

# The 29<sup>th</sup> Annual Meeting of the Philippine-American Academy of Science and Engineering

by Bianca Carla Victorio

**T**he Philippine-American Academy of Science and Engineering (PAASE) held its 29<sup>th</sup> Annual PAASE Meeting and Symposium (29APAMS) last July 13-15 2009 with the theme “Linking Science and Engineering to Development.” The event, attended by over 150 Filipino scientists and engineers and a large number of students from across the country, was hosted by the Ateneo de Manila University (ADMU) in celebration of its 150<sup>th</sup> year of foundation. 29APAMS consisted of several plenary and parallel sessions on a wide range of topics in science, engineering and technology (S,E&T) and became an opportunity for experts to update the audience on recent advances in their fields and for young students to interact with these seasoned scientists and engineers. Aside from the technical sessions, other highlights of 29APAMS were panel discussions and updates on PAASE’s science advocacies and on opportunities for commercialization of S,E&T-based research endeavors.

## Linking Science and Engineering to Development: Active Areas of Research by Filipinos at Home and Abroad

Thirteen sessions on focused areas of research given by noted experts in their respective fields and nine sessions on contributed papers were simultaneously held in separate venues. Topics covered were (1) Alternative Energy, (2) Biofuels, (3) Coconut Research & Development, (4) Environmental Research, (5) Climate Change and Disaster Risk, (6) Natural Resources Management, (7) Drug Discovery from Natural Resources, (8) Health Research, (9) Computational and Theoretical Science & Engineering, (10) Nanotechnology Roadmap for

the Philippines, (11) Advances in Sciences & Engineering, (12) Science, Mathematics, and Engineering Education, and (13) Building Human Capital for Science & Technology. A summary of selected lectures is presented here. (For a summary of the other lectures, visit: [www.paase.org](http://www.paase.org))

**Drug Discovery from Natural Resources.** Dr. Baldomero M. Olivera, Distinguished Professor of Biology at the University of Utah, in an enlightening talk about potential neuroactive drugs from marine snails, described how the fishing method of “lumun-lumun” ingeniously developed by local fishermen, where bundled nets are anchored to the bottom of the sea for several months, has allowed scientists to access an extremely rich diversity of previously undocumented micromollusks. Dr. Gisela P. Concepcion of the University of the Philippines (UP) Marine Science Institute talked about her studies on sponge- and mollusk-associated microorganisms producing anti-infective compounds and the lab cultures which could provide sufficient quantities of potential drugs for further study and development. Dr. Pedro Jose, Director of Molecular Physiology at the National Children’s Medical Center in Washington DC, discussed his studies on various G-Protein Coupled Receptor (GPCR) gene variants in clinical patients and the observed differences in their response to antihypertensive medication.

**Computational and Theoretical Science and Engineering.** Dr. Baltazar D. Aguda from the Ohio State University discussed a proposal using microRNAs (miRNAs) as disease biomarkers, specifically in cancer. Using his group’s recent data on Chronic Lymphocytic Leukemia (CLL) as springboard, Dr. Aguda emphasized the necessity for data mining on miRNA expression and

activity, hence the need for computational algorithm predicting targets and inducing expression of miRNAs. Dr. Eduardo Mendoza of Ludwig Maximilian University in Munich proposed to establish the Philippine Center for Bioinformatics and Computational Systems Biology, which would set the stage for pursuing relevant research on biological problems on the level of systems biology using interdisciplinary perspectives. Dr. Felix Buot, a retired research physicist at the U.S. Naval Research Laboratory, discussed some computational and theoretical aspects of nonequilibrium quantum transport physics in nanoelectronics, spintronics, and thermo-electronics.

**Bioanalytical Methods.** The power of Mass Spectrometry (MS) in elucidating glycosylation patterns in proteins was highlighted in engaging talks by Miss Maria

standardized testing of anti-A and anti-B hemagglutinins found in immunoglobulin products.

