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An observation on the scales of three species of *Varanus* using Scanning Electron Microscopy

Evy Arida, Research Center for Biology, Indonesian Institute of Sciences (LIPI)

The Squamates (scaly reptiles) are characterised by a unique structure of epidermal modification on their skin. Reptilian scales have been used as meristic taxonomic characters, especially in snakes and lizards. I explore the shapes and structures of three species of varanid lizards using the Scanning Electron Microscopy (SEM) to find variability among representatives of a lizard group, of which some of the members are adaptable to different habitats and others are specialised to specific mode of life. Results show morphological variations that may be associated with habitat choice. Whether taxonomy is influenced by variable scale morphology in this small, yet a diverse group of lizards, it is a hypothesis worth testing.

Keywords: scale, morphology, *Varanus*, variation

Genetics Profiling and Reproductive Performance on Indonesian Wild Cattle, Banteng (*Bos javanicus* d'Alton, 1823): Understanding the Potency of Climate Change Impacts on Food Security

Anom Bowolaksono, University of Indonesia

Climate change and its consequences will have a decisive impact on productivity in agriculture, including the animal husbandry and livestock. In environmental temperatures are greater than 30°C, livestock will trigger physiological stress, increase respiration rates, decrease food intake, milk production and fertility caused the changing hormone in many mammals including cattle. The low reproductive performance affect dairy cow when/after the heat stress exposures, including decreased the length and intensity of the estrous period, decreased conception rate and decreased fetal growth and calf size. In the long run, the climate impacts will not only impact the quantity of livestock but also the qualities with both are related with food security globally.

Indonesia has approximately 10 to 11 million head of cattle, including indigenous Bali cattle and foreign breeds. Bali cattle were domesticated directly from wild cattle banteng (*Bos javanicus* d'Alton, 1823) for several centuries ago. Banteng, is listed as 'Endangered' on the IUCN Red List. A species of wild cattle, the banteng occurs in Southeast Asia from Myanmar to Indonesia. The banteng has been eradicated from much of its historical range, and the remaining wild population, estimated at no more than 5.000 –8.000 individuals in the world, is continuing to decline (Hegdes & Tyson, 2002; The IUCN Species Survival Commission, 2000). The global captive population of banteng is 245 in 23 institutions (ISIS, 1993). In Indonesia at least 3 sites have been declared as banteng sanctuaries, those are Ujung Kulon, Meru Betiri and Baluran National parks.

The domestic banteng, Bali cattle, differs little from the wild banteng, although it is smaller in size. Both of those cattle have the same number of chromosomes and will cross-breed. However, while the female hybrids are fertile, most of the hybrid males are sterile. Those cattle have several advantageous characteristics of the breed, such as its high fertility, its survival and capacity to survive under poor environmental and climatic conditions such as in harsh dry land areas in eastern Indonesia. Although the gestation period of the banteng is known in 280 days, it remains unclear if and how the reproductive physiology, including their estrous cycle.

Banteng tends to be nervous and difficult to manage under extensive conditions and are poor milk producers, this indicates that Bali cattle have good genetic potential and benefit from beef consumer preferences. Despite those facts, the major problems are the increase in inbreeding and loss of genetic diversity in Bali cattle and information about genetic profile and reproduction performance of Bali cattle and banteng in Indonesia remains extremely limited. In the near future, it is important to examine the genetic profiling and reproductive performances on banteng to provide the best livestock of Bali cattle in the most developing countries, especially in Indonesia.

Banana genetic improvement in Indonesia: searching for banana FOC resistant genes from local cultivars

Fenny Dwivany, Rizkita Rahmi E. and Resnanti Handayani

Fusarium wilt caused by *Fusarium oxysporum* f. sp *cubense* (FOC) has been threatening to devastate banana production worldwide. Searching of FOC resistant banana cultivars has been goal of many banana researchers and breeders. As mega bio-diversity country, Indonesia has more than 200 identified banana cultivars and several cultivars have been identified as FOC resistant. One of our goals is to understand defence mechanism of banana FOC resistant cultivars. Ethylene has been known as a plant hormone that has role in fruit ripening and triggers defence mechanism. We have been focused our study on the ACS (ACC synthase) gene family expression during fruit ripening and wounding by pathogen. Our next step is to use transcriptomic approach to study genes expression during FOC infection and using RNAi approach to analyse candidate genes function. Several FOC resistant and susceptible local banana cultivars will be used for study.

Keywords: banana, Indonesia, FOC, ACC synthase

Fabrication and Biocompatibility Characterization of Porous Alumina-Hydroxyapatite Composites Prepared by Protein Foaming-Consolidation Method

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Porous alumina ceramics have been attracting considerable attention for cell loading and bone grafts. Although porous alumina provides relatively high mechanical properties in respect to bioactive porous ceramics, the bioinertness of alumina hamper its application for permanent bone implant. On the other hand, the use of hydroxyapatite (HA) for bone surgery is highly successful due to its biocompatibility, bioactivity and osteoconduction characteristics. It is therefore attractive to combine the mechanical properties of alumina with the bioactive of hydroxyapatite for bone generation. This report presents fabrication and biocompatibility test of porous alumina–hydroxyapatite composites fabricated through protein foaming–consolidation technique. Alumina and sol-gel derived HA powder were mixed with yolk and starch at an adjusted ratio to make slurry. The resulting slip was poured into cylindrical shaped molds and followed by foaming and consolidation via 180°C drying for 1 h. The obtained green bodies were burned at 600°C for 1 h, followed by sintering at temperatures of 1200–1550°C for 2 h. Porous alumina–HA bodies with 26–73 vol.% shrinkage, 29%–52% porosity and 0.1–4.9 MPa compressive strength were obtained. The compressive strength of bodies increased with the increasing sintering temperatures. The addition of sol-gel derived HA in the body was found to decrease the compressive strength. Biocompatibility study of porous alumina–HA was performed in a stirred tank bioreactor using culture of Vero cells. A good compatibility of the cells to the porous microcarriers was observed as the cells attached and grew at the surface of microcarriers at 8–120 cultured hours. The cell growth on porous alumina microcarrier was 0.015 h⁻¹ and increased to 0.019 h⁻¹ for 0.3 w/w HA-to-alumina mass ratio and decreased again to 0.017 h⁻¹ for 1.0 w/w ratio. Carbon concentration on porous alumina bodies without addition was 36.03%; it significantly increased 46.14 when 1.0 w/w HA was added.

Current Research Status of CpG Oligodeoxynucleotides in Fish

Asmi Citra Malina A.R. Tassakka, Ph.D

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Synthetic oligodeoxynucleotides (ODN) containing unmethylated CpG dinucleotides within the context of certain flanking bases (CpG motifs) have been described as functioning as natural adjuvants because they promote professional antigen presenting cell (APC) function and co-stimulate lymphocytes. The majority of studies into the immune effects of CpG ODN to date have been carried out on mammals where they are proving very successful at stimulating innate and adaptive immune responses in a variety of species as well as protecting them from bacterial, viral and protozoan pathogens. Recognition of CpG motifs by the innate immune system requires engagement of toll-like receptor 9 (TLR-9), a member of toll-like receptor family, which induces cell signaling and subsequently triggers an immune response. CpG-ODNs are being harnessed for a variety of therapeutic uses, including as immune adjuvants, for cancer therapy, as anti-allergens, and as immunoprotective agents.

