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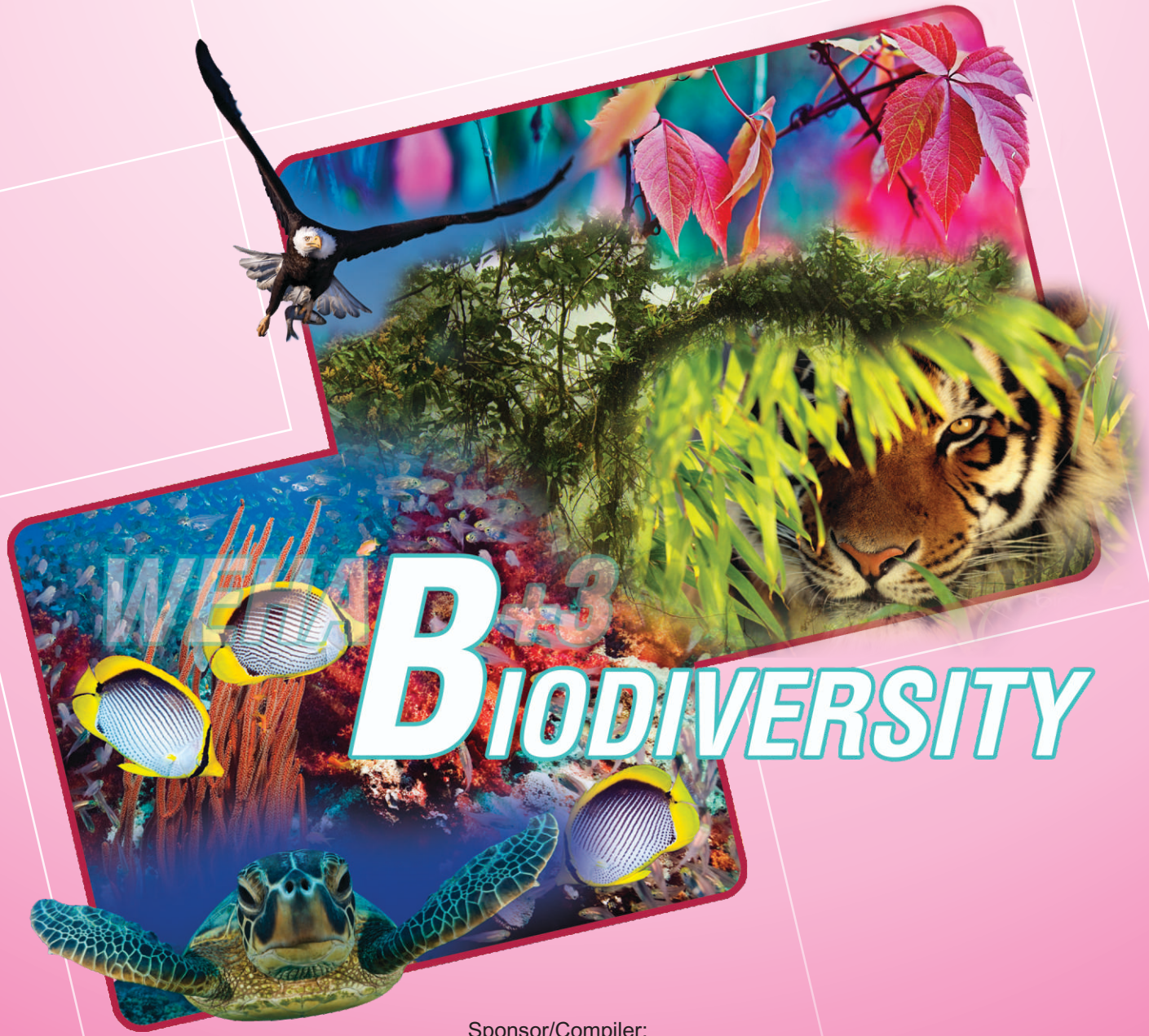
South East Asia Sustainability Network

A SELECTED COMPENDIUM OF SEASN MEMBERS' RESEARCH PUBLICATIONS ON WEHAB+3



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A SELECTED COMPENDIUM OF SEASN MEMBERS' RESEARCH PUBLICATIONS ON WEHAB+3: BIODIVERSITY

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Foreword

The establishment of South East Asia Sustainability Network (SEASN) has provided a platform to support higher education institutions and other related sustainability organisations in South East Asian countries for exchanging ideas, findings, information, and good practices in teaching, research, community engagement and institutional arrangement that relate to their work. In order to expedite this process the SEASN Secretariat at Universiti Sains Malaysia has taken the initiative to publish a compendium entitled '*A Selected Compendium of SEASN Members' Research Publications on WEHAB+3*', in order to share information and best practices in sustainability studies.

This publication will be a medium to exchange research findings in sustainability and to promote sustainability at the global level for the benefit of the wider community of higher educational institutions.

The focus of this book is on the sectors, Water, Energy, Health, Agriculture, Biodiversity (WEHAB); and cross-sectors, Climate Change and Disaster Risk Management, Consumption and Production, and Population and Poverty; collectively represented as WEHAB+3. The compendiums of Water (W), Energy (E), Health (H) and Agriculture (A) have been successfully published and in this last compendium will focus on Biodiversity (B).

Incidentally, WEHAB was launched at the World Summit on Sustainable Development by Kofi Annan in 2002 as a priority set of sectors for sustainability implementation. When we add the three cross sectoral issues, the approach becomes very comprehensive and a broad treatment WEHAB+3 would cover almost all major sustainability challenges.

In this sense, the current compendium will help promote better understanding of sustainable management of Biodiversity and create knowledge societies that ensure improved quality of life for the present and future generations.

I would like to extend my deepest appreciation and gratitude to all the contributors, authors and editors for their hard work in materializing this compendium. The dedication and tireless efforts of the CGSS staff for the success of the compendium is fully recognized and acknowledged.

Professor Dato' Dr. Omar Osman

Chairman
South East Asia Sustainability Network (SEASN)

Preface

The South East Asia Sustainability Network (SEASN) is an alliance of higher education institutions and other related sustainability institution in South East Asian countries committed to promote, engage and integrate sustainability in their mission areas in a systematic way. In this regards, '*A Selected Compendium of SEASN Members' Research Publications on WEHAB+3*' and is in line with the vision and objectives of SEASN.

This book is seen mainly as a means to build a platform for the sharing of research findings in the form of abstracts of published papers. Our survey has revealed that there is enough scope for eight volumes of valuable information that has already been published in the eight areas of WEHAB+3. We have selected the abstract, including reference details, in the hope that it will make life easier for prospective researchers to focus on critical sustainability issues that matter most to their respective countries or the global community at large.

In compiling the abstracts we are mindful of the Intellectual Property Rights of original authors, and in properly acknowledging them CGSS declares that we do not make any claim on IP issues whatsoever.

We do hope that this effort will provide a tangible and inspiring example of publication to address sustainability challenges quickly and more cost effectively. It is also hoped that this book will contribute towards development and progress that is best for the environment, individuals and the economy without compromising the ability of future generations to meet their needs and ultimately ensuring a sustainable future for all.

Professor Dr. Kamarulazizi Ibrahim

Secretary
South East Asia Sustainability Network (SEASN)

Introduction

This book entitled A Selected Compendium of SEASN Research Publication on Biodiversity consists of compilation of abstract of SEASN's sustainability research output and the resulting publications related to Biodiversity from member of South East Asia Sustainability Network (SEASN) which includes of South East Asia higher education institutions, other related sustainability organisations, agencies, NGOs and industries in South East Asia countries with an interest in sustainability.

