The 5th UCAS Postgraduate Symposium

From Stream to Ocean
The Biodiversity and Sustainability of Aquatic Ecosystems

Programme & Abstracts
Welcome

I am very pleased to welcome and sincerely thank all distinguished Professors leading your excellent postgraduate students for coming NTOU’s international conference 5th UCAS conference originated from both Xiamen University and Hong Kong University for attending this very good program for such important conference which directly organized by these participants of postgraduate students herein of three Universities. We are very happy to join this program which invited from your student committees in Xiamen last year.

Therefore, I also want to thank Prof. I-Shiung Chen, Director of IMB, and all his LAB’s postgraduate students and assistants as well as all NTOU student committees paying more effort in several months for organizing this wonderful conference. I think our students know that my current policy of NTOU now is trying to make very strong support to enhance all international and cross-Strait academic exchange including such important international conference, under this plan, for the—high visibility—I make more effort to promote our student’s international learning experience. So, I’m here sincere welcome all of you to come to National Taiwan Ocean University, Keelung. As the name of our University: Ocean, our University is very professional on all marine related disciplines, and has established many academic credits for leading on many fields of research in Taiwan, especially very strong team for marine biology, marine ecology, fisheries, oceanography, marine biotechnology, aquatic environmental biology, as well as aquaculture, food science and other related topics. And the most important institution for organizing them, CMBB: the Center of excellence for Marine Bioenvironment and Biotechnology, have greatly promoted the academic research credit of University in many aspects of excellent joined team research.

Keelung is a very charming city with traditionally famous commercial harbor, fishery harbors as well as excellent night markets with a plenty of famous local foods, sea food restaurants, lovely small shops. I wish that all guests herein will have very good opportunity to explore the city and enjoy many aspects for enriching your nice conference trip.

Finally, I encourage everyone to come, and any young students’ academic activities, as the title of this conference “From Stream to Ocean”, Taiwan is a country surrounded by ocean, and many lovely Forest streams, so all our Taiwanese culture is closely related to ocean—never forgot the source—wish all of you could enjoy this conference, our campus, Keelung city and Taiwan.

Professor Ching-Fong Chang
President of National Taiwan Ocean University
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<th>3/13 Day 3 (Wed.)</th>
<th>3/14 Day 4 (Thu.)</th>
<th>3/15 Day 5 (Fri.)</th>
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<td>Subsession 4 (4 students)</td>
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**Welcome to Taiwan**

**Opening ceremony & Group photo**

**Activities briefing**

**Professor Speech**

**Subsession 1 (5 students)**

**Subsession 2 (3 students)**

**Subsession 3 (3 students)**

**Subsession 4 (4 students)**

**Subsession 5 (5 students)**

**Subsession 6 (4 students)**

**Subsession 7 (5 students)**

**Subsession 8 (5 students)**

**Subsession 9 (4 students)**

**Ecotour plans: Kwantu (mangroves), Danshuei (tourism old street) & Bali (Shihsanhang Museum of Archaeology), and Shilin night market, Taipei.**

**Back to sweet home**
Acknowledgements

This symposium is organized with great support from the following institutes/persons who we would like to express our gratitude here:

**Institutes**
- Staff and students from National Taiwan Ocean University (NTOU)
- Staff and students from Xiamen University (XMU)
- Staff and students from The University of Hong Kong (HKU)
- Student from the National Taiwan University (NTU)
- Student from Hong Kong Baptist University (HKBU)

**Sponsorship for symposium**
- College of Life Sciences, National Taiwan Ocean University
- College of Ocean Science and Resource, National Taiwan Ocean University
- Office of International Affairs, National Taiwan Ocean University
- State Key Laboratory of Marine Environmental Science, Xiamen University
- The Swire Institute of Marine Science, The University of Hong Kong
- School of Biological Sciences, The University of Hong Kong

**Design of poster, handbook, name tag and symposium webpage**
- Mr. Yu-Chun Chen
- Mr. Han-Yang Lin
- Mr. Kuo-Wei Yen
- Mr. Yu-Shin Jeng
- Mr. Yu-Ming Shih
- Mr. Chen-Yun Li
- Mr. Kevin King-Yan Ho

**Handbook edition**
- Mr. Yu-Ming Shih
- Mr. Han-Yang Lin

Special thanks are also due to Prof. Ching-Fong Chang, Prof. Deng-Fwu Hwang, Prof. Ming-An Lee, Prof. I-Shiung Chen, Prof. Kwang-Tsao Shao, Dr. Min Liu, Dr. Jin-Liang Huang, Prof. Gray Williams, Prof. Yvonne Sadovy, Prof. David Dudgeon, Dr. Moriaki Yusuara, Prof. Yunwei Dong, Prof. Dalin Shi, Dr. Jian Ma, Dr. Haizheng Hong, Ms. Vera Shi and Ms. Shuang Yang for their support and help in coordinating the symposium.
Programme
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<tr>
<td>14:00-14:40</td>
<td><strong>Professor Speech</strong></td>
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<td><strong>Exploring marine biodiversity, with special emphasis</strong></td>
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<td></td>
<td>Prof. Tin-Yam Chan</td>
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#### Sub-session 2

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<td>14:40-15:00</td>
<td><strong>Epigenetic changes</strong></td>
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<td>Yuan Wang, Simon</td>
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<td>in response to hypoxia – marine</td>
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<td>medaka as a model</td>
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<td>15:00-15:20</td>
<td><strong>Imposex of Thais clavigera</strong></td>
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<td>Yan-Yan Zhao</td>
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<td>in the coastal waters of Xiamen</td>
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<td>15:20-15:40</td>
<td><strong>Photosynthetic and</strong></td>
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<td>Xian-Liang Yi, Andy</td>
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<td>proteomic responses of the marine</td>
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<td>diatom Thalassiosira pseudonana</td>
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<td>16:40-17:00</td>
<td><strong>Effects of metal</strong></td>
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<td>Lu-Lu Yang</td>
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<td>burden and food avoidance on the</td>
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<td>transfer of metals from naturally</td>
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<td>contaminated prey to a marine</td>
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<td>predator Nassarius siquijorensis</td>
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<td>17:00-17:20</td>
<td><strong>Sipunculan worm</strong></td>
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<td>Yi-Fan Chen, Evan</td>
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<td>Phascolosoma esculenta) — a tool</td>
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<td>to estimate the bioavailability</td>
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<td>of heavy metals in sediment</td>
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<td>17:20-17:40</td>
<td><strong>Phenanthrene causes ocular</strong></td>
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<td>Li-Xing Huang</td>
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<td>developmental toxicity in zebrafish embryos via the AhR/Zeb1/Mitf/Pax6 signaling pathway</td>
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### 3/12 Day 2 (Tue.)

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<td>09:00-09:40</td>
<td>Professor Speech</td>
<td>Taxonomic study on Sciaenidae in mainland China</td>
<td>Dr. Min Liu</td>
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<td>09:40-10:00</td>
<td>Sub - session 4</td>
<td>The systematics and molecular phylogeny of Family Callionymidae from Taiwan</td>
<td>Chen-Yun Lee</td>
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<td>10:00-10:20</td>
<td>Sub - session 4</td>
<td>Two New Records of Marine Turtle Leeches (Hirudinida: Ozobranchidae) of sea turtle in Taiwan</td>
<td>Cheng-Tsung Tseng</td>
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<td>10:20-10:40</td>
<td>Sub - session 4</td>
<td>Taxonomic status of cyprinid fishes genus <em>Opsarichthys</em> (Teleostei: Cyprinidae) from Vietnam</td>
<td>Quang-Thien Huynh</td>
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<td>10:40-11:00</td>
<td>Sub - session 4</td>
<td>Preliminary Taxonomic Studies of Duckbill eel (Nettastomatidae, Anguilliformes) off Taiwan</td>
<td>Shang-Chih Lin, James</td>
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<td>11:20-11:40</td>
<td>Sub - session 5</td>
<td>Developing an effective photographic identification method via the facial features of green turtles in Luichiu island, Taiwan</td>
<td>Chemg-Ming Su</td>
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<td>11:40-12:00</td>
<td>Sub - session 5</td>
<td>Studies on the life cycle of three Anthomedusae (Hydrozoa: Hydroidomedusae) from Xiamen Harbor</td>
<td>Jin-Ru He</td>
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<td>12:00-12:20</td>
<td>Sub - session 5</td>
<td>Preliminary research on the ecosystem-based sea use management: Three cases study of the typical bays in Fujian Province</td>
<td>Kai Chen, Kay</td>
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<td>12:20-12:40</td>
<td>Sub - session 5</td>
<td>Spatio-temporal variations in diversity and abundance of demersal fishes in Hong Kong waters before the territorial-wide ban of trawling</td>
<td>King-Yan Mak</td>
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<td>12:40-13:00</td>
<td>Sub - session 5</td>
<td>Short-term Temporal and Spatial Variations in Larval Fish Community in Estuary of Tamsui River, Northern Taiwan, and Relations in Sampling Designs</td>
<td>Yu-Ming Shih</td>
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<tr>
<td>14:00-14:20</td>
<td>O-21</td>
<td>The influence of temperature on juvenile growth and development of a tropical marine fish</td>
<td>Jian-Long Li, Joy</td>
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<td>14:20-14:40</td>
<td>O-22</td>
<td>Can Dynamic Energy Budget models simulate the life history traits of the black mussel, <em>Septifer virgatus</em>, under heat stress on tropical shores?</td>
<td>In Luk, Michelle</td>
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<td>14:40-15:00</td>
<td>O-23</td>
<td>Physiological response of the limpet <em>Cellana toreuma</em> to simulated environmental heat stress</td>
<td>Karen Villarta</td>
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<td>15:00-15:20</td>
<td>O-24</td>
<td>A Review on the Study of Stream Aquatic-Terrestrial Interactions Mediated by Riparian Arthropods and Investigation of Consumer Food Sources by Stable Isotope Analysis</td>
<td>Yan-Ling Yuen</td>
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### Sub-session 7

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Abstract
(Professor Speech)
Update research of marine toxin poisoning in Taiwan

Deng-Fwu Hwang

Department of Food Science, Taiwan Ocean University, Taiwan, R. O. C

ABSTRACT
The causative agents of seafood poisonings in Taiwan were tetrodotoxin (TTX), paralytic shellfish poisons (PSP), grass carp bile toxins, ciguateric toxins, excess dose of vitamin A, histamine, pyropheophorbide, and dinogunellin. Among them, TTX, ciguateric toxins, PSP and excess dose of vitamin recently caused the food poisoning and are concerned problems. The causative marine animals were identified as puffer, processed puffer products, octopus, goby, and some kinds of gastropods. Furthermore, TTX-containing animals in Taiwan were found to include puffer, octopus, goby, xanthid crab, gastropod, starfish, and flatworm. Those dried dressed fish fillets have caused some food poisoning incidents and been proved due to adulteration of toxic puffers. Among those cases, SDS-PAGE, IEF and PCR methods for identifying species of puffers and their products have been developed. PSPs were identified as the causative agent of several shellfish poisonings and have studied to distribute in the purple clam, xanthid crabs, and gastropods. The source of PSP was the toxic alga Alexandrium minutum, which appears in the winter period (December to March) in the inland aquaculture ponds in Taiwan. The toxin production of alga was affected by a variety of nutritional, environmental, and physiological factors. Most shellfish possessed high resistance to PSP, but the susceptibility of shellfish to the toxic alga was quite different depending on species. Meanwhile, fish liver of several kinds of grouper recently induced hypervitaminosis A disease. It was found that the level of vitamin A increased with increasing the body weight and liver weight. These fish species were identified as Etelis coruscans and E. carbunculus by using SDS-PAGE and PCR methods. Following this way, ciguateric fish Lutjanus bohar, Masturus lanceolatus and Gymnothorax javanicus were also identified as causative fishes of food poisonings. Other marine toxins including diarrheic shellfish poisons (DSP), neurotoxic shellfish poisons (NSP), and amnesic shellfish poisons (ASP) are no poisonings in Taiwan.

KEY WORDS: marine toxin, tetrodotoxin, Taiwan
Exploring marine biodiversity, with special emphasis
on tropical deep-sea benthos

Tin-Yam Chan
Institute of Marine Biology, National Taiwan Ocean University, Taiwan, R. O. C

ABSTRACT
Recent estimation suggests that there are 0.7 to 1 million species in the ocean and only about 1/3 or 1/4 have been described. Therefore, inventorying and documenting marine biodiversity is still an important task for marine biologists. Amongst the marine organisms, mollusks and crustaceans have the highest diversity and with most new species discovered. Since the last decade, a task force led by the Musèum national d’Histoire naturelle, Paris and participated by the National Taiwan Ocean University has organized many international marine biodiversity expeditions in the Indo-West Pacific focusing on mollusks and crustaceans. Exceptional rich results have been obtained particularly for the tropical deep-sea benthos.

