-68

**Background:** There have been studies about the correlation of *Helicobacter pylori*

(H.p.) infection with the development of precancerous lesions such as atrophic gastritis, intestinal metaplasia and dysplasia, showing the link of H.p. infection to stomach carcinogenesis. In a 14-year time period we found a decrease in the prevalence rate of H.p. infection in Cikini Hospital, Jakarta.

**Aim:** 1. To document the decreasing prevalence rate of chronic H.p. infection during a 14-year time period.

2. To determine if a linear link exists between the incidence rates of intestinal metaplasia and stomach cancer, despite a possible decrease in prevalence of H.p. infection.

3. If not, are there any other factors that may play a role in the development of gastric cancer in the medical literature?

**Method:** We surveyed esophagogastro-duodenoscopies from all chronic dyspepsia cases in Cikini Hospital Jakarta, from January 1992 to February 1993 and January 1998 to December 2005 (data per year) and histopathological data from Lab of Pathology Anatomy Faculty of Medicine, Indonesia Christian University /Cikini Hospital, after H/E or Giemsa staining. As for stomach cancer and intestinal metaplasia, data was collected from 1998 to 2005. This is a descriptive study.

**Results:** We found significantly decreasing prevalence rates of H.p. infection from 1992: 19.7% (1992), 12.8% (1998), 12.4% (1999), 14.7% (2000), 9.6% (2001), 11.9% (2002), 3.8% (2003), 2.3% (2004), 2.9% (2005).

The incidence of intestinal metaplasia was 4.7% (1998), 3.2% (1999), 3.1% (2000), 2.3% (2001), 7.6% (2002), 8.3% (2003), 6.5% (2004), and 7.1% (2005); the incidence of gastric cancer was 2.2% (1998), 0.25% (1999), 1.1% (2000), 1.1% (2001), 1.1% (2002), 1.8% (2003), 1.7% (2004) and 3.9% (2005).

**Conclusion:** There was a decreasing prevalence rate of H.p. infection, within the 14-year period observed; however, it is difficult to determine whether a linear link between H.p. infection, intestinal metaplasia and stomach cancer exists. **(Author's abstract)**

Medicine. Linear link. Helicobacter pylori (H.p.) infection. Chronic gastritis. Intestinal metaplasia. Pre-cancerous lesions.

**0381** A review of initial febrile convulsions. Pacifico, Rochelle. **The Medical Journal of De La Salle University**, 11(3):9-13

Clinical records of all Benign Febrile Convulsion cases admitted at De La Salle University Medical Center over a 5 year period were gathered. Epidemiologic, clinical and laboratory data from 441 children with initial febrile seizures were analyzed. Majority were males and most had febrile seizures by age 2 years. Fifty-nine percent had a family history for BFC and/or epilepsy. The more predominant type of seizure was the simple type. As for recurrence during the same hospital stay, this was observed in only 12%. Upper respiratory tract infection comprises a greater percentage of the causes of BFC. Of the various diagnostic examinations used, almost all were subjected to cbc and only a small percentage underwent lumbar tap, blood sugar and serum electrolytes determination. Almost all patients were covered

with antipyretics and anticonvulsants.

In this study, the relationship between epidemiologic and clinical factors were analyzed. It was found out that the presence of a family history of BFC and/or Epilepsy was closely associated with recurrence and seizure type. Furthermore, seizure type was significantly associated with recurrence and age. **(Author's abstract)**

Medicine.

- 0382** Ring chromosome 10 in a Filipino child. Chiong, Mary Anne D., Esquejo, Amelito L., Abad, Lorna R., Dion-Berboso, April Grace. **Acta Medica Philippina**, , 45(4):66-69

We report a 12-day-old infant who presented with ambiguous genitalia, short stature, low-set ears, stubby nose, patent ductus arteriosus and ventricular septal defect. He was confirmed to have a ring chromosome 10 by cytogenetic analysis. Review of the literature showed that our patient shared common clinical manifestations with previously described cases. **(Author's abstract)**

Ambiguous genitalia. Cytogenetic analysis. Ring chromosome 10. Medicine.

- 0383** Risk factors for obstetrical and gynecological surgical site infections in a tertiary government hospital. Hernandez-Nazel, Mariles R., Luna, Jericho Thaddeus P.. **Acta Medica Philippina**, , 40(2):7-11

**Background:** Wound infection represents one of the most common serious complications after obstetric and gynecologic surgery, accounting for approximately 5% of women who deliver by cesarean section and 8% of gynecologic surgical hospitalizations.<sup>(1-4)</sup> A number of risk factors associated with increased postoperative surgical site infection have been identified.

**Objective:** To determine the risk factors associated with the development of surgical site infections among obstetrical and gynecological patients in a tertiary government hospital.

**Methods:** This was a case-control study consisting of 44 obstetrical and gynecological patients who developed surgical site infection and 46 obstetrical and gynecological patients who did not develop surgical site infection after an abdominal surgery at the tertiary government hospital from January 2003 to June 2005. The odds ratio for each clinical and operative risk factor in the development of surgical site infection was calculated.

**Results:** There were no significant differences in mean age, mean body mass index, absence of co-morbid illnesses, pre-operative hemoglobin level, and the duration of operation between the two groups. Patients who have had a prior operation have approximately a two-fold increased risk for SSI (OR = 1.978, 95% CI

1.610 - 2.429).

**Conclusion:** Surgical site infections remain to be a dreaded complication that any surgeon would opt not to experience. A history of a previous operation is still a significant risk factor in the development of SSI. **(Author's abstract)**

Medicine. Surgical site infections. Tertiary government hospital.

- 0384** Short stature among adolescents and its effect on self-esteem. Herrera, Jocelyn. **The Medical Journal of De La Salle University**, , 12(4):28-32

**Objective:** To determine whether or not short stature affects the level of self-esteem of adolescents.

**Materials and Methods:** Analytical cross sectional study in public and private schools of a semi-urban community. Students aged 12 and above in high school were divided into short and normal statured groups. Data included age, sex, height, school and self-esteem scores. Height was measured by using a standard measuring device. Growth percentile was plotted using percentile chart. Those above the third percentile were considered short of stature. The level of self-esteem was measured using the Piers Harris Self Concept Scale.

**Results:** Analysis of Variance (ANOVA) was used to compare groups. Based on the height and self-esteem scores, their difference is significant ( $p=0.000000$ ). There is a significant difference in self-esteem between females with short stature and females with normal stature ( $p=0.000001$ ). The same applies to their male counterparts ( $p=0.000024$ ). However, the level of self-esteem among male and female short-statured and normal-statured groups were comparable ( $p=0.503930$ ). The difference in the level of self-esteem among short- and normal-statured individuals is significant in both public ( $p=0.000005$ ) and private ( $p=0.000024$ ) schools. There is also a significant difference when comparing the level of public and private schools ( $p=0.000052$ ). For the three age groups, only the first group (12-13) showed a non-significant result ( $p=0.303214$ ); the results of the second group (14-15) ( $p=0.000056$ ) as well as the third group (16 and above) ( $p=0.000002$ ) were significant.

**Conclusion:** There is a significant difference in self-esteem among short-statured and normal-statured adolescents. This is also true within each sex category, but the difference is not significant when comparing the two sexes. A significant difference is also noted among short- and normal-statured adolescents from public and private schools. The difference becomes more significant in older children (14 years old and above) **(Author's abstract)**

Medicine. self-esteem. adolescents. short-statured. normal-statured.

- 0385** Single nucleotide polymorphism genotyping of antithrombotic therapy resistance markers using high resolution melt analysis. Aquino, Gerald Ryan R., Cangas, Kristine M., Caringal, Ma. Alegria T., Palmos, Denice Mae, Trocino, Bianca Beatriz V., Lazaro, Jose Enrico H.. **Transactions of the National Academy of Science and Technology**, , 33(1):203

High resolution melt (HRM) analysis is a powerful technique for detecting DNA sequence variations such as mutations, polymorphisms and epigenetic differences. Single Nucleotide Polymorphisms (SNPs) in the CYP3A4 and CYP2C19 genes coding for Cytochrome P450 enzymes involved in the metabolism of nearly all drugs have been reported to be associated with resistance to clopidogrel, an antiplatelet aggregation drug. Moreover, SNPs in the P2Y<sub>12</sub> gene coding for the target receptor of the active metabolite of clopidogrel have been determined to be associated with high platelet reactivity, thus possibly lowering response to clopidogrel as well. In this study, we employed HRM analysis as a diagnostic test to detect these SNPs. Primers were designed to amplify short regions containing the CYP3A4\*1G (G>A), CYP2C19\*2 (G>A), P2Y12 G36T (T>G) and P2Y12 C18T (C>T) SNPs. Blood samples were blotted on Whatman FTA® Elute membrane, from which DNA was extracted. Eleven samples from volunteers were used for screening the three representative genotypes, which we termed homozygous mutant, heterozygous, and homozygous wild-type. Melting temperatures and melting curves generated after fluorescence normalization, temperature adjustment, and difference analysis of the samples revealed distinct genotypes. Larger amplicons were generated by PCR for samples representative of the genotypes and sent for sequencing. Sequencing confirmed the heterozygous genotype for all SNPs, and one homozygous genotype for CYP3A4\*G (mutant), P2Y12 G36T (mutant), and P2Y12 C18T (wild-type). We are waiting the completion of sequencing for the remaining homozygous genotypes. Current results nonetheless suggest a reliable protocol for detecting the heterozygote genotype of PYP3A4\*1G, CYP2C19\*2, P2Y12 G36T, and P2Y12 C18T using HRM analysis. **(Author's abstract)**

Medicine. Polymerase chain reaction. High resolution melting analysis. Single nucleotide polymorphism. Genotyping. Clopidogrel. Cytochrome. P450. P2Y12 platelet receptor.

- 0386** Successful percutaneous balloon pulmonary valvuloplasty in an adult noonan syndrome. Cabujat, Roehl John B., See, Jason A., Villasenor, Jane Andaman , Tangco, Rogelio V.. **Acta Medica Philippina**, , 40(1):58-62

Noonan Syndrome is genetic cardio-cranio-facial syndrome associated with dysplastic pulmonary stenosis. Cardiac surgery had been the mode of treatment for such cardiac abnormality. Percutaneous Balloon Valvuloplasty had been employed with good outcome for isolated typical pulmonary stenosis, but with inconsistent results in dysplastic pulmonary stenosis, with only 7 studies reported.

This paper presents 20 year old male with Noonan Syndrome associated with dysplastic pulmonary stenosis who underwent successful Percutaneous Balloon Valvuloplasty at Philippine General Hospital. This case report is the 8th Noonan syndrome during adulthood that had valvuloplasty.

Long term outcome studies will dictate its future role. **(Author's abstract)**

Medicine. Noonan syndrome. Percutaneous balloon valvuloplasty. Pulmonary stenosis.

- 0387** Surveillance of the incidence of nosocomial infection and antibiotic usage at the ICU of De La Salle University Medical Center. Gurango, Armand, Macalalad, Noel. **The Medical Journal of De La Salle University**, , 11(2):6-11

This was a prospective survey using a coded surveillance form and included subjects 15 years old and above who were admitted to DLSUMC ICU, Dasmariñas, Cavite, during the period from February 1, 1994 to July 31, 1994. There were 34 patients out of 326 who developed NI. Of these 34 patients, there were 37 NI sites noted. The incidence rate was 11.34% and the cumulative incidence was 3.74 per 100 patients days at the ICU.

A majority developed only one episode of NI. Nosocomial pneumonia had an incidence rate of 8.28%. Of the 37 NI sites, 11 (30%) were classified as definite by culture. There were 18 (52%) out of 34 patients who improved. There were 3 (9%) who expired and another 3% who went on HAMA with severe NI that may contribute to death. *Pseudomonas* sp. (40%) and *Enterobacter* sp. (33%) were the most common nosocomial etiologic agent. Most isolates presented with resistance to potent antibiotics based on the antibiogram. The most common antibiotics used in our institution were cefuroxime, ampicillin-sulbactam, cephalexin, and netilmicin.

This study has provided us with a profile of NI and antibiotic usage; we therefore recommend an intervention study to reduce the incidence of NI, determine risk factors and continue surveillance of NI and antibiotic usage at the DLSUMC ICU. **(Author's abstract)**

Medicine. nosocomial infection. antibiotic usage. Nosocomial pneumonia. nosocomial etiologic agent.

- 0388** Syringomyelia with type I arnold - chiari malformation. Salvador, David Raymund K.. **The Medical Journal of De La Salle University**, , 12(4):33-35

A case of syringomyelia with type I Arnold-Chiari malformation is described in a 27-year-old female. The patient had segmental weakness with atrophy of both upper extremities, claw deformity of both hands and dissociated sensory loss over the shoulders, arms, trunk and right leg. Magnetic Resonance Imaging (MRI) revealed a cystic dilatation of the entire spinal cord down to the conus medullaris consistent with syringomyelia. There was likewise a mild cerebellar tonsil herniation 6 mm. from the foramen magnum compatible with the said Chiari malformation. Asymmetry of signs and symptoms is due to the variable transverse and longitudinal progression of the tubular cavitation in the spinal cord. A thorough history and physical examination with a high clinical suspicion is necessary to arrive at the diagnosis of this rare but very distinct disease entity. **(Author's abstract)**

Medicine. arnold-chiari. Chiari malformation. conus medullaris.

