




PHILIPPINE-AMERICAN

Academy of Science & Engineering

**24th Annual Meeting
August 13-14, 2004
University of Maryland
College Park, MD**



**CONFERENCE THEME: "PHILIPPINE-AMERICAN
BONDS IN SCIENCE AND TECHNOLOGY"**



The Philippine-American Academy of Science and Engineering (PAASE) is a professional association of Filipino-American PhDs, many of whom are in the forefront of scientific research in their respective disciplines in the United States and abroad. PAASE was founded and incorporated as a non-profit organization in the state of Indiana on April 23, 1980 by Drs. Severino L. Koh, Pat L. Mangonon, Jr., Edgar H. Buyco and Carlos A. Melendres. Starting with 27 founding members in 1980, its membership has grown to 136 by 2004. Its principal objective is to use the expertise and professional stature of its members to help improve the state of science and technology in the Motherland, the Philippines.

Short-Term Objectives:

- To work with the Philippine scientific community to find mechanisms for enhancing development capabilities for scientific research and development in the Philippines
- To explore avenues to facilitate the exchange of information and resources for economic and technological development
- To explore opportunities for active participation and leadership in the Philippine scientific and technological development
- To develop a model for a practical scientific and technological environment in the Philippines

Long-Term Objectives:

- To promote the advancement of science and technology
- To encourage collaborative work among scientists and engineers in research and development
- To support interaction among U.S./Canadian citizens and residents of Philippine descent, and residents of other countries of Philippine descent in scholarly and scientific endeavors that would be of particular benefit to North America and the Philippines
- To provide a means for transfer of scientific and technological advances between North America and the Philippines

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PAASE CONFERENCE VENUES

1981	Silahis Hotel, Manila, Philippines
1982	University of Pennsylvania, Philadelphia, PA
1983	Florida International University, Miami, FL
1985	Brookhaven National Laboratory, Upton, NY
1986	NASA Goddard Space Flight Center, Greenbelt, MD
1987	University of Maryland, College Park, MD
1988	University of Pennsylvania, Philadelphia, PA
1990	University of Maryland, Baltimore County, MD
1991	George Washington University, Washington DC
1992	University of Maryland, Baltimore County, MD
1993	Department of Science and Technology, Metro Manila, Philippines
1994	Purdue University, West Lafayette, IN
1995	Ohio State University, Columbus, OH
1996	George Washington University, Washington DC
1997	Bryn Mawr College, Bryn Mawr, PA
1998	University of the Philippines, Quezon City, Philippines
1999	Jekyll Inn, Jekyll Island, GA
2000	Shangri-la Hotel, Makati, Philippines
2001	University of California, Berkeley, CA
2002	Holiday Inn Select, Solomon's Island, MD
2003	Manila Hotel, Manila, Philippines
2004	University of Maryland, College Park, MD

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Danilo B. Romero
Mercedes Soberano
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- 10:50 AM **Biochemical and Phenotypic Abnormalities in Kynurenine Aminotransferase II-deficient Mice**
Danilo A. Tagle, Ph.D.
National Institute of Neurological Disorders and Stroke, Bethesda, MD
- 11:10 AM **Familial Encephalopathy with Neuroserpin Inclusion Bodies (FENIB): A Conformational Neurodegenerative Disorder in Children and Adults**
Felicitas L. Lacbawan, M.D.
Children's National Medical Center, Washington, DC and National Human Genome Research Institute, Bethesda, MD
- 11:30 AM **Ciliary Body Neurospheres**
Drina D. Sta. Iglesia, Ph.D.
Johns Hopkins University School of Medicine, Baltimore, MD
- 11:50 AM **D5 Dopamine Receptor Regulation of NADPH Oxidase and Blood Pressure in Mice**
Pedro A. Jose, M.D., Ph.D.
Georgetown University Medical Center, Washington, DC
- 12:10 PM **Lunch (boxed lunches)**

Afternoon Session

- Session S1B: Agriculture and Environmental Sciences**
Moderator: Catalino A. Blanche, Ph.D.
US Department of Agriculture, Washington, DC
- 1:30 PM **Life in Extreme Environments: Microorganisms in the Accreted Ice of Lake Vostoc, Antarctica**
Luis M. Tupas, Ph.D.
US Department of Agriculture, Washington, DC
- 1:50 PM **Environmental Engineering Meets Microbiology: Molecular Techniques for Investigating Biological Treatment Systems**
Francis L. de los Reyes III, Ph.D.
North Carolina State University, Raleigh, NC
- 2:10 PM **The Ethnobotany of the Tala-andig in Lantapan, Bukidnon, Central Mindanao, Philippines and Mass Domestication/Cultivation of Two Wild and Disappearing Species**
Merzelita Yangco-Bangis
National Museum, Manila, Philippines
- 2:30 PM **Coffee Break**
- Session S1C: Nutritional and Natural Products Research**
Moderator: Benito O. de Lumen, Ph.D.
University of California at Berkeley, CA
- 2:40 PM **The Cancer Preventive Properties of a Soy Peptide That Binds to Chromatin**
Benito O. de Lumen, Ph.D.
University of California at Berkeley, CA
- 3:00 PM **Phytochemical Analysis and Toxicity Test of Functional Foods**
Gertrudes Q. Bernardo, Ph.D.
Don Mariano Marcos Memorial State University, San Fernando, La Union, Philippines

3:20 PM **Low Cost Nutritious Food Products from Indigenous Plants**
Norma B. Natino, Ph.D.
Don Mariano Marcos Memorial State University, San Fernando, La Union, Philippines

3:40 PM **Coffee Break**

Session SID: Biotechnology and Pharmaceutical Applications
Moderator: Leah M. Tolosa, Ph.D.
University of Maryland, Baltimore County, MD

3: 50 PM **Predictive Thermodynamic Parameter Sets for Locked Nucleic Acid (LNA)-DNA Duplex Formation**
Meinrado F. Samala, Ph.D.
University of Maryland, College Park, MD

Session S1E: Tour of the Laboratory for Physical Sciences
8050 Greenmead Drive, College Park, MD 20740

4:15 PM **Overview of the Laboratory for Physical Sciences**
Bernadette Preston, Ph.D.
Director, Laboratory for Physical Sciences, College Park, MD

4:30 PM **Tour of LPS Labs**

Evening Session

Calvert House Inn – 6211 Baltimore Ave. (US Rte 1), Riverdale, MD 20737
Tel. (301) 864-5220

6:45 PM **Cocktails (Cash Bar)**

7:00 PM **Dinner Banquet**

7:40 PM **Introduction of Featured Speaker**
Danilo B. Romero, Ph.D.
University of Maryland, College Park, MD

7:45 PM **Featured Talk**

“Don’t Turn Them Off!”- Reflections on Four Decades in the Classroom
Alfonso M. Albano, Ph.D.
Bryn Mawr College, Bryn Mawr, PA

8:15 PM **Presentation of 2004 Severino and Paz Koh Lectureship Award in Science**
Presentors: Paz O. Koh, Romel D. Gomez, Ph.D., Alfonso M. Albano, Ph.D.

Awardee: Eusebio L. Koh, Ph.D.

Presentation of Certificates to New PAASE Members

Presentors: Celso S. Barrientos, Ph.D., Romel D. Gomez, Ph.D.,
Alfonso M. Albano, Ph.D.

New Members: Jacob V. Aranda, M.D., Ph.D.
Jermelina L. Garibay-Tupas, Ph.D.
Felicitas L. Lacbawan, M.D.
Philip Ian P. Padilla, M.D., Ph.D.
Francis L. de los Reyes III, Ph.D.
Eugene S. Santos, Ph.D.
Joseph N. Tan, Ph.D.
Xenia T. Tigno, Ph.D.
Luis M. Tupas, Ph.D.

8:30 PM

“Philippine-American Idol” – videoke singing

Emcee: Terry Sarigumba, Ph.D.