**Health Research.** Dr. Samuel D. Bernal of the University of California-Los Angeles School of Medicine engaged the audience in an exciting discussion on bio-regenerative medicine through hematopoietic stem cells (HSCs) derived from bone marrow. Dr. Bernal said a world-class facility exists at The Medical City Hospital which is capable of executing this procedure, especially for cancer patients with poor prognosis, based on the specific genotype of the cancer patient. The need to create a database of cancer biomarkers among Filipino cases is currently being addressed by the Institute of Genetics at the National Institutes of Health (NIH) in UP Manila, headed by Dr. Carmencita D. Padilla, who spoke on mapping mutations



Attendees of the 29<sup>th</sup> Annual Meeting of the Philippine-American Academy of Science and Engineering

Lorna Arao-de Leoz, a PhD student at the University of California-Davis, who is looking at changes in the levels of high-mannose glycans in sera of cancer patients to identify early-stage breast and prostate cancer and her mentor, Dr. Carlito B. Lebrilla, explained how glycosylation imparts anticancer and other beneficial properties to milk proteins. His group is also developing analytical methods to differentiate glycosylation patterns found in human, bovine, and other mammalian milk. On the other hand, Dr. Maria Luisa Virata-Theimer, from the U.S. Food and Drug Administration (USFDA), shared her study on

and polymorphisms among Filipino clinical cases. Other priority diseases studied at the NIH are G6PD (Glucose-6-Phosphate Dehydrogenase) Deficiency, Maple Syrup Disease, and Schizophrenia.

**Alternative Energy.** Dr. Ernesto Terrado from the World Bank discussed the global status and costs of employing renewable energy for power; Dr. Danilo Romero from the University of Maryland College Park Laboratory for Physical Sciences and Department of Electrical and Computer Engineering spoke on current

trends in flexible organic photovoltaic devices, and Dr. Raymond Tan from the De La Salle University-Manila presented a simulation of the dynamics of energy supply chains using a dual-component model based on input-output systems.

**Biofuels.** Several studies on biofuels showcased Mariano Marcos State University (MMSU) as an energy self-sufficient model. Dr. Carlos Pascual, Dr. Fiorello Abenes, Mr. Samuel Franco, all from MMSU, presented their studies on bioethanol production via one-step hydrolysis fermentation using carabao rumen and its associated microbes, and bioethanol from sweet sorghum syrup, jaggery, and grain. Dr. Lino Blanche, a National Program Leader with the US Department of Agriculture, and Dr. Terry Sarigumba, a former Forest Soils Scientist at the Georgia Pacific Corporation, gave a lecture on the process of biochar production and its applications in line with the goals of MMSU as an energy self-sufficient model.

**Coconut Research & Development.** Dr. Fabian Dayrit, Dean of the School of Science & Engineering at ADMU, discussed a proposed research program based on the unique properties and composition of coconut oil aimed at establishing its health benefits backed by scientific validation; Dr. Mario Capanzana, Director of the Food & Nutrition Research Institute (FNRI), shared his research on coconut products, specifically of coconut flour from “sapal,” coconut syrup, and virgin coconut oil, and their pursuit in making these products functional foods; and, Dr. Jacinto Blas Mantaring, from the UP College of Medicine Department of Pediatrics, related that using medium chain triglycerides amply provided by virgin coconut oil can be used as a supplement to reduce risk of sepsis in preterm neonates and aid in weight augmentation.

**Environmental Research.** Dr. Asuncion Raymundo, Dean of the College of Arts & Sciences at UP Los Baños, and Dr. Augustine Doronila from the University of Melbourne, talked about employing phytoremediation in repairing the prolonged environmental damage caused by abandoned mines. Dr. Nemesio Montaña, of the UP Marine Science Institute, discussed marine toxicity testing using marine plants and animals.