- 0389** Systematic and mucosal immune responses in severely malnourished children. Solon, Juan Antonio. **Acta Medica Philippina**, , 40(2):41-47

This review summarizes studies on systemic and mucosal immunity in severe malnutrition. A review of the immune system and selected methods used to measure responses is given. It puts forth the view an imbalance in the immune response of severely malnourished children may be an underlying pathology that makes nutritional rehabilitation difficult and may contribute to subsequent mortality in the community. The early studies demonstrating depressed cellular immune responses must be interpreted in the light of the limitations of the methods used to assess cellular immunity. Effector function of lymphocytes seem to be intact and an inherent defect may only be limited to a delayed cell cycle. The modifying effect of infection and micronutrient deficiencies are often neglected in these studies. Independent of studies on peripheral immunity, intestinal biopsy studies done over the past four decades have consistently shown a very florid immune response in the gastrointestinal tract. Thus, in contrast with the bias towards demonstrating peripheral immunosuppression, gastroenterologists have been describing gastrointestinal mucosa with heavy lymphocytic infiltrates and a bias towards proinflammatory cytokines. Finally, an approach to studying severe malnutrition concluded in The Gambia is presented as a means of better understanding the immunopathology that underlies malnutrition. **(Author's abstract)**

Medicine. Protein energy malnutrition. Immunity. Intestines.

- 0390** A systematic review of the use of steroids in adult respiratory distress syndrome. Yu, Charles Y.. **The Medical Journal of De La Salle University**, , 12(2):16-21

The study assessed the effectiveness of intravenous steroids in adult respiratory distress syndrome (ARDS) using a meta-analytic/systematic review of RCTs of steroids in ARDS. The criteria used for considering trials for review included: A) Participants: (1) adults > 15 years, (2) fulfilling ARDS criteria, (3) RCTs; B) Intervention: (1) IV methylprednisolone vs. placebo for prophylaxis and treatment of ARDS; C) Outcome measures: (1) all-cause mortality, (2) reversal of ARDS, and (3) prevention of ARDS analyzed using Odds Ratio (with 95% CI), calculations of Absolute and Relative Risk Reduction (ARR, RRR) and the Number Needed to Treat (NTT).

Computerized (OVID) Medline search from 1966-March 1995 was performed. MESH terms used were Respiratory Distress Syndrome, Adult, Steroids and Clin\* Trials. Out of 16 articles searched, only 3 fulfilled the criteria for this review. Trials included 1) Bone (1987 study), 2) Bernard (1987), 3) Luce (1988), and 4) Weigelt study (1985).

The criteria used to assess quality of studies utilized true randomization, clinically relevant outcomes, clinical and statistical significance and accounting for all patients. The Bone study had problems on true randomization and data was unavailable on the outcome of subjects that were eventually excluded to allow for sensitivity analysis. Power analysis showed the Bernard study to have inadequate sample size. Results showed over-all odds ratio of 1.58 (0.96-2.66) for all-cause mortality, 156 (1.05-2.41) for prevention of ARDS and 0.61 (0.33-1.1) for reversal of ARDS. In conclusion, there is no current evidence for the usefulness of IV methylprednisolone in ARDS as far as reduction in all-cause mortality, reversal of ARDS and prevention of ARDS. **(Author's abstract)**

Medicine. Steroids. Adult respiratory distress syndrome. Respiratory distress syndrome. methylprednisolone.

- 0391** Telenursing thru SMS:. Pangan, Ina Kristina, Pangilinan, Gianne Alyssa, Pangilinan, Milcah, Pangilinan, Recah, Pangilinan, Romina, Par, Carl Justine, Paragas, Erickson. **Transactions of the National Academy of Science and Technology**, , 33(1):208

This study aims to develop and implement a telenursing intervention program to increase the knowledge and adherence to proper diet and physical activity for the prevention of weight-related diseases such as Hypertension, Type II *Diabetes mellitus*, and cardiovascular diseases among overweight college students aged 18-25 years old. 24 college students undergone the DeFit It! Program. They have a body mass index (BMI) between 25.00-25.99 kg/m<sup>2</sup>. Subjects in the experimental group were subjected to telenursing by receiving 4 daily short messaging service (SMS) for 21 days regarding health education on proper diet and physical activity, and reminders to follow the DeFit it! Program. There is a significant increase in the knowledge of telenursing and nontelenursing users group is 15 and 16 respectively. There is no significant difference on the physical activity and diet adherence scores of telenursing users when compared to nontelenursing users. There is a significant decrease in the BMI of the nontelenursing users group which may be attributed to their low diet adherence scores since they ate in less than the recommended amount of diet. **(Author's abstract)**

Medicine. Telehealth. Telenursing. Diet. Overweight. Adherence. Knowledge.

- 0392** Test characteristics of core needle biopsy of palpable breast masses. Carnate, Jr., Jose M., Alviar, Earlyn Ma. S.. **Acta Medica Philippina**, , 39(1):7-12

Core needle biopsy (CNB) has been used increasingly as a diagnostic tool in evaluating mammary lesions. To determine the test characteristics of CNB histopathologic review of palpable breast masses in 81 female patients (mean age: 48 years, range 17-71 years) obtained by non-imaging-guided CNB at the Philippine General Hospital Out-Patient Department from January 1999 to march 2001 was compared with the reviewed results of the subsequent excision (excision biopsy, simple mastectomy and modified radical mastectomy) as the reference standard. Of the 81 cases, 62 (77%) were histologically confirmed as malignant and 19 (23%) were benign. Of the 81CNBs, 22 (27%) were unsatisfactory biopsies. Evaluation of CNB test characteristics was based on the rest of the 59 "satisfactory" CNBs. Test characteristics were: Sensitivity= 82.2%, Specificity= 92.2%, Accuracy= 84.7%, Positive Predictive Value= 97.4%, Negative Predictive Value= 61.9%. The test characteristics were lower compared to previously reported values which were however largely based on image-guided CNBs. Specimen adequacy, operator differences in skills and expertise, and histopathologic interpretation error may account for the difference. **(Author's abstract)**

Medicine. Core needle biopsy. Breast mass diagnosis. Test characteristics.

- 0393** Towards antituberculosis drugs. Yang, Catrina Theresa M., Billones, Junie B.. **Philippine Journal of Science**, , 141(2):187-196

Pantothenate synthetase (PS), an enzyme that furnishes an essential precursor of coenzyme A, has been considered as potential target for novel antituberculosis agents. Hence, curcumin, a well-recognized multi-targeted natural product, and its analogues, have been docked to the enzyme. Curcumin analogue 3, having a hydroxyl and methoxy substituents in the aromatic moieties, exhibited the best binding interaction with PS. Its binding energy, as well as that of curcumin and the two other analogues (16 and 18), suggests that these compounds are potentially more potent than nafronyl oxalate, a known inhibitor of the enzyme. Like the natural active intermediate, pantoyl adenylate, analogue 3 interacts with 3 amino acids in common: Gln72, Val187, and Met195. Moreover, its ketone oxygens were oriented directly towards the positive surface of the enzyme, providing additional polar interactions. **(Author's abstract)**

Medicine. Antituberculosis. Curcumin. Molecular docking. Pantothenate synthetase.

- 0394** A two-center review of cases of teenage pregnancy. Castro, Dindo. **The Medical Journal of De La Salle University**, , 11(4):13-17

**Objective:** Teenage pregnancy is a major socio-economic and health problem with unique medical and psychosocial consequences for the patient and society with the total number of teenagers getting pregnant each year remaining high. The study determined the characteristics and outcome of teenage pregnancy.

**Methods:** A five-year retrospective descriptive study was conducted among 1,165 gravid teenagers at the De la Salle University Medical Center and Dr. J.P. Rizal Medical Research Hospital to determine the characteristics and outcome of teenage pregnancy. The variables included patient's age, marital status, gravidity, prenatal care, mode of delivery, pregnancy-related antenatal complications and outcome of pregnancy.

**Results:** The number of admission for teenage pregnancies increased yearly. Majority were married and sought the charity service. Induced abortion among married teenagers were common. Anemia, pre-eclampsia, urinary tract infection and premature labor were the most common antenatal complications. There was a remarkably high incidence of teenage mothers who received inadequate prenatal care. Likewise, there was an increase incidence of preterm delivery, however, the stillbirth rate and perinatal mortality rate were lower compared to previous studies.

**Conclusion:** The risk of developing complication in teenage pregnancy was related to low socioeconomic status, poor health nutrition and inadequate prenatal care. A comprehensive care and education of the teenage mother should be established and complete understanding of adolescent development and the biological changes that make it possible for teenagers to bear children. **(Author's**

**abstract)**

induced abortion. teenage pregnancy. Medicine.

- 0395** A university-based forensic pathology practice. del Rosario-Fortun, Raquel B.. **Acta Medica Philippina**, , 39(1):28-35

Forensic Pathology is not a widely recognized field of medicine in the Philippines. Doctors involved in death investigation are often unskilled due to lack of formal training and their work is further hampered by insufficient support and material resources. Upon the author's return in 1995 from post-residency training in forensic pathology at a medical examiner's office in the United States, she sought to establish a practice as a specialist based at the University of the Philippines Manila-Philippine General Hospital. This case review is the author's initial experience over the period 1996-2000. The procedures done and problems encountered are described, and recommendations on how the specialty can be professionalized are offered. Included are templates of actual worksheets for the guidance of local doctors doing forensic autopsies. **(Author's abstract)**

Medicine. Death investigation. Forensic autopsy. Forensic pathology.

- 0396** Utilization of plant medicine for the treatment of health problems. Kaba, Mirgissa. **The Medical Journal of De La Salle University**, , 12(1):8-11

**Objective:** To determine the differences in the utilization of plant medicine among the Oromos of Clora in terms of their beliefs on illness causation, the role of healers in the management of health problems, knowledge of plant medicine and utilization, and the prevalence of health problems and its treatment.

**Materials and Methods:** Study population consisted of the Oromos which comprised more than 95% of the people in Chora. Unstructured questionnaire was used to interview a total of 13 local elders from 10 peasant associations. The associations were selected because it hosted either a noted local healer or a health station. Five noted healers were also interviewed. The local language Oromifaa was used during the interviews.

**Results:** Healers differed in their knowledge of plant medicine utilization, and in the use of rituals for collecting and administering plant medicine. Beliefs about the causes of health problems determine their treatment seeking behavior. The healing role is performed by healers believed to have been empowered by *Rabby*. And healing is performed by combining plant medicine and prayer.

**Conclusion:** Plant medicine plays a dominant part in indigenous practices. Because of the differences among the healers, a closer scrutiny is needed to validate the plants' effectiveness and to verify the healers' actual knowledge and practices. **(Author's abstract)**

Medicine. beliefs on illness. utilization of plant medicine.

- 0397** In vivo diagnostic tests of immediate hypersensitivity reactions. Sumpaico, Madeleine W., Foronda, Ruby N., Recto, Marysia Stella T., Lobo, Rommel Crisenio M., Perez, Felices Emerita P., Alcantara, Danilo M., De Vera, Michelle Joy D., Vicencio, Joanna Christine A., Tan, Frances M.. **Philippine Journal of Allergy, Asthma and Immunology**, , 13(1):22-31

The Task Force on Allergy Skin Testing was formed to develop a "standard" which can be applied in the local setting when it comes to "performing, reporting and interpreting allergy skin tests." The Task Force was divided into two groups: (1) Prick/Puncture Test and (2) Intracutaneous Tests. The two groups came up with 28 summary statements covering these issues applicable on both tests: context of skin test development, devices, controls, quality assurance, reading of test results, interpretation, demographic effects (age, gender, race), use of concurrent drugs, number of skin tests vis-à-vis patients' medical history, reliability of tests, specificity, limitations, safety, sensitivity, clinical significance and practice parameters. Lastly, the paper also recommended some items for future researches to be undertaken on skin testing.

Medicine.

## NUTRITION

- 0398** Balancing nutrient requirements and manure odor management in growing cobb broilers. Mendoza, Norman, Pabroa, Preciosa Corazon C., Morco, Ryan P., Bolivar, Ramil F., Parco, Joena B., Sugang, Raymond J.. **Transactions of the National Academy of Science and Technology**, , 33(1):12

The responses of broilers to low crude protein diet with synthetic amino acid supplementation were investigated. A feeding program was designed for five hundred experimental single comb Cobb broilers, using a low protein feedstuff but supplemented with amino acid: isoleucine, leucine, glycine, histidine, methionine, cysteine, tyrosine, lysine, phenylalanine, threonine, and tryptophan. A control group was fed with a three phase feeding program (starter 1-15 days; grower 16-28 days; and finisher at 29-40 days). The objective of the study was to determine the effect of a low protein diet on broilers which were supplemented with dietary amino acids. The parameters compared were: average daily weight gain, food conversion ratio (FCR), thigh base weight, and serum proteins. The same averages of 5g/dL total serum protein, an index of visceral protein status, were obtained for both the control and experimental groups. Average weight gain per day of birds fed with the test diets and those fed with commercial formulations, were 4.7g/d and 4.6 g/d, respectively. Feed conversion ratio, FCR, were 2.1 kg feed/kg meat and 1.8 kg/kg meat from the experimental and control groups respectively. Average thigh ash weight of the experimental feeding group ( $16 \pm 0.04$ g) was heavier than in the commercial diet group ( $12 \pm 0.04$ g). Manure nitrogen emission was estimated weekly, on air filters, through a colorimetric comparison using bromphenol blue indicator. This study was

able to demonstrate that poultry management employing very low crude protein diets supplemented with amino acids can significantly reduce manure nitrogen emissions, without compromising Cobb broiler health and economic productivity. **(Author's abstract)**

Cobb broiler. Protein. Nutrition. Amino acid supplementation.