Day 2: August 14, 2004 (Saturday)
Department of Electrical and Computer Engineering, Room 2460
A.V. Williams Bldg, University of Maryland, College Park

Morning Session

8:30 AM **Registration**

Session S2A: Physical Sciences and Technological Applications

Moderator: Danilo B. Romero, Ph.D.
University of Maryland, College Park, MD

9:00 AM **Studying Star Stuff in a Bottle**

Joseph N. Tan, Ph.D.
National Institute of Standards and Technology, Gaithersburg, MD

9:20 AM **A Mathematical Framework for Managing Uncertainties and Incompleteness in a Knowledge-Based System**

Eugene S. Santos, Ph.D.
Youngstown State University, Youngstown, OH

9:40 AM **Experimental Evidence of Quantum Mechanics in Macroscopic Objects**

Roberto C. Ramos, Ph.D.
University of Maryland, College Park, MD

10:00 AM **Coffee Break**

10:10 AM **Nanolithography Using Scanning Tunneling Microscopy**

Ronald de los Reyes, Ph.D.
University of Maryland, College Park, MD

10:30 AM **Methods and Pharmaceutical Applications of Near-Infrared Chemical Imaging**

Frederick W. Koehler, Ph.D.
Spectral Dimensions, Inc., Olney, MD

10:50 AM **Parameters That Affect Patient Exposure from Digital vs. Non-Digital X-ray Machines**

Florence Cua-Christman, Ph.D.
Christman, Cua Associates, Princeton, NJ

11:10 AM **Organic Polymers for Plastic Photovoltaic Device Applications**

Danilo B. Romero, Ph.D.
University of Maryland, College Park, MD

11:30 AM **Lunch (boxed lunches)**

Afternoon Session

Session S2B: Energy and Engineering

Moderator: Josefino C. Comiso, Ph.D.
NASA Goddard Space Flight Center, Greenbelt, MD

1:00 PM **Carbon Finance for Private Power Projects in the Philippines**

Ernesto N. Terrado, Ph.D.
The World Bank, Washington, DC

- 1:20 PM **Thermal Performance Characterization of Capric Acid and Lauric Acid Mixture for Low Temperature Energy Storage**
Maria Natalia R. Dimaano, Ph.D.
University of Santo Tomas, Manila, Philippines
- 1:40 PM **Micro-Hydro Power Stabilization Using Fuzzy Logic**
Laurence A. Gan Lim
De La Salle University, Manila, Philippines
- 2:00 PM **An Environmental Life Cycle Assessment of A Locally-Designed Windmill for Power Generation**
Alvin B. Culaba, Ph.D.
De La Salle University, Manila, Philippines
- 2:20 PM **Coffee Break**
- Special Session: Philippine-American Bonds in Science & Technology**
Moderator: Romel D. Gomez, Ph.D.
University of Maryland, College Park, MD
- 2:30 PM **PAASE - C-GMA Project: Update**
Romel D. Gomez, Ph.D.
University of Maryland, College Park, MD
- Collaborative Work in the Philippines**
Pedro A. Jose, M.D., Ph.D.
Georgetown University School of Medicine, Washington, DC
- Starting a US Technology Company with Philippine Roots: The Xylos Story**
Gonzalo Serafica, Ph.D.
Xylos Corporation, Langhorne, PA
- Teaching in the Philippines**
Seville Detera-Wadleigh, Ph.D.
National Institute of Mental Health, Bethesda, MD
- Funding Opportunities for Science in Developing Countries**
Luis M. Tupas, Ph.D.
US Department of Agriculture, Washington, DC
- Mentoring the Careers of Young Filipino-American Scientists**
Jermelina L. Garibay-Tupas, Ph.D.
The National Science Foundation, Arlington, VA
- 3:30 PM **Open Forum**
- 4:30 PM **Closing Remarks**
Alfonso M. Albano, Ph.D.
PAASE Chairman, Board of Directors, Bryn Mawr College, Bryn Mawr, PA
- 4:35 PM **PAASE Business Meeting (Members and Associate Members only)**

Evening Session

**Ernie and Eden Terrado's Residence - 3801 Daniels Run Court, Fairfax, VA 22030
Tel. (703) 218-6936; Cell (703) 408-7862**

- 7:00 PM **Dinner Party**

2004 SEVERINO AND PAZ KOH LECTURESHIP AWARDEE IN SCIENCE

Eusebio L. Koh, Ph.D.

Dr. Eusebio L. Koh was awarded the title of Emeritus Professor of Mathematics on his retirement from the University of Regina in 1999 after a long and distinguished career of teaching and research.

Dr. Koh holds a Bachelor of Science in mechanical engineering *cum laude* from the University of the Philippines (U.P., 1954), Masters degrees from Purdue University (1956) and University of Birmingham (1960) in England, and a Doctor of Philosophy in Applied Mathematics from the State University of New York (SUNY, 1967).

He taught mechanical engineering at U. P. and mathematics at SUNY, University of South Carolina, University of Regina, Technische Hochschule Darmstadt and King Fahd University in Saudi Arabia. He was head of Mechanical Engineering at U. P. when he left in 1964 and head of Mathematics and Statistics at Regina in the mid seventies.

Dr. Koh consistently received support from the National Science and Engineering Research Council (NSERC) of Canada for his research on distribution theory, generalized transforms, functional equations, and differential equations. He has published over fifty papers in American, Canadian and international refereed journals and has given invited lectures here and abroad.

He has written a column for the semi-monthly Winnipeg-based *Filipino Journal* since 1993 on topics ranging from politics to religion to Philippine affairs. A devout Catholic, he describes himself as left leaning, socially conscious, and incorrigibly pro-Filipino. (He was born and raised in Manila.) He considers writing for this publication an honor and an opportunity to dialogue with the Philippine community.

Since his retirement, he has devoted time to his other love – writing short stories and poetry. His short story “The Summer I Learned to Bike” is on the web site *The Best Philippine Short Stories*. Another short story online is “Soap” which is in the ezine *Our Own Voice*. He also has several poems published in the *Prairie Messenger*, a Catholic weekly in Canada, as well as online.

In 1971 he co-founded the Philippine Association of Saskatchewan and was its first president, bringing the community together for celebrations and helping new immigrants adjust to life in Canada, find child-care and employment. Now there are about 2,000 Filipinos in the city. In 1999, Koh helped found the Santo Nino Council 12415 of the Knights of Columbus in Regina and was its Charter Grand Knight. The council started with 38 Filipino-Canadians. He served the jurisdiction of Saskatchewan as Delegate to Supreme Convention, as State Church and Vocations Director and later as District Deputy for District #3. Dr. Koh is a founding member of PAASE.

He has been named one of the Twenty Outstanding Filipino-Americans (1998, Washington DC), one of the most outstanding Filipino-Canadians (1998, Toronto) and an outstanding Filipino Canadian in education (1990, Saskatoon).

Dr. Koh is a younger brother of Dr. Severino Koh. He is married to Dony Viardo Koh and they have four children and eight grandchildren.

Nominated by: Jose B. Cruz, Jr. Ph.D.

Professor of Electrical and Computer Engineering, Ohio State University, Columbus, OH

2004 SEVERINO AND PAZ KOH LECTURESHIP AWARD IN SCIENCE

Math and Aftermath

Eusebio L. Koh, Ph.D.

Professor Emeritus of Mathematics

Department of Mathematics and Statistics, University of Regina, Saskatchewan, Canada SAS 042

Email: dony@accesscomm.ca

This lecture is made up of two parts. The first part introduces some aspects of my research in mathematics, specifically, the Hankel integral transform of generalized functions. Because the audience consists of professional expert in fields other than mathematics, I shall attempt to bring you up from scratch. Generalized functions are continuous linear functionals belonging to a dual of a test-function space. They include ordinary functions as well as such things as Dirac δ -functions. The Hankel transform $\int \sqrt{xy} \cdot J(xy) f(x) dx$ is extended by constructing a Frechet space H that contains the kernel $\sqrt{xy} \cdot J(xy)$ as an element. The dual space H' is the set of generalized functions of interest to us.

The second part is about what I am doing after I retired five years ago from teaching mathematics. In a way, what I do now is also an aftermath, in a loose sense, of my work before retirement. My volunteer work now with the church follows indirectly from having given an invited talk in a math conference. I am also into creative writing and my recent short stories have an academic flavor. Some of my poetry leans somewhat to meter and rhyme. Within my allotted time, I shall try to squeeze in some of my works. Maybe a couple of sonnets, some cinquains and one or two politically incorrect prose-poems.

2004 ANNUAL PAASE MEETING DINNER BANQUET FEATURED TALK

“Don’t Turn Them Off” – Reflections on Four Decades in the Classroom

Alfonso M. Albano, Ph.D.

Marion Reilly Professor of Physics

Department of Physics, Bryn Mawr College, Bryn Mawr, PA 19010

Email: aalbano@brynmawr.edu

When students learn, do we ascribe it to their intelligence, enthusiasm and hard work, or do we take it as a reflection of the excellence of their teachers? When students do not learn, do we blame it on their lack of preparation or their slow-wittedness and indolence, or is it because of the incompetence of their teachers? I will use the 2004 PAASE dinner as an excuse to reflect on these things, and to see if any lessons can be gleaned from having been in the classroom for over forty years.