**Climate Change and Disaster Risk.** Dr. Josefino Comiso from the NASA Goddard Space Flight Center, Ms. Antonia Yulo Loyzaga from the ADMU Manila Observatory, and Dr. Felino Lansingan of UP Los Baños Institute of Statistics and School of Environmental Science and Management discussed the impending risks of disasters due to climate change as observed from space, and proposed means of mitigating these risks through collaborative studies and employment of available technology such as satellites and remote-sensing devices in the field.

**Natural Resources Management.** Dr. Jurgenne Primavera of the SEAFDEC Aquaculture Department talked about biodiversity in the Agusan Marsh and called for a multidisciplinary collaboration to understand its various biota and habitats. Dr. Rodel Lasco, from the World Agroforestry Centre reviewed the current knowledge on carbon budgets of Philippine forests, and Mr. Jerrold Tubay from UP Los Baños presented a “Fuzzy Goal Programming (FGP) approach for the optimal allocation of biofuel feedstock for ethanol production.”

**Nanotechnology Roadmap for the Philippines.** Dr. Erwin Enriquez from the Department of Chemistry in ADMU and Dr. Romel Gomez of the Department of Electrical and Chemical Engineering at the University of Maryland gave an overview of the current state of nanotechnology in the country, pointed out key technologies that can be explored by Filipino engineers such as carbon nanotube-based transistors, and directed the research thrusts towards applications in various sectors: information and communications, technology (ICT) and semiconductors, food and agriculture, energy, medicine, and environment.

**Advances in Physics and Engineering.** Dr. Amador Muriel, Balik Scientist at the National Institute of Physics in UP Diliman, presented his basic research on the quantum theory of turbulence. Dr. Joseph Tan from the National Institute of Standards and Technology in Maryland gave a lecture on engineering atoms with special features that make them amenable for testing theories and measuring atomic data and fundamental constants, while Dr. Amelia P. Guevara, Vice-President for Academic Affairs of the UP System, presented an overview of the proposed Philippine Genome Center for Genomics Research in Health, Agriculture, and Biodiversity.

**Science, Mathematics, and Engineering Education.** Dr. M. Victoria Carpio-Bernido of the Research Centre for Theoretical Physics in Bohol presented a framework for improving physics education in the country, while Dr. Queena Lee-Chua, of the Departments of Mathematics and Psychology at ADMU, gave a talk on the state of mathematics learning in the Philippines and identified critical factors in the variable abilities among Filipino children to solve high-level non-routine problems. Dr. Ernesto Pernia from the School of Economics in UP Diliman, examined the effects of international migration and remittances on household incomes, poverty reduction, human capital investment, saving, and regional development in the country.

**Building Human Capital for Science and Technology.** DOST Undersecretary Fortunato de la Peña discussed the government’s aggressive move to recruit young students towards the science & engineering fields via the Philippine Science High Schools and the various

post-graduate scholarships. Dr. Fernando Aldaba of ADMU Economics Department gave a talk suggesting more effective ways for the government to recruit more Filipinos into science & engineering, including a more effective coordination mechanism among the various government agencies.

**Biomolecular Design.** The Influenza virus also took center-stage at 29APAMS as Dr. Eduardo A. Padlan discussed his strategy for designing vaccines against influenza. Dr. Padlan, a retired Research Scientist at the US-National Institutes of Health, presently Adjunct Professor at the UP Marine Science Institute, proposes to make vaccines based on the hemagglutinin protein which is “de-antigenized” to direct the immune system to produce antibodies against less antigenic but constant regions of the viral protein. The experimental component of this vaccine design was reported by Dr. Ameurfina D. Santos, of the National Institute of Molecular Biology and Biotechnology in UP Diliman. Deantigenized hemagglutinin has been expressed recombinantly and characterized biochemically, and will be tested for efficacy in an animal model.