Biodiversity is declining at an unprecedented rate due to anthropogenic influence- as much as a thousand times what it would be without the impact of human activity. Half of the tropical rainforests and mangroves have already been lost. About 75 percent of marine fisheries have been fished to capacity. 70 percent of coral reefs are endangered. We must reverse this process - preserving as many species as possible, and clamping down on illegal and unsustainable fishing and logging practices - while helping people who currently depend on such activities to make a transition to more sustainable ways of earning their living.

This book aims to share information and best practices in sustainability studies focused in the 8 known areas of sustainability (WEHAB+3), to exchange ideas, concepts and research findings in sustainability and to promote sustainability at the global level for the benefit of the wider higher educational community. There are four books have been published previously which focus on sustainability research on Water (W), Energy (E), Health (H) and Agriculture (A). Meanwhile, this fifth book will focus on sustainability research on Biodiversity (B). In addition to this, there will be a following book on sustainability research on three major cross-sectoral areas, Climate Change and Disaster Risk Management (CC+DRM), Production and Consumption (PC) and Population and Poverty (PP) which will be published soon.

This book comprises of compendium which combines knowledge on Biodiversity from many primary sources of member of SEASN into a single publication. Some of the primary sources were given by the organization and some of them were extracted from Sciencedirect, Scopus and Thomson Reuters ISI. It is hoped that this book will provide a quick and relatively understand to overview regarding sustainability research output on Biodiversity. Thus, it will hopefully provide a foundation for further studies, and catalyse for new research in South East Asia region.


BIODIVERSITY

1.0 **AIMST University, Malaysia**

1.1 **Talanta, Volume 117, 15 December 2013, Pages 312-317**

Gold-nanoparticle based electrochemical DNA sensor for the detection of fish pathogen *Aphanomyces invadans*

Guan Chin Kuan, Liew Pei Sheng, Patsamon Rijiravanich, Kasi Marimuthu, Manickam Ravichandran, Lee Su Yin, Benchaporn Lertanantawong, Werasak Surareungchai

Epizootic Ulcerative Syndrome (EUS) is a devastating fish disease caused by the fungus, *Aphanomyces invadans*. Rapid diagnosis of EUS is needed to control and treat this highly invasive disease. The current diagnostic methods for EUS are labor intensive. We have developed a highly sensitive and specific electrochemical genosensor towards the 18S rRNA and internal transcribed spacer regions of *A. invadans*. Multiple layers of latex were synthesized with the help of polyelectrolytes, and labeled with gold nanoparticles to enhance sensitivity. The gold–latex spheres were functionalized with specific DNA probes. We describe here the novel application of this improved platform for detection of PCR product from real sample of *A. invadans* using a premix sandwich hybridization assay. The premix assay was easier, more specific and gave higher sensitivity of one log unit when compared to the conventional method of step-by-step hybridization. The limit of detection was 0.5 fM (4.99 zmol) of linear target DNA and 1 fM (10 amol) of PCR product. The binding positions of the probes to the PCR amplicons were optimized for efficient hybridization. Probes that hybridized close to the 5′ or 3′ terminus of the PCR amplicons gave the highest signal due to minimal steric hindrance for hybridization. The genosensor is highly suitable as a surveillance and diagnostic tool for EUS in the aquaculture industry.

Keywords

Epizootic ulcerative syndrome, *Aphanomyces invadans*, Genosensor, Gold nanoparticles, Multi-layer latex particles, PCR product

PLoS ONE, Volume 8, Issue 10, 3 October 2013, Article number e75545 © 2013

Toxicity of buprofezin on the survival of embryo and larvae of African catfish, *Clarias gariepinus* (Bloch)

Marimuthu K., Muthu N., Xavier R., Arockiaraj J., Rahman M.A., Subramaniam S.

Buprofezin is an insect growth regulator and widely used insecticide in Malaysia. The present study evaluated the toxic effects of buprofezin on the embryo and larvae of African catfish (*Clarias gariepinus*) as a model organism. The embryos and larvae were exposed to 7 different concentrations (0, 0.05, 0.5, 5, 25, 50 and 100 mg/L) of buprofezin. Each concentration was assessed in five replicates. Eggs were artificially fertilized and 200 eggs and larvae were subjected to a static bath treatment for all the concentrations. The mortality of embryos was significantly increased with increasing buprofezin concentrations from 5 to 100 mg/L ($p< 0.05$). However, the mortality was not significantly different ($p<0.05$) among the following concentrations: 0 (control), 0.05, 0.5 and 5 mg/L. Data obtained from the buprofezin acute toxicity tests were evaluated using probit analysis. The 24 h LC_{50} value (with 95% confidence limits) of buprofezin for embryos was estimated to be 6.725 (3.167-15.017) mg/L. The hatching of fish embryos was recorded as 68.8, 68.9, 66.9, 66.4, 26.9, 25.1 and 0.12% in response to 7 different concentrations of buprofezin, respectively. The mortality rate of larvae significantly ($p<0.05$) increased with increasing buprofezin concentrations exposed to 24-48 h. The 24 and 48 h LC_{50} values (with 95% confidence limits) of buprofezin for the larvae was estimated to be 5.702 (3.198-8.898) and 4.642 (3.264-6.287) mg/L respectively. There were no significant differences ($p>0.05$) in the LC_{50} values obtained at 24 and 48 h exposure times. Malformations were observed when the embryos and larvae exposed to more than 5 mg/L. The results emerged from the study suggest that even the low concentration (5 mg/L) of buprofezin in the aquatic environment may have adverse effect on the early embryonic and larval development of African catfish.

1.3

Asian Journal of Animal and Veterinary Advances, Volume 8, Issue 2, 2013, Pages 369-375 © 2013 Academic Journals Inc.

Present culture status of the endangered snakehead, *Channa striatus* (Bloch, 1793)

Muntaziana M.P.A., Amin S.M.N., Aminur Rahman M., Rahim A.A., Marimuthu K.

Snakehead (*Channa striatus*) belonging to the Channidae family is an indigenous freshwater fish of Malaysia that has carnivorous behavior. *C. striatus* command high prices since it has a strong demand and are sold alive. It is a commercially important species in Thailand, Philippines, Cambodia and Vietnam. Increased human activities destroyed the feeding and breeding grounds of this species, leading to decline in wild catches. *C. striatus* is considered as an endangered fish in Bangladesh. The research of *C. striatus* provides an account of current knowledge, especially on reproduction, culture and nutritional requirement of snakehead. The problems encountered in snakehead culture are discussed and suggestions made to overcome the problems are highlighted.

Keywords

Carnivorous behavior, *Channa striatus,* Culture status, Reproduction

Turkish Journal of Biology, Volume 37, Issue 2, April 2013, Pages 191-198 © TÜBİTAK

Histology and scanning electron microscopy observations of cryopreserved protocorm-like bodies of *Dendrobium* sonia-28

Poobathy R., Sinniah U.R., Rathinam X., Subramaniam S.

The genus *Dendrobium* possesses horticultural importance. *Dendrobium* sonia-28 is an important ornamental orchid in the flower industry. Cryopreservation is a favoured long-term storage method for orchids with propagation problems. Protocorm-like bodies (PLBs) of *Dendrobium* sonia-28 were cryopreserved using the vitrification technique. Histology and scanning electron microscopy (SEM) observations were conducted on stock, non-cryopreserved (control), and cryopreserved PLBs of *Dendrobium* sonia-28 to detect cryoinjuries resulting from the vitrification protocol. Histological observations of control PLBs indicated that the preculture, osmoprotection, and dehydration steps were not physically damaging to the PLBs. Histological and SEM analyses of cryopreserved PLBs indicated that the freezing and thawing cycles inflicted damages on the parenchymatic regions of the PLBs. Only embryogenic cells survived the treatment. Scanning electron microscopy studies of the control and cryopreserved PLBs indicated that both osmotic and freezing injuries occurred only in the interior regions of the PLBs.