KEY WORDS: Marine biodiversity, Indo-West Pacific, decapod crustaceans
**Taxonomic study on Sciaenidae in mainland China**

Min Liu  
College of Ocean & Earth Sciences, Xiamen University,  
Xiamen 361005, Fujian, P. R. China

**ABSTRACT**

Chu et al. (1963) reviewed the taxonomy of sciaenids from Chinese waters and described 13 genera and 37 species (19 genera and 34 valid species confirmed later). The classification was mainly based on comparative anatomy of the air-bladder, otolith, as well as external characters such as the mouth structure and mental pores. In the past 5 decades, however, no further systematic studies on sciaenids were conducted in mainland China. Based on literature reviews and recent field collections, the estimated number of sciaenids from Chinese waters is about 30 species from 18 genera. The taxonomic problems in sciaenids are partly due to that we do not have a good systematic key for certain genera, such as Johnius and Nibea, and partly due to that we do not have taxonomic specialists on sciaenids recruited from young fish biologists.

Pieces of taxonomic work are conducted in Xiamen University in order to understand the diversity and phylogeny of sciaenid species in Chinese waters. First, species collections throughout Chinese coastline are conducted and will continue. Whole specimens, tissue, air-bladder, otolith and gill rakers are reserved. For each sciaenid species collected external and internal morphology were described and colour photos were taken. Second, osteological study has been conducted in 7 genera, Argyrosomus, Johnius, Larimichthys, Nibea, Pennahia, Protonibea and Sciaenops. Third, barcoding and complete mitogenomic work are conducted. Fourth, a taxonomic guideline book of sciaenid species from Chinese waters with colour photos provided on external and internal morphology is prepared.

**KEY WORDS:** taxonomic study, Sciaenidae, mainland China
Seafood Profile of Asia's 'World City': Hong Kong as a Role Model for Sustainable Trade and Consumption Patterns?

Yvonne Sadovy
The Swire Institute of Marine Science and School of Biological Sciences
The University of Hong Kong

ABSTRACT

Most major urban centres in Asia import an enormous amount of seafood each year, some involving threatened species and taken from communities in source countries that increasingly need the same fish for their own food. Can cities, like Hong Kong, where seafood consumption rates are one of the highest in the world, and which has few marine resources of its own remaining, also be part of the solution to the overfishing associated with international trade? This talk explores the actual and possible roles of a major centre of seafood consumption in moving towards more sustainable practices and habits.

KEY WORDS: sustainable trade, consumption patterns, Hong Kong
Abstract
(Oral)
Heterotrophic Bacterial degradation of Dissolved Organic Carbon at different nutrient levels

Rui Wang, Nianzhi Jiao*

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ABSTRACT

The ocean possesses a huge dissolved organic carbon pool, most of which are recalcitrant to biological use and can persist in the water column for thousands of years. The origin of this recalcitrant DOC pool is presently unclear. The “Microbial Carbon Pump” (MCP) process through which microbes (including bacteria and archaea) transform labile DOC into recalcitrant DOC can address this matter. Many environmental factors can affect this process, including inorganic nutrient which has been studied too little. So a nutrients enrichment experiment was taken in the East China Sea in the winter of 2012. Phytoplankton and predator had been removed in the experiment taken in the dark with a room temperature. The results showed that the total amount of Nitrate and Phosphate concentration decreased within incubation time (30d) were 2um/L and 0.04um/L when the adding nutrients concentrations were 8um/L and 0.5um/L, but higher consumption has not been found when adding Nitrate and Phosphate concentration reached to 24um/L and 1.5um/L. This indicated that inorganic nutrients were essential to heterotrophic bacteria’s metabolism, but the consumption of nutrient didn’t increase when higher nutrient concentration was added. Bacteria abundance of control group and experimental group were nearly the same before 72 hours, after that the latter was higher than the former one. But there was no significant difference between each enrichment levels. However the more definite processes and mechanisms about dynamics of DOC as well as the response of heterotrophic bacteria still need more data to support and we have been taking this work now.

KEY WORDS: heterotrophic bacteria, dissolved organic carbon, inorganic
Preliminary studies on trace elements analysis in cephalopods tissues from the Northeast of Taiwan

Wei-Hsiang Chang* and Chia-Hui Wang

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ABSTRACT

Cephalopod is one of the most important economic fisheries species in Taiwan. Fast-growth character makes them accumulate the trace elements rapid accordingly and become proper species to investigate the concentrations of trace elements of surrounding environments. The content of trace elements varied among tissues within cephalopod which might be influenced by ontogenetic effect or ambient environments. In this study, we collected cephalopods specimen, including cuttlefish (Sepia pharaonis), squid (Sepioteuthis lessoniana) and octopus (Octopus vulgaris) from the waters off northeast of Taiwan during 2011 to 2012. Mantle, gill, liver, gonad tissues and endolymph were collected from all specimens. Except the endolymph, the tissue samples were dissolved in ultrapure HNO₃ and used hot block (Environmental Express 36 place SC154) to digest samples. Concentrations of Na, Mg, K, Ca, Mn, Sr, Ba, Fe, Cd, Pb, Cu and Zn were measured by using an Inductively coupled plasma-mass spectrometry (ICP-MS). The waters off northeast of Taiwan is one of the most important fishing ground of cephalopods. Present study detects the concentration of trace elements in cephalopods in waters off northeast of Taiwan, and the data will be useful for the food security regulation.

KEY WORDS: cephalopods, ICP-MS, trace elements, food security
PBDEs alter larval settlement of marine intertidal organisms by reduction of bacterial abundance on the biofilms

Beverly H.K. Po\textsuperscript{a}, Jill M.Y. Chiu\textsuperscript{b}, Christine Y.S. Chan\textsuperscript{a}, Michael H.W. Lam\textsuperscript{c}, Qian Pei-Yuan\textsuperscript{d}, and Rudolf S.S. Wu\textsuperscript{a}

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\textit{b}. Department of Biology, Hong Kong Baptist University, Kowloon, Hong Kong SAR, China; E-mail: jillchiu@bu.edu.hk

\textit{c}. Department of Biology and Chemistry, City University of Hong Kong, Hong Kong SAR, China

\textit{d}. Division of Life Sciences, Hong Kong University of Science and Technology, Hong Kong SAR, China

\textbf{ABSTRACT}

Polybrominated diphenyl ethers (PBDEs) have been widely used as flame retardants and have become ubiquitous in the marine environments all over the world. Just as many other persistent organic pollutants (POPs), PBDEs have been reported to be accumulating in lipids of various biota, including mussels, sea turtles, birds and polar bears. While most research done has investigated the impacts of the pollutant on reproduction and development of vertebrates such as fish and mammals, little has focused on how invertebrates would be affected. In this study, larvae from three chosen marine invertebrates – the gastropod \textit{Crepidula onyx}, the polychaete \textit{Hydroides elegans}, and the arthropod \textit{Balanus amphitrite} – were used to find out the effects of BDE-47 on their growth and metamorphosis. Since the settlement of these species is a response to the biofilms on substrata, and the microorganisms of biofilms can be varied by the presence of pollutants, the study also investigated whether spiking of BDE-47 onto biofilms would affect the invertebrates indirectly through changes in their larval settlement pattern. The findings showed that larval growth and metamorphosis were not affected by water exposure. However, biofilms spiked with BDE-47 have decreased the preference of larvae to settle, and this might be explained by the reduction of the bacterial density in the biofilms.

As larval settlement determines the structure and dynamics of marine benthic communities, any alteration in larval settlement pattern may lead to serious ecological consequences.

\textbf{KEY WORDS}: PBDEs, biofilms, larval settlement
Thermal tolerance of amphibians and their invasive predator in a polluted environment

*Edward Tak Chuen Lau*, Kenneth Mei Yee Leung*ab* and Nancy Elizabeth Karraker*c

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b. The Swire Institute of Marine Science, Faculty of Science, The University of Hong Kong, Cape d’Aguilar Road, Shek O, Hong Kong, P. R. China
c. Department of Natural Resources Science, University of Rhode Island, 105 Coastal Institute at Kingston, Kingston, Rhode Island 02881 USA

**ABSTRACT**

Many threats are contributing to amphibian declines. Yet, aside from a few examples, we still know very little about the role and magnitude of synergistic effects among these stressors. Our study focused on the importance of relationships between pollution and thermal stress on three lowland wetland amphibians, namely Asian common toad (*Duttaphrynus melanostictus*), brown tree frog (*Polypedates megacephalus*) and marbled pigmy frog (*Microhyla pulchra*) in South China, and the relative performance of the invasive predator fish *Gambusia affinis* in comparison with local larval amphibians. This study determined and compared median lethal concentrations (LC50s) of commonly used agricultural pesticides, methomyl, on the target amphibian and fish species, as well as the thermal tolerance profiles and lethal temperatures of these animals. The investigation on the synergistic effects of thermal stress and the selected pesticide is currently being conducted using integrated measurements of physiological end-points and biomarkers including growth rate, oxygen consumption rate, and expression of heat shock protein and lactate dehydrogenase activity. Our results showed that pesticide tolerance varied highly among the three species of amphibian larvae, with *D. melanostictus* being the most tolerant, followed by *P. megacephalus*, and *M. pulchra*. Toxicity of methomyl on *D. melanostictus* was also found to vary markedly within a temperature range of 15 – 35°C, with LC50 values ranging from 265.5 mg/L at 35°C to 1,109 mg/L at 20°C. Information generated from this study will be useful in developing conservation measures to better protect amphibian populations against these rising threats in South China region.

**KEY WORDS:** pesticide, amphibian, thermal stress, multi-stressor effects
Molecular cloning and differential expression of SpHsp60 in Scylla paramamosain in response to bacterial, osmotic and thermal stress

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*Corresponding author: zoopecol@xmu.edu.cn

ABSTRACT

Hsp60 plays a crucial role in the process of pathogenic and protective immune responses and is implicated in autoimmune disease. In order to understand the immune defense mechanisms of this gene, we cloned a Hsp60 (SpHsp60) gene from Scylla paramamosain, localized of SpHSP60 in hemocytes and detectd the expression patterns of SpHsp60 after bacterial, osmotic and thermal stress in hemocytes by real-time PCR with three housekeeping genes (β-actin, 18S rRNA and GAPDH). The full-length of the SpHsp60 cDNA was found to be 2424 bp. The predicted ORF encoded a protein of 576 amino acids with a predicted molecular mass of 61.19 kDa and a theoretical isoelectric point (pI) of 5.46. It shared high scoring identities with swimming crab, Portunus trituberculatus (95%). In situ hybridization assay showed that the higher expression occurred at granular and semigranular cells when compared to the hyaline hemocytes. These results may relate to the different function of three kind hemocytes. The expression level of SpHsp60 in hemocytes showed a clear time-dependent expression pattern during the 96 h after stimulated by Vibrio alginolyticus. During this experiment the gene was induced and the highest expression level was observed at 3 h. The significantly up-regulated expression and rapidly response of SpHsp60 indicated that the crabs were sensitive to bacterial challenge. After osmotic stress, the expression of SpHsp60 in hemocytes showed this gene was induced by the high salinity (30‰) and the crabs have its adaptive responses to high salinity. SpHsp60 mRNA expression in hemocytes was analyzed after thermal stress at 6 h, the highest and the lowest expression level of SpHsp60 was observed at 36 °C and 32 °C, respectively. This phenomenon indicated that the hyperthermia represents a stress for the host cells, the SpHsp60 was easily induced at hyperthermia and sensitive to temperature variations. Based on our research, it suggested that the SpHsp60 could be inducible by bacterial, osmotic and thermal stress, and therefore plays an important role in innate immune response of S. paramamosain.

KEY WORDS: SpHsp60, Scylla paramamosain
Epigenetic changes in response to hypoxia – marine medaka as a model

The University of Hong Kong, Hong Kong; +85251271457; bioywang@hku.hk

ABSTRACT
Hypoxia has been shown to be an endocrine disruptor and can impair reproduction and affect development of fish and higher vertebrates. Recent studies showed that many endocrine disruptors may also cause transgenerational effects. However, whether, and if so, in what way hypoxia can lead to trans-generational effects in vertebrates remain unknown. Using the marine medaka Oryzias melastigma as a study model, this study aims to test the hypothesis that exposure to hypoxia can cause transgenerational effects in fish, and we further hypothesize that the observed trans-generational effects is caused epigenetic alterations, including DNA methylation and histone modifications. Delayed hatching, retardation of embryonic development, reduced heartbeat rate, declined fertilization success, and increased malformations were observed in fish exposed to hypoxia (1.5±0.4 mg/L) for 10 days. Genes related to hypoxia responsive pathways, epigenetic modulation, steroidogenesis and immune response, were studied in both F₀ and F₁ adults exposed to hypoxia and normoxia. Global genomic DNA hypomethylation was clearly evident in embryos (10 post-fertilization days) as well as testes and ovaries in adult medaka after 10-day hypoxic treatment. Differences in histone modifications patterns (acetylation and methylation) were also found between normoxic control and hypoxic treatment groups. The epigenetic changes revealed in the present study may potentially serve as biomarkers for transgenerational effects resulting from environmental stress, and may also shed light on epigenomic responses to hypoxia in higher vertebrates, including humans.