SESSION S1A: BIOLOGY AND BIOMEDICAL SCIENCES

S1A.1

Association of Apolipoproteins with Non-Traditional Risk Factors for Ischemic Heart Disease

*Xenia T. Tigno, Shiyong Ding and Barbara C. Hansen
Obesity and Diabetes Research Center
School of Medicine, University of Maryland at Baltimore,
Baltimore, MD 21201
Email: Xtigno@yahoo.com*

Recent studies suggest that measurement of metabolic indices such as fasting plasma insulin (IRI) levels, apolipoproteins, and the various fractions of lipoproteins may provide additional information that would be predictive of the risk of ischemic heart disease (IHD). A novel, inexpensive technology for measurement of apolipoproteins has emerged which enables measurements using very small samples of blood (10 µl sample volume). Apolipoprotein determinations (Human Apolipoprotein Lincoplex kit, Linco Research, Missouri) were performed samples of plasma from randomly selected rhesus monkeys, some of whom spontaneously developed type 2 diabetes, obesity and the metabolic syndrome. Results from this assay show that ApoAI is negatively correlated with IRI ($r = -0.60$, $p < 0.02$) and C-peptide ($r = -.58$, $p < 0.02$) levels, whereas Apo E was positively correlated with IRI ($r = 0.60$, $p < 0.02$), which is said to be an independent risk factor for IHD. ApoB, Apo CII, ApoCIII and ApoE were all significantly and positively correlated with HbA1C ($r = 0.89, 0.84, 0.84, 0.59$) and significantly and negatively correlated to Kg, or the glucose disappearance rate during an IVGTT ($r = -0.70, -0.69, -0.75, -0.67$). Apo CII and Apo CIII were also correlated with Fasting Plasma Glucose ($r = 0.50, 0.68$). Apo B and Apo CII were both positively and significantly correlated with total LDL- C ($r = 0.83, r = 0.72$), whereas Apo B, Apo CII and Apo CIII were all found to be significantly correlated with total cholesterol, triglyceride, VLDL-C and VLDL-C, all of which are purportedly atherogenic. The study confirms previous data linking ApoAI with IHD- protective factors, and ApoB, Apo CII, Apo CIII and ApoE with indices for the metabolic syndrome, which predisposes towards heart disease. The study also shows that use of the new multiplex assay may provide a good estimate of the apolipoprotein levels in blood in lieu of the more expensive traditional methods.

S1A.2

Nuclear Localization and Molecular Partners of BIG1, a Brefeldin A-inhibited Guanine Nucleotide-Exchange Protein for ADP-Ribosylation Factors

*Philip Ian P. Padilla, Gustavo Pacheco-Rodriguez, Joel Moss and Martha Vaughan
Pulmonary-Critical Care Medicine Branch
National Heart, Lung and Blood Institute, Bethesda, MD
20892
Email: padillap@nhlbi.nih.gov*

BIG1 is a ca. 200-kDa, brefeldin A-inhibited guanine nucleotide-exchange protein that preferentially activates ARF1 and ARF3. It was initially purified from bovine brain cytosol in a multimolecular complex with a similar ARF-activating protein, BIG2, which is also an A kinase-anchoring protein. In HepG2 cells growing with serum, BIG1 was primarily cytosolic and Golgi-associated. After incubation overnight without serum, a large fraction of endogenous BIG1 was in the nuclei. By confocal immunofluorescence microscopy, BIG1 was localized with nucleoporin p62 at the nuclear envelope (probably during nucleo-cytoplasmic transport) and in nucleoli, clearly visible against the less concentrated overall matrix staining. BIG1 was also identified by Western blot analyses in purified subnuclear fractions (e.g., nucleoli and nuclear matrix). Antibodies against BIG1, nucleoporin, or nucleolin co-immunoprecipitated the other two proteins from purified nuclei. Unlike their localization in cytoplasm, BIG1 and BIG2 were not associated in nuclei. Also of note, ARF was never detected among proteins precipitated from purified nuclei by anti-BIG1 antibodies, although microscopically the two proteins did appear sometimes to be co-localized in the nucleus. These data are consistent with independent intracellular movements and actions of BIG1 and BIG2. They are also evidence of the participation of BIG1 in both Golgi and nuclear functions.

S1A.3

Regulation of the Human Relaxin Genes H1 and H2 by Steroid Hormones

*Jermelina L. Garibay-Tupas**, Kristie J. Okazaki, Lily S. Tashima, Sandra Yamamoto and Gillian D. Bryant-Greenwood
Molecular Endocrinology Laboratory, Pacific Biomedical Research Center, University of Hawaii at Manoa, Honolulu, HI 96822

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Relaxin, a peptide hormone important to the outcome of human pregnancy is expressed in a tissue specific manner as two genes known as relaxins H1 and H2, in addition to a third human relaxin H3, expressed primarily in the brain. The H1 and H2 genes are highly homologous, differentially expressed in reproductive tissues and appear to activate the same receptor, but their regulation is poorly understood. Based upon the known physiology of these hormones and the response elements in their 5'- and 3'-flanking regions, the possibility that progesterone and/or the glucocorticoids might influence their differential expression was therefore investigated. The changes in the mRNA levels of the relaxin genes in response to either medroxyprogesterone acetate (MPA) or dexamethasone (Dex) were analyzed by RT-PCR using a choriocarcinoma cell line (JAR) as a model system, because the expression of these genes in any primary human cell type is too low for such a study. The addition of 0.5 μ M MPA to JAR cells, significantly upregulated the mRNA of only the relaxin H2, while the addition of 0.5 μ M Dex significantly upregulated the mRNAs for both the relaxins after 6 h of treatment. Promoter assays indicated an early activation of transcription (1 h), which by 6 h had decreased. Progesterone and/or glucocorticoids could exert their effects via the GRE motif found on the 5'-flanking region of the relaxin genes. The H1-GRE differs from the H2-GRE by a single nucleotide, which may affect H1-GRE binding to the progesterone receptor (PR) but not the glucocorticoid receptor (GR). The antiprogestin RU486 inhibited the binding of the GR to both H1-GRE and H2-GRE, while it enhanced the binding of the PR to these GREs. As determined by gel shift assays, this GRE motif could bind to both the PR and GR and was therefore considered to be functional. Thus, both progesterone and glucocorticoids are capable of differentially regulating the expression of the two human relaxin genes in a model system.

S1A.4

Novel Expression of Gonadotropin Releasing Hormone-1 (GnRH-1) in the Developing Incisors of Mouse

Jean Tiong and Susan Wray
Cellular & Developmental Neurobiology Section, National Institute of Neurological Diseases and Stroke, Bethesda, MD 20892
Email: TiongJ@ninds.nih.gov

GnRH-1 regulates gonadal maturation and fertility in vertebrates. This function is linked to GnRH-1 secreted by neurons in the adult forebrain. These neurons, however, originate in the nasal placode (epithelial thickening in the nose) and migrate into the brain during embryonic development. This work describes expression of GnRH-1 in developing teeth in mice using RT-PCR, *in situ* hybridization and immunohistochemistry. Tooth development involves the interaction of dental epithelium (DE) and mesenchyme (DM). Developmental landmarks consist of a number of steps including thickening of DE at E (embryonic day) 11.5, bud formation at E12.5 – E13.5, and formation and mineralization of dentine and enamel (hard covering of tooth) at >E16.5. From E12.5 – adulthood, GnRH-1 mRNA and peptide were expressed in midline incisors and not in molars. GnRH-1 expression in incisors was detected in DE and DE – derived structures (i.e. papillary layer and enamel-secreting ameloblast cell layer) but not in neural crest-derived DM or in DM – derived structures. At P (postnatal day) 5, GnRH-1 immunostaining was more pronounced in the anterior DE (more mature cells) and absent in the proliferative zone at the posterior aspect, indicating that GnRH-1 expression is correlated with cell maturity. To begin to address GnRH-1 function in tooth, incisor morphology of wild type (WT) was compared to that of hypogonadal (hpg) mice with GnRH-1 gene deletion. At P1, hpg mice have incisors but morphological changes in cells of papillary layer were noted, i.e. more dispersed in hpg than WT mice. These results indicate that although GnRH-1 is not necessary for incisor formation it may be important in incisor maintenance, enamel formation and/or mineralization. Further analysis of mutant mice will provide a better understanding of the role of GnRH-1 in incisor development. Comparisons of factors that differentially regulate GnRH-1 in teeth versus those that regulate the classic GnRH-1 neuroendocrine neurons will provide insights into development of GnRH-1 phenotype and function of cells that express the hormone outside the CNS.