Keywords

Cryopreservation, *Dendrobium* sonia-28, histology, Protocorm-like bodies, Scanning electron microscopy, Vitrification

2.0 Chulalongkorn University, Thailand

2.1 **Journal of Asia-Pacific Entomology, Volume 15, Issue 4, December 2012, Pages 611-618**

Geometric morphometric analysis of giant honeybee (*Apis dorsata* Fabricius, 1793) populations in Thailand

Atsalek Rattanawannee, Chanpen Chanchao, Siriwat Wongsiri

Geometric morphometry was used to characterize 73 *Apis dorsata* colonies collected from 31 different localities in five major geographic regions of mainland Thailand. We measured 19 easily identified landmarks from the digitized images of the right forewing of 10 worker bees from each colony (730 bees in total); thus, avoiding the confounding variation from haploid or diploid males. After plotting the factor scores, *A. dorsata* from (mainland) Thailand were found to belong to a single group, which was further supported by a hierarchical cluster analysis-generated dendrogram. Multivariate analysis of variance (MANOVA, $\alpha = 0.05$) demonstrated no significant differences among the five geographic groups of *A. dorsata* in Thailand, producing a low degree of accuracy (31.2%) in the identification of the geographic region from which any individual bee originated. Additionally, when the bee samples were classified into two groups, those north and south of the Isthmus of Kra were not significantly different (MANOVA, $\alpha = 0.05$), and a low rate of correct classification in a cross-validation test (65% correct) was found. Therefore, this geometric morphometric based analysis of worker bee wing venation pattern suggests that *A. dorsata* populations in mainland Thailand are panmictic.

Keywords

Giant honeybee, *Apis dorsata*, MANOVA, Geometric morphometry, Wing morphometry

2.2 **Global and Planetary Change, Volumes 92–93, July 2012, Pages 148-161**

Holocene environmental changes in northeast Thailand as reconstructed from a tropical wetland

Barbara Wohlfarth, Wichuratree Klubseang, Suda Inthongkaew, Sherilyn C. Fritz, Maarten Blaauw, Paula J. Reimer, Akkaneewut Chabangborn, Ludvig Löwemark, Sakonvan Chawchai

Geochemical variables (TOC, C/N, TS, $\delta^{13}C$) and diatom assemblages were analyzed in a lake sediment sequence from Nong (Lake) Han Kumphawapi in northeast Thailand to reconstruct regional climatic and environmental history during the Holocene. By around c. 10,000–9400 cal yr BP, a large shallow freshwater lake had formed in the Kumphawapi basin. Oxygenated bottom waters and a well-mixed water column were characteristic of this early lake stage, which was probably initiated by higher effective moisture and a stronger summer monsoon. Decreased run-off after c. 6700 cal yr BP favored increased aquatic productivity in the shallow lake. Multiple proxies indicate a marked lowering of the lake level around 5900 cal yr BP, the development of an extensive wetland around 5400 cal yr BP, and the subsequent transition to a peatland. The shift from shallow lake to wetland and later to a peatland is interpreted as a response to lower effective moisture. A hiatus at the transition from wetland to peatland suggests very low accumulation rates, which may result from very dry climatic conditions. A rise in groundwater and lake level around 3200 cal yr BP allowed the re-establishment of a wetland in the Kumphawapi basin. However, the sediments deposited between c. 3200 and 1600 cal yr BP provide evidence for at least two hiatuses at c. 2700–2500 cal yr BP, and at c. 1900–1600 cal yr BP, which would suggest surface dryness and consequently periods of low effective moisture. Around 1600 cal yr BP a new shallow lake became re-established in the basin. Although the underlying causes for this new lake phase remain unclear, we hypothesize that higher effective moisture was the main driving force. This shallow lake phase continued up to the present but was interrupted by higher nutrient fluxes to the lake around 1000–600 cal yr BP. Whether this was caused by intensified human impact in the catchment or, whether this signals a lowering of the lake level due to reduced effective moisture, needs to be corroborated by further studies in the region.

The multi-proxy study of Kumphawapi's sediment core CP3A clearly shows that Kumphawapi is a sensitive archive for recording past shifts in effective moisture, and as such in the intensity of the Asian summer monsoon. Many more continental paleorecords, however, will be needed to fully understand the spatial and temporal patterns of past changes in Asian monsoon intensity and its ecosystem impacts.

Keywords

Northeast Thailand, Lake sediments, Geochemistry, Asian monsoon, Environmental reconstruction; Moisture availability

2.3 **Marine Geology, Volume 282, Issues 3–4, 15 April 2011, Pages 255-267**

Evidence for a mid-Holocene tsunami deposit along the Andaman coast of Thailand preserved in a mangrove environment

Brady P. Rhodes, Matthew E. Kirby, Kruawun Jankaew, Montri Choowong

Klong Thap Lamu, a large mangrove-fringed tidal channel along the northern Andaman Coast of Thailand, provides an ideal location to test the hypothesis that a paleotsunami record can be preserved in the sediments of a mangrove forest. The 2004 Indian Ocean tsunami destroyed local swaths of mangrove forest with highly variable widths — up to 300 m. Left in the wake of the tsunami is a thin mantling of laterally discontinuous sand, macerated shells, and localized coral rubble that is being mixed rapidly into the underlying mangrove peat. Transects across the channel's tsunami-modified shore show that the sand layer thins abruptly at the border of the undisturbed mangroves, suggesting that the energy of the wave dissipated quickly as it entered the forest. The distribution and sedimentology of the 2004 tsunami deposit (Unit tI) suggest that any paleotsunami deposit within this mangrove environment should be spatially restricted and thoroughly bioturbated. Sediment cores collected from within the 2004 tsunami zone penetrate a buried coral-shell peat unit (Unit tIII) that tapers inland. Unit tIII is strikingly similar to Unit tI, except for Unit tIII's diffuse sedimentology, which we attribute to extensive bioturbation. Unit tIII also cross-cuts an identified facies boundary that is traceable across the width of the 2004 tsunami zone. Rather than a facies boundary associated with the regional early-to-late Holocene sea level regression, stratigraphic correlations suggest that Unit tIII represents an event horizon (i.e. tsunami). AMS ^{14}C dates on material from within Unit tIII combined with an upper bracketing age suggest that the tsunami event occurred sometime between 2720 and 4290 cy BP. If correct, this tsunami predates the 3–4 tsunami events recognized to the north at Koh Phra Thong. Unit tIII is, however, a potential far-field equivalent of a recently recognized paleotsunami deposit on the southwestern Indian coast ca. 3,710 years before present (Nair et al., 2010).