### **Faith in science and technology to lead us through dark times**

Senator Edgardo J. Angara, 29APAMS guest speaker, in his Keynote Address, advertised the efforts of the Congressional Commission on Science, Technology and Engineering (COMSTE) in improving the country's technological capacity and giving a forceful push through the global competitiveness ladder. COMSTE's mandate is to review and assess the science, engineering & technology research and development in the country and to provide



Sen. Edgardo J. Angara delivering the Keynote Address

monetary funding for scientific research, among other things. (For more information, visit: [www.comste.gov.ph](http://www.comste.gov.ph)) According to Sen. Angara, COMSTE is a strong manifestation that the government has faith in scientific and technological innovation and in young minds to lead us out of poverty. He also called on a strong collaboration among Filipino scientists and engineers to help realize this goal. Father Bienvenido F. Nebres, S.J., ADMU President, echoed the senator's call in his welcome note. He implored Filipino scientists based abroad to forge collaborations with Filipino scientists at home and to provide mentorship for Filipino students in building careers in S&T research. He said that the infrastructure and funding needed to provide a nurturing environment for students building a research career are well on the way.

According to Dr. Greg Tangonan, Executive Director of COMSTE, a Memorandum of Understanding (MOU) between COMSTE and Taiwan's Industrial Technology Research Institute (ITRI) had been signed. This aims to aid the Philippines in developing a similar infrastructure in realigning current Philippine engineering towards producing high value-added electronics, which is one of five main areas of research that COMSTE deems must be prioritized, given our perceived competitive advantage. He also shared that the new R&D strategic plan of COMSTE is to increase R&D spending into focused national projects and forge international strategic alliances by luring foreign direct investment.

The other areas of priority are: (1) enhancement and promotion of culinary herb and spice industry, with an initial budget of ₱15 million. This involves breeding for quality enhancement of locally produced spices and improvement of the manufacturing process for export; (2) adopting remote-sensing technology for agriculture and aquaculture. This aims to utilize access to current technology in improving food security, e.g., using remote-sensing to make locally-produced crops more resilient to climate change; (3) active development of renewable energy, e.g., solar energy by stimulating investments in new green electronics such as photovoltaics (PV) manufacturing and power management electronics. This is also intended to jumpstart innovative R&D activities for energy-related small and medium enterprises (SMEs); (4) biomedical telemedicine consortium, i.e. for the promotion of the country as a health and wellness center.

### **2009 Koh Awards Lectures : Marine Biomedical Research and Water Resources Management**

This year's Severino and Paz Koh Awardees were Dr. Gisela P. Concepcion for Science and Dr. Leonardo Q. Liongson for Engineering. Dr. Concepcion is Professor at the Marine Science Institute, while Dr. Liongson is Professor at the Department of Civil Engineering; both are

based in UP Diliman. The Koh Awards are named after Dr. Severino Koh – one of the founders of PAASE – and his spouse, Mrs. Paz Koh. Nominated by fellow PAASE members, awardees are asked to give a lecture during the annual meeting, and receive a plaque of appreciation and \$1,000. Dr. Concepcion gave a talk on “Marine Biomedical Research in a Philippine Setting” and Dr. Liongson on “Meeting the Challenges of Water Resources Management”.

Awards were also given to students and young researchers in the poster presentation category, each awardee receiving a check for \$50. Over a hundred posters submitted by many researchers from across the country and abroad competed in two separate poster sessions held during breaks from the parallel lecture sessions. The diverse range of poster topics included molecular biology, natural products, synthetic chemistry, biotechnology, physics, applied mathematics, and engineering. Three participants were given the student awards: (1) Ma. Corazon C. Cabanilla from the National Institute of Molecular Biology and Biotechnology – UPD with a poster entitled, “Multiplex PCR Detection of *Mycobacterium tuberculosis* and Characterization of Mutations in KATG and RPOD Genes of Multi-Drug Resistant Samples from Metro Manila.” Ms. Cabanilla was an undergraduate student at the Laboratory of Molecular Cell Biology under Dr. Cynthia P. Saloma; (2) Lorillee Tallorin, an M.Sc. candidate in Organic Chemistry. Her poster entitled, “Oxidative Addition of Singlet Oxygen to Pt(II) Thiolato Complex,” was done in the Department of Chemistry and Biochemistry under Prof. Matthias Selke of California State University Los Angeles; (3) Kendrick S. Lao from the Ateneo de Manila University with a poster entitled, “Synthesis and FRET Evaluation of Mycolic Acid Derivative as Diagnostic Device for Tuberculosis.” Mr. Lao is from the Department of Chemistry under Dr. Regina C. So.