S1A.5

Biochemical and Phenotypic Abnormalities in Kynurenine Aminotransferase II-Deficient Mice

Ping Yu¹, Nicholas A. Di Prospero¹, Michael T. Sapko², Tao Cai¹, Amy Chen¹, Miguel Melendez-Ferro², Fu Du², William O. Whetsell Jr.³, Paolo Guidetti², Manickavasagon Alkondon², Edna Pereira², Edson Albuquerque², Robert Schwarcz², and Danilo A. Tagle¹

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Kynurenic acid (KYNA) can act as an endogenous modulator of excitatory neurotransmission and has been implicated in the pathogenesis of several neurological and psychiatric diseases. To evaluate its role in the brain, we disrupted the murine gene for kynurenine aminotransferase II (KAT II), the principal enzyme responsible for the synthesis of KYNA in the rat brain. *mKat-2^{-/-}* mice showed no detectable KAT II mRNA or protein. Total brain KAT activity and KYNA levels were reduced during the first month but returned to normal levels thereafter. In contrast, liver KAT activity and KYNA levels in *mKat-2^{-/-}* mice were decreased by > 90% throughout life though no hepatic abnormalities were observed histologically. KYNA-associated metabolites kynurenine, 3-hydroxykynurenine and quinolinic acid were unchanged in brain and liver of knockout mice. *mKat-2^{-/-}* mice began to manifest hyperactivity and abnormal motor coordination at 2 weeks of age, but were indistinguishable from wildtype after 1 month of age. Golgi staining of cortical and striatal neurons revealed enlarged dendritic spines and a significant increase in spine density in 3 week-old *mKat-2^{-/-}* mice but not in 2 month-old animals. Alpha7 nicotinic acetylcholine receptor (nAChR) activity was assessed in these mice. In three week-old *mKat-2^{-/-}* mice, nAChR activity induced by exogenous application of agonists to CA1 stratum radiatum interneurons was 65% higher than wildtype. Binding studies indicated that the enhanced receptor activity is not a result of an increase in the number of nAChR. Endogenous nAChR activity in the hippocampus was also increased, leading to an enhancement of GABAergic activity but could be reduced significantly by acute exposure to 100 nM KYNA. By 60 days of age, KYNA levels and GABAergic transmission in the hippocampus were comparable in nullizygous mice and controls. Our results show that gene targeting of *mKat-2* in mice leads to early and transitory decreases in brain KAT activity and KYNA levels with commensurate behavioral and neuropathological changes and that nAChRs are major targets for KYNA in the brain which may be of significance in schizophrenia and Alzheimer's disease where brain KYNA levels are increased and nAChR functions are impaired.

S1A.6

Familial Encephalopathy with Neuroserpin Inclusion Bodies (FENIB): A Conformational Neurodegenerative Disorder in Children and Adults

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Like Alzheimer, Parkinson, Huntington and Pick diseases, and spongiform encephalopathies, FENIB is a neurodegenerative disorder that results from the aggregation of conformationally destabilized protein, neuroserpin. Neuroserpin is a brain-associated inhibitor of tissue plasminogen activator involved in modulating cell migration, axon outgrowth and synaptic plasticity. Neuroserpin mutations described to date are in the shutter region that causes misfolding by loop-sheet polymerization in the gray matter cortical neurons and subcortical structures.

To characterize the clinical phenotype of FENIB in the family with S49P mutation, a retrospective assessment of medical records of seven affected family members of a four-generation pedigree and full clinical examination of two living affected members were performed. The S49P family was compared with the phenotypes of patients with other known genotypes, and delineated from the other causes of progressive myoclonic epilepsy (PME) and presenile dementia. Clinical onset in the seven affected S49P members was at the fifth decade of life with a progressive clinical course of greater than 16 years. The average duration of disease to death was 11 years (n=5). Six of the seven affected members with S49P had dementia as the first symptom. Unlike the patients with other neuroserpin mutations, only one of the family members with S49P mutation had spells, hand movements and seizures as presenting symptoms. Although PME is more common in children and young adults, variable frontal lobe, extrapyramidal, and pyramidal symptoms occur in FENIB. There is generalized slowing with disorganized background and theta and delta waves present on EEG. Cerebral atrophy, more pronounced in the insular and parieto-occipital cortex, was observed in advanced stages of the disease. Collins bodies in S49P were noted in the cortical layers, with sparing of the first and second layers, and in subcortical structures like the hippocampus, basal ganglia, midbrain and pons and were rarely in clusters.

FENIB is an autosomal dominant pan-ethnic progressive encephalopathy with seizures or myoclonus in presenile adults or PME in younger adults and children. The clinical onset is variable with the severity and rate of progression dictated by the genotype. FENIB must be included in the differential diagnosis for patients of any age presenting with cognitive

delay, seizures, myoclonus, and/or early-onset dementia with a progressive course possibly accompanied by pyramidal, extrapyramidal, or frontal lobe symptoms such as deterioration of personality and perseveration in speech, thought or task.

S1A.7

Ciliary Body Neurospheres

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Recent reports of stem cells found in adult tissues have led to the current intense activity in the study of stem cells and their use to replace damaged or dead tissues. In the eye, two sources of stem/progenitor cells have been found – the ciliary body and the corneal limbal epithelium. Our lab is interested in using ciliary body progenitor cells to replace the ganglion cells that have degenerated in glaucoma. Cells were isolated from the ciliary body of mouse (FVB.Cg-Tg(GFPU)₅Nagy), rat (Wistar), and human tissues, cultured to form neurospheres, and analyzed for their quantitative and qualitative growth characteristics. Growth pattern and staining similarities among the neurospheres among these species would suggest that treatment of mice and rat neurospheres would give similar results with human neurospheres. Dissociated adult mouse ciliary body neurospheres were transplanted into the intravitreal chamber of eyes of adult Wistar rats with glaucoma. Glaucoma was induced by the lasering of the trabecular meshwork, resulting in an increase in intraocular pressures to levels, causing optic nerve damage.

Four weeks after transplantation, the rat eyes were harvested and fixed with 4% paraformaldehyde. Whole mounts and cryosections were examined. Results indicate cell integration into the retina with most of the cells at the ganglion cell layer. Cell integration was higher in glaucomatous eyes and in regions closer to the optic nerve. This is the first report of ciliary body stem cell integration into glaucomatous eyes. The residence of the cells in the ganglion cell layer and the formation of the processes indicate that these cells may be a valuable way to replace the ganglion cells in glaucoma.

S1A.8

D5 Dopamine Receptor Regulation of NADPH Oxidase and Blood Pressure in Mice

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D₁-like receptors have antioxidant properties but the D₁-like receptor (D₁/D₅) involved is unknown. The D₅ receptor (D₅R) inhibits phospholipase D (PLD) activity in CHO and HEK-293 cells, expressing the human D₅R (hD₅R). Because PLD products activate NADPH oxidase (ox), we hypothesized that hD₅R inhibits NADPHox activity, and thus, the production of reactive oxygen species (ROS). Systolic blood pressures (SBP), mm Hg are higher in anesthetized D₅R deficient (D₅^{-/-}) (SBP=136±4, n=70) than in wild type mice (D₅^{+/+}) (SBP=103±1, n=67, P<0.05). In the absence of anesthesia, the D₅^{-/-} mice are hypertensive (D₅^{+/+} SBP = 119 ± 4, n=4; D₅^{-/-} SBP = 154 ± 6, n=5, P<0.05). Increasing super oxide dismutase (SOD) activity with the stable membrane-permeable, metal-independent SOD mimetic and spin trap, Tempol (10 mg/kg IV), or heme oxygenase 1 activity with hemin (50 μmol/kg/day) decreases blood pressure in D₅^{-/-} (n=22) but not in D₅^{+/+} (n=15) mice. The expressions of p47^{phox} and gp91^{phox} (NADPHox subunits), are higher in D₅^{-/-} mice kidney than D₅^{+/+} mice (P<0.05, n=3/group). In HEK-293 cells expressing hD₅R (HEK-hD₅R) but not hD₁R, the D₁/D₅ agonist, fenoldopam (FEN), decreases NADPHox activity. FEN also inhibits O₂⁻ by 58% (IC₅₀= 1.9 μM, t_{1/2}=29 min) and H₂O₂ production by 36% (IC₅₀= 2.3 μM, t_{1/2}=30 min). The adenylyl cyclase inhibitor, SQ22536, and PKA inhibitors, H-89, R-8-piperidino-cAMPs, and Rp-cAMPs, do not prevent the D₅R action. D₅Rs also cofractionate with gp^{91phox} and p^{67phox}, in HEK-hD₅R and rat renal proximal tubule cells (RPTC). In RPTCs, the D₅R but not D₁R is linked to and co-fractionates with gp91^{phox}. Therefore, D₅Rs inhibit NADPHox activity, directly or indirectly, via PLD, but independent of PKA, decrease ROS production, and may explain the antihypertensive function of D₅Rs.