Keywords

Thailand, Coastal geomorphology, Tsunami, Paleotsunami, Indian Ocean, Andaman Sea, Quaternary Geology, Mangroves

2.4

Agriculture, Ecosystems & Environment, Volume 158, 1 September 2012, Pages 15-30

Seasonal nitrous oxide emissions from different land uses and their controlling factors in a tropical riparian ecosystem

Boonlue Kachenchart, Davey L. Jones, Nantana Gajaseni, Gareth Edwards-Jones, Atsamon Limsakul

An important ecological service provided by tropical riparian ecosystems is the mitigation of nutrient pollution (e.g. nitrate) from surrounding agricultural areas. However, a negative impact of this nutrient remediation may be that the ecozone also functions as a major emitter of nitrous oxide (N_2O). We hypothesized that the high inorganic nitrogen, organic carbon, and soil water content in tropical riparian ecosystems enhances N_2O production through rapid nitrification and denitrification processes. This study was therefore designed to quantify the variability in N_2O emissions in such an ecosystem in northern Thailand with specific emphasis on (1) different land uses (comparing replicate leguminous reforestation areas with conventional maize agriculture with high rates of nitrogen fertilizer addition), and (2) temporal aspects (comparing wet and dry seasons). Our aim was to quantify N_2O emissions and to identify the major drivers controlling these emissions. Using *in situ* closed chambers the annual average emissions of N_2O from the leguminous reforestation area (3.3 kg N_2O N ha^{-1} y^{-1}) was significantly higher than agricultural areas with maize (2.2 kg N_2O N ha^{-1} y^{-1}). The seasonal variation results indicated that the rate of N_2O flux in the wet season was higher than in the dry season. The variations of N_2O emission rates were strongly correlated with water filled pore space (WFPS), denitrification, and microbial biomass C, but not with nitrification. This study indicates that when inorganic N and soil organic C are sufficient, WFPS plays an important role in controlling N_2O emissions from denitrification. Comparatively, annual N_2O emissions from the tropical riparian reforestation were similar to that reported for temperate riparian forests and other ecosystems. Although the annual N_2O emissions from the maize agricultural area were comparable to other crops cultivated in riparian ecosystems, it was higher than the N_2O fluxes from crops grown in non-riparian zones. We conclude that agricultural lands located in tropical riparian zones do not represent a major hotspot of N_2O emissions and that this does not diminish the positive benefits they provide in relation to other aspects of ecosystem service provision.

Keywords

Buffer strip, Greenhouse gas emission, Nitrogen cycling, N-fixing tree, Nitrogen fertilizer

Ecological Economics, Volume 90, June 2013, Pages 132-139

Breaking the elected rules in a field experiment on forestry resources

Marco A. Janssen, François Bousquet, Juan-Camilo Cardenas, Daniel Castillo, Kobchai Worrapimphong

Harvesting from common resources has been studied through experimental work in the laboratory and in the field. In this paper we report on a dynamic commons experiment, representing a forest, performed with different types of communities of resource users in Thailand and Colombia, as well as student participants. We find that all groups overharvest the resource in the first part of the experiment and that there is no statistical difference between the various types of groups. In the second part of the experiment, participants appropriate the common resource after one of three possible regulations is elected and implemented. There is less overharvesting after the rules are implemented, but there is a significant amount of rule breaking. The surprising finding is that Colombian villagers break the rules of the games more often than other groups, and even more so when they have more trust in members of the community. This observation can be explained by the distrust in externally proposed regulations due to the institutional and cultural context.

Keywords

Common pool resources, Dynamic games, Forestry, Field experiments, Rule compliance

2.6 **Gondwana Research, Volume 19, Issue 1, January 2011, Pages 47-60**

Paleo-environments and tectonic setting of the Mesozoic Thung Yai Group in Peninsular Thailand, with a new record of *Parvamussium donaiense* Mansuy, 1914

Wirote Saengsrichan, Thasinee Charoentitirat, Assanee Meesook, Ken-ichiro Hisada, Punya Charusiri

The Thung Yai Group extends over a large area of peninsular Thailand, along the eastern margin of the Shan Thai block. Bound by angular unconformities 300 m thick dominantly detritic brackish to non-marine deposits with few intercalated limestone beds between Triassic marine and Tertiary non-marine sediments, represent the Thung Yai Group that comprises four formations: Khlong Min, Lam Thap, Sam Chom, and Phun Phin Formations. In the Ao Luk–Plai Phraya (ALPP) area, the Khlong Min and Lam Thap formations yield marine, brackish-water and non-marine fossil assemblages. These include trace fossils and for the first time in peninsular southern Thailand, the bivalve *Parvamussium donaiense* Mansuy, 1914. Based on fossil determinations, the Thung Yai Group has a late Early Jurassic to Early Cretaceous age.

Our new observations help unravel the tectonic history of Mesozoic Peninsular Thailand. After the complete closure of the Paleotethys in the Late Triassic, renewed inundation, from the late Early Jurassic to the early Middle Jurassic, brought a regime of shallow to open marine and lagoon sedimentation over northwestern, western and southern peninsular Thailand, in the eastern part of Sundaland bordering the Mesotethys to the west.

Keywords

Jurassic–Cretaceous, Paleo-environments, Tectonic setting, Krabi, Thung Yai Group, Peninsular Thailand, *Parvamussium donaiense*

2.7 Gondwana Research, Volume 19, Issue 1, January 2011, Pages 37-46

New palaeontological investigations in the Jurassic of western Thailand

Takeshi Kozai, Lydia Perelis-Grossowicz, Annachiara Bartolini, Chotima Yamee, José Sandoval, Francis Hirsch, Keisuke Ishida, Thasinee Charoentitirat, Assanee Meesook, Jean Guex

The paleontological investigations of the Jurassic of Western Thailand, districts of Mae Sot (Tak–Mae Sot highway, Padaeng Tak and Ban Mae Kut Luang Zinc mines) and Umphang (Klo Tho), provide age constraints for the Late Indosinian orogeny, the Paleotethys closure and the timing of the marine Jurassic inundation of Sundaland. The basal conglomerate of the Jurassic is derived from the pelagic Triassic Mae Sariang substratum. Stratigraphy, microfacies and paleontology of the Jurassic marine strata focus especially on ammonites, bivalves, large benthic foraminifera and algae. Among ammonites, the Tethyan *Catulloceras perisphinctoides* Gemmellaro marks the Upper Toarcian (Aalensis Zone) along the Tak–Mae Sot highway and *Riccardiceras longalvum* (Vacek), *Malladaites pertinax* (Vacek), *Abbasites* sp. and *Vacekia* sp. indicate Middle Aalenian to lowermost Bajocian in the Padaeng Mine (SE of Mae Sot) and Klo–Tho (Umphang). *Vacekia* sp., *Spinammatoceras schindewolfi* Linares and Sandoval and *Malladaites vaceki* Linares and Sandoval indicate Middle Aalenian to lowermost Upper Aalenian at Ban Mae Kut Luang (NE of Mae Sot). Among foraminifers, the large benthic foraminifer *Timidonella sarda* Bassoullet, Chabrier and Fourcade in the Western Tethys is indicative for Aalenian–Bajocian times, as characterized in the section at the Tak–Padaeng Zinc mine and the Klo–Tho Formation near Umphang. The endemic foraminifer *Gutnicella kaempferi* characterizes the Pu Khloe Khi Formation near Umphang. Among bivalves, shallow marine, dominantly endemic fauna includes *Parvamussium donaiense* (Mansuy) and *Bositra ornate* (Quenstedt), from the Toarcian to the Early Bajocian. A consideration of the faunal affinity shows that the fauna is partly endemic with Northern Tethyan (Eurasian) affinity.

Keywords

Marine Jurassic, Sundaland, Paleontology, Mae Sot and Umphang districts, Tak Province, Thailand

2.8 **Molecular Phylogenetics and Evolution, Volume 61, Issue 1, October 2011, Pages 167-176**

Systematic relationships of Oriental tiny frogs of the family Microhylidae (Amphibia, Anura) as revealed by mtDNA genealogy

Masafumi Matsui, Amir Hamidy, Daicus M. Belabut, Norhayati Ahmad, Somsak Panha, Ahmad Sudin, Wichase Khonsue, Hong-Shik Oh, Hoi-Sen Yong, Jian-Ping Jiang, Kanto Nishikawa

We estimated the genealogical relationships and assessed systematic relationships among 45 out of 89 named species and four unnamed taxa from 11 of 14 genera of the Oriental microhylids from 1767 bp sequences of the mitochondrial DNA genes 12S rRNA and 16S rRNA using maximum parsimony, maximum likelihood, and Bayesian inference methods. Monophyly was rejected for the subfamily Microhylinae, and our data reveal four well-supported clades whose relationships to each other are unresolved: (A) *Microhyla*, *Calluella*, and *Glyphoglossus*, (B) *Chaperina*, (C) *Kaloula*, *Phrynella*, and *Metaphrynella*, and (D) *Micryletta*. They were genetically as divergent from each other as from another Oriental subfamily Kalophryninae, and could be recognized as distinct subfamilies. Within Clade A, our data reveal three well-supported subclades whose relationships to each other are unresolved: (AI) *Microhyla*-I, (AII) *Calluella* and *Glyphoglossus*, and (AIII) *Microhyla*-II. Of the two enigmatic Malaysian genera, whose subfamilial placement has been undetermined, *Phrynella* was found to be the sister species of *Metaphrynella* in Clade C, whereas *Gastrophrynoides* was grouped in the Papua-Australian subfamily Asterophryinae. Currently recognized subgenera and species groups within *Microhyla* based on morphology were not supported phylogenetically, and require thorough reassessments.