Fish and crustacea also possess the ability to raise both innate and adaptive immune responses to invading pathogens and interest in the effect of CpG ODN on the piscine and crustacea immune system is growing. Various studies have now been carried out to elicit the effects of CpG ODN on diverse fish species showing that CpG ODN exert various immune responses both in vivo and in vitro. These responses include activation of macrophages, proliferation of leucocytes and stimulation of cytokine and other immune-related genes expression. CpG ODN have also been shown to be protective against bacterial and viral challenge as well as against pathogenic amoebae. As would be expected these effects are all dependent on not only the ODN sequence and length but on the concentration and the species in which it is being used. This article reviews recent progress in understanding the effects of CpG Oligodeoxynucleotides in fish.

Keywords: CpG; DNA; Carp; adjuvant

Susceptibility to type 2 diabetes is influenced by common, rare and regulatory variants in the human genome

Karen L. Mohlke, University of North Carolina, Chapel Hill

Genes and DNA variants influence susceptibility to type 2 diabetes, a disease characterized by insulin resistance and impaired pancreatic beta-cell function that affects >250 million people worldwide. Identification of genetic variants influencing type 2 diabetes and related metabolic traits will result in better understanding of disease etiology, and has the potential to help identify at-risk individuals, to suggest new drug targets and therapies, and to assist in preventing disease. We use several approaches to identify and study the effects of disease-related variants.

To identify common diabetes susceptibility variants shared across many members of a population, we perform genome-wide association studies. Millions of genetic variants are tested to identify variant alleles found more often in individuals affected than unaffected with disease. We have performed large studies for type 2 diabetes and related traits using thousands of DNA samples from Filipino and Finnish subjects. Through the subsequent large interdisciplinary international collaborations with other studies of East Asian and European subjects, we have implicated >70 gene regions in diabetes susceptibility, >150 in cholesterol levels and >150 in body mass index and fat distribution. Many of these discoveries implicate novel biological pathways in disease processes and instigate research to elucidate the mechanisms of disease.

To identify rare diabetes susceptibility variants present in individuals, families, or smaller subsets of a population, we study variants identified by sequencing subject genomes or protein-coding exomes. In one recent genome-wide analysis of low frequency variants that change protein sequences, we identified three genes that were not previously known to influence insulin processing or secretion, important pathways altered in type 2 diabetes. Current experiments are focused on determining the precise functions of these genes in pancreatic islet cells.

To identify the molecular mechanisms underlying the newly identified disease susceptibility variants, we examine variant effects on gene regulation and function. We experimentally identified regions of the pancreatic islet genome where chromatin is open to regulatory factors, expecting that DNA variants located in these regions may affect gene transcription. At five such regions that contain diabetes susceptibility variants, we have identified a mechanism by which a single nucleotide change in an intron or intergenic region binds to a specific protein and significantly increases or decreases gene expression. These studies are among the first successes discovering some of the mechanisms by which DNA variation leads to common diseases.

Taken together, these studies demonstrate that a very large number of natural human DNA variants influence susceptibility to type 2 diabetes. As we pursue these areas of research, we will continue to identify the biological mechanisms by which genes influence disease and the precise nucleotides that affect disease susceptibility. Based on this knowledge, future research will investigate the newly identified genes as plausible drug targets that may provide improved and possibly personalized therapies.

Exploiting Interestingness in a Computational Evolution System for the Genome-Wide Genetic Analysis of Alzheimer's Disease

Jason H. Moore, Douglas P. Hill, Andrew Saykin, Li Shen, Dartmouth-Hitchcock Medical Center

Susceptibility to Alzheimer's disease is likely due to complex interaction among many genetic and environmental factors. Identifying complex genetic effects in large data sets will require computational methods that extend beyond what parametric statistical methods such as logistic regression can provide. We have previously introduced a computational evolution system (CES) that uses genetic programming (GP) to represent genetic models of disease and to search for optimal models in a rugged fitness landscape that is effectively infinite in size. The CES approach differs from other GP approaches in that it is able to learn how to solve the problem by generating its own operators. A key feature is the ability for the operators to use expert knowledge to guide the stochastic search. We have previously shown that CES is able to discover nonlinear genetic models of disease susceptibility in both simulated and real data. The goal of the present study was to introduce a measure of *interestingness* into the modeling process. Here, we define interestingness as a measure of non-additive gene-gene interactions. That is, we are more interested in those CES models that include attributes that exhibit synergistic effects on disease risk. To implement this new feature we first pre-processed the data to measure all pairwise gene-gene interaction effects using entropy-based methods. We then provided these pre-computed measures to CES as expert knowledge and as one of three fitness criteria in three-dimensional Pareto optimization. We applied this new CES algorithm to an Alzheimer's disease data set with approximately 520,000 genetic attributes. We show that this approach discovers more interesting models with the added benefit of improving classification accuracy. This study demonstrates the applicability of CES to genome-wide genetic analysis using expert knowledge derived from measures of interestingness.

Identification of Conserved Residues 259-ILLCLIFLLVLLDYQGMLPVCPL-283 within Selected S Protein of Indonesia's Hepatitis B Virus Isolates

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Abstract - Hepatitis B virus (HBV) genotypes have distinct geographical distributions, and its prevalency in Indonesia is high (>8%). S Protein sequences of HBV, that contain highly antigenic epitopes, were downloaded from the NCBI of complete genome of HBV in Indonesia. Phylogenetic tree analysis of selected sixty-five sequences showed three distinct clades with genotype B, C, and D as the most prevalent in Indonesia. Amino acids 259-ILLCLIFLLVLLDYQGMLPVCPL-283, were identified as conserved residues among these three genotypes. These amino acids were predicted to be part of the helix 3 and loop between helices 3 and 4 of S protein.