SESSION S1B: AGRICULTURE AND ENVIRONMENTAL SCIENCES

S1B.1

Life in Extreme Environments: Microorganisms in the Accreted Ice of Lake Vostok, Antarctica

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Lake Vostok is the largest and deepest sub-glacial lake in Antarctica. The lake contains liquid water located beneath 3.7 kilometers of glacial ice. The source of freshwater for Lake Vostok is still unknown but the water is kept liquid by the pressure of the ice overburden (about 350 atmospheres) and possible geothermal heating. In 1998, a team of Russian, US and French scientists completed the drilling of Vostok hole number 5G at a termination depth of 3623 meters. The bottom of the core is about 120 meters from the ice-water interface. The composition of the ice core from 3528 meters and below suggests that the basal ice (195 meters above the lake) is refrozen Lake Vostok water. Analysis of a portion of Vostok ice core number 5G, which is believed to contain frozen water from Lake Vostok, revealed 200 to 300 bacterial cells per milliliter and low concentrations of potential growth nutrients. Lipopolysaccharide (a Gram-negative bacterial cell biomarker) was also detected at concentrations consistent with the cell enumeration data, which suggests a predominance of Gram-negative bacteria. At least a portion of the microbial assemblage was viable as determined by the respiration of carbon-14 labeled acetate and glucose substrates during incubation. These accreted ice data suggests that Lake Vostok may contain viable organisms that may be on the order of 10 million years old, which is the time the lake has been covered by glacial ice. Lake Vostok could serve as a terrestrial analog to guide the design of samplers and experiments to be used to probe for life in other planets, such as the ice-covered ocean of the Jovian moon, Europa. Currently, scientists are still developing the technology to break into and explore the lake without contaminating or destroying the pristine conditions it has kept for millions of years.

S1B.2

Environmental Engineering Meets Microbiology: Molecular Techniques For Investigating Biological Treatment Systems

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In the past two decades, DNA and RNA sequence-based methods have been applied to biological treatment processes such as activated sludge and anaerobic digesters. These molecular methods have allowed environmental engineers to identify and quantify microorganisms *in situ*, in complex environments, and without prior cultivation. Molecular tools take advantage of the fact that target molecules such as nucleic acids, proteins, and signature lipid biomarkers unique to certain microbial populations can be detected and quantified. Of these biopolymers, ribosomal RNA (rRNA) as target has received the greatest acceptance, and rRNA-based methods have revolutionized our understanding of the organisms involved in biological treatment systems. This paper summarizes the basics of the techniques currently used and the results from a decade of research and development in molecular microbial ecology and process engineering. In particular, oligonucleotide probing has been used to study (1) filamentous foaming, (2) filamentous bulking, (3) nitrogen removal, (4) phosphorus removal, and (5) anaerobic reactors. Insights from these applications will be presented. For example, quantitative probing of filamentous bacteria has shown the relationship between filament levels and foaming. Methods for species-specific, *in situ* biomass measurements of bulking filaments are being used to determine species-specific relationships to bulking episodes. Probing studies of nitrifying activated sludge have shown that the current “*Nitrosomonas-Nitrobacter* model” of ammonia oxidation-nitrite oxidation is erroneous. Similarly, probe studies have shown the common belief that *Acinetobacter* is the dominant phosphorus-accumulating organism in activated sludge to be wrong. These results and their impact on biological process design and operation will be presented. Future applications of molecular techniques and their potential benefits to the wastewater treatment research and practice communities are discussed.

S1B.3

The Ethnobotany of the Tala-andig in Lantapan, Bukidnon, Central Mindnao, Philippines and Mass Domestication/Cultivation of Two Wild and Disappearing Species

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The Tala-andig comprises one of the ethno-linguistic groups in the province of Bukidnon, Mindanao, Philippines. The group is concentrated in the towns of Lantapan, Capitan Angel, Dalwangan, Patpat and Malaybalay. The political, cultural and religious life of the group that lives in a little village (Tulugan) in Songco, Lantapan is described. More than 85% if the Tala-andig resorts to traditional medicines and only at later stage do they try to get a chance to access to modern physicians.

The most useful wild plants among the Tala-andig in Tulugan are described and illustrated. Two species, *Fimbristylis globulosa* (Retz.) Kunth and *Cephalostachyum mindorense* Gamble., both potential sources of raw materials for the native's handicraft industry were disappearing in their natural habitats. Some emergency food plants and herbal remedies restricted to the Tala-andigs are also described. The Tala-andig's beliefs related to plants and other medicinal practices they commonly use were documented. Many uses of the plants reported have not been recorded in previous works. The two wild species, (*F. globulosa* and *C. mindorense*) were put into massive domestication and cultivation for the revival of the Tala-andig's handicraft industry, sustainable management, and for the enhancement of the Tala-andig's tribal culture. Intensive training program for the out-of-school youths, housewives and children were conducted with the elderly native weavers as the trainers to upgrade the quality of finished products and to retain the original Tala-andig heritage design. Apo Agbibilin Credit Cooperative and Tala-andig Weavers Association were founded during the research period to take charge of the production of finished products. As far as *C. mindorense* is concerned, its massive plantation was fit of its kind in the Philippines.

This ethnobotanical study was conducted during the period 1995-2000, wherein the authors lived with the tribe during much of the period.

SESSION S1C: NUTRITIONAL AND NATURAL PRODUCTS RESEARCH

S1C.1

The Cancer Preventive Properties of a Soy Peptide That Binds to Chromatin

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Epidemiological data suggest a correlation between diet and cancer. The consumption of soy products has been associated with low incidence of certain types of cancer leading to studies on identification of candidate cancer preventive substances. Isoflavones and the protease inhibitor Bowman Birk Inhibitor (BBI) are widely studied. Lunasin, a unique 43-AA peptide originally isolated from soybean, was discovered in our lab about 5 years ago. It has been shown to be cancer preventive in cell culture model and a skin cancer model in mice. Other cancer models are being studied. Evidence point to an epigenetic mechanism of action whereby Lunasin modifies chromatin. The talk will include beginnings and discovery, cancer preventive properties, molecular mechanism, bioavailability in animals and possible role in seed development.

S1C.2

Phytochemical Analysis and Toxicity Test of Functional Foods

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A new global awareness on functional foods emerged in the 1990s. From then on, interest and enthusiasm have been geared on using foods, rather than drugs, to ensure good health, and disease prevention, rather than cure. The Philippines is endowed with natural resources that are potential ingredients for functional foods herbs used in beverages like tea are very popular locally and as an export item. This study was conducted to determine the phytochemical analysis, toxicity test of two indigenous plants used for rural folks for functional foods. Powdered oven-dried plant samples were produced for the phytochemical analyses, toxicity test, and tea production.

Phytochemical analysis of *Codiaeum variegatum* 'Gold Sun' showed that it contains moderate amounts of alkaloids, sterols, tannins, and traces of flavanoids while *Persea Americana Mill* stem bark contain moderate amounts of tannins, traces of alkaloids, glycosides, saponins, and sterols. Toxicity test, LD₅₀ of *Codiaeum variegatum* freeze-dried leaf decoction administered orally to the experimental mice is 34.2208 g/kg while LD₅₀ of *Persea americana Mill*. freeze-dried decoction is 19.33598 g/kg. Toxidrome for both plant drugs ranged from decreased motor activity, increased respiratory rate, ptosis, passivity, loss of grip strength, and convulsion leading to the death of experimental mice. Tea formulation is computed based from the obtained results of the median lethal dose. One-fourth of the LD₅₀ is the human dose multiplied by a constant 1/10 multiplied by 50 kilogram weight of an average Filipino adult. The tea consumption of an average adult Filipino with cough for *Codiaeum variegatum* freeze-dried leaf decoction is 3 bags with 14.5438 g per tea bag in 24 hours administered every 8 hours while the dosage of clients with diarrhea for *Persea americana Mill*. freeze-dried stem bark decoction is 3 tea bags with 42.775 g per tea bag in 24 hours administered every 8 hours.

S1C.3

Low Cost Nutritious Food Products From Indigenous Plants

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Conventional or traditional foods formulated from the edible weeds and discarded green young cassava leaves play a significant role in reducing the budget for foods and can help minimize malnutrition problems, thus uplifting the economic condition of the farmers not only in the province of La Union but also in the 13 regions of the Philippines. This project was conducted to help the farmers develop the problem weeds and discarded green young cassava leaves into baked products; to determine the nutrient contents; shelf-life; moisture-content; and right packaging materials for the baked products to reach out the malnourished children in the province of La Union.

Purleaf Cookies. Nutritional facts for 30 grams serving size, the serving per container is 20, calories 130, calories from fat 45, Total fat 3.5 g, Saturated fat 2.5 g, Cholesterol 15 mg, Sodium 70 mg, Total carbohydrates 22 g, Dietary fiber 0 g, Sugar 13 g, Protein 1 g, Vitamin A 2%, Calcium 5%, Phosphorus 20%, Vitamin C 10%, Iron 100%, Riboflavin 2%. Percent Daily Values are based on a 2,000 calorie diet.