- 0399** Pre- and Post- evaluation of growth patterns and nutritional status of zero to 24 month old children in BIDANI and non-BIDANI areas in lowland and coastal villages in the Philippines. Saccalan-Africa, Leila, Eusebio, Josefa S., Kusin, Jane A., Barba, Corazon VC., Renqvist, Ulla H.. **Philippine Journal of Nutrition**, , 52(3-4):9-24

This study evaluated if Barangay Integrated Development Approach for Nutrition Improvement (Bidani) can make a difference in the nutritional status of zero to 24 month old children. Growth patterns (based on Z-scores) and malnutrition prevalence among 348 children (162 in lowland and 186 in coastal) in the baseline survey were compared to 394 children (193 in lowland and 201 in coastal) in the post-survey in BIDANI and non-BIDANI areas. Regression models were developed to examine variables associated with post-survey cases of underweight, stunting and wasting. Results showed no indication of improved growth among siblings. Growth faltered in infancy until about 24 months. Growth and nutritional status in BIDANI and non-BIDANI lowland and coastal villages were generally better in the pre- than post-survey. The final regression analysis of all related factors highlighted the significance of child's age, mothers' nutritional status and food security indicators as determinant of growth and nutritional status. Thus, a 24-month exposure to BIDANI did not prevent growth faltering and reduce malnutrition prevalence. It is also possible that 24 months was short to assess the effects of the program on growth and nutritional status. (Author's abstract)

Nutrition. nutritional status. growth patterns. BIDANI.

## PHYSICS

- 0400** Angular and lateral resolution study in pCT imaging involving biological tissues. Quiñones, Catherine Therese J., Maratas, Jan Mickelle V., Nawang, Salasa A.. **Transactions of the National Academy of Science and Technology**, , 33(1):184

The angular and lateral resolutions were studied for possible application in proton Computed Tomography (pCT) imaging which is a prerequisite procedure for radiation therapy. These quantities provide a measure of the sharpness of the image using proton beams but unlike the conventional x-ray imaging, protons suffer from deflections due to multiple Coulomb scattering (MCS) interactions. In order to improve pCT images, analytical formulas that model the effect of MCS on individual proton trajectories were investigated.

The standard deviation of the angular ( $\sigma_u$ ) and lateral ( $\sigma_v$ ) distributions were

calculated using analytical MCS reported in two journals: (a) *Phys. Med. Biol.*, 49 (2004), 2899-911 and (b) *Med. Phys.*, 35 (2008), 4849-56. In this study, two methods were performed: the numerical method and the sampling method.

During the simulation, a pencil beam profile of protons is directed to a cubic phantom ( $20 \text{ cm}^3$  for water, soft tissue or muscle tissue and  $10 \text{ cm}^3$  for compact bone) using the Geant4 toolkit. Fifty thousand protons were bombarded at incident energies 200 MeV and 250 MeV. A 5<sup>th</sup> order polynomial was then used to parameterize the energy loss function. To test the validity of the analytical models, the angular and lateral distributions were obtained by Monte Carlo sampling of the exit protons. The  $\sigma_u$  and  $\sigma_v$  were extracted and compared with the result of the analytical method.

Results show that for a 200 MeV incident proton, the angular and lateral scattering was around 2 degrees and 3.27 mm, respectively, while for the 250 MeV the values were 1.38 degrees and 2.5 mm, respectively. Also, the inclusion of a logarithmic correction factor to the MCS model improved the analytical  $\sigma_u$  and  $\sigma_v$  values with an error of about 17%. In conclusion, good resolution was observed at higher energies. **(Author's abstract)**

Physics. Proton computed tomography. pCT. MCS. Lateral resolution. Angular resolution.

- 0401** Anisotropic surface texturing of silicon substrate using alkaline solution for solar cell application. Vacalares, Kayrol Ann B., Vequizo, Reynaldo M., Alguno, Arnold C.. **Transactions of the National Academy of Science and Technology**, , 33(1):181

High-efficiency silicon solar cells need a textured front surface to reduce the reflectance of incident light and to improve light trapping using cost-effective method. In this work, we report on the anisotropic surface texturing of Si(100) substrates using alkaline solution, forming pyramidal structures on its front surface. This method provides a straight forward and cost-effective approach. We utilized a mirror-polished single crystalline Si(100) substrate for texturing using alkaline solution. The alkaline mixtures contained sodium hydroxide, isopropyl alcohol and de-ionized water. The concentration of the alkaline solution was held constant while varying the texture time. The surface morphology of the textured surface is investigated by Scanning Electron Microscopy (SEM) and its reflectance is measured using UV-Vis Spectrometer. Results showed that the sizes and shape of the resulting pyramids after texturing process are dependent on the texturing time. Furthermore, the pyramid density increases with increasing etching time. Moreover, SEM images revealed that the size and the uniformity of the pyramids affect the reflectance of the incident light as depicted in the UV-Vis spectra of the mirror-polished and textured silicon samples. It was found that reflectance of the incident light could be reduced up to less than 20 percent by optimizing the surface morphology of the textured silicon. It is suggested that having a large and almost uniformly distributed pyramids on the Si surface will drastically reduce the reflectivity. We also present in this study a model that will describe and discuss the effects on the reflectance in relation to the distribution of pyramids in terms of distance and size. **(Author's abstract)**

Physics. Solar cells. Anisotropic surface texturing. Reflectivity. Alkaline solution.

- 0402** The effect of adhesion force on cell elastic modulus. Villaruz, Lara Gay, Bernido, Christopher, Carpio-Bernido, Ma. Victoria, Otadoy, Roland, Bacabac, Rommel. **Transactions of the National Academy of Science and Technology**, , 33(1):173

The ability of cells to deform or resist deformation affects several important factors of cell function. Most studies infer the elastic modulus of a living cell from the simultaneous measurements of forces and deformations exerted on the cell, based on the Hertz model. However, the force-distance curves are affected by indenter-cell adhesion forces, and neglecting this effect may result in systematic errors in the determination of the Young's modulus of elasticity.

For the first time, the Hertz model was extended to include the effect of adhesion in the description of contact stiffness by using the Lennard-Jones potential to model the inter-molecular interaction between the probe surface and a living cell sample. The adhesion force derived from the potential gradient was incorporated to the Hertz relation, from which the value of the elastic modulus of the sample is obtained.

Our result show that during indentation of the intact cell, the adhesion force increases in proportion to the indentation depth. The increase in the slope of the force-indentation curves predicts a higher Young's modulus than the value obtained by the Hertz model neglecting adhesion force by up to 25% for decreasing size of molecules coating the probe. The model predicts the Young's modulus of a cell based on the radius of the probe, and the size and concentration of the molecules coating the surface. Thus, our approach provides precision on cell mechanics measurements without neglecting surface interactions that could be incorrectly neglected. **(Author's abstract)**

Physics. Young's modulus. Hertz model. Lennard-Jones potential. Elastic force. Force-indentation curve.

- 0403** Influence of stacked Ge islands on the dark current-voltage characteristics of a diode for solar cell application. Alguno, Arnold C., Kirit, Noli Vergel E., Codizar, Jihan D., Dagaerag, Liza-Fe L.. **Transactions of the National Academy of Science and Technology**, , 33(1):180

We report on the dark current-voltage ( $I$ - $V$ ) characteristics of the diode with embedded stacked Ge islands in the intrinsic layer for solar cell application. Gas-source molecular beam epitaxy was used to grow the stacked Ge islands on a Si substrate. Two-diode model was utilized to analyze the dark  $I$ - $V$  characteristics of a solar cell with embedded Ge islands in the intrinsic region. This model describes the relationship between current and voltage of a solar cell with stacked Ge island in the generation region under dark condition. Furthermore, this models is capable of predicting some physically meaningful parameters for the enhancement of solar cell efficiency. Based on this two-diode model, we found out that the minority carrier diffusion and the recombination current components increase when there is an increase on the number of stacked Ge island layers. Moreover, we believe that the increase in minority carrier diffusion current might be due to an increase on the intrinsic carrier density as the number of stacked Ge islands layers increases. Similarly, the increase in the recombination current components might be due to the enormous recombination of carriers in the intrinsic region as the number of stacked layer increases. These results can be used to fabricate a high-efficiency solar cell with embedded stacked Ge islands through efficient separation of electron-hole pairs by

the internal electric field and this can contribute to significantly increase the photocurrent without considerable recombination of carriers in the stacked Ge island layers. **(Author's abstract)**

Physics. p-n junction. Two-diode model. Ge islands. Solar cells.

- 0404** Initial studies of a microwave-induced atmospheric plasma jet. Lacdan, Ma. Camille, Tuballa, Tracy, Ting, Julie Anne, Lee, Jr., Henry V., Rosario, Leo Mendel, Tumlos, Roy, Ramos, Henry. **Transactions of the National Academy of Science and Technology**, , 33(1):179

This study investigates the dimensions of plasma using a gkW microwave-induced atmospheric plasma jet. The forward power studied ranges from 600W to 1800W for different flow rates. In this experiment, a 9.5cm quartz glass was used. In order to measure the length of the plasma, images of the plasma for different settings were observed using a digital camera 127cm away from the setup. The data is presented as plasma length versus absorbed power. It was shown that the plasma length increased as the absorbed power was increased. It was also observed that the ambient air had an influence on the plasma length. The results of this study are relevant for future optimization studies involving the microwave plasma jet. **(Author's abstract)**

Physics. Atmospheric plasma. Microwave. Plasma jet. Plasma length. Optimization.

- 0405** A Monte Carlo simulation study on the interactions of proton,  $^7\text{Li}$  and  $^{12}\text{C}$  with water for hadron therapy application. Maratas, Jan Mickelle V., Morente, Carlo Paul P., Nawang, Salasa A.. **Transactions of the National Academy of Science and Technology**, , 33(1):183

The interactions of  $^{12}\text{C}$ ,  $^7\text{Li}$  and protons were simulated using a tissue reference media (water). The primary focus is to investigate the nuclear fragmentation which is believed to be the cause of the so-called dose-tail located right after the Bragg peak structure, which might affect the healthy neighboring tissue of the tumor.

Using Monte Carlo Method in GEANT4 (GEometry ANd Tracking 4<sup>th</sup> incarnation) toolkit, a pencil-like beam profile with Gaussian energy distribution is directed towards a box-shaped water target. Mean energies ranging from 100 MeV to 400 MeV for  $^{12}\text{C}$ , 100 MeV to 250 MeV for the  $^7\text{Li}$ , and 50 to 250 MeV for protons were used. Electromagnetic (EM) interactions are described by the standard and low-energy EM models, while the nuclear fragmentation interactions are described by the Hadronic interaction models such as the Binary cascade and Statistical Multifragmentation Models. Information such as Depth dose profile and peak to entrance ratio were extracted from the simulation.

The results show that the peak-to-entrance ratio was lower at higher mean energies for the three projectiles. At 400 MeV the peak-to-entrance ratio was about 3.425 for  $^{12}\text{C}$ . At 250 MeV the peak-to-entrance ratio were 3.615 and 2.514 for protons and  $^7\text{Li}$ , respectively. These peak-to-entrance values are approximately half of the highest known value of  $^{12}\text{C}$  at 175 MeV. Unlike protons,  $^{12}\text{C}$  and  $^7\text{Li}$  produced a larger dose tail with  $^7\text{Li}$  lower by 37.88% than  $^{12}\text{C}$  at 170 mm range.

Results suggest that for the three projectiles it is  $^7\text{Li}$  which are most suitable for therapeutic radiation therapy since it has lower dose tail compared to  $^{12}\text{C}$  and a more enhanced peak-to-entrance ratio compared to proton. **(Author's abstract)**

Physics. Hadron radiation therapy. Nuclear fragmentation. Dose tail. Peak-to-entrance ratio. Bragg peak.

- 0406** High resolution probing of elastic properties of biopolymers and living cells. Bacabac, Rommel G., Ayade, Heev, Villaruz, Lara Gay, Licup, Albert, Bernido, Christopher, Carpio-Bernido, Ma. Victoria, Otadoy, Roland. **Transactions of the National Academy of Science and Technology**, , 33(1):174

Correlation measures based on embedded probe fluctuations, are now widely used for characterizing viscoelastic properties of biological samples. However, novel applications using this robust tool are still lacking, considering that the study of living matter routinely demonstrate new phenomena, not immediately characterized by usual quantitative tools. Therefore, we derived new experimental and theoretical approaches to adapt ways of probing non-linear and non-equilibrium phenomena for biological samples.