Keywords

Asia, *Gastrophrynoides*, mtDNA, Papua-Australian element, *Phrynell,* Subgeneric classification

2.9 **Virus Research, Volume 158, Issues 1–2, June 2011, Pages 209-215**

Cross-species transmission of gibbon and orangutan hepatitis B virus to uPA/SCID mice with human hepatocytes

Pattaratida Sa-nguanmoo, Yasuhito Tanaka, Parntep Ratanakorn, Masaya Sugiyama, Shuko Murakami, Sunchai Payungporn, Angkana Sommanustweechai, Masashi Mizokami, Yong Poovorawan

To investigate the potential of cross-species transmission of non-human primate HBV to humans, severe combined immunodeficiency mice transgenic for urokinase-type plasminogen activator, in which the mouse liver has been engrafted with human hepatocytes, were inoculated with non-human primate HBV. HBV-DNA positive serum samples from a gibbon or orangutan were inoculated into 6 chimeric mice. HBV-DNA, hepatitis B surface antigen (HBsAg), and HB core-related antigen in sera and HBV cccDNA in liver were detectable in 2 of 3 mice each from the gibbon and orangutan. Likewise, applying immunofluorescence HBV core protein was only found in human hepatocytes expressing human albumin. The HBV sequences from mouse sera were identical to those from orangutan and gibbon sera determined prior to inoculation. In conclusion, human hepatocytes have been infected with gibbon/orangutan HBV.

Keywords

Non-human primate, Cross-species transmission, Chimeric mouse, Phylogenetic analysis, HBV cccDNA, Immunofluorescence method

2.10 **Journal of Hazardous Materials, Volume 186, Issues 2–3, 28 February 2011, Pages 1300-1307**

Biodegradation pathways of chloroanilines by *Acinetobacter baylyi* strain GFJ2

Parnuch Hongsawat, Alisa S. Vangnai

The *Acinetobacter baylyi* strain GFJ2 was isolated from soil that was potentially contaminated with herbicides. It exhibited complete biodegradations of 4-chloroaniline (4CA) and 3,4-dichloroaniline (34DCA), a wide range of monohalogenated anilines (chloro-, bromo-, and fluoro-anilines) and other dichloroanilines. An in-depth investigation of the biodegradation pathway revealed that a dechlorination reaction may be involved in 34DCA biodegradation, which forms 4CA as the first intermediate. By detecting the transient intermediates and characterizing the relevant enzymes, this investigation is also the first to report that *A. baylyi* strain GFJ2 has two distinct 4CA degradation pathways that yield 4-chlorocatechol (4CC) and aniline as the first intermediate in each route, which are further metabolized through an *ortho*-cleavage pathway. Analysis of biodegradation kinetics analysis illustrated that *A. baylyi* GFJ2 utilized aniline and 4CC at significantly slower rates than it used 4CA, suggesting that the transformations of aniline and 4CC were probably the limiting steps during 4CA biodegradation. Our results suggest the potential application of *A. baylyi* strain GFJ2 in bioremediation and waste treatment, and the kinetic data provide the insights into the degradation mechanism, dynamics and possible limitations of the biodegradation which include substrate and product inhibitions.

Keywords

4-Chloroaniline, 3,4-Dichloroaniline, Monohalogenated aniline, Biodegradation pathway, *Acinetobacter baylyi*, Bioremediation

2.11 **International Biodeterioration & Biodegradation, Volume 65, Issue 6, September 2011, Pages 902-905**

Bioaugmentation of carbofuran residues in soil by *Burkholderia cepacia* PCL3: A small-scale field study

Pensri Plangklang, Alissara Reungsang

A small-scale field study was conducted in 1 m × 1.25 m × 20 cm plots. In the soil with only indigenous microorganisms, carbofuran degradation was slow with a long half-life ($t_{1/2}$) of 127 d. Bioaugmenting the soil with the immobilized PCL3 could shorten the $t_{1/2}$ of carbofuran to 16 d. The $t_{1/2}$ rose to a significantly longer 28 d when the free cells of PCL3 were used instead of the immobilized cells. Viable cell counting of carbofuran degraders in soil indicated that the carbofuran degradation efficiency directly correlated to the number of introduced carbofuran degraders that survived in the system. PCL3 in free-cell form did not survive in the soil during the field operation; this suggested that the immobilization of PCL3 is needed in order to implement the bioaugmentation technique in a real environment.

Keywords

Bioremediation, Bioaugmentation, *Burkholderia cepacia* PCL3, Carbofuran, Field study

2.12 **Biochemical Systematics and Ecology, Volume 39, Issues 4–6, August–December 2011, Pages 449-457**

Genetic structure of the common terrestrial pulmonate snail, *Cryptozona siamensis* (Pfeiffer, 1856), in Thailand

Pongpun Prasankok, Somsak Panha

Allozyme variation was examined in 432 specimens of the pulmonate snail, *Cryptozona siamensis*, from 24 localities across three regions of Thailand plus an additional population from Malaysia. Although this snail is a cosmopolitan species it was predicted that *C. siamensis* should exhibit a large degree of genetic subdivision across these regions due to a low level of inter-population gene flow. To test this hypothesis, 10 enzyme systems were screened using horizontal starch gel electrophoresis, from which 14 presumed allozyme loci were scored and 13 found to be polymorphic. For these 13 polymorphic loci the expected heterozygosity levels were moderate (H_{exp} = 0.036–0.183, mean = 0.101). Genetic differentiation among the samples was low, with a low F_{ST} value (0.254) and genetic distance (D = 0.000–0.124, mean = 0.034) and no significant isolation by distance (IBD) across the whole sampled range of Thailand or Thailand plus Malaysia. However, an IBD pattern in the population substructure in the central Thailand region was detected. The low F_{ST} and moderate H_{exp} values in various populations of *C. siamensis* suggests a high degree of gene flow/migration between populations across the three geographic regions of Thailand (northern, central and southern) as well as the sampled population in Malaysia, perhaps associated with the anthropochoric effect of snail dispersal. The apparent IBD in the central Thailand region could be the consequence of local dynamics though this region.