KEY WORDS: hypoxia, transgenerational effects, epigenetics.
Imposex of *Thais clavigera* in the coastal waters of Xiamen

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**ABSTRACT**

Average sea surface temperatures (SSTs) are predicted to increase by at least 1–3 °C on the The degree of imposex, i.e. the imposition of male characteristics onto females, in neogastropods can be used as a sensitive and accurate biomarker to evaluate organotin contamination in coastal marine environment. Now, the imposex status in females of *Thais clavigera* in 9 sites was investigated to evaluate the organotin contamination along Xiamen Bay in 2012. The four indices including incidence of imposex (IOI), relative penis size index (RPSI), vas deferens sequences index (VDSI) and sex ratio index (SRI) were used comprehensively to assess the imposex status in order to ascertain the extent of organotin bioavailability in Xiamen Bay. Based on this research, *T. clavigera* in all survey sites exhibited the IOI of 100%. The imposex level was very serious with VDSI value of about 4 at all sites. At drum hole side, the imposex level was the most serious with maximum RPSI value of 13.6. In general the imposex level decreased from the inner to the outer of Xiamen Western Harbor and the populations in the open Xiamen Eastern Waters. These results were accordant with the concentrations of organotins in 2007. The imposex degree also increased with increasing organotin contamination and decreasing distance from shipping facilities.

**KEY WORDS:** imposex, *Thais clavigera*, organotin compounds
Photosynthetic and proteomic responses of the marine diatom  
_Thalassiosira pseudonana_ to triphenyltin exposure


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**ABSTRACT**

Triphenyltin compounds (TPTs) have been widely detected in marine environment because of their common use as antifoulants (e.g. in boats or other maricultural facilities) and biocides against fungal diseases. Generally, TPT is as toxic as TBT but comparatively less well studied [4], and little is known about its toxicity to marine algal species. Diatoms, as world widely distributed species, are responsible for 20% of global carbon fixation. Because of their important ecological role, diatoms have been applied in toxicological studies for decades. _Thalassiosira pseudonana_ was the first chosen eukaryotic marine phytoplankton as model species for whole genome sequencing, and this genomic information has opened a window for looking at the algal response to toxicants at molecular levels. In this study, therefore, the marine diatom _T. pseudonana_ was chosen as a model organism to elucidate the impact of TPT on marine diatom. An integrative measurement of physiological end-points (i.e., photosynthetic response and growth inhibition) was employed. The 96-h LC_{50} was 1.09 µg/L (95% CI:0.89 - 1.34 µg/L), and the 96-h EC_{50} for photosynthetic parameters were 1.54 µg/L (95% CI: 1.40 - 1.69 µg/L) and 1.51 µg/L (95% CI: 1.44 - 1.58 µg/L) for Φ_{P0} and Φ_{P}, respectively. The results also showed that increasing exposure concentrations of TPT led to reduction in photochemical quenching (i.e. decreased Φ_{P0}, Φ_{P} values). This dwindling trend of both Φ_{P0} and Φ_{P} indicates that electron transport from photosystem II (PSII) to photosystem I (PSI) was hindered. Proteomic response and expression of selected genes of _T. pseudonana_ (e.g. fucoxanthin-chlorophyll a/c light harvesting proteins and silaffin precursors which are relating to photosynthesis and silica shell formation, respectively) are being conducted currently and this analysis would help use to screen out a suite of protein or gene biomarkers which can further advance our knowledge on the specific chemical associated stress.

**KEY WORDS:** TPT; diatom; photosynthesis; proteomics
Effects of metal burden and food avoidance on the transfer of metals from naturally contaminated prey to a marine predator *Nassarius suisquijorensis*

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ABSTRACT

Nassarid snails are important opportunistic scavengers widely found in marine intertidal shores and trophic transfer is a predominant source of metal accumulation in these species, thus there is a significant need to understand the controls of metal trophic transfer. In the present study, we took advantage of a severely contaminated estuary and collected two prey organisms (oysters *Crassostrea angulata* and barnacles *Fistulobalanus albicostatus*) with different contaminated histories. These naturally contaminated prey were then fed to a marine neogastropod *Nassarius suisquijorensis* for a period up to 7 weeks. We then investigated the influences of prey type, metal burden and subcellular distribution in the prey on the metal accumulation, trophic transfer, and potential toxicity on *N. suisquijorensis*. We demonstrated an obvious negative relationship between the trophic transfer and the metal concentration in prey or the metal dosage. *N. suisquijorensis* exhibited food avoidance behavior to the Cu contaminated food, which effectively reduced the metal ingestion and resulted in a decrease of trophic transfer, as well as reduced the potential toxic effect from dietary exposure. On the other hand, our results also implied the metal specific impact of subcellular metal distribution in prey on the bioavailability of *N. suisquijorensis*. Our study suggested that the metal burden and feeding avoidance should certainly be considered in understanding the trophic transfer of metals in marine benthic food chain.

KEY WORDS: *Nassarius suisquijorensis*; metal-contaminated prey; food avoidance; trophic transfer
Sipunculan worm (*Phascolosoma esculenta*)—a tool to estimate the bioavailability of heavy metals in sediment

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\textbf{ABSTRACT}

Metal concentrations in sediments are usually several orders of magnitude higher than in waters, therefore, even a small fraction of sediment metal being bioaccumulated may cause unacceptable ecological risks. However, current sediment quality criteria for metals are based on total metal concentrations, although total concentrations are considered of little ecotoxicological value, because metals bound to various sediment geochemical components differ greatly in bioavailability. Whereas, it is not clear whether total concentrations can adequately indicate bioavailability. We tested this hypothesis using a deposit-feeding sipunculan worm, *Phascolosoma esculenta*, and sediments collected from intertidal zones of Xiamen City, China. Metal concentrations in sediments were generally low, but elevated concentrations of metals were obvious at several sites. Consistently, principal component analysis of metal concentrations in the worms also revealed considerable contamination of chromium, nickel, copper and zinc at these sites. Significant correlations were found for the total concentrations of chromium, copper, zinc, cadmium and lead in sediments and their concentrations in both somatic tissue and coelomic fluid of the worms, which indicates that sediment-metal bioavailability could be predicted by total metal concentrations. Therefore, in a restricted area with small heterogeneity in sediment geochemistry, it possibly is scientifically acceptable to base sediment quality criteria on total metal concentrations.

\textbf{KEY WORDS:} sediment, metal bioavailability, *Phascolosoma esculenta*
Phenanthrene causes ocular developmental toxicity in zebrafish embryos via the AhR/Zeb1/Mitf/Pax6 signaling pathway

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ABSTRACT

Recent researches show that polycyclic aromatic hydrocarbons (PAHs) may be a candidate cause of congenital ocular defects, especially inner malformations, but the mechanism is still unclear. We evaluated the ocular developmental toxicity and the mechanism(s) underlying PAH–induced retinal development defects due to environmental levels Phenanthrene (Phe) exposure in zebrafish. The morphological and histological changes, apoptosis, cell proliferation, activity of caspase 3 and expression level of proliferating cell nuclear antigen (PCNA) were investigated in retina. We also used the real-time quantitative (QPCR) analysis, Western blotting, In situ hybridization, Immunostaining, electrophoretic mobility shift assay (EMSA), and chromatin immunoprecipitation (ChIP) assay approaches to elucidate the signaling pathway leading to ocular developmental defects. We found that environmental levels Phe exposure caused obvious morphological changes, developmental retardation, apoptosis, and reduction of cell proliferation in the retina. Phe exposure up-regulated aryl hydrocarbon receptor (AhR) and microphthalmia-associated transcription factor (Mitf) expression, and down-regulated zinc finger E-box binding homeobox 1 (Zeb1) and paired box 6 (Pax6). Moreover, our results demonstrated that AhR played a key role in Zeb1 reduction and Mitf induction upon Phe exposure. Our results indicated that Phe could cause visual system developmental defects. We demonstrated for the first time that Phe’s ocular toxicity might be through up-regulating AhR, which then down-regulated Zeb1, induced the expression of Mitf, and finally caused the reduction of Pax6.

KEY WORDS: phenanthrene, ocular developmental toxicity, zebrafish embryos
The systematics and molecular phylogeny of Family Callionymidae from Taiwan

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ABSTRACT

Dragonets (Callionymidae) are benthic fishes and there are 182 species belonged to 10 genera worldwide. Previously the phylogenies based on morphology were reviewed by Nakabo and Fricke, but there are still some differences on genera classification which need to be resolved. The aims of this study were to review dragonets in Taiwan and using molecular data to test generic relationship of callionymid. In our result, we identified 11 genera and 26 species of dragonets in Taiwan with one new recorded species and one undescribed species. Previous studies listed 10 genera and 37 species, but there are 16 species without specimen records. Molecular phylogenetic analysis of data from both mitochondrial and nuclear genes indicated that it tends to support the genus classification system proposed by Nakabo (1982). Combined the molecular phylogeny with fossil evidences and morphological characters, it is suggested that the origin of dragonets was from Tethys sea. The dragonets then separated into two groups one tended to live in deep sea and another in shallow habitat. Those lives in shallow habitat splitted into two lines, associated with rocky or coral reef; muddy or sandy bottom.

KEY WORDS: Callionymidae, molecular phylogeny, Tethys sea
Two New Records of Marine Turtle Leeches (Hirudinida: Ozobranchidae) of sea turtle in Taiwan

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ABSTRACT

Marine turtle leeches (Ozobranchus spp.) are ectoparasites of sea turtles. They can cause such symptoms as anemia, large-scale thinning of the dermal layer and general deterioration in the health of sea turtles. Only two species were identified on turtles examined from Taiwan: Ozobranchus branchiatus, only found on the green turtle (Chelonia mydas), with 7 external gills on each side of its abdomen and Ozobranchus margoi, found on the Loggerhead turtle (Caretta caretta), with 5 external gills on each side of its abdomen. From July 2009 until July 2011 in eastern Taiwan’s Don-Ou village, the infection rate of O. branchiatus and O. margoi were 8.5% (2/23) and 37.5% (3/8), respectively. For the first time, we report these leeches in Taiwan. Analyses of 658bp of CO1 sequence of O. branchiatus showed that the leeches in Taiwan are 3.8 - 4.3% different in haplotype from Europe species. These results suggested that the population in Taiwan may be different from those of European leech O. branchiatus.

KEY WORDS: marine Ozobranchus spp., sea turtles, new records, Taiwan
Taxonomic status of cyprinid fishes genus *Opsariichthys* (Teleostei: Cyprinidae) from Vietnam

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**ABSTRACT**

Cyprinid fish is common fish group which can be used for recognizing species diversity. Chen et al. (2008a, 2008b and 2009) used both morphological and mitogenetic approaches to study about taxonomy and phylogeny of genus *Candidia* from Taiwan and genus *Opsariichthys* from Taiwan and China. One of these studies indicated the validity of *O. hainanensis* which have been ignored since several decades. Above researches display the higher diversity of species exists than contemporary knowledge as well as the nomenclature problem. The aim of this study is to revise all of nomenclature of opsariichthines which have been recorded from Vietnam. The opsariichthines are also widely recorded from northern and central Vietnam. From some preliminary results, we report eight names of *Opsariichthys* which had ever been recorded from Vietnamese references. Nguyen (1987) and Nguyen & Nguyen (2000) described several new species of *Opsariichthys* from Vietnam but some of newly described *Opsariichthys* species are definitely misidentified into this genus *Opsariichthys*. This detailed survey of field work in Vietnam also found that the Ve river (Quang Ngai Province) is southernmost distribution record of genus *Opsariichthys* on the Old World. Besides, the preliminary molecular phylogeny tree inferred from mitochondrial D-loop sequences would be provided to represent the taxonomic position as well as evolutionary history of opsariichthines among Vietnam, China and Taiwan.