Optical tweezer systems , two-beam tandems using dual-wavelength and single-wavelength splitting, were designed for high resolution microrheology in bulk down to single biopolymer or protein, based on the fluctuation spectra of embedded or attached probes. We derived calculations for winding turn probabilities to account for unfolding events in single fibrous biopolymers and globular proteins under tensile stretching based on approximating the ensuing probe fluctuations as originating from a damped harmonic oscillator under oscillatory forcing, Furthermore, for networks of biopolymers and living cells, we designed experiments using force pulses for simulating non-equilibrium phenomena, which naturally incorporates non-linear mechanics. The tools developed in this study will probe elastic properties of single biopolymers and networks, as well as living cells, aimed to gain insights for creating low-cost technologies for industrial and medical applications. **(Author's abstract)**

Physics. Biophysics. Microrheology. Biopolymers. Cell mechanics. Biomechanics. Protein folding. Non-equilibrium phenomena.

- 0407** Stretching single molecular DNA by temperature gradient. Maglasang, Gibson T., Gemao, Beverly V., Bornaes, Jinky B.. **Transactions of the National Academy of Science and Technology**, , 33(1):178

In this study, we obtained the mechanical properties of double stranded DNA (dsDNA) particularly the partition function and extension under small fluctuations limit stretched by temperature gradient field with Wormlike Chain (WLC) as the favored theoretical model. In this model, the dsDNA is treated as a continuous curve chain. The Hida-Streit integral formulation (White Noise Analysis) is used as a tool in evaluating the partition function of the dsDNA under temperature gradient field because of its versatility and prowess in solving many problems in quantum

mechanics as well as in statistical mechanics which includes the system focused in this study. From the partition function, the extension or dsDNA's elastic response through stretching is calculated which turns out to be linearly dependent on the temperature gradient field strength. The result of the calculation shows that temperature gradient can exert force on dsDNA and create internal tension within it which is enough to study and manipulate the biomolecule. **(Author's abstract)**

Physics. Partition function. dsDNA. Wormlike chain model. Temperature gradient. White noise analysis.

- 0408** Surface modified zinc oxide. Piagola, Joy Cristy S., Gambe, Jess E., Vequizo, Reynaldo M.. **Transactions of the National Academy of Science and Technology**, , 33(1):172

Zinc oxide ( $ZnO$ ), with its satisfactory stability, has been extensively used as a gas sensor for various gases such as hydrocarbons, oxygen,  $H_2O$ , etc.  $ZnO$ -based gas sensors are usually operated at  $> 100^\circ C$  temperatures which demand more power consumption compared to sensors that can operate at room temperature. To our knowledge, no reports have been presented on the capability of surface of surface modified bulk  $ZnO$  to sense smoke at ambient condition. In this study, the smoke sensing properties of  $HCl$ -etched  $ZnO$  samples in pellet form is presented.

$ZnO$  powders (99%) were pelletized and annealed at  $700-1000^\circ C$  with  $100^\circ C$  increment. Acidic etching using appropriate amount of hydrochloric acid was performed to increase the surface area of the samples. Morphology, electrical and smoke sensing characteristics of the surface modified  $ZnO$  pellets were investigated at room temperature ( $\sim 25^\circ C$ ). Electrical stability of the annealed samples improves as the annealing temperature is increased. All samples have n-type conductivity which is intrinsic for  $ZnO$ . Increase in surface area through etching was successfully achieved as seen from their scanning electron microscope (SEM) images. These  $HCl$ -etched  $ZnO$  pellet samples are then referred to as surface modified samples. The surface modified  $ZnO$  pellets are more sensitive to smoke than the as-annealed  $ZnO$  pellet. The remarkable increase of sensitivity from  $\sim 11$  to  $\sim 2000\%$  is exhibited by the surface modified  $ZnO$  pellets annealed at  $700^\circ C$ . These results indicate that  $ZnO$  is a potential material for smoke sensing application at ambient. **(Author's abstract)**

Physics. Zinc oxide. Smoke sensor. Annealing. Etching. Sensitivity.

- 0409** Year level fluctuations of misconceptions on the different dimensions of force among physics major. Malayao, Jr., Sotero O., Lahoylahoy, Myrna E., Pinar, Jezyl Mae V., Vios, Efren B.. **Transactions of the National Academy of Science and Technology**, , 33(1):222

This study is an attempt to unravel the cognitive structure regarding the concept of force, among physics majors, as it is decomposed into its nine sub dimensions. The scope of the sample covers both BS and BSEd students represented by year level. The study utilized the Force Concept Inventory (FCI) in which available studies in Philippines set-up involved only, in most cases, its usage as a construct to correlate with other cognitive or affective constructs. The respondents were determined by stratified random sampling and were given the FCI after their classes. By dissecting

every dimensions of force, the study yielded very interesting results that are deemed important for curriculum developers: *(i)* that misconceptions does diminish with increasing year level in terms of gross count with the third year having the least average misconception over the fourth year, *(ii)* that there is an interesting though inconsistent fluctuations, in the third year and first year based on average percent of misconceptions, *(iii)* that there is indeed an incoherent structure of knowledge about force based on the inconsistent concentration of misconceptions among the respondents. One big implications of the study is the need to investigate in depth the different dimensions of force by covering bigger demographics in order that a conclusive status can be established. **(Author's abstract)**

Physics. Force. Force concept inventory. Curriculum developers. Misconceptions. Incoherent structure.

## SCIENCE

## AND

## TECHNOLOGY

- 0410** Alcogas as fuel for power generation in barangay Bagong Silang, Real, Quezon. Capareda, Sergio C.. **Philippine Agricultural Mechanization Bulletin**, , 9(2):14-17

The study is involves the utilization and production of bio-fuel in barangay Bagong Silang, Real Quezon, as an effective and practical alternative source of power generation to commercial fuel. The study is a part of the O' Ilaw Program of the Department of Energy (DOE), which makes use of the local resources such as raw cassava, gabi and coconut sap for ethanol production. Aside from a series of consultations involving the local community, the project also conducted a Geographic Information System-Based (GIS-based) mapping and Global Positioning System (GPS) in the barangay. Three technologies were actually presented during the workshop consultation with the local community: biogasification, ethanol production and gasification, of which Ethanol fuel was the preferred option among the member participants. The project cited the following as among its objectives: "(1) To develop the electrification plan for an un-electrified barangay with ethanol as the main source of fuel for power generation; (2) To develop technology package for sustainable ethanol production, and; (3) To pilot the technology for implementation to other un-electrified barangays in the country."

Science and technology.

- 0411** Calamansi wastes for the production of USP grade pectin as source of dietary fiber. Torres, Rosalinda C., Monroyo, Evangelina C., Villanueva, Merie A., Bonifacio, Teresita S., Manalo, Carmelita O., Estrella, Romulo R., Lanto, Eduardo A., Genato, Edgardo S., Manongsong, Evelyn B., De Vera, Carlos, Arrogante, Elvira L., Adulta, Milagros. **Transactions of the National Academy of Science and Technology**, , 33(1):213

Enormous amount of waste are being generated by calamansi juice processors in the country. These wastes pose health and environment hazard in the environment, thus its utilization into high value products is the main objective of this project.

Pharmaceutical grade pectin was produced from the waste of *Citrus microcarpa* Bunge (calamansi) obtained from calamansi juice processing plants. Percentage yield was 10-14% (dry weight basis) by alcoholic precipitation method. The physico-chemical properties of produced pectin were analyzed and compared with standard specifications of the United States Pharmacopeia for pharmaceutical grade pectin. Techno-economic assessment of producing USP grade pectin was undertaken.

ITDI produced pectin was off-white to beige in color, odorless and had a slightly acidulous taste. It had a methoxyl content of 8.6% to 10.20% and galacturonic acid content of 77.6% to 82.2%. Degree of esterification ranged between 73.0% and 83.2%. Moisture content was determined at 10.0%. The soluble dietary fiber content was 70.6% using the enzymatic/gravimetric method. The arsenic content and the lead content were 0.15 ug/g and 0.8 ug/g, respectively, using the ashing-acid digestion and atomic absorption spectrophotometry.

The produced pectin was utilized as a source of dietary fiber where it is helpful in maintaining good digestive balance. It is advocated for those suffering from ulcer and for regulating blood pressure.

The total project cost of producing 23 kgs./month of USP grade pectin is P735,235.00. Unit cost of production per kilogram is P13,557.75, with a proposed selling price of P15,500.00 only. **(Author's abstract)**

Science and technology. Pectin. Dietary fiber. Citrus microcarpa.

- 0412** Cytotoxic cardenolide and sterols from *Calotropis gigantea*. Jacinto, Sonia D., Chun, Eunice Alexis C., Shen, Chien-Chang, Espineli, Dinah L., Ragasa, Consolacion Y.. **Transactions of the National Academy of Science and Technology**, , 33(1):214

The dichloromethane extract from the leaves of *Calotropis gigantea* Linn. was strongly cytotoxic against non-small lung carcinoma 9A549), colon carcinoma (HCT 116) and hepatocellular carcinoma (Hep G 2) and non toxic to non cancer Chinese hamster ovary cells 9AA8). The extract afforded uscharin (1), 3,5,8-trihydroxy-24-methylcholest-6,22-diene (2), a mixture of (24R)-3-hydroxy-24-ethylcholest-5en-7-one (3a) and (24S)-6-hydroxy-24-ethylcholest-4,22-dien-3-one (3b), and another mixture of (24R)-24-ethylcholest-4-en-3-one (4a) and (24S)-24-ethylcholest-4,22-dien-3-one (4B). Compound 1 exhibited extreme toxicity to A549, HCT 116 and Hep G 2 with IC50 of 0.003 µg/mL, 0.013 µg/mL, respectively, while sample 3 exhibited IC50 of 1.35 µg/mL, 4.46 µg/mL, and 3.83 µg/mL, respectively. **(Authors abstract)**

Science and technology. *Calotropis gigantea* Linn. Asclepiadaceae. Uscharin. Cytotoxic. MTT.

- 0413** Discrimination of Philippine coffee beans using an electronic nose system based on polymercoated piezoelectric quartz crystal. Cabanilla, Sharlene R., Sevilla, III, Fortunato B.. **Transactions of the National Academy of Science and Technology**, , 33(1):143

Electronic nose (EN) generates an electrical signal in the presence of a substance causing aroma. In this study, the feasibility of a fabricated EN based on polymer-coated piezoelectric quartz crystals (PQC) was investigated for the discrimination of the different coffee varieties in the Philippines (i.e. Arabica, Robusta, Excelsa and Liberica). The EN system that was employed was based on PQC coated with six sensing elements of different polarities [polyethylene glycol (PEG), polyvinylchloride (PVC), Silica (PVC/Silica), Cat-Ex (PVC/CatEx)], polymethylacrylate (PVC/PMAA) and Fluorosil (PVC/Fluor). Using the optimized conditions, coffee samples were sealed separately in the suitable vial and the headspace gas was pumped through the EN system using nitrogen gas. The gas phase detection was based on the corresponding change on the frequency of the crystal. Distinct radar plot quality profiles were obtained for each variety. Chemometric analysis of the responses from 48 different coffee samples using the EN was carried out using principal component analysis (PCA) and cluster analysis (CA). PCA and CA were applied to classify and to quantify how coffee samples are close to each other. The developed group of sensors was then able to categorize the different coffee varieties. **(Author's abstract)**

Science and technology. Piezoelectric quartz crystal. Electronic nose. Chemometric analysis. Principal component analysis. Cluster analysis.

- 0414** Effect of preservation and incubation methods on the hatching percentage of F1 hybrid silkworm eggs. Sanchez, Zita L., Ompoy, Serenita S., Mojica, Sweet GerryLou R.. **PTRI Samay Bulletin**, , :18-25

The study was conducted to evaluate the effect of different preservation and incubation methods for different F1 hybrid silkworm eggs based on hatching percentage.

Four (4) Mindanao F1 silkworm hybrids were utilized namely: PTRI SW-101, PTRI SW-102, PTRI SW-103 and PTRI SW-104. The eggs were subjected to 0, 3, 6, and 9 months preservation and 1 or 2 two days black boxing durations.

Results showed that the hatchability of F1 silkworm eggs were significantly higher with long-term preservation method compared with the eggs subjected to 0-month preservation. Hatching percentages were also observed to be higher at incubation with 2-days black-boxing compared with eggs black-boxed for only 1 day. For all the four Mindanao hybrids used, the effect of long-term preservation method and 2-days black-boxing during incubation effected the same results, thus the response of the four hybrids were uniform. This study recommends that F1 silkworm eggs should be preserved under long-term preservation and should be black-boxed for 2 days during incubation to ensure high hatching ratio. **(Author's abstract)**

Science and technology. silkworm. silkworm eggs. F1 hybrid.