Masculinities, men's risk taking behaviours and health

Sudirman Nasir, Hasanuddin University

I would like to present and discuss the intersection between masculinities, men's risk taking behaviours and health. Masculinities can be defined as gender perspectives or social constructions that generate a set of characteristics or roles generally considered appropriate to or typical of a man. Toughness, bravado, fearlessness and willingness to take risk and to be involved in risky behaviours are among many characteristics that are generally categorized and frequently taken from granted as masculine traits or part of masculine identity. Studies have indicated that in all regions of the world, men (particularly young men and those from lower socio-economic background) have higher rates of involvement in risk taking behaviours than women, including engagement in various forms of violence, the use of drugs, alcohol and tobacco, risky driving, unsafe sex and suicide. Involvement in these risky behaviours is associated with the high rates of morbidity, disability and mortality that affect men's health and wellbeing. This, directly or indirectly, also influence the health and wellbeing of their family. Ironically, only recently there is an increasing number of studies that link masculinities, men's risk taking behaviours and health, and most of these studies take place in developed world. There are few studies that explore the role of masculinities in men's risk taking behaviours in developing countries, including Indonesia. However, it is noteworthy that in the last few years, several studies have examined the relationship between masculinities and men's risk taking behaviours in Indonesia, such as the role of masculinities in promoting men's involvement in violence (Nasir and Rosenthal, 2009a; Nilam 2011), tobacco use (Ng, 2007), unsafe sex (Nasir, 2009) and drug use, including risky drug injection practices that render them vulnerable to blood-borne viral infections such as HIV and hepatitis C (Nasir and Rosenthal, 2009b, 2010; Nasir, Rosenthal and Moore, 2010). These studies addressed the interplay between socio-economic marginalization and the limited access of young men to traditional ways in expressing masculinity (e.g. through employment, education and career) that promote the emergence of other forms of masculinity (i.e. hypermasculinity or destructive form of masculinity). In turn, this interplay provides fertile ground for young men's engagement in the above risk taking behaviours. Additionally, these studies advocate the need for health promotion programs to be more cognizant to gender, cultural and structural issues such as masculinity and socio-economic marginalization (e.g. unemployment and underemployment) that facilitate men's involvement in risk taking behaviours. These studies also demonstrate the contribution of social science (particularly sociology and anthropology) in better understanding social dynamics and environment (social determinants) that influence men's involvement in risk taking behaviours.

Evolutionary Analysis of the Protein Domain Distribution in Eukaryotes

Arli Aditya Parikesit, University of Indonesia

The genomic inventory of protein domains is an important indicator of an organism's regulatory and metabolic capabilities. Existing gene annotations, however, can be plagued by substantial ascertainment biases that make it difficult to obtain and compare quantitative domain data. We find that quantitative trends across the Eukarya can be investigated based on a combination of gene prediction and standard domain annotation pipelines. Species-specific training is required, however, to account for the genomic peculiarities in many lineages. In contrast to earlier studies we find wide-spread statistically significant avoidance of protein domains associated with distinct functional high-level gene-ontology terms.

Elucidation of Hd3a Florigen Activation Complex in rice flower signaling

Yekti Asih Purwestri, Universitas Gadjah Mada

Most recently, the nature of Hd3a florigen and its orthologs are considered as mobile flowering signals in rice. The next question which should be addressed is the mechanism of Hd3a function. One important step in the characterization of Hd3a function is to identify other proteins with which it interacts. We focus here on searching for Hd3a interacting proteins using yeast two-hybrid screening, which has been widely used to identify protein-protein interactions. In this study we have performed a yeast two-hybrid screen to search for Hd3a partners in a cDNA library made from rice leaf blades harvested 35-40 days after sowing under SD conditions, a period when the transition from vegetative phase to reproductive phase was occurring and *Hd3a* was being highly expressed.

In this study, we identified diverse proteins which mainly involved in signaling. We focused on three candidate proteins: GF14c (14-3-3 isoform protein), OsKANADI (transcription factor) and BIP116b (BRI1 kinase domain interacting protein 116b). Since 14-3-3 family members in plant interact with diverse proteins, it was of interest to understand their role in Hd3a signaling. *In vitro* and *in vivo* experiments, using a combination of pull-down assay, co-immunoprecipitation and bimolecular fluorescence complementation, confirmed the interaction between Hd3a and GF14c.

Functional analysis using reverse genetic approach, either GF14c overexpression or knockout transgenic rice plants indicated that this interaction plays a role in flower regulation. GF14c-overexpressing plants exhibited a delay in flowering and, surprisingly, the knockout mutants displayed early flowering that was comparable to wild-type plants under short-day conditions. These results suggest that GF14c acts as a negative regulator of flowering by interacting with Hd3a. Since the 14-3-3 protein has been shown to interact with FT protein in tomato and *Arabidopsis*, our results in rice provide important findings about FT signaling in plants.

Further, our finding demonstrated that Hd3a interacts with 14-3-3 proteins in the apical cells of shoots, yielding a complex that translocates to the nucleus and binds to the *Oryza sativa* (Os)FD1 transcription factor, a rice homologue of *Arabidopsis thaliana* FD. The resultant ternary 'florigen activation complex' (FAC) induces transcription of *OsMADS15*, a homologue of *A. thaliana* *APETALA1* (*AP1*), which leads to flowering. We have determined the 2.4 Å crystal structure of rice FAC, which provides a mechanistic basis for florigen function in flowering. Taken together, our results indicate that 14-3-3 proteins act as intracellular receptors for florigen in shoot apical cells, and offer new approaches to manipulate flowering in various crops and trees.

Diversity of *Streptococcus pneumoniae* in Indonesian population

Dodi Safari

Eijkman Institute for Molecular Biology, Jakarta, Indonesia,

Streptococcus pneumoniae (*S. pneumoniae* or pneumococcus) is part of the commensal flora of the upper respiratory tract which colonize the nasopharyngeal niche together with *Staphylococcus aureus*, *Haemophilus influenza*, *Moraxella catarhalis*, *Neisseria meningitides*, and other haemolytic streptococci. Currently more than 92 different serotypes have been identified based on polysaccharide structure and its immunogenicity. This structure diversity of capsular polysaccharide determines the ability of pneumococcus to survive in the bloodstream and very likely the ability to cause invasive disease, especially in the respiratory tract. Incidence of invasive pneumococcal disease varies substantially by age, genetics background, socioeconomic status, immune status, and geographical location.

Currently, the publish data on *S. pneumoniae* carriage or invasive from Indonesian population was still limited. In 2001, Soewignjo et al was reported that prevalence of *S. pneumoniae* carriage in healthy children in Lombok Island, Indonesia was 48% (soewignjo, 2001). In present study, a cross sectional study was performed to investigate *S. streptococcus* serotype diversity in Indonesia population. Our current research project in human immunodeficiency virus (HIV)-infected children group showed that the prevalence of *S. pneumoniae* carriage was 45.6 %. Distribution of *S. pneumoniae* serotype very varied with serotype 19F (19.5%) was most dominant isolate. Our study was important for Surveillance of *S. pneumoniae* carriage, government policy on introduction and development of pneumococcal vaccine in Indonesia.

Molecular epidemiology of Mycobacterium tuberculosis isolated from pulmonary TB patients with previous treatment history in Makassar, Indonesia

Hasnawati Saleh, Hasanuddin University

Tuberculosis (TB) has been a global burden. Indonesia ranks fourth among 22 high-burden countries. The rising numbers of multi-drug resistant (MDR) TB and extensively drug resistant (XDR) TB threaten the control and management of TB.

We are currently investigating TB patient cohort with previous TB-treatment history enrolled in collaborating hospitals in Makassar with the objective of evaluating treatment outcome, re-infection versus reactivation and determining emergence of drug resistance. We interview and collect sputum from the suspected TB patients for TB diagnostic. Likewise treatment regimens are also recorded. TB- positive patients are followed up at 2 months, 6 months and 2 years after treatment initiation. Presently, 348 TB patients have been enrolled in the study.