**KEY WORDS:** taxonomy, nomenclature, mitogenetic phylogeny, *Opsariichthys*, Vietnam.
Preliminary Taxonomic Studies of Duckbill eel (Nettastomatidae, Anguilliformes) off Taiwan

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\textbf{ABSTRACT}

Nettastomatidae is a deep sea eel family which belongs to the apodal fish order Anguilliformes. Because their very similar appearance, frangible body and easily broken tail, the family Nettastomatidae are poorly known about its knowledge and research study on the world. According to Nelson (2006) \textit{<Fishes of the World 4\textsuperscript{th}>}, there have six genera about thirty-eight species distribute worldwide; especially in the Indo-Pacific region. Specimens in this study were collected around Taiwan, on the open sea. Most of them were collected from the bottom-trawl fish market in north-eastern part: Daxi, NanFangao, Ilan; and south-western part of Taiwan: Tungkong, Pingtung. Some specimens were collected from Dongsha by the research vessel. And we also visited all Taiwanese fish collection museums to check and examine this study group. Measurement, counting and illustrations are all taken and done in laboratory. As a preliminary result, this study shows up that there have 4 genera about 10 species of Nettastomatidae in Taiwan, and we find out the precaudal vertebrae counts (PCV) might be an important character. Due to the fragile and easily damaged tail, it is very hard and maybe impossible to compare each species base on the total vertebrae numbers (TV), for this reason, counts of the precaudal vertebrae maybe as a second useful character which can instead the total vertebrae in some case. Diagnosis, color photo, dentition illustration, and the key to Nettastomatidae are all display below.

\textbf{KEY WORDS:} Nettastomatidae, Anguilliformes, Duckbill eel, Taiwan.
Developing an effective photographic identification method via the facial features of green turtles in Luichiu island, Taiwan.

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\textbf{ABSTRACT}

Liuchiu Island is one of the existing nesting sites of green turtles in Taiwan. In addition, green turtles are also easily observed in the nearshore waters. In order to understand of the population size of sea turtle in the nearshore waters, we use photo-identification method to estimate the total number of the turtles in the water. This photo-ID method is based on the face scales characteristics of sea turtle, such as the shape, numbers, size and arrangement of the scales. Based on the results of this study, we estimated that there are 73 green turtles in total inhabits in the nearshore waters around Liuchiu Island. This is the first study in Taiwan to estimate the population size of wild animal with the photo ID method. It can also facilitate the long-term researches and conservation of green turtle in Liuchiu Island.

\textbf{KEY WORDS}: photo-id, green turtle, photographic identification
Studies on the life cycle of three Anthomedusae (Hydrozoa: Hydroidomedusae) from Xiamen Harbor

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ABSTRACT

As one of the most important groups in marine zooplankton, Medusae plays a distinguished role in marine ecosystems due to the large population quantity and vital ecological influence. Like most of the Cnidarian species, it is characterized as fragile forms and complex, morphologically-distinct life history stages, which always leads to the misidentification, even for taxonomic experts. In this study, complete life cycles of three species, \textit{Bougainvillia} sp. (Anthomedusae: Bougainvilliidae), \textit{Hydractinia multigranosi} (Anthomedusae: Hydractiniidae) and \textit{Zanclea} sp. (Anthomedusae: Zancleidae) were described, morphological characters of both polyps and medusae were documented and compared to those of the congener species. Types of nematocysts were analyzed with the help of light microscope. Mitochondrial partial 16S rRNA and cytochrome oxidase subunit I (COI) gene sequences, two of the promising DNA barcodes for Hydrozoa identification, were sequenced and submitted to GenBank. Neighbor-joining (NJ) cluster and genetic distance under the Kimura two-parameter (K2P) model based on the two sequences strongly support the morphological identification. Moreover, two species, \textit{Bougainvillia} sp. and \textit{Zanclea} sp. showed a relatively broad genetic variance (0.05~0.10) compared with the sequences from the database, which probably indicate the presence of cryptic species and an underestimation of local marine biodiversity. Additionally, field sampling with plankton net always brings about low biomass and abundance of Anthomedusae, together with the evidence of the relatively high polyp colony growth rate and medusa release frequency, might call for a better understanding of the traditionally believed bloom species.

KEY WORDS: life cycle, Anthomedusae, Xiamen Harbor
Preliminary research on the ecosystem-based sea use management: Three cases study of the typical bays in Fujian Province

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\end{itemize}

\textbf{ABSTRACT}
Bay locates between ocean and continent, holding a key position for the coastal zone exploitation, and is regarded as the complex of all kinds of marine resources. With the rapid development of the marine economy, the exploitation activities gradually intensified. It results in a significantly ecological pressure on the bay ecosystems. The environmental pollution in bays not only deteriorates the function of ecosystem but also the biodiversity, since it directly influences the sustainable development of social economy around bay area. Fujian is a province on the southeast coast of mainland China, and its coastline is rugged and has many bays and islands. Xiamen Bay, Quanzhou Bay and Luoyuan Bay represent three kinds of bays affected by the land runoff, coastal industrial and aquaculture, facing the problems such as ecological environment deterioration, bay area reducing, and resource degradation. This research based on 1990–2010 of bay environmental quality status survey data in Fujian Province, analyzing Xiamen Bay, Quanzhou Bay and Luoyuan Bay sea area use situation and environmental quality, and explaining Fujian Province typical bay main problems appeared in the resources utilization process. Preliminary research in long time scales environment quality changes, and the relationship between it and regional economic development model, different industrial structure, public policy, etc. And based on the Ecosystem-based management (EBM) bay integrated management mechanism, to put forward the corresponding management suggestions and provide reference for effective bay integrated management methods.

\textbf{KEY WORDS:} bay, ecosystem-based management
Spatio-temporal variations in diversity and abundance of demersal fishes in Hong Kong waters before the territorial-wide ban of trawling

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ABSTRACT

Hong Kong’s marine environment is influenced by tidal currents, the Pearl River discharge and monsoon induced coastal currents. Owning to these influences, western waters (WW) of Hong Kong are heavily influenced by freshwater and sediment discharge from the Pearl River and the dominating Hainan current during summer monsoon. Eastern waters (EW) are mainly affected by oceanic and tidal currents, while southern waters (SW) are in the transitional zone of this estuarine-oceanic gradient. Such a gradient drives spatio-temporal differences of marine biodiversity in local waters. This study investigated the spatio-temporal variations in diversity and abundance of demersal fish species in Hong Kong coastal waters by conducting trawl surveys in WW, EW and SW during July to November 2012. A total of 162 fish species from 49 families were recorded, among which Trypauchen vagina, Siganus canaliculatus and Cynoglossus arel were the most abundant fish species in WW, EW and SW, respectively. The highest fish abundance and biomass was found in EW, whereas the fish diversity of EW was significantly lower than that of WW and SW. Results of the present study were similar to findings of previous studies in EW and WW between December 2003 and May 2005. Patterns of the abundance-biomass comparison curves and negative W-statistics revealed that the demersal fish community has been subjected to intense anthropogenic perturbations such as trawling and pollution. Since a territorial-wide trawl ban has been imposed in Hong Kong waters on 31 December 2012, the present results can serve as a baseline for studying the prospective recovery trend of demersal fish biodiversity.

KEY WORDS: demersal fish, trawling, diversity, sustainability, Hong Kong
Short-term Temporal and Spatial Variations in Larval Fish
Community in Estuary of Tamsui River, Northern Taiwan, and
Relations in Sampling Designs

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**ABSTRACT**

Researches on larval fish provide important and fundamental information for fisheries management and marine conservations. However, the accuracy of the information will affect the subsequent efficiency of management. In the past, the majority of the time unit in larval fish sampling in Taiwan was seasonally or monthly based, and thus, the representative samples might be biased. The objective of this research is to evaluate, through high frequency sampling, the larval fish assemblage variations in short-term temporal and spatial intervals and to discuss the relations in sampling designs. Larval fish were collected from 3 stations (array in line, 2 km apart from each) in the coastal waters of Tamsui River estuary, Northern Taiwan, with different sampling frequencies (2~12 hours across day and night, and 2~43 days intervals) and in early June to mid-July 2012. Afterward, the larval fish assemblage variations in different temporal and spatial scales were evaluated. The preliminary results showed that the fluctuations in the catches were large. In the temporal scale, the most important factor that resulted in community variations in the fish assemblages was day-night; the next important factors were the hourly- and daily-intervals. In the spatial scale, there were no significant assemblage differences among the 3 stations. This preliminary result suggests that, to correctly reflect the larval fish assemblages in the Tamsui River estuary, the sampling designs in the future must firstly cover the day-night interval and secondly increase the hourly and daily sampling frequencies, as well as decrease the number of sampling stations.

**KEY WORDS:** Tamsui River, larval fish, sampling designs, short-term variations

**Critique:**

**Score:** ☆☆☆☆☆
The influence of temperature on juvenile growth and development of a tropical marine fish

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ABSTRACT

Average sea surface temperatures (SSTs) are predicted to increase by at least 1–3 °C on the tropical oceans by the end of the 21st century. Coral reef ecosystem has been considered widely as one of the most vulnerable ecosystem to global climate change. Coral reef fishes, as the important components in the ecosystem, understanding the impacts of temperature increase on their recruitment mechanisms have become extremely important. To understand the influence of temperature on growth and development of coral-reef fishes, the orange clownfish *Amphiprion percula* (Pomacentridae) is selected. Juveniles of *A. percula* from 12-day post hatching (DPH) to 87 DPH were reared in captivity at water temperatures of 22±0.5, 25±0.5, 28±0.5 and 31±0.5 °C, respectively. For each temperature, six replicates were carried out with 50 juveniles per replicate. The water temperature of 31 °C is approximately 2–3 °C above the long-term average of summer sea temperature at tropical oceans. During the experimental period, ten juveniles were sampled randomly every 25 days from every replicate; five were examined for gonad development and the rest five were analyzed for skeletal development. This long-term study will provide scientific evidences for predicting the population trends of coral reef fishes under climate change.

KEY WORDS: temperature, climate change, coral reef fishes, growth, development
Can Dynamic Energy Budget models simulate the life history traits of the black mussel, *Septifer virgatus*, under heat stress on tropical shores?

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\textbf{ABSTRACT}

During low tides, emersion period can be extremely stressful on tropical shores, when high temperatures and desiccation stress can invoke high energetic costs from heat shock responses, and may lead to mortality of intertidal species. To investigate possible strategies of energy allocation, and associated growth and reproduction under such conditions, a Dynamic Energy Budget (DEB) model approach was applied to the black mussel *Septifer virgatus* (Wiegmann). *Septifer* is dominant in the mid-low levels of exposed shores in the Northwest Pacific, reaching its southern geographic limit in south China. In Hong Kong, aerial and rock surface temperatures over 30 °C and 50 °C respectively during hot, wet summer season, lead to "high shore kills" where the mussel percentage cover drops from 82% to 27% and density decreases from 1654 inds per m\textsuperscript{2} to 216 inds per m\textsuperscript{2}. Provisional data from the DEB model show that *Septifer* require more energy in summer before reproductive events, which may be related to tolerance of heat stress and/or energy storage for reproduction. Increasing heat stress due to climate change is likely to result in greater mortality of *Septifer*; and thus a possible northwards shift in the geographic distribution. DEB models, therefore, can predict how *Septifer* may respond under different temperature regimes by determining the energy allocation strategy; and will be important to our understanding of the strategies this species can adopt to tolerate thermal and desiccation stresses which can reach lethal limits in the tropics.

\textbf{KEY WORDS:} dynamic energy budget, energy allocation strategy, heat tolerance, *Septifer*
Physiological response of the limpet Cellana toreuma to simulated environmental heat stress

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ABSTRACT

Many rocky intertidal species in Hong Kong suffer from heat stress during summer, particularly when spring low tides fall in the afternoon. Under such conditions, intertidal organisms such as limpets are subjected to long periods of emersion where they experience both thermal and desiccation stresses associated with the hot and wet monsoon season. Environmental stress from emersion has been shown to have effects on the physiology of many intertidal organisms, including the limpet Cellana toreuma. This study examines the possible physiological responses (increase in heartbeat rate, changes in body water content and osmotic concentrations of mantle water and haemolymph) of C. toreuma in the laboratory and specifically tests whether limpet body size has an effect on metabolism and overall thermal tolerance. To establish whether the Arrhenius breakpoint temperature (ABT), heart beat rate, water loss and osmotic concentrations of C. toreuma varies with size, different size classes of C. toreuma were selected to test their physiological response to elevated temperature. Results show that smaller limpets have higher heart beat rates compared to larger ones. Smaller limpets also showed higher percentage water loss and osmolality. This study attempts to link whether this is related to their physiological responses, and how these may explain cases of mass mortalities during the summer and transform to larger-scale patterns in the population dynamics of this limpet. Understanding C. toreuma’s physiological response to thermal stress will ultimately lead to an understanding of the potential different strategies it can invoke to combat such predictable stress.