Keywords

Cryptozona siamensis, Allozyme, Genetic structure, Isolation by distance

2.13 **Animal Feed Science and Technology, Volume 169, Issues 3–4, 3 November 2011, Pages 265-269**

Nutritional composition of farmed and wild sandworms, *Perinereis nuntia*

S. Techaprempreecha, N. Khongchareonporn, C. Chaicharoenpong, P. Aranyakananda, S. Chunhabundit, A. Petsom

The nutritional compositions of farmed sandworms, fed with a commercial shrimp diet, and wild sandworms, caught from the shore line in Chonburi province, Thailand, were investigated. Protein was not different between farmed and wild sandworms (512 and 528 g/kg, $p>0.05$) but fat content was different (340 and 273 g/kg, $p<0.05$). The moisture content was higher in wild (813 *versus* 763 g/kg, $p<0.05$) while the ash contents were higher in farmed than in wild sandworms (94 *versus* 67 g/kg, $p<0.05$). The fatty acid profile was identified and the major saturated fatty acids (SFA), monounsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA) in both groups of sandworms were present in somewhat different levels in farmed and wild sandworms, being C16:0 (309 and 332 g/kg, $p<0.05$), C18:1 (83 and 131 g/kg, $p<0.05$) and C18:2 (94 and 78 g/kg, $p<0.05$). The total SFA and MUFA contents were higher in wild than farmed sandworms, respectively (461 *versus* 411, 218 *versus* 198 g/kg, $p<0.05$). The PUFA content was lower in wild than farmed sandworms (184 *versus* 247 g/kg, $p<0.05$). The content of arachidonic acid (AA) and docosahexaenoic acid (DHA) in both groups of sandworms were not different ($p>0.05$). However, farmed sandworms were found to contain a higher ratio of n3:n6 PUFA than wild sandworms (0.7:0.4, $p<0.05$). But the content of eicosapentaenoic acid (EPA) in farmed sandworms was lower than that of wild sandworms (30 *versus* 42 g/kg, $p<0.05$). The content of analyzed micro-minerals in farmed and wild sandworms were different ($p<0.05$) while the content of analyzed macro-minerals were different ($p<0.05$) except for potassium. Wild sandworms were contained higher level of vitamin A and lower level vitamin C and E than farm sandworms.

Keywords

Perinereis nuntia, Sandworm, Polychaete, Shrimp broodstock, Maturation diets, Nutritional value

Pharmacognosy Journal, Volume 3, Issue 23, July 2011, Pages 50-58

Antioxidant, Antimicrobial and Cytotoxicity Activities of *Acacia farnesiana* (L.) Willd. Leaves Ethanolic Extract

Salfarina Ramli, Ken-ichi Harada, Nijsiri Ruangrungsi

The antioxidant activity was evaluated from the ability to chelate iron, reducing property, scavenging DPPH radical and nitric oxide. The *A. farnesiana* ethanolic extract responded to all the antioxidant assays in concentrations dependent manner. Evaluated by broth microdilution assay, the extract exhibited MIC value at 0.8 mg/ml against *Bacillus subtilis* and MIC value at 2.5 mg/ml against *Saccharomyces* cerevisiae. The absence of cytoxicity was observed from the brine shrimp lethality test. The quantification of total phenolic content by Folin-Ciocalteu reagent resulting 209.78 ± 3.21 mg gallic acid/g ethanolic extract of *A. farnesiana* leaves. Analysis of the extract by both HPLC-PDA and LC/MS has tentatively identified flavonoid galloylglycoside and flavonoid glycosides from the extract. It was plausible that the preparation method of the extract influenced the consituents of the extract, and that later contributed to the exhibited antioxidant and antibacterial activities. Quercetin deoxyhexoside was tentatively identified as the major consituent of the extract. Bioassay guided isolation is suggested as future research to study the biological activities and elucidate the chemical structure of flavonoids involved.

Keywords

Electrospray negative ionization, Mimosoideae, Soxhlet extraction

2.15 **Marine Pollution Bulletin, Volume 74, Issue 1, 15 September 2013, Pages 95-104**

Abilities and genes for PAH biodegradation of bacteria isolated from mangrove sediments from the central of Thailand

Wanwasan Wongwongsee, Promchat Chareanpat, Onruthai Pinyakong

PAH-degrading bacteria, including *Novosphingobium* sp. PCY, *Microbacterium* sp. BPW, *Ralstonia* sp. BPH, *Alcaligenes* sp. SSK1B, and *Achromobacter* sp. SSK4, were isolated from mangrove sediments. These isolates degraded 50–76% of 100 mg/l phenanthrene within 2 weeks. Strains PCY and BPW also degraded pyrene at 98% and 71%, respectively. Furthermore, all of them probably produced biosurfactants in the presence of hydrocarbons. Interestingly, PCY has a versatility to degrade various PAHs. Molecular techniques and plasmid curing remarkably revealed the presence of the alpha subunit of pyrene dioxygenase gene (*nidA*), involving in its pyrene/phenanthrene degrading ability, located on megaplasmid of PCY which has never before been reported in sphingomonads. Moreover, genes encoding ferredoxin, reductase, extradiol dioxygenase (*bphA3A4C*) and exopolysaccharide biosynthetase, which may be involved in PAH degradation and biosurfactant production, were also found in PCY. Therefore, we conclude that these isolates, especially PCY, can be the candidates for use as inoculums in the bioremediation.

Keywords

Novosphingobium sp. PCY, Polycyclic aromatic hydrocarbons, Mangrove sediment, Pyrene, Megaplasmid, *nidA*

3.0 Diponegoro University, Indonesia

3.1 Journal of Asian Natural Products Research, Volume 16, Issue 2, 2014

Two new compounds from an Indonesian sponge *Dysidea* sp.

Trianto, A., de Voodg, N.J., Tanaka, J.

On our joint bioprospecting research on Indonesian marine invertebrates, we found moderate cytotoxicity on an extract of the sponge *Dysidea* sp. collected at Biak, West Papua. Separation of the extract provided two new compounds, biaketide (1) and debromoantazirine (2), along with four known molecules 3-6. The new structures were elucidated by spectroscopic analyses and by comparison with those reported. Compounds 1 and 2 showed moderate cytotoxicity against NBT-T2 cells with IC50 values of 8.3 and 4.7 μg ml^{-1}, respectively.

Keywords

Marine natural products, Polyketide, Azirine, Cytotoxicity, Sponge

Biodiversity 14 (2), pp. 80-86. 2013

Bacterial symbionts of reef invertebrates: Screening for anti-pathogenic bacteria activity

Radjasa, O.K., Khoeri, M.M., Darusallam, C.C., Trimasanto, H., Sudoyo, H.

One of the most serious bottlenecks in developing natural products from coral reefs has been the availability of sufficient biomass to conduct preclinical and clinical studies. Commercial development of new discoveries is further complicated by the fact that most of the metabolites possess highly complex structures, making it difficult to produce them economically via chemical synthesis. There is, however, substantial emerging evidence demonstrating that many natural products extracted from marine invertebrates are in fact the products of associated microorganisms. The general neglect of this highly important field of research and development has led to this study, the intention of which was to isolate bacterial symbionts of reef invertebrates and to screen against clinically important pathogens. A group of invertebrates, namely sponge, soft coral, gorgonian, nudibranch and tunicate, were collected from the Karimunjawa Islands, in the Northern Java Sea, and successfully screened for their antibacterial activity against pathogenic bacteria Escherichia coli, Staphylococcus aureus and Salmonella typhi using an overlay method. Molecular analysis based on 16s rDNA revealed that the active isolates belonged to members of Staphylococcus, Bacillus, Vibrio and Enterobacter. This study highlights the potential of bacterial symbionts of reef invertebrates to serve as a sustainable source of bioactive marine compounds for medical research.

Keywords

Bioprospecting, Antibacterial activity, Reef invertebrate bioactive compound

3.3 **Marine Ecology Progress Series 480, pp. 185-197. 2013**

Pronounced genetic structure in a highly mobile coral reef fish, *Caesio cuning*, in the Coral Triangle

Ackiss, A.S., Pardede, S., Crandall, E.D., Ablan-Lagman, M.C.A., Ambariyanto, Romena, N., Barber, P.H., Carpenter, K.E.