Casleaf Cookies. Nutritional facts for 30 grams serving, the serving per container 20, Calories 130, Calories from fat 45, Total fat 5 g, Saturated fat 4 g, Cholesterol 15 mg, Sodium 6 mg, Total carbohydrates 20 mg, Dietary fiber 0 g, Sugar 12 g, Protein 2 g, Vitamin A 6%, Calcium 2%, Phosphorus 4%, Vitamin C 0%, Iron 4%, and Riboflavin 25%.

For both products, the shelf life is 12 months and the right packaging material is VPMET/VMCPP with 18 cm x 12 cm dimensions and 16 microns thickness.

After one month of daily feeding, the final weight of the target clients was measured. It is heartening to mention that the gain weight of pupils who consumed the 100 grams food supplement given in school, ranged from 2-4 kilograms. Severely malnourished children, however, who did not take all the 100 grams daily food supplement and those who were irregular in their attendance gained one kilogram weight.

SESSION 1D: BIOTECHNOLOGY AND PHARMACEUTICAL APPLICATIONS

S1D.1

Predictive Thermodynamic Parameter Sets for Locked Nucleic Acid (LNA)-DNA Duplex Formation

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Assay designs that enhance traditional DNA-based oligonucleotide primers and probes with modified nucleic acids are becoming increasingly important in achieving the goal of rapid, low-cost and high-throughput DNA testing that provides accurate results on the first try. One of the most useful modified backbones is Locked Nucleic Acid (LNA), an RNA derivative that stabilizes oligonucleotide hybridization. In order to make robust LNA test designs, it is essential to predict the melting temperature (T_M) for LNA-containing primers and probes, in all possible sequence contexts, which, heretofore, has not been systematically assessed. To address this deficiency, we examine LNA stability, initially for the entire set of 64 5'-XLY-3' perfect match triplets and then, currently in-progress, for the set of 192 mismatched LNA:DNA pairs; where X and Y are DNA bases and L is an A, C, G, or T LNA-base. In the first phase of the work, the hybridization dH° , dS° and T_M were measured from absorbance melting curves for 100 duplex oligonucleotides with single internal LNA nucleotides on one strand. SVD analysis of the thermodynamics provided ddH° , ddS° , ddG°_{37} ,

and dT_M values relative to reference DNA oligonucleotides for all of the 32 possible nearest-neighbor dinucleotides (5' XL- and 5' -LY), establishing new predictive thermodynamic parameters for single-LNA incorporation. They provide T_M estimates accurate to within 2°C for LNA-containing oligonucleotides, which is significantly better accuracy than previously available. Overall, LNA incorporation provides stability either by preorganization or improved stacking, but usually not both simultaneously. The most useful extension to the perfect-match thermodynamic parameter-set is to apply the nearest-neighbor approach to LNA:DNA mismatches. In general, we find that differences in T_M between LNA:DNA mismatches and the corresponding DNA:DNA mismatch is distributed over a range of -6°C to about 14°C, and T_M reduction due to mismatch appears to be greater for LNA-containing duplexes, within various sequence contexts.

SESSION S2A: PHYSICAL SCIENCES AND TECHNOLOGICAL APPLICATIONS

S2A.1

Studying Star Stuff in a Bottle

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Techniques developed for storing and manipulating isolated ions and elementary particles under extreme conditions are opening ways to learn about phenomena found in astrophysical objects and to study questions about the nature of the cosmos. This is a brief survey based on the author's personal journey. Examples range from the recent success in the production of cold antihydrogen in an accelerator, to experiment using highly-charged ions in an EBIT.

S2A.3

S2A.2

A Mathematical Framework for Managing Uncertainties and Incompleteness in a Knowledge-Based System

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In the real world of building intelligent systems, managing uncertainties during the knowledge engineering process (from elicitation to verification and validation) requires a flexible, intuitive, and semantically sound knowledge representation. This is particularly critical since this process is typically highly interactive where the human user must add, update, and maintain knowledge. In addition, new knowledge is incrementally introduced to an existing knowledge base in a typical knowledge-engineering cycle. Unfortunately, at most given stages, the knowledge base is incomplete but must still satisfy sufficient consistency conditions in order to provide sound semantics. Maintaining semantics for uncertainty is thus of primary concern. A new mathematical framework, in the form of Bayesian Knowledge-Base (BKB), is introduced for managing uncertainties and incompleteness in a Knowledge-based System. BKBs provide a highly flexible and intuitive representation following a basic "if-then" structure in conjunction with probability theory. Theoretical and algorithmic results concerning BKBs and how they can naturally and implicitly preserve semantics as new knowledge is added are examined. In particular, equivalence of rule weights and conditional probabilities is achieved through stability of inferencing in BKBs.

Moreover, efficient algorithms are developed to guarantee stability of BKBs during construction. Furthermore, formal conditions that hold during the incremental construction of BKBs are established. BKBs have been deployed in various applications from Space Shuttle Engine Maintenance to Adversarial Decision Modelling.

S2A.3

Experimental Evidence of Quantum Mechanics in Macroscopic Objects

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Quantum mechanics is often observed in systems of atomic dimensions, as exemplified by the discrete spectra arising from transitions between quantum energy level states of ionized gases. In contrast, key features of quantum mechanics have also been observed in solid-state superconducting circuits called Josephson junctions which measure *a few microns across*. When isolated from the environment and cooled to ultra-low temperatures, these devices exhibit quantum energy levels that can be probed by microwave spectroscopy(1). I will report on our experiments which have elucidated the quantum nature of these “artificial atoms”. Furthermore, I will report the first experimental demonstration of a completely quantum mechanical feature called quantum entanglement, based on a prediction we made two years ago(2). Such entanglement, a key requirement for performing any form of quantum information processing, was observed between states of two Josephson junctions, physically separated by a macroscopic distance of almost 1 mm(3).

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S2A.4

Nanolithography Using Scanning Tunneling Microscopy

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Features as small as a billionth of a meter and placed at precise locations on surfaces exhibit exotic quantum and optical effects that form the basis of devices with extraordinary functionalities. In this talk, I will present a novel technique based on the scanning tunneling microscope that uses electrostatic discharge and electron field emission processes to create identical structures on metal and semiconductor surfaces with nanometer resolution. The method is based on a *proximal probe technique*, where a sharp metallic tip is capacitively charged and brought to within a few nanometers above the surface through a very thin liquid film medium. The geometrical sharpness of the tip causes intense electric field in the gap region which causes electron emission from the tip. At low voltages (< 10 volts), electron bombardment causes local melting and vaporization of the metallic atoms. Using this method, we can inscribe preconceived geometrical shapes made up of a series of nanometer size features. At higher voltages (>10 V), dielectric breakdown of the gap media occurs, and are mainly concentrated at the tip region containing asperities or nanopoints. This causes features to be imprinted on the surface whose shape is the *negative image* of the tip topography. This is thus a convenient “nanoprinting” technology where one can tailor the tip geometry, e.g., using focus ion beam, and transfer the complement of this pattern into an indefinite array of identical patterns on the surface. Both low and high nanolithography methods are competitive alternatives to state of the art techniques in nanomachining and enjoys advantages in feature resolution, reduced process cycle time, and applicability to a wide range of materials. I will discuss the principle of operation, some theoretical underpinnings and examples of our nanolithography results.

S2A.5

Methods and Pharmaceutical Applications of Near-Infrared Chemical Imaging

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Infrared chemical imaging integrates infrared optics, a means of wavelength selection such as a liquid crystal tunable filter, and an infrared focal plane array detector to characterize samples in the spectral and spatial dimensions simultaneously. These systems provide the unique capability to collect thousands of infrared spectra characterizing an entire spatial region of the sample in parallel. Applications of these instruments have included diverse categories of chemically and spatially heterogeneous samples ranging from broad landscapes in remote sensing applications down to the level of single cells. One of the most important goals in the analysis of chemical image data is the production of a chemical map which describes the spatial distribution and relative concentration of chemical species of interest in the chemical image data set. The work to be presented will introduce the method and demonstrate applications of near-infrared chemical imaging in pharmaceutical samples for the determination of blend homogeneity in solid dosage forms.