KEY WORDS: Cellana toreuma, physiology, stress, temperature
A Review on the Study of Stream Aquatic-Terrestrial Interactions Mediated by Riparian Arthropods and Investigation of Consumer Food Sources by Stable Isotope Analysis

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ABSTRACT

Stream margins provide an array of microhabitats for different organisms and act as a medium for energy and material exchanges between terrestrial and aquatic ecosystems to take place through different ecological processes. Some of the processes include the supply of allochthonous subsidies to consumers mediated by invertebrates, such as input of emerging aquatic insects into the terrestrial environment, predation of adult aquatic insects by terrestrial predators, and input of terrestrial invertebrates from overhanging vegetation into streams. The importance of energy exchange through these processes has been broadly investigated in temperate regions, but data from tropical regions is still scant. The confirmation of consumers’ energy dependency on resources from adjacent systems through assimilation-based techniques is also an area that needs to be explored. A review on the above topics would be conducted using currently available literatures. Apart from the review, a currently ongoing study will be introduced. By exploring temporal and spatial dynamics of riparian arthropods through field surveys and basal food sources of consumers by stable isotope techniques, this study will provide a better understanding on the consumer-resource relationship and energy links across the land-water boundary along tropical Asian streams.

KEY WORDS: riparian zone, arthropods, energy links, stable isotope
Shallow Marine Ecological Degradation In Hong Kong: A Paleoecological Approach Using Ostracods

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\textbf{ABSTRACT}

Hong Kong is one of the largest and most rapidly developing cities in Asia. It is known that the marine ecosystems of Hong Kong have been seriously influenced by a variety of anthropogenic factors, including eutrophication, bottom trawling, coastal reclamation, pollution etc. However, little is known about long-term history of such human-induced marine ecological degradation in Hong Kong. Here we use microfossil ostracod as a model system and compare among top-1-cm (representing live or recently dead assemblages) and whole (representing averaged state of assemblage for the past several decades) assemblages in grab samples and Holocene background assemblages in a long sediment core. Preliminary results showed that discrepancy between top-1-cm and whole assemblages is larger in urban sites and smaller in rural sites. Furthermore, species diversity of Holocene background assemblage was much higher than diversities in grab samples. Faunal composition of Holocene sample was also distinct from faunal assemblages of grab samples. These results clearly indicate serious ecological degradation during the past several decades.

\textbf{KEY WORDS}: ostracods, ecological degradation, anthropogenic impacts, shallow marine

Critique: ____________________________  
Score: ★★★★★
Organotin contamination in market seafood and its implication for human health risk in Hong Kong

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ABSTRACT

Organotins (OTs), in particular tributyltin (TBT) and triphenyltin (TPT), have caused widespread adverse effects on marine organisms since their wide application as biocides in 1960s. For instance, TBT induces imposex development in marine gastropods and inhibits growth and development in oysters. Nevertheless, it is anticipated that there will be a reduction of OT pollution in the marine environments after the mandatory global ban on the use of OT-based antifouling systems which was started from September 2008. Humans can take in OTs via consumption of contaminated seafood, and high levels of OTs present in our bodies may lead to health problems. In this study, we measured the tissue concentrations of OTs (i.e., mono-BT, di-BT and TBT, mono-PT, di-PT and TPT) in 11 seafood species including gastropods, bivalves and fishes. The highest total OTs concentration was 2326$\mu$g kg\textsuperscript{-1} dry weight in tongue sole \textit{Paraplagusia blochi}. TPT was the most abundant residue among the six OTs, accounting for 56--97\% of total OTs. The non-cancer hazard quotients (HQs) and hazard indices (HI; i.e., summation of HQs) were determined. The highest HQ for TPT was 2.50 in \textit{P. blochi} while the HQs for TBT and DBT were less than 1. HI of \textit{P. blochi}, however, is much greater than 1 indicating that it is likely to have risks of consuming this species. Evidently, OTs are still persistent in Hong Kong waters thus appropriate management actions should be taken to control their use and release in order to safeguard the marine ecosystem and human health.

KEY WORDS: triphenyltin, fish, tissue burden, hazard quotient, management
Tandem repeats, high copy number and strong diel rhythm in transcription of form II Rubisco in dinoflagellate Prorocentrum donghaiense

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ABSTRACT

Although Rubisco is the critical first enzyme catalyzing the fixation of inorganic carbon in photosynthesis, the structure and expression regulation of form II Rubisco in dinoflagellates is still poorly understood. In this study, we isolated this gene and investigated the diel expression rhythms of it in Prorocentrum donghaiense. Like other nuclear-encoded genes in dinoflagellates, the transcript of this gene possesses the conserved spliced leader at the 5’end, with a typical chloroplast transit peptide (76AA long) in the N-terminus of the deduced protein sequence, followed by at least 3 tandem repeats of the coding region. Every tandem repeat contains 1,455bp coding unit (the last one 1464bp) and is linked to another by a 63bp spacer. Using real-time PCR we obtained an estimate of 116.9±40.04 copies of Rubisco coding unit in the P. donghaiense genome. Results of qRT-PCR for fairly well synchronized cultures showed a strong diel rhythm of gene transcription, with Rubisco transcript abundance peaking at dark-to-light transition, when the cultures were dominantly in the G2 phase of the cell cycle. Stastical analyses revealed significant linear correlations between Rubisco expression and G2-phase fraction as well as time interval from light turnon. The results from this study indicate that 1) Rubisco diverged significantly between closely related species of Prorocentrum and 2) Rubisco is regulated transcriptionally and the transcription dynamics is likely co-regulated with the cell cycle by the light dark cycle.

KEY WORDS: rubisco, dinoflagellates, Prorocentrum donghaiense
Patterns of genetic variation among streams animals in Hong Kong

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\textbf{ABSTRACT}

Freshwater animals differ from their terrestrial and marine counterparts because of the isolation of their habitat units due to limitation upon dispersal (and hence genetic exchange) over land or along the coast. The resulting combination of inbreeding, local adaptation or genetic drift produce high genetic differentiation among populations, and may be responsible for the relatively high levels of $\beta$-diversity characteristic of freshwater assemblages. Even within the same drainage basin, the hierarchical arrangement of streams means that individuals from adjacent headwater tributaries may not be able to exchange if downstream areas offer unsuitable habitat or are rendered inaccessible by waterfalls or in-stream barriers such as dams. The objective of my research is to analyze the patterns of genetic variation among stream animals in Hong Kong and relate this to their dispersal abilities by comparing fully-aquatic species (e.g. snails, shrimps, fishes) with aquatic insects (mayflies, caddisflies, damselflies) that have differing abilities to disperse overland as adults. Amplified fragment length polymorphism (AFLP) will be used to compare inter-population genetic differentiation of study species within and among drainages with different degrees of separation. The first stage of this work has focused on a fully-aquatic prosobranch snail with limited dispersal ability, \textit{Sulcospira hainanensis} (Pachycilidae), that is widespread and abundant in Hong Kong streams. Patterns in the genetic variation of 14 populations of this snail will be presented and discussed.

\textbf{KEY WORDS}: genetic variation, AFLP, dispersal ability
Cloning, expression and biological activity of an antiparasitic peptide

Sciaenidin from red drum (*Sciaenops ocellatus*)

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ABSTRACT

The piscidin family of antimicrobial peptides with broad-spectrum antimicrobial activity plays an important role in the innate immune system of fish. Most piscidins are linear, amphipathic and cationic. A cDNA encoding peptide was isolated from red drum (*Sciaenops ocellatus*) head kidney named as Sciaenidin. The Sciaenidin belonged to the piscidin family. *Cryptocaryon irritans* is one of the most important ectoparasites of marine fish. The Sciaenidin mRNA expression was observed in multiple tissues of red drum, especially high in gill. A up-regulation was found in gill, skin and head kidney after 6 hour infection with *Cryptocaryon irritans*. After the parasites fell off the red drum up-regulation was observed in all tissues. Synthetic Sciaenidin had no antibacterial activity to Gram-(+) and Gram-(-) bacteria, but exhibited antiparasitic activity against *C. irritans*. The minimum protozoacidal concentration of Sciaenidin against trophonts and theronts were 12 µM and 6 µM. The 100% protozoacidal concentration of Sciaenidin against trophonts and theronts were 24 µM and 48 µM. So the Sciaenidin was an antiparasitic peptide. The recombinant Sciaenidin could be expressed as a soluble protein using a prokaryotic expression system. The synthetic Sciaenidin had very weak haemolytic activity. Taken together, our results showed that Sciaenidin might contribute to the innate host defense system of red drum against *C. irritans* and had potential application value.

KEY WORDS: piscidin, antiparasitic peptide, red drum, *Cryptocaryon irritans*
Using the numerical model to detect the effect of Kuroshio Current on the set-net catches in northeastern Taiwan

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ABSTRACT

Climate change is the important event in the world. Ocean current is one of the climate change and it will affect the coastal fishery. Set-net is the important coast fishery in Taiwan and the ocean current is affect the set-net catch very hard. In Taiwan, there is many set-net in the east, and those catch the fishes by the Kuroshio. it is a great amount of fish catches which come with Kuroshio on east by set-net. Kuroshio will be change with the seasonal change. Know the change of Kuroshio and could predict that is very useful in the fishing economic or fish resources. In the other research, there are a few papers which analysis the Kuroshio with the Sea Around Taiwan Model (SAT model). This study analysis the set-net catches from 2007 October to 2012 and combine the seasonal data of Kuroshio. We try to find the connection between the catches and Kuroshio data. The purpose which is understand the Kuroshio how to affect the fish group in this study is very important to manage the fishing resources, and know the change of Kuroshio to find the best fishery season. This study also discussed the possible reasons resulting in the fluctuation of the predictability.

KEY WORDS: Kuroshio, numerical model, costal fishery, climate change
Reproductive biology of seabreams (Family: Sparidae) and their fisheries status in Hong Kong and adjacent waters, with special focus on *Acanthopagrus schlegelii*, *Evynnis cardinalis* and *Pagrus major*

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**ABSTRACT**

Understanding the reproductive biology of fish species can provide important information to develop fishery management strategies and advance conservation. Seabream (Family: Sparidae) have long been important food fishes in Hong Kong yet little is known of their fishery status and biology. Many seabreams have interesting and diverse sexual patterns including hermaphroditism (i.e. adult sex change). Sex change can make certain species particularly susceptible to unmanaged fishing and may require specific management action. A study on the reproductive biology of three seabream species (*Acanthopagrus schlegelii*, *Evynnis cardinalis* and *Pagrus major*) that are important in the local capture fishery is being conducted. Fish samples were collected from wet markets and also from trawler surveys carried out by the Hong Kong government. The reproductive cycle, sexual maturity and sexual patterns were determined by both histology and gonadosomatic index. Information on local fisheries status and possible spawning and nursery areas is being collected by literature review, market surveys and interviews with fishermen. Preliminary results show that three focal species have similar spawning seasons, mainly during the winter-spring period from November to March. Protandrous hermaphroditism was found in *A. schlegelii* while *E. cardinalis* and *P. major* exhibited gonochorism. Market surveys revealed considerable numbers of juveniles on sale, suggesting the fisheries might not be sustainable especially for certain types of gear such as trawling and gill-net. Adults were mainly available during the spawning seasons suggesting there may be spawning migration. The major spawning and nursery ground of sparids concentrated in eastern waters such as Tolo Harbour.

**KEY WORDS:** reproductive biology, Sparidae, sexual pattern, fisheries
Modelling the growth of sea urchins: a multi-model approach

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ABSTRACT

Accurate growth determination is critical to understand population structure and support harvesting and conservation decisions. Sea urchin growth has been estimated by observing natural growth ring in the ossicles, determining size frequency distributions, and conducting mark-and-recapture studies using fluorescent dyes. Eight candidate models (i.e. von Bertalanffy, Logistic, Inverse logistic, Gaussian, Gompertz, Richards, Jolicoeur and Tanaka) are commonly used to describe different patterns of sea urchin growth. This review presents the pattern of use of these techniques and growth models in the literature, and demonstrates the importance of adopting a statistical approach to estimate sea urchin growth. Our review shows that the geographical cover and target species are skewed, with most of the sea urchin growth studies conducted in temperate water, compared with studies in cold/deep waters and in tropical/subtropical waters. A majority of these studies were conducted with growth ring analysis despite this method being the least reliable. The von Bertalanffy model was often used arbitrarily, whereas the few studies that compared model performance commonly selected the Tanaka and Richards models. There is no best model to estimate urchin growth but it is important to include a set of candidate models to examine their statistical performance (Akaike weight) before selecting a model to describe urchin growth. To substantiate this view, we used a recently developed R/Excel-based programme to conduct a meta-analysis of the empirical growth data of 10 studies of sea urchins, applying a multi-model approach and a set of quantitative selection criteria.