Preliminary data analysis indicated the presence of multi-drug resistance (MDR-TB) and extensively drug resistant (XDR-TB) cases in our study population. DNA sequence analysis to determine underlying resistance phenotypes of the MDR and XDR TB is currently underway.

Strain identification of Mycobacterium tuberculosis (Mtb) using MIRU-VNTR analysis indicate the presence of population heterogeneity of Mtb in Makassar, with predominant strains are being East Africa-Indian (EAI), Beijing, Haarlem, S and small proportions of LAM, Delhi/CAS, New-1, Ghana, Ugandal, and Cameroon strain families. Interestingly, there are a significant proportion of the samples with strain that do not match with the available reference strain-patterns in the MIRU-VNTR website.

We hope that this molecular epidemiology study will provide a first indication on the success, failure and limitations of TB management in settings with limited resources. The heterogeneity of Mtb strains present in Makassar will facilitate the study interpretation regarding possible re-infection versus re-activation or treatment failure. Systematic sequencing analysis of drug-target genes and genotyping will provide the bases to evaluate existing public health policies and specifically TB management.

Plant and Landscape Ecology Studies in Mount Papandayan, West Java, Indonesia

Endah Sulistyawati, Institut Teknologi Bandung, Bandung-Indonesia

I will present a summary of results from a number of ecological studies conducted in Mount Papandayan Nature Reserve during 2004 – 2011, which generally aimed to provide ecological information that can be used as a basis for conservation and forest restoration. Major types of natural plant communities in the region were crater vegetation, mixed forest and grassland. Such variation of plant communities is a result of specific environmental condition, natural as well as human-induced disturbances. A landscape analysis demonstrates the extent of human disturbance in the form of forest conversion into agricultural fields during 1994-2001 based on Landsat data. The deforestation during that period has changed the shape of the forested area markedly. A recent analysis based on 2008 SPOT data reveals that the shape of the forest patch of Mount Papandayan was highly convoluted with the shape index of 25.43. Such highly convoluted shape is not an ideal shape for conservation purpose. Dry-land field was the dominant land-cover types (29.43%) surrounding the forest (within 1 km from the forest edge), which suggests that agricultural activities would be the potential sources of human-induced disturbances for the reserve at present or in the future. Examination on the succession on abandoned agricultural fields indicates that some spontaneous regeneration originating from nearby forest has occurred although the extent was limited. During the period of 2009-2010, we made a monthly observation on flowering and fruiting phenology of tree species along a track covering areas with the altitude ranging from 1,385 m asl to 2,277 m asl. We found 43 species found flowering and/or fruiting with the peak occurred at July 2010. The result indicates that February to July were considered to be the appropriate time to collect seeds of native trees in Mount Papandayan. Since 2011, we have established a one-hectare permanent plot at a montane zone (at 2,262 m asl). In the permanent plot, we found 31 species from 18 families. The stand density was 902 ind/ha; the average DBH was 22.81 cm; the average basal area was 51.93 (m²/Ha); the aboveground biomass was 572.69 (Mg/Ha) and the Shannon-Wiener diversity index was 2.63.

Keywords: Mount Papandayan, plant communities, landscape patterns, disturbances, succession, phenology, permanent plot

Using regulatory genomics to unlock the potential of disease association studies and personal genomes

Lucas Ward, Massachusetts Institute of Technology

Association studies provide genome-wide information about the genetic basis of complex disease, but medical research has focused primarily on protein-coding variants, owing to the difficulty of interpreting noncoding mutations. This picture has changed with advances in the systematic annotation of functional noncoding elements. Evolutionary conservation, functional genomics, chromatin state, sequence motifs and molecular quantitative trait loci all provide complementary information about the function of noncoding sequences. We have used these functional maps to generate hypotheses about which variants on risk haplotypes are causal, to perform systems-level analyses revealing processes underlying disease associations, and to detect lineage-specific purifying selection through aggregated patterns of human diversity. We are further developing methods to use regulatory annotations to interpret mutations found through clinical whole-genome sequencing and to perform rare-variant association studies. Ultimately, advances in regulatory and systems genomics will allow us to unleash the value of whole-genome sequencing for both medical applications and basic research in human evolution and physiology.

Zebrafish as a model system to study the expression of a novel cannabinoid receptor GPR55

Indra Wibowo, School of Life Sciences and Technology-Institut Teknologi Bandung

GPR55 has recently been identified and has gained notoriety because of its putative identification as a cannabinoid receptor subtype. Studies have been done to answer several questions regarding the pharmacology and (patho)physiology of GPR55. The studies done were the collective data that combine *in vivo* and *in vitro* studies. However, most of the studies performed are mainly on the human cancer cell lines or other cell lines that lack certain physiological and biological processes. Although there is one knockout mouse of GPR55 but still the future study needs to be done to further elucidate the pharmacology and physiology of GPR55. One *in silico* study has shown that GPR55-like is also presence in zebrafish. Thus, the objective of this project is to investigate the presence of *gpr55-like* gene during embryogenesis and to identify whether its expression is also found in adult zebrafish organs. Our results show that the zebrafish GPR55-like is structurally similar to the 7-transmembrane protein that most of the cannabinoid receptors have. RT-PCR results depict that the adult tissues of zebrafish are also expressing *gpr55-like*. Furthermore, *in situ* hybridization results show that *gpr55-like* is expressed mainly in the head of zebrafish embryos. With this project we hope that GPR55-like will emerge as potential lipidsensitive receptor family and is involved in numerous cellular/physiological processes and pathologies, which may represent areas for novel therapeutic intervention in the future.

Keywords: zebrafish, *gpr55-like*, endocannabinoid receptor, GPR55

Downregulation of macelignan isolated from *Myristica fragrans* on lipopolysaccharide-induced matrix metalloproteinase-9 expression via MAPK and PI3K signaling pathways in rat chondrocytes

Yanti, Atma Jaya Catholic University

M. Elza, Yustine, H.C. Leman, and L.D. Antika. Faculty of Biotechnology

Gout or arthritis inflammation is caused by the accumulation of uric acid in connective and joint tissues that lead to local inflammation and increase the production pro-inflammatory molecule including matrix metalloproteinase (MMP)-9. Macelignan, a natural lignan isolated from nutmeg seed extract (*Myristica fragrans* Houtt.) with molecular weight of 326, has been reported for its potential anti-inflammatory activity. However, its efficacy as a natural chondroprotective agent is not explored yet. Here, we investigated the inhibitory effects of macelignan on the expression of MMP-9 protein and gene in rat chondrocyte explants stimulated by lipopolysaccharide (LPS) by performing Western blot, gelatin zymography, and Reverse Transcription-Polymerase Chain Reaction (RT-PCR). Chondrocytes were isolated from femoral and knee bone explants of Sprague-Dawley rat. Furthermore, we also studied whether macelignan interfered the signaling pathways, i.e. MAPK (ERK1/2, JNK1/2, p38) and PI3K/Akt, mediated LPS-stimulated MMP-9 gene expression in chondrocytes *in vitro*. Our results demonstrated that LPS significantly induced MMP-9 secretion in chondrocytes, and macelignan dose-dependently inhibited the expression of MMP-9 secretion, protein, and gene in LPS-induced chondrocytes. Macelignan effectively suppressed phosphorylation of ERK1/2, p38, JNK1/2, and Akt involved in LPS-induced MMP-9 gene expression in chondrocytes. These results suggest that macelignan decreases MMP-9 gene expression via blocking MAPK and PI3K signaling pathways. Further *in vivo* study using animal models is needed to determine the exact chondroprotective potential of macelignan.