The redbelly yellowtail fusilier *Caesio cuning* has a tropical Indo-West Pacific range that straddles the Coral Triangle, a region of dynamic geological history and the highest marine biodiversity on the planet. Previous genetic studies in the Coral Triangle indicate the presence of multiple limits to connectivity. However, these studies have focused almost exclusively on benthic, reef-dwelling species. Schooling, reef-associated fusiliers (Perciformes: Caesionidae) account for a sizable portion of the annual reef catch in the Coral Triangle, yet to date, there have been no indepth studies on the population structure of fusiliers or other mid-water, reef-associated planktivores across this region. We evaluated the genetic population structure of C. *cuning* using a 382 bp segment of the mitochondrial control region amplified from over 620 fish sampled from 33 localities across the Philippines and Indonesia. Phylogeographic analysis showed that individuals sampled from sites in western Sumatra belong to a distinct Indian Ocean lineage, resulting in pronounced regional structure between western Sumatra and the rest of the Coral Triangle (Φ_{CT} = 0.4796, p < 0.004). We found additional significant population structure between central Southeast Asia and eastern Indonesia (Φ_{CT} = 0.0450, p < 0.001). These data in conjunction with spatial analyses indicate that there are 2 major lineages of C. *cuning* and at least 3 distinct management units across the region. The location of genetic breaks as well as the distribution of divergent haplotypes across our sampling range suggests that current oceanographic patterns could be contributing to observed patterns of structure.

Keywords

Connectivity, Gene flow, Isolation by distance, Coral reef fish, Artisanal fisheries, Coral Triangle

3.4 **Coral Reefs 32 (2), pp. 515-525. 2013**

Phylogeography of the crown-of-thorns starfish: Genetic structure within the Pacific species

Vogler, C., Benzie, J.A.H., Tenggardjaja, K., Ambariyanto, Barber, P.H., Wörheide, G.

Previous studies of the population genetic structure of the corallivorous crown-of-thorns starfish (COTS) *Acanthaster planci* in the Pacific Ocean showed high levels of gene flow that were assumed to reflect a high dispersal potential. However, the phylogeographic analyses of the Pacific crown-of-thorns starfish species of this study, using the highly variable mitochondrial control region and the most complete geographic coverage to date, contradict this view. Results show high levels of overall genetic structure (Φ_{ST} = 0. 198), suggesting a complex history of range restrictions and expansions, a pattern that we hypothesize results from changes in topography and oceanography associated with sea-level changes. However, results also show signatures of ongoing gene flow between populations isolated in the past and high levels of genetic connectivity even among distant populations. Combined, these results indicate that while there are significant limits to genetic exchange among populations among Pacific Ocean populations of the crown-of-thorns starfish, the high larval dispersal potential of this species is often achieved as well.

Keywords

Acanthaster planci, Crown-of-thorns, Starfish Phylogeography, Pacific Ocean Control region

3.5 **Animal Genetics 43 (6) , pp. 760-767. 2012**

Microsatellite DNA markers indicate three genetic lineages in East Asian indigenous goat populations

Nomura K1, Ishii K, Dadi H, Takahashi Y, Minezawa M, Cho CY, Sutopo, Faruque MO, Nyamsamba D, Amano T.

The genetic differentiation and phylogenetic relationships of 18 indigenous goat populations from seven East Asian countries were analysed based on data obtained from 26 microsatellite DNA markers. The mean number of alleles (MNA) per population ranged from 2.5 to 7.6, with an average of 5.8. Genetic variability estimated from MNA and heterozygosity (HE and H O) were relatively low in coastal and island populations. A heterozygous deficiency within populations (FIS = 0.054, P < 0.001) and total inbreeding (FIT = 0.181, P < 0.01) were observed, and genetic differentiation in the populations (FST) was 13.4%. The results of Bayesian model-based clustering and a neighbour-joining tree based on Nei's genetic distance showed that Asian goat populations could be subdivided into at least the following three genetic clusters: East Asian, Southeast Asian and Mongolian. These results are in close accordance with conventional morphological and geographical classifications and migration history.

Keywords

Genetic distance, Genetic diversity, Indigenous goats, Microsatellite (MS) markers

3.6 **American Journal of Environmental Sciences 8 (3), pp. 334-344.2012**

The diatom stratigraphy of Rawapening Lake, implying eutrophication history

Soeprobowati, T.R., Hadisusanto, S., Gell, P., Zawadski, A.

Problem statement:

The use of diatoms to reconstruct past ecological conditions in lakes is well established. Diatoms are microscopic algae that form siliceous frustules which allow them to preserve well in sediments. Rawapening Lake is one of 15 Indonesian lakes identified as 2010-2014 National Priority Lakes. Naturally, Rawapening is a tectono-volcanic lake. In the early 1900s, the sole outlet of the lake, Tuntang River, was impounded for hydroelectricity, irrigation and fisheries. Since then Rawapening had become a semi natural lake. The main problem of Rawapening Lake is blooming of water hyacinth that reduces lake function. This research was conducted in order to reconstruct the nutrient history of Rawapening Lake, Java.

Approach:

Sediment samples were taken from four sites and were sliced every 0.5 cm for diatom analysis and bulked across 2-5 cm for 210Pb radiometric dating of sediment. Diatom analysis consisted of three steps: the digestion process to separate the diatoms from the sediment; preparation and mounting of diatom residues onto slides and identification-enumeration.

Results:

The diatom-inferred condition of Rawapening Lake may be divided into four phases represented by zone 1 (1967-1974), zone 2 (1974-1983), zone 3 (1984-1990) and zone 4 (1990-2008). The predominance of Synedra from 1967 to present indicates that Rawapening Lake has been fresh and meso-eutrophic throughout. Zone 1 is also characterized by *Fragilaria capucina* Desm, Luticola goeppertiana (Bleisch) Mann, Mayamae atomus (Kutzing) *Lange-Bertalot*, *Navicula radiosa* Kutzing, *Nitzschia palea* (Kutzing) W. Smith and in one site, *Tryblionella apiculata* Gregory, that reflect eutrophic, but clear waters. An increase in epiphytic *Gomphonema* spp. in zone 2 marks an increase in aquatic macrophyte plants, perhaps in response to high nutrient levels. This change is followed promptly by an increase in acidophilous *Eunotia* spp. reflecting high organic production. A transition to a diatom community dominated by planktonic forms occurs c. 1983. This community was initially dominated by more clear water, oligotrop hic species such as *Discostella stelligera* (Cleve and Grunow) Houk and Klee and *Aulacoseira distans* (Ehrenberg) Simonsen, but transitions in 1990 to one dominated by A. granulata (Ehrenberg) Simonsen and ultimately *Aulacoseira ambigua* (Grunow) Simonsen. This is interpreted as a shift to a turbid water phase that has advantaged phytoplankton, at the expense of benthic or epiphytic taxa that require clear water.

Conclusion:

The dominance of *A. granulate* (Ehrenberg) Simonsen since the 1990s indicates the lake experienced hypertrophic conditions with pH > 9. A high proportion of the taxa in Rawa Pening sediments are not represented in the European data set, so the development of data set of tropical lakes is recommended to provide stronger inferences in local settings.

Keywords

Eutrophication, Rawapening Lake, Nutrient, Diatom

3.7 **Marine Ecology Progress Series 444, pp. 117-132. 2012**

Patterns of *Symbiodinium* distribution in three giant clam species across the biodiverse Bird's Head region of Indonesia

DeBoer, T.S., Baker, A.C., Erdmann, M.V., Ambariyanto, Jones, P.R., Barber, P.H.