S2A.6

Parameters that affect the patient exposure from digital vs. non-digital dental x-ray machines

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The Conference of Radiation Control Program Directors (CRCPD) has published the Nationwide Evaluation of X-ray Trends (NEXT) Tabulation and Graphical Summary of the 1999 Dental Radiography Survey for non-digital dental x-ray machines. The parameters looked at are kVp, mAs, time msec, and the result is mR exposure or entrance skin exposure (ESE). Bradley Grinstead of Alabama X-ray Compliance Branch had data on digital x-ray machine on the abovementioned parameters as well as D and E speed film and digital ESE as a function of years 1999, 2000, 2001, 2002, 2003 and 2004. The New Jersey Department of Environmental Protection, Bureau of Radiological Health through Mr. Paul Orlando and Dr. Jill Lipoti also gave the author data on non-digital dental x-ray machines ESE vs. % of sample. The materials used are the dental phantom and ionization chambers. The method used is the NEXT protocol for dental measurement. The result shows that the time msec was inclined to the lower time msec intervals for digital compared to non-digital. The mR exposure was twice less for digital vs. non-digital in the range of 50-124 mR exposure. The kVp % of sample was increased 10 times in the 70-75 kVp range for digital vs. non-digital x-ray machines. The New Jersey non-digital mR exposure levels were greater than the NEXT non-digital and Alabama digital levels. The D speed film mR exposure or ESE is greater than E speed film and greater than digital. This article presents the overwhelming evidence of less exposure for digital compared to non-digital dental x-ray machines due to the lesser time of exposure for digital.

S2A.7

Organic Polymers for Plastic Photovoltaic Device Applications

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Organic polymers are currently being considered as possible alternative to amorphous silicon-based technology for solar cell applications. They are highly processible at room temperature, making them compatible with lightweight plastic electronic devices. They are cheap to fabricate that makes them attractive candidates to replace the expensive silicon based photocells. In this talk, I will review the current state-of-the-art in this field research and the approaches that we are adopting to develop highly efficient organic polymer solar cells that could rival the currently available silicon-based devices.

SESSION S2B: ENERGY AND ENGINEERING

S2B.1

Carbon Finance for Private Power Projects in the Philippines

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Climate change has emerged as a key concern in the 21st century. Sea level rise, warming temperatures, uncertain effects on forest and agricultural systems, and increased variability and volatility in weather patterns are expected to have a significant and disproportionate impact in the developing world, where the world's poor remain most susceptible to the potential damages and uncertainties inherent in a changing climate. Reducing carbon dioxide and other greenhouse gas emissions to the atmosphere from human activity, such as the operation of fossil-fueled power plants, is one of the key approaches to combating climate change. The Prototype Carbon Fund (PCF) managed by the World Bank aims to catalyze a global carbon market through the purchase of high quality emission reductions in climate-friendly projects in developing countries and economies in transition. Through the PCF, private sector-led clean power projects in developing countries are awarded additional revenues as carbon is avoided during plant operation (carbon emission credits). This encourages more private investments in clean energy in developing countries at the same time that developed economies with high carbon intensity are able to meet emission limits mandated by the Kyoto Protocol.

The paper explains the concept and process of carbon finance through detailed descriptions of two new private sector renewable energy projects now being considered for emission reduction credits in the Philippines: a 25 MW windfarm power plant in Bangui Bay, Ilocos Norte and a 30 MW bagasse cogeneration power plant at the Talisay Sugar Mill in Negros Island.

S2B.2

Thermal Performance Characterization of Capric Acid and Lauric Acid Mixture for Low Temperature Energy Storage

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The low-temperature air conditioning technology employing the latent heat energy storage system provides an attractive alternative to air conditioners and process cooling, with the possibility of deloading peak energy consumption and making the environment pollution free. The thermal performance of the binary mixture of decanoic acid (capric acid, 65 mol %) and dodecanoic acid (lauric acid, 35 mol %) mixture, herein referred to as the C-L acid, was closely examined for thermal energy storage for cooling application. Both fatty acids are basically derived from coconut oils that are abundantly available in the Philippines.

Based on DSC analysis, C-L acid exhibits a heat of fusion value of 140.8 kJ·kg⁻¹ and a melting point of 18.0°C. Corroborative results were obtained when the thermal energy storage performance and heat transfer behavior were experimentally elucidated from the radial and axial temperature distribution during its melting and solidification. The heat transfer characteristics of the C-L acid were determined. All experimental results were in good agreement with the numerically simulated results. Subsequent performance investigations were carried out on C-L acid and C-L acid with chosen organic additives to lower the melting point while retaining its substantial energy capacity without impairment of its requisite qualities.

C-L acid has sound benefits particularly on the melting congruency, no degradation, chemical stability, its behavior in relation to melting and freezing reproducibility, and reasonable energy density. Although the temperature depression of 8 to 11°C with respect to the C-L acid had not been attained in all PCM mixtures that were analyzed, C-L acid with methyl salicylate provided the most effective additive. This PCM mixture is specifically good enough for industrial applications that will focus on waste heat recovery, process cooling, impregnated construction materials and other environmental safety related concerns.

S2B.3

Micro-Hydro Power Stabilization using Fuzzy Logic

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A micro-hydro power system that is connected to a small and independent network has an inherent problem on stability caused by random variation in the electrical load. Line voltage and frequency can fluctuate as a result of sudden change in the electrical load. Among a number of possible remedies to this problem, the application of fuzzy logic can provide a simple and straightforward solution. This paper presents the results of a study regarding the implementation of fuzzy logic control in a small micro-hydro power system test rig. Using fuzzy logic, the controller that was used in this study was able to maintain values close to 750 rpm and 8 Vdc for the turbine shaft speed and generator output voltage, respectively.

S2B.4

S2B.4

An Environmental Life Cycle Assessment of a Locally-Designed Windmill for Power Generation

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This study presents a life cycle assessment (LCA) study of a wind energy system developed at the Sustainable Technology Laboratory of De La Salle University-Manila. The current system is designed to improve the stability and reliability of conventional bladed designs. It incorporates an automated control mechanism to maximize wind energy conversion and a hydraulic mechanism that facilitates control of structure stability during bad weather conditions. This translates to an actual power output of 2.5kW based on overall turbine efficiency of 45%. The evaluation of the environmental impacts was done on the system life cycle covering production, operation and maintenance and disposal. An Excel program was developed to determine the effect of the design parameters, materials use, fabrication processes, operational changes, and parts replacement to the overall environmental impact. Disposal of the system was also considered but eventually found to be negligible since most of the system components used are recyclable. Environmental outputs considered were categorized according to its contribution to resource depletion, greenhouse effect, ozone depletion, toxicity, photochemical oxidation, acidification, nitrification, and energy consumption. Results showed high impact values in the areas of greenhouse effect and toxicity due to the wide use of metal parts and significant oil usage for lubrication. Two scenarios were developed to demonstrate that changes in materials used for fabricating the system could have significant impact on the environment.

SPECIAL SESSION ON PHILIPPINE-AMERICAN BONDS IN SCIENCE AND TECHNOLOGY

SS.3

Starting a US Technology Company with Philippine Roots: The Xylos Story

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Xylos Corporation is a venture capital (VC) backed biomaterials company based in Langhorne, PA. The company was started in 1996 at the Incubator Center of Rensselaer Polytechnic Institute (RPI) where one of its founders, Dr. Gonzalo Serafica was completing his Ph.D. in Chemical Engineering. The company's mission is to develop medical products using its core technology, biosynthesized cellulose, a material very similar to our Philippine dessert, *Nata de Coco*. The company has 22 employees and has several products being marketed in wound care industry and plans to soon launch its implantable medical products. Dr. Serafica will briefly describe the company's history and will touch on its existing relationships in the Philippines and the future of such US-Philippine technology partnerships.

SS.5

Funding Opportunities for Science in Developing Countries

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Several federal and international programs are available to support science in developing countries such as the Philippines. The National Science Foundation's (NSF), through its International Science and Engineering (INT) Program, provides proposal-based, competitive grant funding to U.S. researchers for scientific, engineering and educational cooperation with institutions and researchers in the region, including the Philippines. NSF support for international research and education collaborations include cooperative research projects; joint workshops and seminars; fellowships; research planning visits; international opportunities for students; dissertation enhancement; supplements to existing NSF awards; international collaboration in new proposals to other NSF programs; international linkages for NSF centers and Small Grants for Exploratory Research (SGER). NSF support for international research and education collaborations can be requested using three methods: Current NSF grantees may request a supplement to their existing grant to add an international dimension; Include international collaboration as part of a new proposal to non-INT programs; Submit a proposal directly to INT for support of international travel and subsistence, and other items to enable international collaboration. The National Institutes of Environmental Health Science sponsors the Fogarty International Research Collaboration Award (FIRCA) for collaborative research between U.S. biomedical scientists supported by the National Institutes of Health (NIH) and investigators in developing countries such as the Philippines. Awards are made to the U.S. applicant institution to support a collaborative research project that will be carried out mainly at the foreign collaborator's research site. The John E. Fogarty International Center at NIH promotes and supports scientific research and training internationally to reduce disparities in global health.

