

Strengthening Collaboration through Distance Education and Research Extension: An Impression during the 8th International Kuroshio Symposium

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“Alone we can do so little; together we can do so much”

— Helen Keller

This year's conference was relatively overwhelmed with multi-disciplinary ideas as the Kuroshio Science had reached its third (3rd) cycle and once again held in the country where it was first recognized. Recently a significant number of research affiliates were increasing which implies its continuous expansion and even stronger linkages with institutions within the region. The relater would rather say it in this way since he is not novice to this event whom he had witnessed three other momentous events in the past including the foremost one. In fact, the growing network among collaborating international institutions became evident as Malaysia and Indonesia have recently partake in this joint research meetings in 2012 that had expanded from the formerly known *Kuroshio triangle* (signifying Philippines, Taiwan and Japan where the ocean current mainly traverse) to its new domain which formed the “*Kuroshio*-related S-shaped zone”. Consequently in the succeeding year the Tanjung Pura University, Indonesia and Universiti Malaysia Sarawak, Malaysia had made its successful part when they hosted the 7th symposium in November, 2013 at Tanjung Pura University in Pontianak, Indonesia. In this year, another three prominent institutions have participated namely the Ryukyus University in Okinawa, Japan, National Dong Hwa University in Taiwan and University of the Philippines-Marine Science Institute in Philippines as their well-known authorities from respective fields have shared their diverse technical views. Likewise there were ten (10) young researchers (6 from Philippines and 4 from Taiwan) who constituted the first batch of Sakura Science Project in Kochi University that also contributed their significant findings and further discussed with experts. Truly, the outcome of more strengthened collaborative efforts was indeed realized as it has been emphasized on its recent theme “Kuroshio University League Network Formation Towards the Establishment of a Sustainable Society in the Kuroshio Region Through Cross-Border Education”.

In the entire two-day conference, there were some studies

presented that profoundly impressed the author and thereby remarked in this report. Relating the issue on cross-border education along Kuroshio Region as its major theme, Dr. Fay Lea Patria M. Lauraya (President of Bicol University, Philippines) made the keynote discussion while Dr. Yi-Ching Huang from International Affairs Office of National Dong-Hwa University in Taiwan presented it on a regular session. According to Dr. Lauraya, this system of education transforming the higher education institution (HEIs) whom she referred as “academic mobility” was essential elements of inter-nationalization that play an important role in facilitating country-level knowledge *i.e.* scientific research, trends and programs towards better understanding on the aspects of *Kuroshio* science. As a benefit, this offers numerous opportunities to exchanging learners that helps build human capital development. Further she emphasized the experience of Bicol University and Kochi University in the pursuit of cross-border education that has been practiced for several years since the initiation of their collaboration in 2006. The research partnership practices involved were exchanges of researchers and students whom one (1) of the faculty of BU had obtained his PhD degree in 2010 and two (2) are on their on-going study statuses while several exchange students have given opportunities to take short course program in the past. The conduct of various collaborative research projects, lectures and symposia are also actively being exercised likewise exchanges of academic information and materials were further disseminated. Anticipation for “brain drain” as one of the negative impact of cross-border education resulting to failure of scholar to return to home institution due to attraction from “highly-paid jobs” abroad is also one of her concern. Such matter has been mentioned in the report of Dr. Huang who reported some incidences that occurred in their case. On the other hand, Dr. Huang stressed on the credit transfer scheme as a system involved in cross-border education effective in standardizing and recognizing student's performance

and attainment between host and home institutions. She mainly discussed the two mostly known credit transfer system such as University Mobility in Asia and the Pacific (UMAP) and European Credit Transfer and Accumulation System (ECTS). However she further recommended ECTS *i. e.* ERASMUS Program having well-developed scheme and successful projects such as in the “Rhine River Project”. By promoting student mobility programs such as exchange, short-term courses and dual degree programs, the formation of ‘Kuroshio League of Universities’ will pave the way for the technical knowledge to convey joint sustainable management of resources along the region.

Another impressive keynote report was presented by Dr. Hiroyuki Matsuda from Yokohama National University (Faculty of Environment and Information Sciences) and visiting professor of Kochi University. His discussion on ocean management as an integrated approach of science, technology and human dimensions was rather alarming as international conflict on the use of territorial rights of the sea and the exclusive economic zones (EEZ) concerns have risen between opposing countries. In fisheries aspect, there are three major kinds of conflicts that occurred such as competing nations against ocean resources, fisheries against conservation effort and fisheries against other kind of human activities where he cited each with relative circumstances in Japan. Due to user rights both fisheries and any other human practices can coexist in a common area. Here he accentuated three major cases such as the management issue on chub mackerel, expanded seasonal fishing ban at Shiretoko World Heritage site and the fisheries co-management trend made during the formation on the later having one of the six high impact issues in 2010. Hence his key inference indicated that the significance of sustainable fisheries depends on how the resource stocks were being regulated. In studying the dynamics of marine ecosystem, the stochastic modelling can be useful parameters in risk assessment rather than evaluation of its steady-state. Under the Territorial User Rights for Fishers (TURFs) management as well as exploitation practices can be simultaneously done whom fishers and stakeholders

coexisted beyond conflicts.