- 0415** Effects of applied voltage on the mean diameter of electrospun polyaniline (PANI)-elastomeric adhesive fiber. Emralino, Francis Murillo, Herrera, Marvin Ustaris. **Transactions of the National Academy of Science and Technology**, , 33(1):176

The effects of applied voltage on the mean diameter of electrospun polyaniline (PANI)-elastomeric adhesive fibers were investigated. Polymeric solutions composed of equal volume of demethyl sulphoxide-dissolved polyaniline and elastomeric adhesive were prepared. These solutions were drawn into fibers by electrospinning with different applied voltage of 20, 30, 40, 50 and 60 kV. Scanning Electron Microscopy (SEM) images, together with fiber diameter measurements, showed that as the applied voltage was increased, the mean fiber diameter of the electrospun fibers also increased. The increase in mean fiber diameter was attributed to shortened flight time of the jets produced during electrospinning, increased deposition rate and bead formation, which contributed to the increase in fiber diameters. **(Author's abstract)**

Science and technology. Conducting polymers. Elastomeric adhesive. Electrospinning. Polyaniline.

- 0416** Electrochemical synthesis and corrosion performance of polypyrrole and poly(pyrrole-co-aniline) films on copper. Viray, Angeline S., Binag, Christina A.. **Transactions of the National Academy of Science and Technology**, , 33(1):147

The cheapest and most commonly used metal to date is copper, which is highly prone to corrosion. However, copper is mostly used in highly corrosive environment, which degrades the metal's durability and costs money to multinational businesses. To protect metals, conducting polymers are one of the most promising materials.

In this study, the electropolymerization of polypyrrole and poly(pyrrole-co-aniline) on copper electrode was done with cyclic voltammetry. A 0.1M pyrrole (Py) in 0.1 M near neutral (pH 7.6)  $\text{Na}_2\text{C}_2\text{O}_4$  solution was used and a potential window of -0.5 V to +1.8 V. For the preparation of poly(pyrrole-co-aniline), a 0.1 M monomer solution of 0.5 M pyrrole and 0.5 M aniline were used.

The corrosion protection properties of these polymers were studied using the open circuit potential (OCP) measurement in 3.5% NaCl (aq). PPy had the best corrosion protection properties, followed by poly(pyrrole-co-aniline). PPy showed responses going towards more positive potentials compared to the copolymer and bare copper upon immersion to saline solution, which is due to both the pseudo-layer of copper oxalate complexes formed on the copper surface before polymerization and the polymer coat synthesized on its surface. SEM micrographs showed that polypyrrole exhibited multiple layers synthesized on the surface of copper, which contributed to its efficiency on protecting copper from corrosion. **(Author's abstract)**

Science and technology. Polypyrrole. Polyaniline. Corrosion. Open-circuit potential. Voltammetry.

- 0417** Extraction and characterization of achuete (*Bixa orellana*) dye powder and its application to cotton and silk. Leaño, Jr., Julius L.. **PTRI Samay Bulletin**, , :9-17

Dyes from achuete seeds were extracted using ethanol at different liquor ratios (LR) and agitation time. The powders obtained were oven-dried at 60°C and were

characterized using UV-Vis spectrophotometry and FT-IR spectroscopy. The  $\lambda_{\text{max}}$  of the aqueous alkaline dye solution is 451nm and is stable to prolonged heating. The FT-IR spectrum suggests the presence of bixin and norbixin pigments in the powder. Adsorption curves (isotherms) reveal rapid dye absorption during the first 30 minutes and slows down after 60 minutes for all the mordanted fabrics. Different concentrations of the aqueous alkaline dye powder solution were applied to alum and copper sulfate mordanted cotton and silk materials under varied dyeing time. Color yield was found dependent on the mordant used whereas the colorfastness (CF) to laundering was not affected by the dyeing time. CF to laundering rating is 3.5 for cotton and 4.0 for silk. **(Author's abstract)**

Science and technology. achuete. FT-IR. dyeing.

- 0418** Google earth. Vallesteros, Arvin P., Bantayan, Nathaniel C., Calderon, Margaret M., Pulhin, Juan M., Cruz, Rex Victor O.. **Transactions of the National Academy of Science and Technology**, , 33(1):197

As a component of REDD or REDD+ 9 Reduced Emissions from Deforestation and Forest Degradation), detection and measurement of forest degradation has been widely reported in literature as technically difficult. This is because forest degradation is not easily detected and measured using satellite imageries, a situation that requires increased use of field data and information from local people. Hence, all available technology must be used including Google Earth that provides virtual landscape of localities on earth.

A high resolution Google Earth imagery was used to delineate watershed boundary; map streams, roads, trails, houses and other ground features; stratify forest vegetation according to carbon stock; and as input for interpreting Landsat ETM+ data. More importantly, the three dimensional virtual landscape enhanced collection of information about historical change in extent and composition of forest vegetation, proximate drivers of forest degradation, and risk of degradation based on historical trend. Using the virtual landscape as visual aid, key informant interview and workshop were conducted to elicit information. It was observed that, using an effective visual aid, local people can easily grasp such technical concepts as percent canopy cover, relationship between tree diameter and tree crown, appearance of canopy in the imagery according to species composition and tree density, and carbon stock decline as indicator of forest degradation. The information elicited from local people when combined with GIS ancillary data, Landsat ETM+ data, and field data resulted in reliable estimate of forest degradation in Maasin Watershed in Nueva Vizcaya. **(Author's abstract)**

Science and technology. Google Earth imagery. Forest degradation. REDD. Local knowledge. Participatory GIS.

- 0419** Halogen-free, imidazolium based ionic liquids for organic and inorganic syntheses. Arco, Susan D.. **Transactions of the National Academy of Science and Technology**, , 33(1):161

Ionic liquids (IL) are designer solvents exhibiting negligible vapor pressure, high

thermal stability, wide liquid range, and excellent ability to dissolve various inorganic and organic compounds. Typical ILs consist of N,N'- dialkylimidazolium cations and a wide variety of halide-based anions but the presence of halides in these ILs raise environmental concerns when the hydrolysis stability of the anion is poor or when a thermal treatment of the IL in use is necessary. In response to this, two series of halogen-free, 1-alkyl-3-methylimidazolium [RMIM] based ILs, [RMIM] Acetate and novel [RMIM] Lauryl Sulfate (LS), have both been prepared through a two step procedure: step (1) involves a reaction between 1-methylimidazole and the appropriate alkylbromide to yield [RMIM]Br and step (2) involves the exchange of the bromide ion in [RMIM]Br with sodium acetate or sodium LS to afford the halogen free ILs. A comparison of optical properties of 1-butyl-3-methylimidazolium [BMIM]LS and [BMIM]Br shows that the interesting excitation wavelength-dependent behavior observed in both ILs is typical of ILs bearing the imidazole moiety. The Diels-Alder reaction provides a means by which heterocyclic ring may be produced from acyclic precursors in a single step and the endoselectivity (endo:exo=91:1) and product yield (89%) obtained for the Diels-Alder reaction between cyclopentadiene and methyl acrylate in 1-hexyl-3-methylimidazolium [HMIM] Acetate is remarkably high. The control of the morphogenesis of gold nanoparticles leads to unique properties that are essential to applications such as catalysis and analytical sensing. [RMIM] LS has been utilized both as a solvent and as a stabilizing agent in the synthesis of anisotropic gold nanostructures and the morphogenesis of these gold nanostructures has been examined. Presence of [BMIM] LS stabilized the formation of Au nanoplates as well as intertwined Au nanoparticles and nanorods. **(Author's abstract)**

Science and technology. Ionic liquid. Lauryl sulfate. Diels-Alder. Stabilizing agent. Morphogenesis.

- 0420** Household daily nitrite consumption levels from some commonly consumed processed meats in selected sites/areas in the Philippines. Solano, Lalaine S., Udarbe, Mildred A., Arim, Rosario H., Ranille, Jay, Portugal, Teresita R., Capanzana, Mario V.. **Transactions of the National Academy of Science and Technology**, , 33(1):207

Ten nitrate-and nitrite-treated meat products rank among the top 20 processed meats consumed by Filipinos (6<sup>th</sup> National Nutrition Survey,2003). Nitrate and nitrites when ingested in high concentrations have been implicated as factors in the etiology of methemoglobinemia, intestinal/colon cancer, and type 1 diabetes. The study determined the contents of nitrites and the potential nitrite intakes/exposure risks in ten commonly consumed processed meats collected from selected sites in nine study areas. Popular branded, canned and plastic-packaged processed meats (i.e. hotdog, corned beef, luncheon meat, Vienna sausage, and beef loaf) were purchased in SM Supermarket - Las Piñas. Commonly consumed cured meat products (i.e. *tocino*, *longganisa*, *tapa*, *chorizo*) were also purchased in selected markets of some major processed meat-consuming cities (i.e. Las Pinas, Muntinlupa, Baguio, Bacolod, and Butuan), and provinces (i.e. Bulacan, Iloilo, Southern Leyte, and Davao del Sur). Nitrite contents of the collected meat samples were compared against the BFAD-DOH Guidelines on Food Additives (2006). Nitrite contents of most test samples within the same sampling area were found to be highly variable but still within the BFAD maximum levels. Nitrite intakes from all the processed meat consumed in each study site/area were then computed using the low and high concentration range, and compared against the JECFA-WHO/FAO (2002), Acceptable Daily Intake (ADI) of 0.07 mg nitrite per kg body weight equivalent to 4.13 mg for a 59 kg adult Filipino male. Results indicated that household nitrite intakes from processed meats in

selected sites pose potential exposure risks in the cities of Las Piñas (4.84-38.46 mg/capita) and Muntinlupa (6.53-7.59) and in the provinces of Bulacan (6.53-7.59 mg/capita) **(Author's abstract)**

Science and technology. Processed meat. Nitrite. Household intakes. ADI. Potential exposure risk.

- 0421** A hybrid gas sensor array for the quality assessment of virgin coconut oils. Rañola, Rey Alfred G., Ongo, Emelda A., Santiago, Karen S., Sevilla, III, Fortunato B.. **Transactions of the National Academy of Science and Technology**, , 33(1):145

A hybrid gas sensor system composed of seven chemiresistors based on thin conducting polymer (CHCP) films and nine polymer-coated piezoelectric quartz crystals (PPQC) were developed and utilized for assessing the quality of virgin coconut oil. The sensors were exposed to the headspace of samples of virgin coconut oil (VCO), refined, bleached and deodorized coconut oils (RBD), rancid VCO and flavored VCO. The response of the chemiresistor was measured using a bridge circuit operating in a deflection mode, and the response of the piezoelectric quartz crystals was measured using an instrumentation system involving an oscillator circuit and a frequency counter. The CHCP sensor displayed good reproducibility (rsd= 2.02% to 10.40%; n=6) and reversibility (rsd= 0.033% to 1.98%; n=3). At the same time, PPQC also exhibited good reproducibility (rsd= 3.54% to 6.28%; n=3) and reversibility (rsd=3.83% to 7.95%; n=3). Chemometric analysis of the data through principal component analysis (PCA) enabled a very good discrimination of VCO, RBD, rancid VCO and flavored VCO with a cumulative variance of 81.87%. This hybrid gas sensor system will be very useful in monitoring the quality of VCO products and will detect adulterated and fraudulent VCO products. **(Author's abstract)**

Science and technology. Hybrid sensor array. Chemiresistor. Piezoelectric quartz crystal. Conducting polymers. VCO.

- 0422** Hydrogeochemistry and gross alpha-beta activities of Aklan's watercourses. Pabroa, Preciosa Corazon C., Castaneda, Soledad S., Sugang, Raymond J., Laurente, Dan R., Conanan, Aida P., Ebihara, Mitsuru. **Transactions of the National Academy of Science and Technology**, , 33(1):211

Neutron activation analysis (NAA) and gross alpha-beta measurement by Liquid Scintillation Spectrometry (LSC), were used to mark out regions with impending elevated concentrations of minerals/pollutants in the offshoot streams of the Aklan River. Five tributaries were selected as sampling points: Tinigao, Numancia, Badyangan, Mobo and Bakhaw Norte. Streambed sediments were collected from Tinigao, Numancia, Badyangan, and Mobo sites, and were analyzed for elemental composition using neutron activation analysis (NAA); surface water from all of the five sites were analyzed for bicarbonate ions by titrimetry; pH and conductivity by selective electrodes; and radioactivity by Wallac 1414 Liquid Scintillation Counting. None of the watercourses exceeded the regulatory limits set by the Philippine National Standards for Drinking Water for conductivity, pH and bicarbonate parameters for surface waters. As far as radioactivity is concerned, each of the Tinigao, Numancia, Badyangan,

Mobo and Bakhaw Norte water sample displayed total alpha activity of less than the detection limit, LLD, (LLD= 0.03 Bq/L) which was way below the drinking water regulatory limit of 0.1 Bq/L for alpha emitters; all the samples exhibited beta activities of less than LLD (LLD= 0.3 Bq/L), which were also way below the drinking water regulatory limit of 1.0 Bq/L for beta emitters. The determination of major riverbed components (Cl, Ti, Ca, Mg, V, Si, Al, Na, K, Mn) was accomplished using neutron activation analysis. All the measured parameters were put together to be able come up with a more accurate reconstruction of the ecological processes occurring across the whole watershed system. **(Author's abstract)**

Science and technology. Neutron Activation Analysis. NAA. Gross alpha-beta. Liquid Scintillation Spectrometry (LSC). Aklan River.