SS.6

Mentoring the Careers of Young Filipino-American Scientists

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It is encouraging to see that PAASE is active in helping Filipino scientists and graduate students. However, while we are doing this we should not forget that even in the United States there are still beginning Filipino American scientists, postdoctoral fellows, graduate and undergraduate students who need mentoring so they too can get to a stage where they can help others. PAASE should also be concerned about mentoring the young Filipino American scientists so they can become independent investigators as well as look for means of infusing young blood into its membership. These are our future PAASE leaders. Several minority programs, which can be used as pipelines for young Filipino Americans who are developing their careers in science and engineering, will be presented.

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Expertise: hazardous waste management, treatment technologies for medical (biohazardous) waste, environmental assessment and remediation of contaminated sites, health risk assessment

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Present Position: Project Coordinator, Climate Studies Division

Expertise: Meteorology and oceanography, numerical modeling of the atmosphere and ocean

ESTRELLA, Roger - No updated info

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Present Position: President and CEO

Expertise: Molecular genetics and functional genomics

GAMBOA, Eugene - No updated info

GAN, Jose C.

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Present Position: Professor

Expertise: Structures and functions of glycoproteins, gonadotrophic hormones and plasma proteins, medical education

GARCIA, Crisostomo B.

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Expertise: Statistics, finance, computers

GARCIA, Jerrold J.

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Present Position: Department Associate Chairperson and Assistant Professor

Expertise: Mathematical physics

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Present Position: Program Director
Expertise: Molecular Endocrinology

GEAGA, Jorge V.
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Present Position: Consultant
Expertise: neural net algorithms, satellite radar imagery, object tracking

GOMEZ, Romel D.
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Present Position: Associate Professor
Expertise: Microelectronics, nanotechnology, condensed matter physics, magnetism and electromagnetic theory

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Present Position: Research Fellow
Expertise: Antibody engineering

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Expertise: Infectious diseases

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Present Position: Executive Director
Expertise: Fisheries management and aquaculture

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Present Position: Professorial Lecturer, Independent Scientist
Expertise: Ecology (wetlands and wildlife), animal behavior, environmental education and conservation

Philippine-American Academy of Science and Engineering – 2004 Membership Directory

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Present Position: Professor

Expertise: Design and analysis of algorithms, theory of computation, computational complexity, parallel computing, formal verification

IBARRA, Rufino H.

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Present Position: Instructor

Expertise: Theoretical nuclear physics and physics education

JIMENEZ, Elsie C.

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Present Position: Director

Expertise: Peptide chemistry, toxinology

JOSE, Pedro A.

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Present Position: Professor of Pediatrics, Physiology and Biophysics

Expertise: Hypertension genetic markers, dopamine, dopamine receptors, G-protein coupled receptor kinase

JUMAWAN, Agustin Jr. B.

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Present Position: Chief, Water Quality Modeling, Permitting Branch

Expertise: Chemical and environmental process engineering/design, water quality management, wastewater recovery

KATAGUE, David B.

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Present Position: Retired from US Food and Drug Administration

Expertise: Drug approval process, analytical chemistry of pesticides, botanical drugs and natural products, manufacturing and control of new anti-infective drug products

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Present Position: Professor Emeritus of Mathematics

Expertise: Functional analysis, distribution theory, differential equations, functional equations, applied mathematics

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Present Position: Clinical Genetics Attending Physician (CNMC), Assistant Professor of Pediatrics (George Washington University School of Medicine and Health Sciences)

Expertise: Medical genetics

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Present Position: Professor

Expertise: Bioanalytical mass spectrometry, Fourier Transform Mass Spectrometry applications to problems in biological chemistry, instrumentation development, theoretical calculations and fundamentals of gas-phase ion chemistry, matrix-assisted laser desorption ionization and electrospray ionization

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Present Position: Associate Professor

Expertise: The psychology of teaching and learning, specifically cognition in math and science; ethnomathematics; finite mathematics

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Present Position: Professor and Director, National Hydraulic Research Center

Expertise: Hydrology, hydraulics and water resources engineering

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Present Position: Professor

Expertise: Nursing, international nursing, curriculum development, theory of nursing, technological competency as caring in nursing

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Present Position: Assistant Professor
Expertise: Chemical Education, Free Radical Chemistry, Biophysical Studies of Cationic Lipids, Phytochemicals

MANUEL-DELOS REYES, Mariquit N. - No updated info
Expertise: Biochemical engineering

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Present Position: Professor
Expertise: Econometrics and mathematical statistics

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Present Position: Research chemist
Expertise: Food chemistry, microanalytical chemistry, food safety of chemical and microbiological contaminants, biosensor analysis, immunochemistry

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Present Position: Consultant
Expertise: Synchrotron infrared spectroscopy, chemical engineering

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Present Position: Associate Professor
Expertise: Modeling of forest systems, forest and natural resource management, geographic information systems and techniques in wood processing and utilization

Philippine-American Academy of Science and Engineering – 2004 Membership Directory

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Present Position: Professor

Expertise: Molecular genetics, marine resources, expression systems

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Expertise: Economics (Southeast Asia)

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Present Position: Director – Molecular Theory of Turbulence Project

Expertise: Statistical Mechanics, Turbulence, theoretical physics

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Expertise: Theoretical biology, biophysics, recombinant biotechnology, structure of DNA/RNA probes, design of synthetic vaccines, nuclear science

NONATO, Maribel G.

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Present Position: Director and Associate Professor 3

Expertise: Phytochemistry and spectroscopy

OUANO, Augustus C. - No updated info

Expertise: Polymer science

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Present Position: Distinguished Professor

Expertise: Biochemistry, neurobiology, conopeptides, key signalling molecules in the central nervous system, ion channels and receptors

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Expertise: Chemistry

ORDONEZ, Cesar - No updated info

ORDONEZ, Rowena - No updated info

Philippine-American Academy of Science and Engineering – 2004 Membership Directory

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Present Position: Professor of Plant Pathology
Expertise: Plant pathology, soybean pathogens; tropical diseases of cocoyam, abaca, rice, coconut; growing shiitake propagules in artificial culture media; development of transgenic soybean plants

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Present Position: Visiting Associate
Expertise: Bacteriology (bacterial pathogenesis), cell biology (cell vesicular trafficking), biochemistry and molecular biology (protein trafficking)

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Present Position: Associate Professor
Expertise: Marine natural products

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Present Position: Retired from National Institutes of Health/NIDDK; Visiting Professor (UP, Ateneo)
Expertise: Molecular Immunology, antibody structure

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Present Position: Professor of Computer Science
Expertise: Parallel and distributed computing, design and analysis of algorithms, and computational complexity

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Expertise Environmental chemistry, remediation, waste recycling, environmental health, heavy metals

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Present Position: Investigator (HHMI) and Professor (BCM)
Expertise: Structural biophysics and biology, x-ray crystallography of proteins, molecular recognition and protein-ligand interactions

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Present Position: Post-doctoral researcher

Expertise: Low temperature physics, quantum fluids, nanotechnology, superconductivity, scanning probe microscopy, device physics
quantum computing, physics education

RANESES, Anthony R. – No updated info

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Present Position: Director and Professor

Expertise: Microbial genetics, biotechnology, molecular phytobacteriology

REYES, Jaime – No updated info

REYES, Marcelino G. – No updated info

Expertise: Neuropathology

RIBAYA-MERCADO, Judy

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Present Position: Scientist

Expertise: Vitamin A and antioxidant nutrients: their bioavailability, biochemistry, antioxidant properties, and effects on human health

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Present Position: Professor Emeritus (UIC), Adjunct Professor (UP)

Expertise: Marine ecology, environmental geology, volcanology, hazard mitigation

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Present Position: Research Scientist

Expertise: Condensed matter physics, materials physics, optics

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Expertise: Forestry policy and economics, agroforestry socio-economics

Philippine-American Academy of Science and Engineering – 2004 Membership Directory

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Present Position: Lecturer
Expertise: Biophysics

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Present Position: Professor
Expertise: Molecular immunology and genetics, antitumor antibodies and marine resources

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Present Position: Professor
Expertise: Computer science, software design of operating, word processing, database management systems, communication and decision support systems

SANTOS, Leonel – No updated info

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Present Position: Retired
Expertise: Forest productivity research, environmental management, financial planning

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Present Position: Dean, College of Science
Expertise: Instrumentation and analytical sciences, chemical sensors and biosensors, low-cost chemical instrumentation

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Expertise: Atomic physics, cold antihydrogen research, design of ion traps for high-resolution atomic spectroscopy, nanotechnology

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