For the young researcher awards given to professionals and researchers under the age of 35 years, three winners were proclaimed: (1) Kimberly S. Beltran from UP Manila with a poster entitled, “Genotoxicity Assessment of Coastal Water in Cavite using Single-Cell Gel Electrophoresis Assay on *Perna veridis*.” Ms. Beltran is an Instructor in the Department of Biology; (2) Dr. Christine C. Hernandez from UP Diliman with a poster entitled, “Anti-Inflammatory Potential of *Crateva religiosa*.” Dr. Hernandez is the head of the Bioorganic and Natural Products Laboratory of the Institute of Chemistry in UP Diliman; (3) Dr. Stephanie S. Pimentel, a professor from the Biology Department of the Ateneo de Manila University. Her poster was entitled, “Probiotic Effects of Four *Lactobacillus* Species on *Edwardsiella tarda* Challenge Nila Tilapia (*Oreochromis niloticus*).” Aside from these traditional awards, a special award was also handed out to the youngest participant in the poster

competition: Ma. Christina M. Jamerlan, a high school senior from Philippine Science High School – Western Visayas, for her poster on an “Automated Bunsen Burner.”

### **From Bench to the Market: Dialogue with Industry**

In an effort to bring the fruits of research closer to the market, a dialogue between the science community and key people in industry was also held during the last day of 29APAMS. Four key speakers were chosen to represent their respective fields: Dr. William Padolina from the International Rice Research Institute (IRRI) representing the Agricultural Sector; Mr. Lito Abelarde of the Chamber of Herbal Industries Philippines, Inc.; Mr. Andrew Arriola from the Bataan Center for Innovative Science & Technologies, Inc. representing the micro, small, and medium-scale industries (MSMEs); and Dr. Samuel Bernal of The Medical City Hospital for the Healthcare Industry. Dr. Padolina and Mr. Abelarde agreed that for us to identify key areas of innate competitive advantage where we can excel, a unified market assessment must be done both in the food and herbal medicines industry. Moreover, steps must be taken to ensure that we present and provide these needs in a unique way, adds Dr. Bernal. According to Dr. Padolina, preliminary studies have identified two products that we have in abundance – citrus fruits and cephalopod mollusks (squid and octopus), but a more extensive market analysis could reveal more unfilled global niches that could be taken advantage of. Once these niches have been identified, a unified research agenda supporting the market data should come into play. In this case, breeding studies on the improvement of citrus fruits and aquaculture of marine mollusks to improve yields must be the focus of intensive research for us to become strong players in the global food market. In the case of the herbal medicine industry, the renewed interest in natural products as healing agents has spurred scattered research on various herbal plants in the country. Though this is good for science’s sake, this has not helped the industry, says Mr. Abelarde. A unified research agenda where several groups would be studying different aspects of the same herbal plant is needed in order to fast-track its development into a marketable drug or food supplement.

Another impediment being faced by the industry is the dwindling number of people to do the bench-side of product development. Dr. Padolina voiced out his concern that fewer students are enrolling in the agricultural sciences, even in UP Los Baños – the premiere agricultural university of the country. Most experts in this field are close to retirement and there is a pressing need to find young people to whom current knowledge must be transferred. Perhaps incentives must be necessary to attract individuals to embark in these studies, adds Mr. Abelarde. In the case of the medical industry, experienced and well-equipped clinicians are abundant, but the

researchers who would work closely with doctors are also lacking. These are some of the issues that need to be addressed immediately in order to ensure efficient research product commercialization.