- 0423** Lactic acid fermentation from *Jatropha curcas* L. press cake and raw cassava starch using *Rhizopus oryzae* NRRL-395. Perdon, Liza Rowena DLC., Elegado, Francisco B., Migo, Veronica P., Movillon, Jovita L., Demafelis, Rex B.. **Transactions of the National Academy of Science and Technology**, , 33(1):193

The utilization of *Jatropha curcas* L. for biodiesel production, produces significant amount of press cake as by-product. Toxic compounds render the cake unsuitable for animal feed. Thus other uses, such as substrate for fermentation should be explored. Its use for lactic acid production was tried in this study.

Dilute-acid hydrolysis of *Jatropha* press cake substrate was initially optimized, specifically pH conditions and duration of autoclaving. The highest value of reducing sugars recorded was 86.6 g/L obtained by hydrolyzing the samples at pH 1.0 for 30 minutes. Upon fermentation with *Rhizopus oryzae* NRRL-395, starch-supplemented hydrolyzed *Jatropha* press cake produced 3.67 g/L lactic acid in one day at pH 5.0. On the other hand, unhydrolyzed press cake took four days to ferment, but attained the highest value of 11.93 g/L lactic acid. Hydrolyzed samples could have produced sugars that are not utilizable by *Rhizopus oryzae*.

The use of *Jatropha* press cake as protein supplement for the fermentation of raw cassava starch into lactic acid was feasible. This would probably provide a good alternative to reduce the fermentation costs due to chemical supplements. Further optimization is still needed for it to be suitable for large scale production. **(Author's abstract)**

Science and technology. Lactic acid fermentation. *Jatropha curcas*. Cassava starch. *Rhizopus oryzae*.

- 0424** Microemulsified hybrid fuel from *jatropha* and coconut oils. Briones, Annabelle V., Bawagan, Apollo Victor O., Mallillin, Armando T., Trinidad, Oscar R., Avila, James E., Esperanza, Ramon C., Aquino, Juanito P.. **Transactions of the National Academy of Science and Technology**, , 33(1):190

A microemulsified hybrid fuel from *jatropha* and coconut oils was developed through the process of microemulsification. This was done by mixing the oils with

surfactant, co-surfactant and water. The resulting product was evaluated in terms of phase behavior and physicochemical properties. Application tests were done in high powered lantern (petromax) for lighting and gas stove for cooking. Results of the study showed that microemulsions of *Jatropha* oil and coconut oil and its blend are thermodynamically stable, have low viscosities and stable against oxidation. Application tests showed that microemulsified blend of *jatropha* and coconut and blends with kerosene have better lux range and less fuel consumption than using kerosene in petromax. In gas stove, results showed that blends of microemulsified *jatropha* and coconut oil with kerosene, exhibited less fuel consumption, high thermal and combustion efficiency, reduced CO and CO<sub>2</sub> emission. Results of the analysis of physicochemical properties, smoke emission test and vehicle performance showed its potential as alternative fuel for transport. Application test of microemulsified hybrid fuel in diesel genset showed reduced fuel rate consumption, liter per hour of about 53.0% to 76.5%.

The process of microemulsion is simple with no residual waste product to be disposed or treated. Microemulsion fuels are generally cleaner fuel. Microemulsion fuels provide a method for increasing the use of *jatropha* and coconut oil as fuel. It has the ability to significantly reduce petroleum consumption as well as lower harmful and particulate emissions. **(Author's abstract)**

Science and technology. Microemulsification. *Jatropha* oil. Coconut oil. Hybrid fuel.

**0425** Microwave-assisted reaction. Creencia, Evelyn C., Horaguchi, Takaaki. **Transactions of the National Academy of Science and Technology**, , 33(1):155

The use of microwave radiation for heating reaction mixtures has proved to be a convenient method for the synthesis of indazoles and benzimidazoles as it can carry out the reaction under solvent-free condition, at shorter reaction time and with better product yield.

A domestic microwave oven was used to carry out the reactions. The starting materials were placed in a test tube and mounted in an Erlenmeyer flask. This set-up was placed inside the cavity of the oven and irradiated for several minutes at a particular power. The products were identified by their IR, <sup>1</sup>H nmr and <sup>13</sup>C nmr spectroscopic data.

A 77% yield of 2-phenyl-2*H*-indazole was obtained by irradiating a mixture of 1.0 mmol *N*-(2-nitrobenzylidene)aniline and 4.0 mmol P(OEt)<sub>3</sub> for 14 min at 200W. 2-(1Naphthyl)-2*H*-indazole was obtained in 89% yield when *N*-(2-nitrobenzylidene)-1-Naphthylamine and P(OEt)<sub>3</sub> was irradiated for 14 min at 200W. Irradiation of *N*-benzylidene-2-nitroaniline and PPh<sub>3</sub> for 5 min at 200W gave 96% 2-phenyl-1*H*-benzimidazole. other indazoles and benzimidazoles were also synthesized using the microwave-assisted method. The results showed that high yields were obtained at shorter reaction times and without excessive use of organic solvents. **(Author's abstract)**

Microwave-assisted reaction. Indazoles. Benzimidazoles. Imines. Synthesis. Science and technology.

- 0426** Performance evaluation of Philippine Tropical Fabrics as DOST office uniform. de Leon, Marites S.. **PTRI Samay Bulletin**, , :1-8

The performance of the Philippine Tropical Fabrics (PTFs) as office uniform was evaluated through actual wear test. The survey was participated in by 836 respondents comprising of 552 female and 284 male employees from the Department of Science and Technology (DOST) central office and its 22 agencies including regional offices. Four sets of polyester/pineapple blouses (beige, mustard, pink and blue) for female and one set each of polyester/abaca (beige) and polyester/pineapple (blue) barongs for male were evaluated. A survey questionnaire form was used to record the respondents' observations on the different properties that contribute to the acceptability and varying preferences.

Results show that the fabrics have acceptable weight, strength and softness for uniforms and are easy to care and maintain. Other properties, however, such as comfort, itchiness and colorfastness need to be improved to make the fabrics highly acceptable.

Among the uniforms, the blue for female and beige for male were found the most acceptable by the majority of the respondents. The ranking of the uniforms according to respondents' preferences can be expressed as follows: for female: blue > mustard > pink > beige; for male: beige > blue. **(Author's abstract)**

Science and technology. polyester. abaca. tropical fabrics.

- 0427** Properties and performance of MMSU hydrous biofuel. Agrupis, Shirley C., Ulep, R. A., Mateo, N., Ascano, R., Birginias, M. B., Valencia, M. A., Abenes, F.B.. **Transactions of the National Academy of Science and Technology**, , 33(1):188

Modified fermentation techniques at ambient temperature and simplified reflux distillation protocols were developed to produce the *MMSU 95 hBE* bioethanol and the *MMSU hBE-20* gasohol fuel blend.

The 95% fuel-grade hydrous ethanol, *MMSU 95 hBE*, was produced from sweet sorghum and sugarcane and was subsequently used to formulate a unique hydrous gasohol blend: the *MMSU hBE-20*. Unlike other hydrous ethanol fuel blends formulated in other countries, our formulation does not need a dispersant, nor a co-solvent and uses the commercially available anhydrous E-10 gasohol blend. The *MMSU hBE 20* was stable at ambient temperature and did not show phase separation even at refrigerated conditions. Preliminary tests of the gasohol, when used in stationary 4-stroke engines, motorcycles and motor vehicles, revealed no discernible problems. The performance of a 6.5 HP engine when fueled with *MMSU hBE-20* was comparable with the commercial E-10. Under different engine load of 4, 6, and 8 kg, the fuel consumption (L/hr), brake horsepower (BHP), brake fuel rate (L/BHP-hr), heat value (Btu/lb), and brake thermal efficiency of the same engine fueled with *MMSU hBE 20* did not vary significantly with the E-10-fed engine. Further tests indicate the *MMSU 95 hBE* can also be used up to e-85, indicating the possibility that it can be suitable for use in modern Flex Fuel Vehicles (FFV) when they become available in the Philippines.

The *MMSU hBE 20* is a promising fuel for gas powered engines and vehicles that is more economical and environmentally sustainable than blends using anhydrous ethanol. More important, these technologies are scale-adaptable and easily adoptable at the village level to create an enterprise that is economically viable. Current forecast indicate an average production cost of PHP 30 using feedstocks from sugarcane and sweet sorghum which, when compared to the prevailing cost of gasoline, can result in a profit margin of about 67%.

Commercialization of these technologies will open opportunities for village level ethanol production and would be a significant contribution towards the implementation of several Republic Acts: the RA 9637- the Philippine Biofuels Act, RA 9003- Philippines' Ecological Solid Waste management Act, RA 9513- The Philippines Renewable Energy Act, and the RA 8749- The Philippine Air Act. **(Author's abstract)**

Science and technology. Village-scale ethanol production. MMSU 95 hBE. MMSU hBE-20. Hydrous ethanol. Reflux distillation. Biofuel.

- 0428** PTRI intervention on the natural dyeing practices of the Higaonon Hinabol Weavers of Mintapod, Impasug-ong Bukidnon. Leaño, Jr., Julius L.. **PTRI Samay Bulletin**, :26-33

The traditional dyeing practices on the hinabol of the Higaonon weavers in Impasug-ong, Bukidnon was assessed to suit the proposed intervention. The evaluation revealed the low productivity and lack of systematic dyeing procedure which often compromised the quality of the dyed materials. PTRI introduced a technology, which sought to install a more systematic, standard and scientific approach in dyeing abaca fibers. Fiber pre-treatment using hydrogen peroxide, alkali and sodium silicate was introduced to clean and render a whiter appearance of the fibers prior to dyeing. Some of the local dye sources used include tungog (roots of *Morinda citrifolia*) yellow ginger (rhizomes of *Curcuma longa*), and the native lila (vine) and ilalama (wood). The use of Sibukao (wood of *Cesalpinia sappan*) was also introduced as a dyeing options to obtain the much desired red color while Talisay (leaves of *Terminalia catappa*) was used to produce the desired black color. Standardizing techniques of the local dye sources were likewise pursued.

The assimilation of the PTRI technology in natural dyeing was found to have increased the over all quality, and productivity and likewise improved the aesthetic appeal of the hinabol. These findings ascertained the successful intervention of PTRI in sharing the systematic process of natural dyeing in the Higaonon weavers. **(Author's abstract)**

Science and technology. Impasug-ong. hinabol. dyeing. natural dyeing.

- 0429** Quality of lint properties of seven locally grown cotton varieties. Pedrugao, Julita H., Hayin, Jovita A., Cuchon, Caridad M.. **PTRI Samay Bulletin**, :34-42

Seven varieties of locally grown cotton namely CRDI-1 from Sarangani, Ilocos Sur and South Cotabato, CRDI-2 from Pangasinan and Ilocos Sur, UPL-C2 from Ilocos

Norte and Sur, (PSB-Ct8, PSB-Ct3, Navkar F1 and Navkar F2) all from Ilocos Norte, submitted by the Cotton Development Authority (CODA) were evaluated as to their acceptability in yarn production.

The study focused on six cotton fiber properties namely, staple length, breaking tenacity, fiber fineness, maturity, sugar and non-lint content.

With the Indian standards as basis, results showed that CRDI-2 of Alacan, Pangasinan and San Juan, Ilocos Sur, is the most promising variety. Based on its exhibited CSP volume, it can be processed to 30 Ne yarn count and higher. (Author's abstract)

Science and technology. lint. cotton. CRDI-1. CRDI-2.

- 0430** Rapid synthesis under mild conditions of an acrylic diamide N, N, N', N'-tetrabutylphthalamide, a potential antimicrobial agent. Abrenica, Graniel Harne A., Bernardo, Valeree Ross R., Paredes, Fiona U., Arco, Susan D.. **Transactions of the National Academy of Science and Technology**, , 33(1):150

The amide functional group is a common feature in both small and complex synthetic or natural molecules. It is one of the most significant functional groups of organic molecules in terms of medicinal use. Medicinal Chemistry database showed that approximately 25% of known drugs contain this carboxamide group. The synthesis of acyclic diamide, N, N, N', N' – tetrabutylphthalamide, by the condensation with phthalic anhydride in dioxane of dibutylamine proved to be highly efficient. A product yield of 85% was obtained under mild conditions (6-hour reaction time at 27°C). The product was recrystallized in acetonitrile. The successful synthesis was confirmed through spectroscopic techniques such as infrared, nuclear magnetic resonance and mass spectroscopy. The purified product was tested for antimicrobial activity against *Escherichia coli*, *Staphylococcus aureus*, *Candida albicans* and *Aspergillus niger*. Chloramphenicol and clotrimazole were used as positive controls. The acyclic diamide exhibited antimicrobial activity with an antimicrobial index of 0.1 against *Escherichia coli*, 0.3 against *Staphylococcus aureus* and 0.2 against *Candida albicans*. No inhibition activity against *Aspergillus niger* was observed. (Author's abstract)

Science and technology. Acyclic diamide. Medicinal chemistry. Condensation reaction. Antimicrobial agent. Antimicrobial index.