On a regular session, Mr. Sing-how Tuo of National Sun-Yat Sen University and one of the participants from the Sakura Science Program reported his study on the different responses of the host diatoms *Rhizosolenia* and *Hemiaulus* with the symbiont *Richelia intracellularis* under the high nitrate availability. The latter as an important N₂-fixing cyanobacterium obtained from the nitrate-depleted *Kuroshio* upstream and northern part of South China Sea exhibited varying population *in hospite* associated with the seasonal changes affecting N₂ concentration. Density of symbiont was relatively low between hosts during winter noted with high N₂ level than summer. To compare *in situ* condition with controlled experiment during these seasons, the on-board nitrate enrichment set-up were done to determine the effect of N₂ as other environmental factors appeared to have no evident relationship. Data from two sources have shown that increasing nitrate reduced the symbiont population in both host diatoms thus resulted to decreasing population of *Hemiaulus membranaceus*. However this was contradicting to *Rhizosolenia clevei* that has significant abundance inferred to this condition which further investigation is needed. On the other hand, this indicated that *H. membranaceus* was more dependent to *Richelia* symbioses while increasing N₂ level suppresses its production *in hospite*.

Another interesting study was reported by Dr. Ching-Nen Nathan Chen of National Sun Yat-sen University (Department of Oceanography) who relates about the pigment production of a newly isolated thermotolerant microalga *Coelastrrella sp.* Based on the morphological and molecular evidences including meridional ribs on the cell wall, pigment production and its 18S rDNA sequence suggested that this microalga belongs to the later genera. According to him, the species which originally has green pigment turned into reddish pigment when subjected under environmental stress such as temperature, light and salinity. Salt stress and high light intensity accelerated biosynthesis of the pigments that contains astaxanthin, lutein, canthaxanthin and β -carotene. As the stress factors continuously induced chlorophyll gradually



Dr. Yoshiaki Iiguni (*left*) during his welcome remark and Dr. Fay Lea Patria M. Lauraya (*center*) and Dr. Hiroyuki Matsuda (*right*) on their keynote presentations.

reduced while astaxanthin mainly produced. However, the microalga has the ability to retrieve its original pigment as the stress factors were eliminated. Likewise the significant quantities of oil were accumulated as the cells experienced stress due to nutrient deficiency. As thermotolerant species, it could withstand the maximum temperature of 50°C for more than eight hours. This condition further implied the suitability of the species for outdoor cultivation primarily along tropical region considering its more stable weather condition throughout the year. In economic and medical aspects, astaxanthin commercialization is of great value in global market due to its super antioxidant properties used in feed and cosmetics and known with curative effect against cardiovascular and brain diseases as well as cancer.

In the report of Dr. Takahiro Taguchi from Graduate School of Kuroshio Science of Kochi University (Laboratory of Human Health and Medical Science), he had shared captivating information on the aspect of molecular cytogenetics as essential tool to overview relationship among scleractinian corals for comprehensive taxonomic studies at present times. His study mainly addressed the obscure condition of coral classification leading to some inconsistency in the recent studies and the limited cytogenetic information. Through karyotype (chromosomal) examination using fluorescence in situ hybridization (FISH) technique, relevant information dealing with the explorations of the evolutionary relationships, phylogenetics and sex determination were significantly obtained. Further this new molecular approach can provide framework for future coral genome projects useful to modern coral biologists and reef conservationists. With the advent of this application which complements the conventional cytogenetics, the process revealed the detection of characteristic heterochromatin distribution, mini-satellite DNAs shared with human and the highly amplified rRNA gene (rDNA) mapping. In their study on genomic DNA hybridization (GDH) using DNA extracted from a scleractinian coral embryo, they have succeeded in displaying

the characteristic and distinct heterochromatin distribution especially on telomeric regions of chromosomes that facilitates the classification of the species. Through FISH mapping of rRNA genes, the presence of telomere sequence in the chromosomes demonstrated that some coral species have same sequences as humans and further suggested that karyotyping, rRNA gene mapping and heterochromatin motic sequences were useful tools for exploring the process of chromosome evolution and phylogenetics of scleractinian corals.

Then on his brief closing remark, Dr. Kimio Fukami (Vice President and Director for Education, Kochi University) acknowledged everyone for the successful accomplishment of the symposium and thanked all the collaborating institutions for the continued support in this significant endeavour. In a humorous way, he cited that “as we pursue this effort, there must be more beer to come” inspiring everyone of the warm future of Kuroshio partnerships. Further he ended it in expressing a short passage saying “*sana magkita-kita tayong lahat*” derived from a Pilipino phrase that means “hope to see each other once again”.

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