KEY WORDS: modelling, sea urchins, population growth, Akaike weight.
Ins and outs of sea cucumber fisheries and trade

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ABSTRACT

Sea cucumbers are a high valuable seafood commodity, traditionally consumed by Chinese communities. Dwindling imports have been related to over-exploitation of sea cucumber fisheries worldwide, associated to decline of holothurian populations. Thus investigating both growth and socio-economic aspects of the trade will help understanding ins and outs of issues related to holothurian consumption. On the one hand, this study aims at describing the current state of trade and consumption of bêche-de-mer in the central hub of the trade that is Hong Kong (SAR). This will be achieved by carrying out interviews with multiple stakeholders. On the other hand, this study intends to investigate growth of sea cucumbers that is one determining factor of population dynamics. This parameter is challenging to determine due to the plasticity of those animals. One way to characterize individual growth is the use of mark-recapture experiment. However, due to their mutable collagenous tissues, holothurian species are usually expelling physical internal and external tags. In the purpose of determining growth, this study investigates the use of fluorochromes to mark the endo-skeleton of holothurians: isolated microscopic spicules from body-wall and ossicles from the peripharyngeal calcareous ring. Test on the efficiency of using fluorochromes will be performed in Hong Kong on Holothuria leucospilota.

KEY WORDS: Holothurians, consumption, growth
Potential impact of global warming on Albacore (*Thunnus alalunga*) catch rate in the South Pacific

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**ABSTRACT**

Ablacoire (*Thunnus alalunga*) catch rate for Taiwan distant-water longline fishery in the South Pacific in relation to climatic variability was studied using generalized additive model (GAM). Satellite remote sensed sea surface temperature (SST), chlorophyll-a (SSC), sea surface height (SSH) and mixed layer depth (MLD), subsurface ocean temperature at certain depths (T105M, T205M and T303M) from 1998 to 2007 were utilized as covariates for assessing albacore catch rate in the South Pacific. GAM results indicated that water temperature changes were the most important factors for albacore catch rate, in which subsurface ocean temperature was better compared to SST. T205M and T303M warming had positive effect on albacore catch rate, respectively. However, SST has the advantages of accurate and rapid observation, yet still plays an important role in fisheries researches. Other parameters such as SSH and SSC, their influences on tuna catch rate were still uncertain. In this study, we introduced IPCC scenario simulation data in to the GAM-empirical model in order to analyze the future change of fishing ground. The result indicated that the level of declination was most significant in scenario A2. The outcome of scenarios B1 and A1B suggested that different capture rates decline varied with season. No matter in which scenarios, the trend indicates that areas with higher catch rates will be moving to higher latitudes. New scenario simulation data will be released recently and the accuracy of forecast fisheries will be improved by rolling correction in the future.

**KEY WORDS:** albacore, longline fishery, South Pacific Ocean, climate change
Marine environmental monitoring scheme of estuary: Case study of 
Pearl River Estuary
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ABSTRACT
Currently, estuarine environmental monitoring in China still faces many problems such as undefined objectives, disregard of the features of estuary and the disjunction between monitoring and assessment. Aiming at solving these problems, the paper proposes to set up a scientific and integrative system for estuarine environmental monitoring and assessment. The original monitoring schemes in Pearl River Estuary are reclassified and we mainly focus on the type of surveillance monitoring. Taking account of the chemical, physical and biological background information of Pearl River Estuary, together with the consideration of hydrodynamics, ecosystem type and pollution sources, the new monitoring scheme were designed, implemented and gradually optimized during three cruises, following the step-by-step approach. Three cruises of monitoring were conducted in December 2011, May and August 2012. We particularly improved in three fields: (i) Added some fixed and unfixed monitoring stations to understand salinity distribution and the mixing of freshwater and seawater; (ii) Added salinity, total nitrogen and phosphorus as monitoring indicators; (iii) Applied quasi-synchronous sampling method to conduct monitoring at flat tide time of neap season in each cruise. The monitoring results show that the horizontal distribution of monitoring indicator conforms to the features of hydrodynamics and pollutant sources distribution, the salinity dilution curve conforms to the estuarine chemistry principle, which demonstrate that the new monitoring scheme could reflect estuarine biogeochemical features and is scientifically correct.

KEY WORDS: estuarine environmental monitoring, step-by-step approach, Pearl River Estuary

Critique:______________________________ Score: ☆☆☆☆☆
Ecosystem Vulnerability Assessment of the Tieshangang Bay, GuangXi

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ABSTRACT

Base on a summary of the exiting theories and methods of ecological vulnerability assessment, it was stated that exposure, sensitivity and adaptive capacity should be the key elements of vulnerability. The comprehensive assessment framework consisting of four hierarchies was constructed, including objective level, branch objective level, normal level and index level. With a combination of Analytic Hierarchy Process (AHP) and Principal Components Analysis (PCA), a total of 40 indicators for the key elements were proposed and weighted to assess the vulnerability of Tieshangang Bay quantitatively. The exposure indicators included natural stresses (annual days of extreme temperature, annual frequency of storm surge, pests, biological invasion, etc.) and anthropogenic stresses (population density, GDP per capita, aquaculture, pollution from land-based sources, intensity of tourism development, etc.). The sensitivity indicators consisted of water quality index, sediment quality index, biodiversity index, the habitat quality of mangrove and seagrass bed, etc. The adaptive capacity indicators comprised of tertiary industry accounted for GDP, investment on controlling the environmental pollution, the proportion of population with higher education, the rates of sewage treatment, regulations and policies, construction of MPA and public participation. The result of vulnerability assessment showed that the Tieshangang Bay was ecologically light vulnerable. The rapid expansion of invasive alien species was the major lead to the exposure. Meanwhile, the best practice of MPA was one of the most effective ways to reduce vulnerability.

KEY WORDS: vulnerability assessment, exposure, sensitivity, adaptive capacity, the Tieshangang Bay
How much should hydropower plants pay for the damaged ecosystem services?

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ABSTRACT

Hydropower used to be considered as entirely clean energy until its negative impacts were identified as well as the supplier-buyer-conflicts emerged. Ecological Compensation (more widely termed as Payment for Ecosystem Services) is a novel instrument to tackle sustainable development issues of water resource. However, integration of PES with hydropower development for decision making is rarely done. It’s also still controversial about how much should the developers pay for the external and invisual damaged caused. This study theoretically discussed the concept of PES of hydropower development in essence, as well as the principles to determine the payment criteria. As a result of the discussion, this study adopted three different methods, damaged watershed ecosystem services evaluation, opportunity cost analysis and ecological restoration cost accounting, to evaluate negative impacts induced by hydropower plants. This theoretical approach was later applied in the case study of Jiulong River Watershed in Fujian Province of P. R. China. It’s suggested that the ‘damaged watershed ecosystem services evaluation’ requests 893.54 million Yuan per year as the payment standard, while the ‘opportunity cost analysis’ is asking for 1347.64 million Yuan per year, but the ‘ecological restoration cost accounting’ only proposes a demand of 215 million Yuan per year. However, the reasonable payment criteria of hydropower development on Jiulong River Watershed should be ranged from 215 to 1347.64 million Yuan per year as it is subjected to various impact factors, e.g. negotiation between stakeholders and different sectors, paying approach and PES mechanism, etc.

KEY WORDS: payments for ecosystem services; hydropower; quantifying criteria; Jiulong River Watershed
Intrinsic value-- a potential undervaluation of marine and coastal ecosystem

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ABSTRACT

Humankind depends on oceans and its coasts for survival. With one third of the world’s population living in coastal areas, ecosystems and their value are important and critical to understanding the overall importance of those coasts for human community. Ecosystem services are valued from the view of human needs; by definition they only represent the instrumental or extrinsic value of an ecosystem, rather than the full value. There is a potential undervaluation that has to be remedied. Intrinsic value is the value that an ecosystem has in itself and for itself, independent of extrinsic properties. This value arises from the essential internal properties of an ecosystem. Based on the aspects of marine ecosystems, we analyze the production processes and realizations from marine ecosystem services and also calculate the intrinsic value. We consider the ecosystem service produced by its components, functions and processes. However, the intrinsic value related to the natural properties of marine ecosystems, including complexity, self-organization, and non-linear dynamics, requires complicate analyses. It is shown that ecosystem services are the external form of ecosystem value, and intrinsic value reflects the internal properties of an ecosystem that can be mapped to a value scale. The complete marine ecosystem value is the union set of the ecosystem services values and intrinsic value.

KEY WORDS: marine and coastal ecosystem; intrinsic value; ecosystem value; ecosystem services
Effects of Submarine Grundwater Discharge on the Carbonate System in a Coastal Coral Reef Environment: Significance of Tidal Forcing

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ABSTRACT

Coral reefs are vulnerable to climate and environmental changes, examples of which may include pH reduction, or ocean acidification. Although rarely considered, coastal reefs are prone to be affected by terrestrial inputs from submarine groundwater discharge (SGD). We conducted a week-long time-series observation on the carbonate dynamics in a coastal reef system off Sanya in the southern Hainan Island, China. We observed significant diurnal changes of partial pressure of CO$_2$ ($p$CO$_2$), dissolved inorganic carbon (DIC), total alkalinity (TA), pH, and dissolved oxygen (DO). The amplitudes of diurnal variations were larger in spring tide compared to neap tide. Most interestingly, during spring tide salinity drops occurred at low tide coinciding with peaks of sea surface $p$CO$_2$ while inconspicuous at neap tide. These observations pointed towards a SGD input of high DIC/TA/ $p$CO$_2$ and low pH waters largely tidally-driven. The intrusion of SGD of low pH led to the aragonite saturation as low as 1.72. High frequency variations at diurnal time scales in the carbonate system, although also influenced by SGD, were largely controlled by biological metabolisms. We contend that such tidally-driven SGD fluxes of low pH waters could be a potential threaten to coral reef systems.

KEY WORDS: Hainan Island, coastal reefs, submarine groundwater discharge
Abstract

(Poster)
Exploring the Role of Ecological Groin in Improving River Water Quality: A Case Study in Wangyu River, China

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ABSTRACT
The ecological groin being built using elastic filter bulb with biologic filler, has received attention in the community for its role in improving stream water quality through altering stream hydrodynamics and intercepting sediment, as well as the sediment-attached nutrients. As an important component of the project “Transferring Yangtse River into Taihu Lake”, Wangyu River, was chosen in this study to investigate the effect of ecological groin based on two sampling campaigns in spring in 2012. The results showed that suspended solid (SS) and total phosphorus (TP) in the water were removed significantly after the ecological groin. The SS and TP in the surface, intermediate and bottom water were reduced after the ecological groin by 53.50 and 12.74%, 44.00 and 14.53%, and 35.50 and 9.34%, respectively, which were greatly related to the facts that ecological groin favored sedimentation and that the total particulate phosphorus accounted for up to 75.00% of TP in the water. Comparatively, TN concentration in the surface, intermediate and bottom water were reduced after the ecological groin by 5.64, 2.38 and 5.06%, respectively. On the one hand, the nitrite bacteria on the biological membrane of the groin’ filter material facilitated the ecological groin to remove the nitrogen in the water. On the other hand, the ecological groin exerted relatively little effect on nitrogen removal in the water, partly because Total dissolved nitrogen (TDN) accounted for approximately 84.50% of the TN in the water samples. The findings of this study enable us to gain insight into the role of ecological groin in improving river water quality.

KEY WORDS: ecological groin, river water quality, river ecological restoration
Seasonal and horizontal changes of zooplankton in Sansha Bay, Fujian

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ABSTRACT

The semi-enclosed coastal waters of northeastern Fujian (Sansha Bay) are an important natural spawning ground for the large yellow croaker (\textit{Larimichthys crocea}) in China. The yellow croaker is an important species for Chinese fisheries, and depends on a healthy zooplankton population. In this study, we tried to analyze the characteristics of this ecosystem from a new perspective, eco-groups. The seasonal and horizontal changes of zooplankton in Sansha Bay were described and its relationship to the currents from the open sea was analyzed. Sampling was carried out in June, August and October 2010, and in April and May 2011. Seasonal and horizontal changes in the zooplankton community structure were strongly influenced by the coastal current and the Taiwan Warm Current as well as an influx of freshwater from the mainland. A total number of 71 species of zooplankton were identified, which consisted of 19.72\% warm temperate nearshore species, 30.99\% subtropical nearshore species and 47.89\% subtropical offshore species. The community structures were different as seasonal and horizontal changes. The characteristics of the zooplankton community in Sansha Bay were similar to those in the subtropical water areas of China.