- 0431** The scientist as humanist and statesman. Davide, Jr., Hilario G.. **Transactions of the National Academy of Science and Technology Philippines**, , 26(2):173-179

Science has become a part of everyday experience. Man, in his complete reliance on tools sometimes loses sight of what he is building; thus, such tools have stunted or confused the search for meaning and purpose. The tools of law in its traditions and stability must be coupled with scientific innovations. While scientist strive to unify the sciences, so also must the sciences be unified with the law. However, scientist should never tire in urging the law to catch up with them. What law and polict ask of scientist

is no small feat. Not only do scientists have to convince government leaders but their advocacy must stretch to every sector of society. Our nation's dedication to science and technology and the purpose behind it is an explicit State policy. Section 17, Article II (declaration of Principles and State Policies) of the 1987 Constitution culture and sports to foster patriotism and nationalism, accelerate social progress, and promote total human liberation and development. "Scientists are urged to propagate the tradition of science that teaches individuals and, ultimately, nations, the power to dream, to create, to act, to reason, and if it fails, to try again. This is not only within the power of science to do, but the power of science in a democracy. **(Author's abstract)**

Science. Law. Democracy. Humanist. Science and technology.

- 0432** *Tamarindus indica* seed gum as a natural coagulant for textile dye effluents. Pagkalinawan, Jenice O.. **PTRI Samay Bulletin**, , :43-48

*Tamarindus indica* seed gum was evaluated and explored for its coagulation ability to remove color from actual textile dye effluents and synthetic dye solutions. Five types of commercial dyes namely reactive yellow, acid red, direct blue, disperse red and basic blue were selected for this study. Variations of the volume of gum solution were conducted for optimum results. Tamarind seed gum was found to be a potential natural coagulant for the decolorization of textile dye effluents especially for basic and direct dyes, but not for acid, disperse and reactive dye solutions. **(Author's abstract)**

Science and technology. *Tamarindus indica*. seed gum. tamarind. tamarind seed gum.

- 0433** Yield potential of rain tree fruit (*Samanea saman* Merr.) as feedstock for biofuel production. Simon, Samuel R.. **Transactions of the National Academy of Science and Technology**, , 33(1):187

This study was conducted to determine the ethanol yield potential of rain tree fruit and to evaluate its potentials as a feedstock for biofuel production.

Ripe rain tree fruits were fermented using baker's yeast (*Saccharomyces cerevisiae*) with the following treatments with three (3) replications each: Treatment 1 ( $T_1$ )- fermentation of the whole fruit pods; Treatment 2 ( $T_2$ )-fermentation of the fruit with the seeds removed and Treatment 3 ( $T_3$ ) - fermentation of the filtered mixture only (solid particles consisting of pulp, bark and seeds were removed). One (1) kg of pounded and blended fruit was used for each replication and was fermented for 10 days in a six-gallon water container.

Results of this study reveals that using the basis that fifty percent (50%) of the measured sugar level is converted into ethanol,  $T_1$  obtained the highest yield potential of 210 ml/kg. Based on the alcohol content analysis of the fermented solution the highest ethanol yield was obtained by  $T_1$  (180 ml/kg), followed by  $T_2$  (177 ml/kg) while  $T_3$  (162 ml/kg) obtained the lowest ethanol yield among the treatments. Moreover, based on the alcohol analysis of the distillate,  $T_1$  (117.03 ml/kg) obtained the highest average ethanol yield followed by  $T_2$  (116.40 ml/kg) while  $T_3$  (90.23 ml/kg) obtained the lowest. Analysis of variance reveals that there is a significant difference among the

treatments at 5 percent level of significance.

This study found out that rain tree fruit has a yield potential of 210 ml/kg (210 liters/ton). Comparison of the yield potential of rain tree fruit with other feedstock reveals that the rain tree fruit is a very good feedstock for biofuel production. It is recommended that optimization studies should be conducted in all aspects of fruit processing, from particle size reduction to fermentation and distillation, for optimum bio-ethanol production. **(Author's abstract)**

Science and technology. Rain tree fruit. Ethanol yield. Biofuel feedstock. Biofuel production. Fermentation.

## SOCIAL

## SCIENCES

- 0434** Adoption of a tool to measure the extent of presence of social constructivism in high school and college physics classrooms. Malayao, Jr., Sotero O., Lahoylahoy, Myrna E.. **Transactions of the National Academy of Science and Technology**, , 33(1):221

The move towards constructivism in classrooms has been widely initiated although not explicitly named as constructivism. In the early 1990's, DepEd together with DOST initiated programs to foster new approaches in teaching sciences and mathematics. Lately, with the rapid expansion of the capacity of computer, the ICT integration is becoming a widespread phenomenon and many other pedagogical innovations that are inherently or implicitly associated with ICT integration come into clearer focus. All these are manifestations of the immense scope of social constructivist perspectives in the learning process. However, measurement of the presence of the social constructivism is not being given due to importance unlike in the neighboring countries. In this study, the Social Constructivist Learning Environment Survey (SCLES) made by Australian educators is being attempted for full adoption in physics classrooms both in high school and college. With the involvement of 1000 college students in MSU-IIT and 1,194 senior students throughout Mindanao, the reliability of SCLES was established. In the original study, the cronbach alpha in 5 different dimensions of SCLES ranged from 0.54 - 0.81 while the present study ranged from 0.55 – 0.72. The present study, however, showed an overall cronbach alpha of 0.82 which was not established in the original study. The study further revealed that at its initial result, the SCLES can be good measuring tool in investigating the extent of social constructivism in physics classrooms. **(Author's abstract)**

Social sciences. Social constructivist. Pedagogical innovations. Reliability. ICT integration. Physics classrooms.

- 0435** Agricultural output and the states of poverty in the Philippines. Mapa, Dennis S., Lucagbo, Michael Daniel C., Garcia, Heavenly Joy P.. **Evidence from self-rated poverty data**, , 33(1):217

The high poverty incidence in the country is a major development concern that needs to be addressed by our policy makers. Official poverty data shows that headcount poverty increase to 26.5% of the total population in 2009 from 26.4% in 2006. The number of poor Filipinos reached 23 million in 2009. Since poverty incidence has dynamic patterns, studies using official poverty data encounter difficulty because of limited number of data points. This study builds econometric models in analyzing the movement of poverty in the country using the quarterly self-rated poverty series of the Social Weather Stations. The first model uses as Markov Switching model to determine the states of poverty. The model assumes two states: *extremely high* and *high* poverty states. An average of 61% of the population considered themselves as poor when the country is in the state of *extremely high poverty*. In times of high poverty, an average of 49.5% of the population considered themselves as poor. The result shows that once the country is in the state of *extremely high poverty*, it stays there for an average of 24 quarters, or six years, before moving out. The paper then used the Logistic Regression model to show what determines the states of poverty. Three variables are considered as important determinants: agricultural output, government spending and underemployment rate. A one-percentage point increase in agricultural output reduces the probability of being in the *extremely high state* of poverty by about 46 percentage points, all things being the same. The study shows that poverty incidence in the country is dynamic and frequent monitoring through self-rated poverty surveys, perhaps at the provincial level, is important in order to assess the effectiveness of the government programs in reducing poverty. The self-rated poverty surveys can complement the official statistics on poverty incidence. **(Author's abstract)**

Social sciences. Markov switching. Logistic regression. Self-rated poverty.

- 0436** Do community-driven development projects enhance social capital?. Chase, Robert S., Labonne, Julien. **Social Welfare and Development Journal**, , 3(2):10-16

This paper explores the social capital impacts community driven development project in the Philippines in which communities compete over block grants for infrastructure investment. It takes advantage of a unique dataset of about 2,100 households collected before the project started (2003) and after one cycle of subproject implementation (2006) in 66 treatment and 69 matched control communities. Participation in village assemblies, the frequency with which local officials meet with residents and trust towards strangers, increased as a result of the project. However, there is a decline in group membership and participation in informal collective action activities. This may have been because households were time constrained, so that in order to participate in project activities, they needed to temporarily reduce their participation in informal activities. An alternative explanation is that the project improved the efficiency of formal forms of social capital and thus households need to rely less on informal forms. Finally, our results indicate that, in the short-run, the project might have reduced the number of other investment. **(Author's abstract)**

Social sciences. community. social capital. community driven.

- 0437** Determinants of poverty in elderly-headed households in the Philippines. Mapa, Dennis S., Bersales, Lisa Grace S., Albis, Manuel Leonard F., Daquis, John Carlo P.. **Transactions of the National Academy of Science and Technology**, , 33(1):218

This paper looks at the impact of population dynamics on poverty in elderly-headed households in the Philippines using data from the Family Income and Expenditures Survey (FIES) from 2000 to 2006. The population of the elderly, or those 60 years and above, has increased from 3.2 million in 1990 to 4.6 million in 2000. This group is growing at a rate of 3.6% per annum and estimated to reach 7 million in 2010. Data from the FIES shows that the percentage of the elderly who are poor is increasing since 2003. Moreover, the percentage of elderly-headed household belonging to the poorest 10% of all households has been on the rise since 1997. An econometric model based on the logistic regression shows that the presence of a young dependent (aged 14 years old or below) increases the probability that the elderly-headed household will become poor by about 9 percentage points, controlling for other factors such as income of the household, education, age and gender of the household head, income transfer from abroad and regional-specific characteristics. The results of the econometric model suggest that the high proportion of young dependents create negative effects on the welfare of the elderly-headed household by increasing the probability of the household being poor. From the point of view of policy, addressing the alarming poverty incidence in the country must include measures that will manage the country's burgeoning population and bring down the fertility rate to a level that is conducive to higher income growth. **(Author's abstract)**

Social sciences. Elderly. Population dynamics. Poverty. Logistic regression. Young dependents.

- 0438** Development of an interactive instruction system for science and health VI. Capilitan, Diamer B., Salic-Hairulla, Monera. **Transactions of the National Academy of Science and Technology**, , 33(1):227

The objective of this study is to develop an interactive instructional system which is a computer-assisted instruction, as an instructional tool in teaching "Climate of a Place". This is in response to the low performance of the grade six (VI) pupils in the 2007-2008 National Achievement Test in Science.

In carrying this objective, the researcher utilized the quasi-experimental design utilizing a pre-test and posttest design. The grade six (VI) pupils of Northeast-II Central School in Dalipuga, Iligan City were chosen as the respondents of the study and various reactions and effects towards the use of the instruction system were consolidated. The Developed Interactive Instruction System was evaluated by experts and inservice teachers using a set of rubrics. Revisions on the computer-assisted instructional tool were done based on the experts' and inservice teachers' suggestions.

The result of this study showed that the developed interactive instruction system could be used as a good instructional tool to improve the pupils' performance in teaching "Climate of a Place". Results in the try-out indicate that the performance of the pupils were significantly higher after using the instruction system. Pupils' comments on the instruction system were all positive and indicate the same reaction, which is they all liked the methods used and they learned better from the lesson.

**(Author's abstract)**

Social sciences. Development. Interactive. Computer-assisted instruction. Instruction system. Evaluation. Performance.

- 0439** Effect of web-enhanced learning activities on the english achievement of freshment ant Nueva Vizcaya General Comprehensive High School. Bustos, Katherine Faith M., Navalta, Jane D.. **Transactions of the National Academy of Science and Technology**, , 33(1):223

The study established the effects of Web-Enhanced Learning Activities (WELA) on the achievement in English of freshmen students of the Nueva Vizcaya General Comprehensive High School (NVGCHS).

The research combined the quantitative approach using quasi-experimental design, with the qualitative approach involving immersion learning among 66 students from two first year classes, 34 under the experimental group and 32 under the control group. Observation, participation in the classroom interaction, and interview were employed. The study covered the third grading period of School Year 2007-2008.

The achievement level of respondents was evaluated based on pretest and posttest with a validated teacher-made test. Data were analyzed using mean, frequency distribution, percentage, and t-test.

While the students gained knowledge in both approaches, those under the WELA obtained higher achievement level in the posttest, significantly outperforming the students in the control group. Moreover, based on data from interview and classroom observation, the following positive behaviors were noted among the students under the WELA: (a) increased interaction among the students, between the students and learning materials, and between the students and the teacher; (b) decreased cases of absenteeism; (c) independent learning; (d) enhanced and structured learning styles; and (e) more defined focus in learning.

Administrators should encourage their teachers to be involved in updating their teaching and learning methods and strategies. Teachers should be more open to new techniques and styles; and join trainings, seminars, and workshops on web-enhanced learning and ICT integration. **(Author's abstract)**

Social sciences. Web-Enhanced Learning Activities (WELA). ICT integration.

- 0440** Farmers' attitudes and knowledge level on organic farming in Region 1 and Cordillera Administrative Region (CAR). Pastor, Floramante C., Legaspi, Noralyn B., Salas, Maria Angelica O., Pastor, Diana A., Agbigay, Lea C., Cacatian, Marlyn S., De Padua, Ma. Victoria M., Llanes, Clifton R., Imper, Amado P.. **Transactions of the National Academy of Science and Technology**, , 33(1):220

This study mainly focused on the assessment of attitudes and level of knowledge of farmers towards organic farming (OF) and the contributory factors that are assumed to affect these. Two groups of respondents were interviewed: a) NOF or farmers who

have not tried OF; and 2) TOF or farmers who have tried OF, either partially or discontinued. T-test was used to analyzed the significant difference of NOF and TOF as to attitudes and knowledge. Pearson correlation was used to determine which of the socio-demographic characteristics significantly affect the attitudes and knowledge respondents towards OF.