Acknowledgement:

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Utilization of Radionuclide Labeled Compounds in Research of Biomolecules

Rohadi Awaludin, Badan Tenaga Nuklir Nasional

Radionuclides have some unique characteristics. It can be detected easily though in small amounts, up to the order of picogram, precisely. The detection is based on the radiation emitted by the radionuclides. Therefore, radionuclides have a great opportunity as a radiotracer in many studies and investigations.

Radionuclides can be attached by chemical bond to some bioactive compounds by labeling reaction. The radiation emitted by radionuclide can be used to investigate the biodistribution of these compounds in the body. The dynamics of the compound can also be followed in living organisms. These properties are very useful for tracing the dynamics of compounds in organism, such as the dynamics of the drug compound (farmacodynamic) as well as the dynamics of a specific toxin in the body. In line with the discovery of many new compounds from natural materials, radionuclides have a great opportunity to help in biodistribution studies of these compounds in the body.

We are in The Center for Radioisotope and Radiopharmaceutical, National Nuclear Energy Agency of Indonesia (BATAN), have successfully developed several radionuclide-labeled compound such as phosphor-32-labeled ATP, Iodine-125-labeled-antibody and Lutetium-177-labeled antibody. We are developing Iodine-125-labeled antibody for radioimmunoassay development and Lu-177-antibody for development of radioimmunotherapy for cancer treatment.

The challenge in research using radionuclide is the image of radioactive materials that is regarded as a very dangerous material. It is true that the radionuclides have potential hazards. However, actually it is the same as chemical and biomaterials that also have potential hazards. We can use radioactive materials safely by controlling the hazards of the materials and compliance to the guideline from the regulatory body for the use of radioactive materials.

Research Based on Clay Modification for Green Chemistry and Environmental Applications*Is Fatimah, Islamic University of Indonesia*

Nanostructured hybrids derived from clays are materials of increasing interest due to their structural characteristics and functional applications, including environmental and biomedical uses. Since they have high surface area, microporous structure and are modifiable they have the potential to be used to prepare functional materials. The aim of our research project during the last 10 years has been to design modified and intercalated clays as selective heterogeneous catalysts in some organic reactions, the adsorption of organic pollutants and other applications in alternative energy reactions. The main objective has been to explore the possibility of utilizing Indonesian clays in such industrial applications. Our work has included the pillarization of Indonesian montmorillonite minerals with some metal oxides consisting of ZrO_2 , TiO_2 , Al_2O_3 and Fe_2O_3 and their comparison with similar modified materials based on synthetic clay minerals. TiO_2 - and ZrO_2 -pillared montmorillonite is an effective and reusable heterogeneous catalyst in green conversion of some organic reactions. In this session, preparation of TiO_2 , ZnO, Ag- TiO_2 and Ag-ZnO modified clay and its photoactivity for phenol photodegradation and water disinfection against *Escherichia coli* bacteria are presented as an example. Modified clay exhibited significant activity as a photocatalyst and catalyst support and a photocatalyst support in organic compounds photodegradation. The important thing to note from previous research is the effect of clay modification on the physico-chemical character of photocatalyst, which also governs its activity by the contribution of adsorption process by porous structure of clay. Silver ion exchanged TiO_2 - and ZnO-modified clay showed significant photoactivity. In conclusion, modified clay is a potential material for such adsorption and catalysis application and contribute to green chemistry and green chemical engineering scheme. These result can be adopted green industrial concept in the future.

Budding Yeast *Saccharomyces cerevisiae* as a Model Organism to Assay Antiproliferative of Sukun (*Artocarpus communis*)

Hermansyah, Sriwijaya University **Herlina, *Minetaka Sugiyama, ***Satoshi Harashima*

In this research, the budding yeast *Saccharomyces cerevisiae* was used as a model organism to assay antiproliferative properties of Sukun (*Artocarpus communis*). However, utilization of *S.cerevisiae* cell as a model organism for screening drug candidate is rare. First, Sukun was extracted using methanol. Observation of antiproliferative properties was carried out using phenotype test using spot analysis, measuring growth rate of cells *S.cerevisiae*, morphological cells using differential interference contrast (DIC) microscopy, and using Fluorescence Activated Cell Sorting (FACS) analysis in the presence of Sukun extract to the growth media of *S.cerevisiae*. Our research showed that various concentration of Sukun extract (1-5% w/v) did not inhibit cell cycle of budding yeast *S.cerevisiae*., while our previous research using noni fruit (*Morinda citrifolia*) resulted that G1 to S phase transition progression of *S.cerevisiae* cell cycle was delayed in the presence of noni fruit extract. Based upon results was concluded that Sukun extract did not show antiproliferative properties to the budding yeast *S.cerevisiae*.

Keywords : *Saccharomyces cerevisiae*, antiproliferative, Cell cycle

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Mapping Multi-scale Energy Flow with Ultrafast Optical Microscopy

Libai Huang, University of Notre Dame

Novel nanoscale materials with unique physical properties are highly promising for applications in the next generation of solar energy conversion devices. The frontier in solar energy conversion utilizing nanoscale materials now lies in learning how to integrate functional entities across multiple length scales to create optimal devices. To address this new frontier, I will discuss our recent efforts to resolve multi-scale energy transfer, migration, and dissipation processes with simultaneous femtosecond temporal resolution and nanometer spatial resolution. My talk will focus on the following examples representing different length scales and levels of complexity: (i) energy relaxation in individual nanostructures including graphene and carbon nanotubes; (ii) morphology dependent charge dynamics in organic solar cells; and (iii) correlating structure to functions in photosynthetic systems.

Distribution of phenolic compounds and anticariogenic activity of *Lepisanthes amoena* leaves

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The genus *Lepisanthes* belongs to one of the groups of plant family Sapindaceae. A number of species from this genus are widely used in traditional and folk medicine systems in different parts of the world. One of species in this family that found in East Kalimantan (Indonesia) is *Lepisanthes amoena*. The leaves utilized in folklores medicine in East Kalimantan by Dayak's tribe. The objective of this study was to determine the effect of leaf age on phenolic composition and anticariogenic activity of *Lepisanthes amoena*. The study indicated that the leaf of *Lepisanthes amoena* contain phenolic compound and has a potency as an anticariogenic agent.