KEY WORDS: eco-group; seasonal succession; zooplankton; Sansha Bay
Study on Eco-compensation of Coastal Principal Functional Zoning
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ABSTRACT
In recent years, the coastal environment and resources problems have been getting obvious, because of the intense economic activities and the ecosystem vulnerability. Therefore, it is urgent to take into account both sea and land, and make a new planning and layout for the development of coastal zone. Coastal principal functional zoning (CPFZ) is a new approach to solve the issue of conflict on utilizing coastal resources, and protect the coastal environment. The eco-compensation policy is one of the most important corresponding mechanisms, which could improve the operability of CPFZ decision. This paper discusses the eco-compensation connotation, and points out that the eco-compensation of CPFZ should consider two aspects, i.e., the compensation of coastal ecosystem services damage caused by the leading industries, and the compensation for losses of the restricted or forbidden industries for the leading industry priority. Then some estimation models for eco-compensation amount are built by methods of market price, benefit transfer, indirect market and expert judgment, and applied into a case study of Luoyuan Bay. Based on the CPFZ results of Luoyuan Bay, the relevant eco-compensation amount is estimated. For the coastal ecosystem services damage caused by mariculture, the reference eco-compensation amount would be 220-270 million RMB/a from 2013 to 2020. The compensation for losses of the restricted port and shipping industry is approximately 3.5 million RMB/a. The paper ignores the compensation for tourism due to the lack of special tourism resources and small development potential of tourism in this area. The relevant policy is also suggested.

KEY WORDS: coastal zone, principal functional zoning, eco-compensation, Luoyuan Bay
Diurnal Variation of Zooplankton Distribution Characteristics in the Jiulong River Estuary, Fujian

Jing He

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ABSTRACT
Based on the data collected at the station M2 (24.396°N, 117.938°E) at Jiulong River Estuary during May 24 ~ 25, 2012 (samples were collected every 3h), the species composition and abundance of meso- and macro-zooplankton were preliminarily studied. The results showed that 36 species of zooplankton and 11 groups of planktonic larva were recorded. Most were estuarine and neritic species. With the tides and salinity changed, the species composition of zooplankton was changing. The species number at flood tide was larger than that at ebb tide. Blackfordia virginica, Pseudodioaptomus poplesia and Acartiella sinensis were the dominant species during this investigation. They made up 52.35% ~ 95.46% of the total abundance (except at 4:00 am). The total individual number of zooplankton varied from 639.20 ind. /m$^3$ to 6975.56 ind. /m$^3$, and the abundance number at night was significantly higher than the day. There were three quantity peaks of total abundance of zooplankton appeared in the early morning, dusk and midnight respectively, which was related to the diurnal vertical migration of copepod. Light intensity, tidal, topography and zooplankton physiological adaptation were important factors which affecting the diurnal variation of zooplankton in this estuary.

KEY WORDS: Jiulong River Estuary, zooplankton, species composition, diurnal variation
Spatio-temporal characteristics of species composition caught by
torch-light fisheries in Kong-Liao Region

Ching-Hsien Ho, Yi-Ting Liao, Hsueh-Jung Lu and Kuo-Tien Lee

Department of Environmental Biology and Fisheries Science, National Taiwan
Ocean University, Keelung 202, Taiwan, R.O.C.

ABSTRACT

Kong-Liao is a traditional fishing village located in northeast Taiwan with more than half of its population rely on fishery. The fisheries mainly operated in the adjacent water of the Yen-Liao bay, where Kuroshio and China coastal currents meets. Under the global warming scenario, many impacted fishery resources in the world has been reported. Seasonal migratory pelagic species are main targets for the local Kong-Liao villagers, especially for torch-light net fisheries concentrating fishing effort in summer time. As the sea surface temperature rising is very significant in recent decades, there might be influence on the pelagic fish resources. But how is the response of the migratory pelagic species? It’s very hard to observe from short-term survey. Therefore, the objective of this study is to find out the relationship between the alteration of species composition caught by torch-light fishery and ocean temperature in the Kong-Liao region.

KEY WORDS: spatio-temporal characteristics, species composition, torch-light fisheries, Kong-Liao
Variations of primary productivity and skipjack tuna (*Katsuwonus pelamis*) stock in the Western and Central Pacific Ocean

Kuo-Wei Yen, Hsueh-Jung Lu, Ping Li

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**ABSTRACT**

The ocean possesses a huge dissolved organic carbon pool, most of which are found in the Western and Central Pacific Ocean (WCPO), characterized by high sea surface temperature and an oligotrophic environment, is the largest fishing grounds of skipjack (*Katsuwonus pelamis*) in the world. The spatial and temporal features of primary productivity in the WCPO may affect the distribution of skipjack stock. In this study, we used 3 monthly high resolution pieces of remote sensing data (4 km × 4 km spatial resolution), including sea surface temperature (SST), Chlorophyll-a (Chl-a) and photosynthetically active radiation (PAR). Throughout the study, the vertically generalized production model (VGPM) was utilized to establish euphotic depth-integrated primary productivity (IPP). The modeling IPP was used to find the relationship between IPP and the stock assessment of skipjack tuna. During 2003-2010, one degree of aggregated CPUE data from a Taiwanese purse seiner fishery was utilized for accurate analysis. The major results of the analysis are as follows: In the WCPO, the IPP near islands has a higher value, but most of the high IPP is still from the Eastern Pacific. Areas with high IPP were altered by ENSO episodes. Areas where IPP significantly correlated with ENSO were mainly located along the equatorial band (2°N-2°S), with the highest value being between 160 ~ 165°E. We found that the high recruitment of skipjack occurred between 24 and 48 months after an IPP bloom. The time lags imply that the primary productivity increases led to an increase of larvae survival rate and affected the recruitment of skipjack broodstock. However, a low recruitment of skipjack was also observed with a time lag of 3-6 months. These results need further investigation.

**KEY WORDS:** *Katsuwonus pelamis*, recruitment, ENSO
An undescribed species of genus *Pseudogobius* Popta from the mangrove estuary of Matang, Malay Peninsula

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ABSTRACT

A mangrove Pseudogobius goby is first described herein as an undescribed species and was collected from the shallow intertidal pools at the mangrove estuary around Matang, Malay Peninsula, Malaysia. *Pseudogobius fulvicaudus* n. sp. is well distinguished from other congeners by the unique combinations of the following features: (1) fin rays: D2 I/7, A I/6-7 (modally 7), P 14-15 (modally 15) and first dorsal fin lacking filaments; (2) squamation: lateral body with large ctenoid scales, longitudinal scale rows 25-26, predorsal scales 6; (3) specific coloration: body with 4-5 main oblique black bars, caudal fin base with 2 black spots; first dorsal fin with a rear black blotch, and caudal fin base with a large semicircular bright yellow mark. It belongs to the small-sized *Pseudogobius* genus, with 15.5 mm being the minimum mature female SL. We will compare this undescribed *Pseudogobius* species from other nominal species based on morphological features herein.

KEY WORDS: *Pseudogobius*, undescribed species, Gobiidae, Malaysia.

Critique: ___________________________________________  Score: ☆☆☆☆☆
Species identification of starfishes by PCR-restriction fragment length polymorphism analysis of the 16S rRNA gene

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ABSTRACT

Starfishes are echinoderms, belonging to the class Asteroidea and currently species numbers being 1,800. Taiwan is an island topography. The diversity of asteroids occupied of a wide range of habitats, including tidal flat, shallow water, coral reef and sandlot. The species numbers are approximately 56 in Taiwan. Starfishes are echinoderms, belonging to the class Asteroidea. Because the starfishes are with inheritance, mutation or different habitats, morphological identification may be sometimes misjudged. Even starfishes have been processed for medicine, resulting in difficulty for morphological identification. In order to identify the starfish species, gene sequencing and polymerase chain reaction-restriction fragment length polymorphism (PCR-RFLP) were used in this study. In conclusion, using designed primers, the 16S rRNA gene fragment sequences of the mitochondria DNA of four species were established and specific restriction enzymes were applied to identify four species of starfishes. Using restriction enzyme Alu I analysis could distinguish these 4 species of starfishes. In conclusion, 4 species starfishes of the 16S rRNA gene fragment sequences of the mitochondria in this study were established and using specific restriction enzyme Alu I could identify 4 species.

KEY WORDS: starfishes, PCR-RFLP, 16S rRNA gene
Molecular species diagnosis confirmed the pure population of Portuguese oyster *Crassostrea angulata* in Taiwan

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**ABSTRACT**

Shell morphology of oysters is plastic and sensitive to environmental changes and cannot be used as a reliable character for species identification. The oyster species found in Taiwan has long been identified as *Crassostrea gigas*. However, recent molecular studies have shown that the oysters found in Taiwan are the conspecifics, *Crassostrea angulata*, of those found in Europe. In this study, approximately 315 oyster samples were collected from Taiwan, Kinmen and Matsu Islands, and were analyzed based on mitochondrial DNA markers. The results showed that all the oyster samples collected in Taiwan formed a stable clade, identical to the clade of *C. angulata* and different from the clade of *C. gigas* found in Japan. However, the evolutionary genetic relationship between the two clades was very close. This study proved that both wild and farm oysters in Taiwan were *C. angulata*; *C. gigas* was not found in Taiwan. Furthermore, there is no evidence to show there are *C. angulata/C. gigas* hybrids occur in Taiwan.

**KEY WORDS:** oysters, mitochondrial DNA markers, evolutionary genetic relationship
Protein oxidative damage in an intertidal limpet *Cellana toreuma* facing thermal stress

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ABSTRACT

Marine invertebrates living in the intertidal zone frequently confront thermal extremes. Protein is sensitive to environmental temperature variation and closely relates to an organism's thermal tolerance, and protein oxidative damage is stimulated by high levels of Reactive Oxygen Species (ROS) that are induced by environmental factors such as thermal stress. Meanwhile, ROS can generate the oxidation of amino acid residues on proteins, forming protein carbonyls. Therefore, protein carbonyl groups, as biological markers, correlate well with oxidative damage and then the levels of protein damage in vivo. In this study, we used an intertidal limpet *Cellana toreuma* as a model organism, by measuring the level of protein carbonyl groups under several different temperature treatments to determine the effect of thermal stress on protein oxidative damage levels in the intertidal organisms. The levels of protein carbonyl groups were detected based on the principle that protein carbonyl groups was derivatization of the carbonyl group with 2,4-dinitrophenol hydrazine (DNPH), which leads to formation of a stable dinitrophenyl (DNP) hydrazone product, and analyzed by using OxyBlotTM Protein Oxidation Detection Kit. Carbonyl protein groups were upregulated rapidly at high temperatures. The upregulation of carbonyl protein groups at 38°C was over four times higher than that at the low temperature of 22°C, and level of the carbonyl groups between 30°C and 40°C were higher than that at 22°C. The temperatures at which carbonyl groups was expressed initially (\(T_{on}\)) and maximally (\(T_{max}\)) were 30°C and 38°C, respectively. These results indicate that thermal stress can lead to huge amount of protein denaturation, and then energy is necessary for repair and clearance of denatured proteins. These results also suggest that the level of protein carbonyls is good indicator of the intensity of in vivo thermal stress for the intertidal limpet.

KEY WORDS: thermal stress, protein damage, carbonyl protein groups, *Cellana toreuma*, immunodetection
Liquid Chromatography-Tandem Mass Spectrometry Determination of the TTX Derivatives Produced from Bacteria in Gastropod

Oliva hirasei

Chun-Lan Lin\textsuperscript{a}, Hsu-Yang Lin\textsuperscript{b}, Cheng-Hong Hsieh\textsuperscript{c}, You-Liang Hsieh\textsuperscript{c}, Deng-Fwu Hwang\textsuperscript{ac*}

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ABSTRACT

To investigate tetrodotoxin (TTX) compound really produced from bacteria in the toxic gastropod Oliva hirasei, the muscle and digestive gland of O. hirasei were collected from New Taipei City, and plated on ORI agar broth for the aerobic plate count. Bacterial counts of were 7.10 and 8.89 log (CFU/g) into the digestive gland and 6.84 and 8.20 log (CFU/g) into the muscle from O. hirasei in August 2011 and March 2012, respectively. Based on API 20E the predominant genera were Vibrio, Pseudomonas, Shewanell, Pasteurella, Aeromonas and others. In addition, the bacterial strains were isolated from the gastropod digestive gland and cultured with ORI broth culture for 3 days. The cultured bacterial extract was frozen to dry, extracted TTX with methanol. The bacteria were confirmed to produce TTX by LC-MS/MS (liquid chromatography - tandem mass spectrometry) analysis. The results showed that V. alginolyticus (HO 014) and Vibrio sp. (HO 013) produced real TTX and TTX derivatives 4-epi TTX, 4,9-anhydro TTX, 11-deoxy TTX, 5-deoxy TTX and 5, 6, 11-trideoxy TTX. And the average toxicity of TTX-producing bacteria was 5.31 and 8.65 ng/mL, respectively.