### **Updates on past initiatives and future directions of PAASE**

Dr. Caesar Saloma, Dean of the College of Science of UP Diliman, gave an update on the status of the National Science Complex (NSC), which is deemed a strategic investment for higher education in a knowledge-based global economy. The NSC aims to generate new scientific knowledge, to serve as training ground for the next generation of scientists in the country and presently houses medium- to high-technology equipment needed to pursue more advanced research problems which are open for use by academic and industrial researchers. Dr. Saloma reported that the roads linking all the infrastructure within the complex have recently been completed and will soon be operational.

PAASE has helped push for graduate scholarships to be provided for higher studies in the sciences and engineering by the Department of Science and Technology (DOST). Dr. Fabian Dayrit, current president of PAASE, reported an increase in the number of scholarship recipients and in the number of graduates. Moreover, there is also an active recruitment program to find grantees to fill up the many available positions. Dr. Norbert Que gave an update on the status of the Engineering Research and Development for Technology (ERDT) program, an initiative composed of seven universities with mature programs in engineering (CLSU, ADMU, MSU-IT, MIT, USC, UPLB, and UPD). The program had been active during the past year in giving out scholarships to local engineering students as well as to professors abroad who wish to teach in Philippine universities through a Visiting Professor Program. Under this initiative, engineering students could also do active research in engineering programs hosted abroad through the Visiting Researcher Program for postdoctoral fellowships and the Sandwich Program for scholars working towards their doctorate.

Dr. Gisela P. Concepcion gave an update on PAASE's science advocacies. The online journal *Philippine Science Letters* (PSL) has been operational since the third quarter of 2008 and features the research of Filipino scientists both locally and abroad. In an effort to bring science closer to the general public, the newspaper column *Star Science* has been running for over five years, with many contributions of popular science articles from PAASE members. Recently, a compilation of selected essays featured in *Star Science* was published in a book entitled, "Science and Technology for Securing a Better Philippines." An update on the DOST-funded Balik-

Scientist Program was also given by Dr. Concepcion. The program, which was started to facilitate the return to the country of Filipino scientists and engineers based abroad in order for them to share their knowledge, establish collaborations with local counterparts, and mentor young students who wish to learn more about their research, has successfully sponsored the return of more than a hundred experts from abroad. Since the simplification of the application process in 2007, the number of first-time Balik-Scientists has steadily increased. Moreover, scientists are now given the privilege of returning many times of they have made significant impact in scientific pursuits in their local host institutions.

PAASE members also gave a preliminary list of initiatives to be pursued for the year 2009-2010. These include the major problem of obtaining funding both from the government and from private institutions. There is also a pressing need to simplify the process of obtaining funding mainly from the DOST and to ensure that the members of the panels reviewing the proposals are all experts in the field pertinent to the proposal. Other issues that PAASE will focus on in the near future include: (1) strengthening the capacity of local scientists and engineers to publish in high-impact journals, (2) supporting multi-disciplinary collaborations among Filipino scientists and engineers at home and abroad, (3) encouraging other universities in the country to participate in active research in the sciences and engineering, (4) building of infrastructure and mentoring system to host local graduate students in their pursuit of higher degrees, (5) planning the National Science Complex so that its facilities could be used to their full potential by all researchers throughout the country, and most importantly (6) planning to ensure a fluid continuity of current research policies in new administration following the 2010 national elections. We all hope to hear of the updates in these initiatives next year in the University of Wisconsin in Madison, where the 30<sup>th</sup> APAMS will be held with a proposed theme of "Science and Engineering for a Sustainable Prosperity." **PSL**