Key words: Phenolic, anticariogenic, *Lepisanthes amoena*

Nanostructured Metal Oxides for Energy Conversion and Storage

Yat Li, University of California

Metal oxide nanostructures are emerging as a unique class of electrode materials for energy conversion and storage. In comparison to bulk materials, they have larger semiconductor /electrolyte interfacial area, shorter diffusion length for minority carriers, equally good charge transport and lower surface reflectivity. The Li group has been focused on the development of chemically-modified semiconductor metal oxide electrodes, with enhanced photoelectrochemical and electrochemical properties. This poster reviews our recent efforts in using hydrogen thermal treatment as a general strategy to improve the performance of metal oxide electrodes such as TiO₂ for photoelectrochemical water oxidation and charge storage.

Chitosan-Pentagamavunon-0 Nanoparticles Formulation and Its Anti Inflammatory Activity In Vivo

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Pentagamavunon-0 (PGV-0) is a new drug derived from curcumin and possesses anti-inflammatory effect of 40% and does not show ulcerogenic effect. However, PGV-0 has a poor bioavailability due to its low solubility. Nanoparticle formulation is a strategy which can be used to increase the solubility of PGV-0 so that the absorption and the bioavailability increase. The aim of the current study was to develop PGV-0 nanoparticles and to examine the anti-inflammatory activity in vivo. PGV-0 nanoparticles were formulated based on ionic gelation between chitosan, PGV-0, and TPP as cross linker. PGV-0 nanoparticles presented size of 159.77 nm, a polydispersity index of 0.529, zeta potential of 3.41 mV, and spherical. PGV-0 nanoparticles have shown high entrapment efficiency (99.30±0.08%) and a high stability in both artificial gastric and intestinal fluid of 99.51±0.03% and 99.52±0.04% respectively. PGV-0 nanoparticles which contain PGV-0 5 mg/kgBW has shown an anti-inflammatory effect of 60.63%. From the study, it is shown that PGV-0 nanoparticles obtained by ionic gelation using chitosan can increase the anti-inflammatory activity of PGV-0.

Key words: PGV-0, nanoparticle, low viscous chitosan, ionic gelation.

Anthocyanin-Colorant Powders from Jambolan (*Syzygium cumini*) Fruit: Their Production, Properties, and Stability*Puspita Sari, Jember University*

Jambolan (*Syzygium cumini*) fruit, a tropical fruit found in Indonesia, is rich in anthocyanin pigments especially in its peel part. The content of total monomeric anthocyanin in peel of the ripe fruit was 731 mg/100 g fresh weight. Anthocyanins obtained from jambolan fruit peel are attractive and potential as novel source of natural red colorants for food system. The objectives of this study was to produce anthocyanin- colorant powders (crystalline and encapsulation) from peel of jambolan fruit and to evaluate the colorant properties and stability. Anthocyanins was extracted from peel of jambolan fruit with ethanol (97%) and purified using Amberlite XAD-7 to remove sugars, organic acids, and other water soluble compounds. Anthocyanin colorants were dried by spray drier to obtain colorant powders. The quality attributes of the colorant powders were characterized by anthocyanin content; antioxidant capacity; *L*, *a*, *b*, *C*, and *H* values; drying loss of pigment, moisture content; hygroscopic moisture, and solubility. Scanning electron microscope (SEM) was used for monitoring the structure of the powders. For determination the stability and half-life period (orde 1) of anthocyanin colorant powders, samples were stored under different storage temperatures of 5 and 27°C. The physical and chemical properties of jambolan anthocyanin colorants were almost similar with commercial anthocyanin colorants (enocyanine and purple carrot colorants). The higher content of anthocyanins was found in jambolan anthocyanin colorants. Encapsulated-pigment powders were more stable compared than crystalline-pigment powders during storage at temperatures of 5 and 27°C.

THE GREEN SYNTHESIS OF SILVER NANOPARTICLES USING *Brucea javanica* (L) Merr EXTRACT

Salprima Yudha S., Doni Notriawan, Eka Angasa, Totok Eka Suharto, John Hendri, Yuta Nishina

Abstract

We are interested to investigate the local plants extract such as *Brucea javanica* (L) Merr for synthesis of coinage nanoparticles especially silver nanoparticles. The plant is distributed throughout Asia and has some local name, for example in Indonesia has a popular name “Makasar kernel”. The *Brucea javanica* (L) Merr seeds widely known as traditional medicine for various diseases such as malaria, amoebic dysentri, and cancer.¹⁻² On the other hand the rinds part of *Brucea javanica* is not widely used and they are thrown as solid waste.

Our research results revealed that the *Brucea javanica* (L) Merr rind extracts can be used as medium/reducing system for the formation of silver nanoparticles. The reaction was followed using UV-vis spectrophotometer. Figure 1a. indicating that the absorbance at 450 nm as maximum absorption wavelength (λ_{max}). The presence of absorption band at 450 show the surface plasmon resonance (SPR) spectrum of silver nanoparticles. To give more evidence that the silver nanoparticles was obtained using the present reduction system, the nanoparticles colloids introduced to TEM analysis. Figure 1b. show that silver nanoparticles are predominantly in spherical form. The average size of resulting silver nanoparticles was $37,8 \pm 14,3$ nm.³

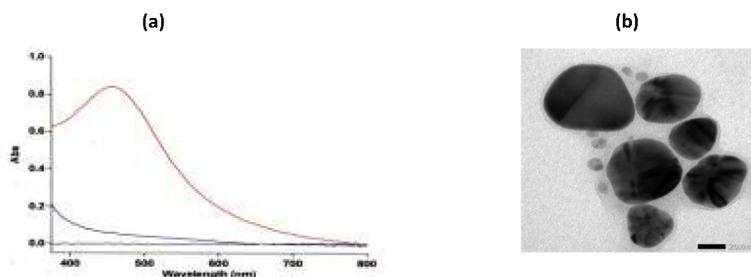


Fig 1. UV-Vis pattern of the nanoparticles colloids after 24 hours (a) TEM pattern of the spherical silver nanoparticles, scale of 20 nm (b)

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**“Sustainable Village”: A Pilot Project for a Socially Constructed Technology
The Foundation of a Sustainable Way of Living in Harmony with Nature**

Wiratni Budhijanto, Gadjah Mada University

In developing countries, especially in rural areas, people often innocently pollute their environment just because they are running their business traditionally as being practiced through generations. This is very well illustrated by a current situation in a dairy village in Indonesia. The dairy farmers maintain the old habit of flushing all of the manure into nearby streams, which flow downstream through many other villages and towns. The amount of the flushed manure from one village can reach as much as 10 tons per day, and there are many similar villages in one district. This practice is damaging to the water quality in the area.

The idea of the pilot project of “Sustainable Village” is introducing a manure collection system and developing a new community business with an appropriate technology to convert the manure into valuable products, which are free energy and fertilizer. The aim of this project is to raise the awareness that managing manure will have an economic incentive rather than being a burden. This community incentive will be more effective than any sanitation regulations enforcement. Upon the completion of this program, the target is to expose this village as an exemplary community, to which other villages can refer to with respect to sanitation programs which can give them additional profit at the same time. This project is supported by several scientific researches.