Results showed that most of the farmers in both regions are aware of OF. However, there are TOF in Region 1 who are unaware. They are practicing organic techniques but an aware that such is organic in nature. Statistics showed that NOF and TOF respondents are significantly different with their attitudes on some attributes of OF. Both groups in two regions are uncertain of the negative and agreeable of the positive attributes of OF by TOF respondents are more optimistic.

Socio-demographics have no affects on the attitudes of both NOF and TOF. Notable demographic factors that have influences on technical knowledge and some aspect of OF are religion, educational attainment , ethnicity, number of years in farming, annual income and farm size.

Notable reasons for non-adoption/discontinuance of OF are economics impact during conversation period like low yield , slow effect, laborious, no sustained government support and low technical knowledge on OF. These can be some possible entry point for promotional activities of organic farming in the country.  
**(Author's abstract)**

Social sciences. Organic. Attitudes. Knowledge. Composting. Conversion.

**0441** The humanities in our intellectual and cultural life. Dalisay, Jr., Jose Y.. **Transactions of the National Academy of Science and Technology Philippines**, , 26(2):192-201

Forty-five years after C.P. Snow\’s famous and contentious lecture at Cambridge on "The Two Cultures," of the humanists and scientists, we continue to suffer, not so much from this dichotomy in our ways of thinking, but rather from their shared subservience in this country to a third "culture," the culture of politics, of base survival and self-interest from the lowest to the highest levels of our government and society.

In our critical faculties were truly at work, the Filipino humanist should have no trouble concluding that the way forward - culturally and economically - can only be led by a greater awareness and application of science in our national life, especially in our education.

But rational decisions like this are held back by the supervening claims of politics, which are neither humanist nor scientific, and by a naïve and retrograde conception of science and humanities as options – mutual exclusivity, and bordering on frivolous – rather than imperatives.

The humanities, in particular, are often taken for a little more than entertainment, a belletristic indulgence devoid of rigor and practical significance.

The question to ask should really not be where the humanities might be located in our intellectual and cultural life – something for which I suspect we already know the answers – but rather where intellect and culture belong in our national consciousness.

**(Author's abstract)**

Social sciences. Third culture. Humanities. Culytural life. Science.

- 0442** The KALAH-CIDSS CDD-LPP harmonization pilot initiative. Aguilar, Jr, Cicero Juan **Social Welfare and Development Journal**, , 3(2):31-36

This paper describes the KALAH-CIDSS CDD-LPP Harmonization Pilot Initiative, otherwise known as the "Makamasang Tugon" Pilot (MT Pilot). The CDD-LPP Harmonization Pilot is the KALAH-CIDSS Project's attempt at exploring operational strategies that will infuse local development planning and budgeting processes with CDD processes and elements, through an LGU-facilitated implementation of the KALAH-CIDSS CDD approach. This paper shall provide readers with the basic framework, implementation design elements, and preliminary feedback of municipal stakeholders. **(Author's abstract)**

Social sciences. community driven development. CDD. Makasamang Tugon.

- 0443** Risk communication behavior towards environmental risks among upland farmers in the dampalit watershed, Los Baños, Laguna, Philippines. Simondac-Peria, Aileen C., Torres, Cleofe S.. **Transactions of the National Academy of Science and Technology**, , 33(1):219

This research looked into the perception of environmental risks in relation to risk communication (riskcom), explored the upland farmers' perception of environmental risks, and determined their riskcom behaviors as inputs to decisions and actions to adapt to such risks. Riskcom behavior towards environmental risks were measured by their ability to use communications sources, its truthfulness and credibility, and use of information obtained

A one-shot interview schedule was administered to randomly selected upland farmers with farms located in the Dampalit watershed. Data were triangulated by focus group discussion, interviews, and secondary documents. Descriptive statistics and Pearson's correlation were used in data analyses.

Results found significant relationships between age and mass media as well as educational attainment in relation to mass media and interpersonal communication sources; annual income, educational attainment, and topography in relation to trust and credibility; and age and educational attainment in relation to utilization of information. The study also revealed that upland farmers rely on a *batingaw* or large bell as an effective early warning device in danger zone areas.

This study concludes that riskcom behavior was influenced by familiarity and dread as environmental risk factors. Familiarity made them to prefer mass media. Dread predisposed them to refer to interpersonal sources. **(Author's abstract)**

Social sciences. Risk communication. Risk perception. Communication

behaviour. Environmental communication.

- 0444** Signs of the times. Camba, Anah Mae H., Candari, Christine Joy D., Candelario, Abigail Ann B., Canobas, Aldin Francis M., Cardenas, Isidro F., Carlos, Florie Anne A., Empaynado-Porto, Analin B.. **Transactions of the National Academy of Science and Technology**, , 33(1):226

In the Filipino family, certain changes have been evident – one of which is the transition from home care to nursing home care for the elderlies. However, though already practiced by some, the placement of the elderly to nursing homes is still not socially acceptable to many Filipinos.

This study aimed to identify Filipinos current outlook in placing elderlies in nursing homes, and to determine the trends and factors affecting the respondents' answers after using the Changing WInD Tool.

Twenty respondents were chosen through purposive sampling. The following criteria were set: (1) Is in the working age (2) middle to upper class citizens (3) have their own nuclear family and (4) has a living elderly relative. An intervention tool named "Changing WInD (Willingness by Information Dissemination) Tool" was used in interviewing the respondents. The interview was done before "WInD" and after "WInD".

The findings showed that 14/20 respondents were reluctant or has negative reaction in admitting an elderly relative and 16/20 answered no to having themselves placed in a nursing home. However, after the administration of the "Changing WInD Tool", there was a marked change in the answers of the 20 respondents. All these changes were due to the presentation of the tool which proves that information dissemination was enough to elicit a change from within the respondents. Further, three factors that changed the respondents' decision were identified and these were awareness of the following: Aging Filipino population, Availability Nursing Homes in the Philippine And Quality nursing Homes.

Our Filipino culture has long standing roots as to how we should take care of our elderly. Nursing homes are not a means to abandon our elderly, but a place of safety and security; they are not alternative to geriatric care, but a complement to ensuring proper care is rendered to the elderly. **(Author's abstract)**

Social sciences. Elderly. Home care. Nursing care. Care for elderly. Aging population.

- 0445** The teacher on the internet. Simon, Audrey B.. **Transactions of the National Academy of Science and Technology**, , 33(1):224

This study examined the relationship between and among teachers' self-efficacy beliefs, usage, and attitude towards the Internet with their personal characteristics such as age, number of years in teaching, computer literacy level, and trainings attended.

A descriptive method of research was used in findings answers to the problems of this study while random sampling method was applied to select the 124 teachers

participants from nine campuses of the Isabela State University. This study used a four-part questionnaire and a five-point Likert-type scale in gathering and in interpreting the data. The first part was used to collect the teachers' personal characteristics. The second part measured the teachers' Internet self-efficacy. The third part gathered data on the Internet usage of the teachers, and the fourth part measured their attitude towards the Internet. Negatively stated attitude questions were scored in reverse order.

Teachers participants were given one week to complete the questionnaire before the researcher personally retrieved them. The responses were tallied and presented using frequency distribution, weighted mean and percentage distribution. The Pearson Product Moment correlation was used to determine the significant relationships and correlations between and among the variables.

It has been found that: 1) the older the age and the longer a teacher had been in the teaching profession, the less comfortable he or she was in using the Internet; 2) a high computer literacy level and in-service trainings influenced the teachers' frequency of Internet use, high self-efficacy, and positive attitude towards the Internet; 3) teachers frequency of Internet use increased their self-efficacy and attitude, while a highly positive attitude motivated teachers to frequently use the Internet and increased their self-efficacy; and 4) the more problems the teachers encountered the lesser their usage, the lower their self-efficacy, and the more negative their attitudes were.

**(Author's abstract)**

Social sciences. Internet. Internet self-efficacy beliefs. Internet usage. Internet attitude. Computer literacy.

- 0446** The timing of occurrence, frequency and duration of sexual problems among married men. Semorian, Adrian P.. **Research Journal**, , 31(1):56-67

This paper aimed to describe the sexual problems among selected married men in Zamboanga City. It focused on the timing, frequency and duration of experienced sexual problems. Selected by purposive sampling, the key informants of the study were 16 married men with recurrent sexual problems for the past 12 months. Their ages ranged from 26-61 years old. All had formal education; they were working in varied occupation and were earning about Php 11,900/month on the average. They had been married for an average of 13 years and had an average of two children. Findings showed that of the 16 informants, half had experienced one sexual problem while the other half had two sexual problems. Among the informants who had two sexual problems, premature ejaculation and lack of sexual desire were the most mentioned while those having one sexual problem, premature ejaculation was the most prevalent. Most informants experienced sexual problems after marriage. The frequencies of sexual problems, which the informants had experienced for the past 12 months prior to the interview, varied. In terms of duration, the informants had erection only for a few seconds. Regarding their ejaculation, they mentioned that they would reach orgasm in a matter of seconds or minutes. Moreover, age tended to affect the nature of informants' sexual problems as younger men reported mostly premature ejaculation while older men reported erectile dysfunction and loss of sexual desire.

**(Author's abstract)**

Social sciences. Sexual problems. Married men. Occurrence. Timing and frequency.

- 0447** Towards understanding corruption. Agaser, Nixon V., Reyes, Marris V.. **Transactions of the National Academy of Science and Technology**, , 33(1):225

This paper investigates how community leaders think about corruption in Philippine society particularly corruption in government through simple interpretative phenomenological analysis (IPA). Eight rural community leaders (4 Barangay captains and 4 Sanggunian Kabataan chairpersons) participated in this study. Using in-depth interview, questions were focused on the "what" and why corruption persists in Philippine society. Interview texts were classified and interpreted following the basic steps used in IPA. Following bottom up approach, abstractions of meaning were done at two levels; text coding and thematic coding. Analysis reveals that corruption involves four basic interdependent concepts namely; a) stealing government funds; b) abused of power; c) conspiracy of those who holds power, and; d) socio-cultural. In other words, rural community leaders think that corruption is an act of conspiracy of those who holds power to steal government funds. Furthermore, community leaders thought that corruption has socio-cultural roots making it more difficult to solve. Participants also thought that political power gives opportunity for corruption to thrive in government and that corruption will perpetuate if those who are in power are "united" in carrying out corrupt practices. Solution in battling corruption, as indicated by the participants, still rest largely on government leaders. Conceptual and practical implications are discussed. **(Author's abstract)**

Social sciences. Community leaders. Corruption. Interpretative analysis. Conspiracy. Sociocultural.

- 0448** Villagization of the Sama Dilaut. Jumala, Francis C.. **Research Journal**, , 31(1):41-55

It has always been observed in many anthropological researches that development which aimed for the betterment of indigenous peoples have resulted in numerous negative impacts especially when such development schemes are derived from "top to bottom" policy formulation. This paper aimed to assess the impact of development and peace and order on the lives of a group of Sama Dilauts in Tungkalang, Sanga-Sanga, Tawi Tawi. It aimed to shed light on some of the negative and positive effects of government infrastructure projects on the lives of marginalized people and to question whether or not these projects address the simple needs confronting these fisher folks. The access to a coral reef which had been their moorage and home was examined, and sentiments were presented showing how, sometimes, government projects in this part of the Philippines may have upset some aspects of the culture of the Sama Dilaut. Finally, this paper sought to convey the need for government planners to reconsider their formalist approach to program design and infuse the voice of those directly affected by their projects, the indigenous people concerned. **(Author's abstract)**

Social sciences. Sama Dilaut. Villagization. Marginalization. Moorage. Habitat loss. Displacement. Mendicancy. Tourism.

- 0449** Who's at the wheel when communities drive development?. Chase, Robert S., Labonne, Julien. **Social Welfare and Development Journal**, , 3(2):17-25

Community-Driven Development (CDD) approaches have become an important part of development operations and are one of the preeminent means by which the World Bank supports multistakeholder engagement in decentralized contexts. However, the existing literature does not provide a sufficient understanding of how decisions are made by communities in CDD projects, and in particular the role of elites in this process.

Diverging from previous research, the paper uses ex-ante data on the preferences of both household and village officials regarding the most pressing development problems faced by their community, as well as data on the project proposals that were put forward for funding in communities that did and did not receive funding. This allows understanding on (i) how decisions regarding which project to implement are made and (ii) how funds are allocated across villages.

Overall, the preferences of community members and elected village leaders (barangay captain) seem to be equally represented in the community's project proposal. Households that are more involved in communal activities are more likely to have their preferences represented in village proposals. Evidence suggests that, within a municipality, resources flow to the poorest and more politically active villages. Controlling for poverty, more unequal villages are, surprisingly, more likely to receive funding. Evidence that the negative impact of inequality arises during proposal selection is provided: in more unequal villages, the barangay captain is more likely to override community preferences, and to influence inter-village competition such that project resources flow to their villages. **(Author's abstract)**

Social sciences. CDD. community driven development. CDD projects.

# **SUBJECT INDEX**

## SUBJECT INDEX

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