KEY WORDS: tetrodotoxin, TTX derivatives, gastropod, TTX-producing bacteria
ABSTRACT

Sea urchin is a high economic fishery product in Taiwan. The edible part of sea urchin is gonad, consist 8-13% in total body weight. The rest part is mainly composed by shell which consisting 80-90% in total body weight, and is thought to be waste. The waste part of sea urchin shells sometimes caused environment pollutions. In this research, we use sea urchin body wall as materials to extract bioactive components and evaluate the availability of those extracts by different bioactivity assessments. The waste part of sea urchin body wall was extracted with 70% ethanol three times and filtered, the supernatant were concentrated by vacuum pump to remove ethanol and treated with ester to get ester layer (BE) and non-protein water layer (BW). The residue was extracted with 100% ethanol thrice to get ethanol layer (BA). To get the protein contained layer, body wall was directly extracted with water three times (BOW). Only BA and BOW layer showed inhibitory effect on L-DOPA forming activity. After incubating with different extract concentration, cells showed proliferation trends in BW and BOW layers with increasing extract concentration. But after incubating with BA and BE layer in different extract concentrations, the growth rate of cell showed to inhibit.

KEY WORDS: Tripneustes gratilla, bioactive component, waste utilization
Taxonomic review and molecular phylogenetic perspectives of Tripterygiid fishes from Taiwan

Min-Chia Chiang & I-Shiung Chen*

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ABSTRACT

Tripterygiid fishes (Blennioidei: Tripterygiidae) are small bottom-dwelling fishes characterised by three separate dorsal fins. The systematic status of the tripterygiid fishes recorded from coastal waters of Taiwan is reviewed. Twenty eight species belonging to five genera are described, including three recently published species- Enneapterygius sheni, Enneapterygius shaoi, and Helcogramma williamsi. The aligned ND5 and 12S rRNA gene dataset consists of 44 different haplotypes from 21 triplefin species and two outgroup with a total length of 2,000bp. Phylogenetic trees of tripterygiids from Taiwan are constructed using the maximum parsimony and Bayesian analyses of combined mitochondrial ND5 and 12S rRNA gene. All trees show the genus Norfolkia is the oldest group in these triplefin species. The largest genus Enneapterygius is not monophyly, in which E. tutuilae grouping with Springerichthys and Ceratobregma species, and E. philippinus sister to Helcogramma species that forming a monophyletic group.

KEY WORDS: Tripterygiidae, taxonomy, molecular phylogenetics, Taiwan
The head lateral-line system and preliminary molecular phylogenetic analyses of mudskippers and eel gobies in Taiwan

Zong-Han Wen and I-Shiung Chen

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ABSTRACT

The mudskippers and eel gobies are the Oxudercine gobies living in mangroves, estuaries, lagoon as well as the coastal waters with sandy to muddy substratum. In Taiwan, the species diversity of this group has been revised at least consisting of 9 genera and 11 valid species. The head lateral-line system of this group have been reexamined and checked in detail for those main taxa. All members of fish genera represent as the loss of any head canal system except Beleophthalmus with reduced anterior oculoscapular canal system of three pores. This research for preliminary phylogenetic approach has been employed mitochondrial CO1 gene sequences. Our preliminary survey for this group has found that there is no well separation for both so-called, mudskippers and eel gobies based on the partial CO1 genes. However, the further molecular evidence may be very necessary to enrich more informative characters by sequencing multiple genetic markers for both mitochondrial and nuclear genomes.

KEY WORDS: molecular phylogenetics, mudskippers, eel gobies, Taiwan
The systematics and molecular phylogeny of Pinguipedidae in Taiwan

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Institute of Marine Biology, National Taiwan Ocean University, Keelung 202, Taiwan, ROC.

ABSTRACT
The fishes of sandperches (Family Pinguipedidae) are known as the belong to class Actinopterygii, subclass Neopterygii order Perciformes, suborder Trachinoidei. They live mainly on sandy or sand-rubble areas; and they are usually carnivorous, feeding principally on benthic crustaceans, especially crabs and shrimps, occasionally on small fishes. The sandperch Family Pinguipedidae comprises 7 genera and 83 valid species. A total of 25 valid species of the Parapercis and Kochichthys in family Pinguipedidae has been recorded in Taiwanese waters. Parapercis is the largest genus in the family, 17 new taxa of Parapercis described in recent 5 years including 5 of them were just recently described from Taiwan. This morphological survey for cephalic lateral-line system is also conducted. In order to study the evolutionary history of sandperches around Taiwan, the genetic markers of mtDNA COI sequences have been processed for further phylogenetic analysis. The molecular phylogenetic analysis for 15 Taiwanese species has shown the support of monophyletic group for the largest species-diversity genus, Parapercis. Further discussion for other generic relationship among sandperches will be presented in this paper.

KEY WORDS: COI, Pinguipedidae, cephalic lateral-line system, Taiwan.
Molecular phylogenetic perspectives of evolutionary history of cyprinid fish genus, *Acrossocheilus* (Teleostei: Cyprinidae) in Fujian and Taiwan between the Formosan Strait inferred from both mitochondrial 12 S rRNA and CO1 gene sequences

Meng Han and I-Shiung Chen

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**ABSTRACT**

The member of cyprinid fish genus, *Acrossocheilus* (Teleostei: Cyprinidae) living in running fresh waters from the Eastern Asia which has been considered very diverse in current species. However, their phylogenetic analyses have never been surveyed in detail. The cyprinid fishes of *Acrossocheilus* in Fujian and Taiwan between the Formosan Strait have been recollected and processed the molecular phylogenetic analyses. The DNA genetic markers were employed as both mitochondrial 12 S rRNA and CO1 genes. The both clustering methods (distance method: NJ and discrete method: MP) have been conducted and performed as similar trees with same basal topology. Both trees reveal that three distinct large clades for species members from these and nearby regions. All species from Fujian and Taiwan can be existed within the three main clades. In Taiwan, there is only one species, *Acrossocheilus paradoxus* (Gunther, 1868) with slight geographical variations. Among all main basins of Fujian, there are at least two valid species in the Minjian basin; one is related to *A. paradoxus* (Gunther, 1868), and the other one is *A. hemispinus* (Nichols, 1925); there is one endemic species, *A. spinifer* Yuan & Zhang, 2006 in the Julongjiang basin; there are two species, one is *A. parallens* (Nichols, 1931) and another one may be undescribed one, *A. sp. 1* in the Tingjiang, Hanjiang basin; and there is one endemic and possibly undescribed species, *A. sp. 2* in the Dongshi basin. All detailed and relevant taxonomic comments will be discussed in this poster paper.

**KEY WORDS:** molecular phylogenetics, *Acrossocheilus*, CO1, 12S rRNA, Taiwan.
The systematics and molecular phylogeny of the genus *Bathygobius*

(*Teleostei : Gobiidae*) from Taiwan

Yu-Hai Kung and I-Shiung Chen

*Institute of Marine Biology, National Taiwan Ocean University, Keelung 202, Taiwan, ROC.*

**ABSTRACT**

The gobiid genus *Bathygobius* Bleeker, 1878, belonging to a group of small-size marine benethic gobies, which is widely distributed on the rocky substratum of intertidal habitats, estuaries, and lagoons in the tropical and subtropical region. So far, there are 29 nominal species reported in the world. There are 7 nominal species reported in Taiwan. In this study, we examine 6 valid nominal *Bathygobius* species (*B. fuscus*, *B. cocosensis*, *B. coalitus*, *B. cyclopterus*, *B. cotticeps*, and *B. laddi*). In order to clarify the phylogenetic perspective for such species group, we have employed the mtDNA sequence for further molecular analysis. The genetic marker, mitochondrial NADH dehydrogenase subunit 5 (ND5) gene partial sequence, was selected in this study. The molecular phylogenetic tree consists of 6 Taiwanese species was constructed by Bayesian analyses. The tree shows *B. coalitus* is the first diverged from the other *Bathygobius* species. *B. fuscus*, *B. laddi*, *B. cyclopterus* and *B. cotticeps* are separated into two groups and forming an ingroup. *B. cocosensis* is sister to the ingroup.

**KEY WORDS:** *Bathygobius*, ND5, molecular phylogeny, Taiwan
Seasonal variability of Kuroshio off the northeastern Taiwan using satellite remote sensing

An-Ke Hsu*

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ABSTRACT

Kuroshio is the world’s second-largest ocean current that is north-flowing current of western side in the North Pacific. Kuroshio transports warm and low-nutrient water such specially hydrological conditions can effect open ocean’s water mass transportation, fishery and even climate. Season is one of the most important factors to adjust our environment, so here we analysis the factot. In this study, ten years (2002-2012) sea surface temperature (SST) and ocean color data derived from Moderate-Resolution Imaging Spectroradiometer (MODIS) were used. Because the Kuroshio has entirely different water mass with the coast current, the SST data could be used to determine the front between the Kuroshio water and coast water. The thermal front (derived from the SST data) disappears in summer due to the spatially uniform surface heating. Hence, this research used ocean color data to determine the front in summer. In a word, the Kuroshio front is offshore in summer but onshore in winter.

KEY WORDS: Kuroshio, ocean color, sea surface temperature

Critique: ___________________________________  Score: ☆☆☆☆☆
Notes
**Rules of Debate**

1. **General Arrangements**
   All participants will be informed of four debate topics prior to the symposium. The debate position of each team (Affirmative and Opposition) will be assigned in the morning on **Day One**. The debate competition will be held in the afternoon on **Day Three**, from **14:20 to 18:00**.

2. **Team Member**
   There will be 5 people from different universities with different background in each debate team. Team members are encouraged to discuss with each other with enthusiasm to prepare for the debate. All team members have to show up on the stage and join the debate.

3. **Debate procedure**
   The procedures of debate are designed in the way to ensure equal involvement and active participation of every team member during the argumentation and rebuttal sessions within the debate. Each debate will take about 26 minutes and then will be followed with an 8-10 minutes Q&A session. There are 4 parts of each debate competition-Statement, Argumentation, Free Debate and Conclusion. Every team need to choose 3 people for part of Statement, Argumentation and Conclusion, and all 5 people can argument and rebuttal in part of Free debate. All audience are encouraged to ask questions or to comment on the topic. For each debate topic, judge panel will discuss and decide which debate team wins the debate on that specific topic.
4. **Assessment of BEST debater**

The best debate team will be assigned and discussed by the staff Mentor Committee and will be announced by the Moderator.
**Debate Topics**

**Topic 1**
Development of aquaculture *can* reduce exploitation from wild populations.
Development of aquaculture *cannot* reduce exploitation from wild populations.

**Topic 2**
Science *can* enhance conservation of aquatic ecosystems.
Science *cannot* enhance conservation of aquatic ecosystems.

**Topic 3**
Conservation should be *people-oriented*.
Conservation should be *nature-oriented*.

**Topic 4**
Having several small marine conservation reserves *should* be better than a single big one.
Having several small marine conservation reserves *should not* be better than a single big one.
### Debate Groups

#### Group 1
- Marielle Dumestre  HKU
- Cong-Cong Chen, Clara  XMU
- Rui Wang  XMU
- Yuan Wang, Simon  HKU
- Xin-Xin Wu, Will  XMU

#### Group 2
- Yuan-yuan Hong  HKU
- Hua-Xia Sheng  XMU
- Ya’-nan Yang  XMU
- Xian-Liang Yi, Andy  HKU
- Wei-Hsiang Chang  NTOU

#### Group 3
- In Luk, Michelle  HKU
- Jia-Yi Xu  XMU
- Yan-Yan Zhao  XMU
- King-Yan Ho, Kevin  HKU
- Yen-Chiun Haung  NTOU

#### Group 4
- Beverly Po  HKU
- Jing He, Ann  XMU
- Yi-Fan Chen, Evan  XMU
- Gui-Hua Wang, Samuel  HKU
- Chemg Ming Su  NTOU

#### Group 5
- Karen Villarta  HKU
- Lu Ye, Daisy  XMU
- Yuan Jin  XMU
- Jian-Long Li, Joy  XMU
- Cheng-Tsung Tseng  NTOU

#### Group 6
- Zhe Wang  HKU
- Lu Yang, Tina  XMU
- Tak-Chuen Lau, Edward  HKU
- Jin-Ru He  XMU
- Quang-Thien Huynh  NTOU

#### Group 7
- Yan-Ling  HKU
- Lu-Lu Yang  XMU
- Sui-Wai Law  HKU
- Li-Xing Huang  XMU
- Shang-Chih Lin, James  NTOU

#### Group 8
- King-Yan Mak  HKU
- Shu Zhang  XMU
- Juan Diego Urriago  HKU
- Xin-Guo Shi  XMU
- Bo-Wei Ye  NTOU

**Debate Topic 1:** Group 1 VS Group 2

**Debate Topic 2:** Group 3 VS Group 4

**Debate Topic 3:** Group 5 VS Group 6

**Debate Topic 4:** Group 7 VS Group 8
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