The poster will highlight the scientific aspects of this project (includes the brief descriptions of biogas production optimization, methane purification, adsorbed methane storage, site specific and slow released fertilizer, and oxygen adsorption technology) with some illustrations about how to bring the laboratory results (which are highly theoretical) into the reality (where the community does not even aware that they are facing a serious problem of environmental damages). The study is an intersection between engineering science and social perspective. The importance of social insight in engineering advancement is often overlooked. Especially in developing country, it is very important to consider the social aspects in technological development, otherwise the technology cannot be adopted to make the nation innovative and at the end of the day, the nation remains as a consumer of the technologies developed by other countries. This area of this study is not very well developed as a scientific approach, and therefore will be specifically addressed in the poster.

Effect of Hyphothiocyanite Antimicrobial Agent for Tropical Fruity Milk Preservation

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Natural antimicrobial agent of hyphothiocyanite from the reaction of thiocyanate and hydrogen peroxide catalyzed by lactoperoxidase has been investigated to preserve the tropical fruity milk. The sterile solution of tropical fruits extract: salak and longan, and non-tropical fruit extract: avocado were added to pasteurized milk to produce fruity milk. The hyphothiocyanite solution that was obtained from the reaction of thiocyanate and hydrogen peroxide was added to the fruity milk. The fruity milk containing hyphothiocyanite then was kept at 30°C for 6 h. The lactoperoxidase was purified from whey of bovine milk through SP-Sepharose FF[®] Column. Purity of enzyme was checked by sodium dodecyl sulphate-polyacrylamide gel electrophoresis (SDS PAGE) method and a single band was observed. Hyphothiocyanite production and the residues of thiocyanate and hydrogen peroxide were observed spectrometrically. The sample has been collected at every hour of incubation for analysis of total bacteria and pH, while the protein profile of the product was analyzed from sample that has been obtained from six hour incubation. The result concluded that the hyphothiocyanite was remarkably inhibited the growth of bacteria but have no significant effect to the pH value. Based on the SDS PAGE analysis, the sample obtained from six hour preservation had no change on the protein profile. The research concluded that the hyphothiocyanite might be used for natural preservative since the application of this agent to the fruity milk did not provide any changes on pH and protein profile but strongly inhibited the growth of bacteria.

Keywords: tropical fruit, hyphothiocyanite, preservation, total bacteria, pH, and protein profile.

The Status of Reef Health and Coral Diseases Prevalence in Eastern Indonesia

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Despite Indonesia has been well known as the central of coral reef biodiversity in the world, very little work has been done to investigate the health of Indonesian coral reefs, especially on coral diseases. Series of coral disease surveys around Indonesian reefs in the last two years (2011-2013) indicate that most recorded coral diseases worldwide such as black band disease, white syndromes, growth anomalies, brown band disease, *Porites* ulcerative white spot, and skeletal eroding band were also present in Indonesia. Some unknown diseases or parasites were also found and are still being investigated. One of the objectives of this study was to obtain information on coral health and disease, benthic community structure, and fish community structure inside and outside of the COREMAP small-scale locally managed marine protected areas within several different regions of Indonesia: Spermonde, Sikka, Wakatobi, and Biak. The first year data indicated that less coral diseases were found in the area where coral reefs being better protected or those having better coral cover and fish abundances. This study also further investigates the impacts of several coral diseases, especially black band diseases on the rate of coral mortality. In light of predicted climate change scenarios, it is likely that coral diseases will increase over time. These future scenarios identify an urgent need to improve our understanding of current coral disease dynamics in Indonesia as the center of Coral Triangle Area.

Economic and Environmental Impacts of Biofuels

Madhu Khanna, University of Illinois at Urbana-Champaign

Concerns about energy independence, high oil prices and greenhouse gas emissions from transportation fuels have led to various types of policy initiatives to induce a switch to biofuels in the United States and other countries, such as Brazil and India. Existing policy initiatives in these countries include biofuel mandates, tax credits and other low carbon fuel policies. Biofuels can be produced from many different feedstocks that differ in their greenhouse gas intensity, land requirements and costs of production. In the United States, current policies are emphasizing a shift from first generation to second generation biofuels from dedicated energy crops, forest and crop residues. The poster presents my research analyzing the direct and indirect effects of various types of biofuels on greenhouse gas emissions and oil consumption and effectiveness of alternative policies in promoting sustainable biofuels. It examines the economically viable mix of biofuels, the implications of biofuels for land use and food and fuel prices in the United States and other countries and the trade-offs among the goals of energy security and greenhouse gas emissions under alternative policy scenarios.

Combination of Time Series Model Outputs as an Alternative to Numerical Weather Prediction

Heri Kuswanto, Institut Teknologi Sepuluh Nopember

Improving the forecast accuracy of weather and climate forecast is an important issue. In Indonesia, the forecast is commonly done by performing a deterministic forecast meaning that the system will generate a point forecast without taking into account the uncertainty induced by model specification as well as the nature behavior. Ensemble forecast has been introduced to overcome this problem and it has been implemented in many Ensemble Prediction systems (EPS) over the world. A problem arises in some developing countries that unable to develop such EPS due to the system restrictions. This paper discusses the performance of combined forecasts generated from a class of time series model as an alternative of EPS, hereafter denoted as artificial ensemble forecast. The models are calibrated using Bayesian Model Averaging (BMA). The results show that the proposed procedure is capable to increase the reliability of the forecasts.

Global Search of Triggered Tectonic Tremor*Zhigang Peng, Georgia Tech*

Deep tectonic tremor is newly discovered seismic phenomenon. The tremor signal is non-impulsive, low-amplitude and long-duration, and is observed at major plate-boundary faults around the Pacific Rim. While tremor occurs spontaneously or accompanies slow-slip events, it could be also triggered by large distant earthquakes and solid earth tides. Because triggered tremor occurs on the same fault patches as ambient tremor and is relatively easy to identify, a systematic global search of triggered tremor could help to identify the physical mechanisms and necessary conditions for tremor generation. Here we conduct a global search of tremor triggered by large teleseismic earthquakes. We mainly focus on major faults with significant strain accumulations where no tremor has been reported before. These includes subduction zones in Central and South America, strike-slip faults around the Caribbean plate, the Queen Charlotte-Fairweather fault system and the Denali fault in the western Canada and Alaska, the Sumatra-Java subduction zone, as well as major strike-slip faults around Tibet. In each region, we first compute the predicted dynamic stresses from global earthquakes with magnitude greater than 5.0 in the past 20 years, and select events with dynamic stresses larger than 1 kPa. Next, we download seismic data recorded by stations from local or global seismic networks, and identify triggered tremor as a high-frequency non-impulsive signal that is in phase with the large-amplitude teleseismic waves. In cases where station distributions are dense enough, we also locate tremor based on the standard envelope cross-correlation techniques. Finally, we calculate the triggering potential for the Love and Rayleigh waves with the local fault orientation and surface-wave incident angles. So far we have found several new places that are capable of generating triggered tremor. We will summarize these observations and discuss their implications on physical mechanisms of tremor and remote triggering.

What Makes Mountains?

Joshua West, University of Southern California

Abstract: Mountain topography is a first-order feature of Earth and shapes much of our natural environment, modifying the character of soils and ecosystems, influencing climate from the local to regional and even global scales, and regulating many natural hazards such as landslides. Yet, intriguingly, the picture of what forms mountain topography is incomplete. The frequent textbook perspective is that mountains form when two tectonic plates collide. While this is often true in generality, the details of this picture remain fuzzy. For example, it is not clear whether and to what extent earthquakes, the most obvious manifestation of plate motion, actually build topography. One major problem is that earthquakes also lead to removal of mass from mountains, by triggering landslides. In this poster I will summarize some of our efforts to better understand the processes that build mountain topography. I will focus on two case studies that are capturing my current attention to this problem. One of these is on the eastern edge of the Tibetan Plateau, where we are working to quantify the mass balance of the 2008 Sichuan Earthquake, and to put this into the context of a global model for how earthquakes contribute to building topography. The other case study comes from the Banda Arc, which forms a range of islands in the eastern reaches of Indonesia. Here we see the initial stages of collision between tectonic plates (in this case Australia and Asia). We are just beginning a research effort to understand what lessons this "emergent topography" holds about the fundamental processes at work in building mountains.



Evaluation of Multitemporal Landsat Satellite Images to Identify Total Suspended Solid (Tss) Alteration In Saguling Reservoir, West Bandung
Ketut Wikantika, Institut Teknologi Bandung (ITB)

Anjar Dimara Sakti, Soni Darmawan, Ketut Wikantika, Remote Sensing and GIS Research Division, Faculty of Earth Science and Technology, Center for Remote Sensing, Institut Teknologi Bandung (ITB), Indonesia

Mud sludge eroded due to the destruction of water catchment area in the upper stream and the accumulation of untreated household waste resulting in sedimentation problem at Citarum River, including the Saguling Reservoir which acts as water infrastructure network system. Remote sensing data, especially Landsat image, is very functional in monitoring Total Suspended Solid (TSS) value, however the very dynamic water causing the algorithm used still localized. This study used five selected algorithms where the measurement value will be compared with the results of the in-situ measurement in the field, then the best algorithm is applied to calculate the TSS value changes of Saguling Reservoir from 2005 until 2009. From this comparison, the algorithm obtained by Hashimirradian using reflectance values of the red band as the input data is the best data for the approximate value of the in-situ measurements of TSS in four point observation stations, which there's an increase of 20 mg/1 for Saguling area. Study showed the alternative measure in developing a new algorithm to extract water quality especially in Indonesia water area.

Keywords — *Total Suspended Solid (TSS), remote sensing data, Saguling Reservoir.*

Green Composites Based on PLA and Cellulose Nanofibers as a Substitute for Petroleum-based Polymer

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During the last decades, plastics have replaced many conventional materials such as metal in various applications because of the ease of processing, high productivity, and substantial cost reduction that are possible with polymers. Since most of the plastics currently in use are petroleum-based polymers, petroleum depletion and a growing concern towards environmental issues have motivated many scientists to develop plastics from bio-based materials. Recently, cellulose nanofibers-reinforced bioplastic has been studied with the aim of developing sustainable 'green composites'. Among bioplastics, polylactic acid (PLA) has a great potential to replace petroleum-based plastics because of its high stiffness and strength. PLA is a versatile polymer made from renewable agricultural raw materials that are fermented to lactic acid. However, the main drawback of semi-crystalline type of PLA for industrial application is the longer injection molding cycles compared with conventional polymers such as polypropylene (PP). This paper provides an overview of recent progress made in the area of microfibrillated cellulose (MFC) reinforced PLA composites which consisted of evaluating the effect of MFC reinforcement on the thermal and mechanical properties of PLA, investigating the thermo-mechanical properties of MFC-reinforced PLA having different degree of crystallinity, and accelerating the injection molding cycle of PLA by synergetic effect of MFC and nucleating agent. We found that the combination of nucleant addition and MFC reinforcement made possible to process PLA at similar molding cycle of PP.

Keywords: Green composite, sustainable materials, microfibrillated cellulose, PLA, thermo-mechanical properties

A model for the evolution of left-handedness

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An overwhelming majority of humans are right-handed. Numerous explanations for individual handedness have been proposed, but this population-level handedness remains puzzling. I will present a novel mathematical model and use it to test the idea that population-level hand preference represents a balance between selective costs and benefits arising from cooperation and competition in human evolutionary history. I will also present evidence of atypical handedness distributions among elite athletes, and show how our model can quantitatively account for these distributions within and across many professional sports. The model predicts strong lateralization for social species with limited combative interaction, and elucidates the absence of consistent population-level "pawedness" in many animal species.

Cataract Screening Techniques under Limited Health Facilities

Eng. Retno Supriyanti, Jenderal Soedirman University

We developed a cataract screening system using image processing techniques. The goal is to solve problems about cataract diagnosing under limited health facilities. Toward this end, we will use low-cost and easy-to-use equipment such as a digital camera for cataract diagnosis so that anyone can conduct diagnosis easily. In our system, once a user simply takes a patients photograph of an eye, the system will automatically analyse the image and distinguish between serious and non-serious conditions. Our system performance is promising for further development.

Free-Energy Analysis of the Preferred Configuration of Transmembrane Protein in Model Membrane: Roles of Lipid and Water

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Here, two contrast configurations are examined for a transmembrane protein in a model membrane system. In the first one, the protein stays in the direction normal to the membrane surface, and in the second, it is buried in the membrane core. We investigate the relative stabilities of the two configurations with the free-energy analysis using the energy-representation method. The free-energy change of the protein binding is found to be more favorable for the vertical configuration. The free-energy decomposition into the contributions from lipid and water shows that the water effect overturns the lipid one to stabilize the vertical configuration. This work is collaboration between me and Prof. Nobuyuki Matubayasi (Kyoto University) who develop new technique to calculate free-energy. This method is a new method and applicable for wide area in biological material and estimating a binding and docking in protein engineering.

Marketing to Poor but Wirelessly Connected Consumers: Understanding Brand Preferences among Social Media Active Low-Income Consumers in Indonesia

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Mobile internet penetration in Indonesia has been growing exponentially in recent years. One of the main drivers is the affordability of the services. Inexpensive smart phone and price war between network operators allow lower income consumers to adopt mobile internet. Audaciously, mobile internet services in Indonesia are mainly offering unlimited internet quota for social media sites, such as Facebook and Twitter. As a result, many low-income consumers are becoming active users of social media sites. The social media interaction introduces different perspective to this low-income consumer. In some part, they were introduced to different pattern of consumption of their higher income counterparts, and thus it affects their perspective toward purchase decision and brand preferences. Against this backdrop, this paper aims to understand brand preferences among low-income consumers by examining their post in social media sites. By using text mining techniques and content analysis on social media sites, this paper proposes to identify the determinants of brand preferences among low-income consumers. In addition, this paper aims to examine the notion that social media active low-income consumers are becoming more brand-conscious rather than price-conscious. The results provide important insights into the business impact of social media toward marketing intervention on low-income consumers.