The formation and persistence of modern coral reefs depends largely on organisms that host dinoflagellate algal symbionts of the genus *Symbiodinium*. There are important ecological and physiological differences among*Symbiodinium* types, and many host species are able to associate with multiple types, which may facilitate adaptation to local environmental change. Using denaturing gradient gel electrophoresis (DGGE) and sequencing of internal transcribed spacer-2 (ITS2) ribosomal DNA, we identified 11 *Symbiodinium* types belonging to clades A, C, and D in 250 host animals from 3 *Tridacna* species in eastern Indonesia. Individuals with multiple symbiont types were common: 42% of all clams had symbionts from multiple clades and 15% of all clams had multiple types from a single clade. *T crocea* associated more often with clade C symbionts and less frequently with clade D symbionts. *T.squamosa* associated more frequently with clade D and less often with clade C symbionts. *T.maxima* did not preferentially associate with a particular *Symbiodinium* clade, but sample sizes were low. We used both satellite sea surface temperature and *in situ* recordings to characterize the thermal environment in the study area. Clams with clade C and D symbionts were located in areas with higher mean temperatures, while clams with clade A symbionts were in cooler areas. This is consistent with previous research indicating that clade C and D types may be more heat-tolerant than clade A. These results support the hypothesis that giant clams can associate with different symbiont types based on local environmental conditions.

Keywords

Symbiodinium, *Tridacna* spp., Thermal tolerance, Climate change, Coral reef, Indonesia

3.8 **Bioorganic and Medicinal Chemistry 19 (22), pp. 6658-6674. 2011**

Highlights of marine invertebrate-derived biosynthetic products: Their biomedical potential and possible production by microbial associants

Radjasa, O.K., Vaske, Y.M., Navarro, G., Vervoort, H.C., Tenney, K., Linington, R.G., Crews, P.

Coral reefs are among the most productive marine ecosystems and are the source of a large group of structurally unique biosynthetic products. Annual reviews of marine natural products continue to illustrate that the most prolific source of bioactive compounds consist of coral reef invertebrates - sponges, ascidians, mollusks, and bryozoans. This account examines recent milestone developments pertaining to compounds from invertebrates designated as therapeutic leads for biomedical discovery. The focus is on the secondary metabolites, their inspirational structural scaffolds and the possible role of micro-organism associants in their biosynthesis. Also important are the increasing concerns regarding the collection of reef invertebrates for the discovery process. The case examples considered here will be useful to insure that future research to unearth bioactive invertebrate-derived compounds will be carried out in a sustainable and environmentally conscious fashion. Our account begins with some observations pertaining to the natural history of these organisms. Many still believe that a serious obstacle to the ultimate development of a marine natural product isolated from coral reef invertebrates is the problem of compound supply. Recent achievements through total synthesis can now be drawn on to forcefully cast this myth aside. The tools of semisynthesis of complex natural products or insights from SAR efforts to simplify an active pharmacophore are at hand and demand discussion. Equally exciting is the prospect that invertebrate-associated micro-organisms may represent the next frontier to accelerate the development of high priority therapeutic candidates. Currently in the United States there are two FDA approved marine-derived therapeutic drugs and two others that are often cited as being marine-inspired. This record will be examined first followed by an analysis of a dozen of our favorite examples of coral reef invertebrate natural products having therapeutic potential. The record of using complex scaffolds of marine invertebrate products as the starting point for development will be reviewed by considering eight case examples.

The potential promise of developing invertebrate-derived micro-organisms as the starting point for further exploration of therapeutically relevant structures is considered. Also significant is the circumstance that there are some 14 sponge-derived compounds that are available to facilitate fundamental biological investigations.

Keywords

Reef invertebrates, Biosynthetic products, Invertebrate-microbial associations, bioactive small molecules, Marine-derived bacteria

4.0 Kampus ITS Surabaya, Indonesia

4.1 Industrial Crops and Products, Volume 41, January 2013, Pages 107-112

Proximate composition of Xylocarpus moluccensis seeds and their oils

Setiyo Gunawan, Raden Darmawan, Miranti Nanda, Akhmad Dhika Setiawan, Hamzah Fansuri

Mangroves play an important role in protecting shorelines, supporting the food web, and sequestering carbon. In addition, they offer protection against waves, winds, storms, and tsunamis. Indonesian mangrove resources are increasingly being lost due to unsustainable utilization and habitat conversion. Reclamation for aquaculture and agriculture is currently considered the main way to achieve the development of mangrove areas. However, these types of reclamation are costly and have adverse environmental effects. The isolation, identification, and utilization of valuable mangrove products, such as *Xylocarpus moluccensis*, are other ways to achieve the development of mangrove areas. *X. moluccensis* is a species of mangrove that has medicinal properties. However, its nutritive and lipids values have not been evaluated. In this study, the proximate composition and mineral content of *X. moluccensis* seeds, as well as the fatty acid composition of *X. moluccensis* seed oils, were investigated. The results revealed that *X. moluccensis* fruit seeds contained crude lipids (10.65–11.09%), crude proteins (4.76–10.14%), ash (10.07–11.59%), crude fibers (7.81–15.85%), and nitrogen free extract (e.g. carbohydrates (52.42–63.32%)). The seeds also contained copper (12.82 ppm), iron (20.25 ppm), manganese (16.22 ppm), zinc (5.89 ppm), potassium (621.98 ppm), and calcium (43.69 ppm). Myristic acid (C14:0), palmitic acid (C16:0), stearic acid (C18:0), oleic acid (C18:1), linoleic acid (C18:2), linolenic acid (C18:3), arachidic acid (C20:0), and docosanoic acid (C22:0) were identified in the hexane extracts of *X. moluccensis* fruit seeds. It was found that mangrove seeds of moluccensis have potential as biodiesel feedstock due to their lipid content.

Keywords

Carbohydrates, Fatty acids, Lipids, *Xylocarpus moluccensis* seeds, *X. moluccensis* seed oils

5.0 Mae Fah Luang University, Thailand

5.1 **Process Biochemistry, Volume 47, Issue 12, December 2012, Pages 2566-2569**

Recovery of proteases from the viscera of farmed giant catfish (*Pangasianodon gigas*) by three-phase partitioning

Saroat Rawdkuen, Aten Vanabun, Soottawat Benjakul

Three-phase partitioning (TPP) was used to recover proteases from the viscera of farmed giant catfish. Different ratios of crude enzyme extract to *t*-butanol (1.0:0.5, 1.0:1.0, 1.0:1.5, and 1.0:2.0; v/v) and concentrations of ammonium sulfate ($(NH_4)_2SO_4$) (20, 30, 40, and 50%; w/v) were investigated. The best protease yield (163%) with a 5-fold purification was obtained in the interphase (I-ph) of the 2nd TPP system, which consisted of the crude extract to *t*-butanol ratio of 1.0:0.5 in the presence of 50% $(NH_4)_2SO_4$. A higher concentration of $(NH_4)_2SO_4$ increased the protease recovery at the interphase, whereas an increase in the *t*-butanol volume decreased the recovery. SDS-PAGE and zymography revealed a substantial level of isolation of proteases from the viscera of farmed giant catfish by TPP. The molecular weight of the major protease recovered was approximately 25 kDa, corresponding to trypsin. The present study demonstrates desirable outcomes and could be used as a primary purification process.

Keywords

Giant catfish, Viscera, Proteases, Three phase partitioning, *t*-Butanol

6.0 Prince Songkhla University, Thailand

6.1 Comptes Rendus Biologies, Volume 336, Issue 9, September 2013, Pages 449-456

DNA barcoding for the identification of eight species members of the Thai Hyrcanus Group and investigation of their stenogamous behavior

Adulsak Wijit, Atiporn Saeung, Visut Baimai, Yasushi Otsuka, Sorawat Thongsahuan, Kritsana Taai, Wichai Srisuka, Siripan Songsawatkiat, Sriwatapron Sor-suwan, Chayanit Hempolchom, Pradya Somboon, Wej Choochote

Eight species members of the Thai Hyrcanus Group were identified based on the intact morphology and molecular analysis (COI barcoding, 658 bp) of F_1-progenies. Five iso-female lines of each species were pooled in order to establish stock colonies. A stenogamous colony of each species was investigated by making 200 and 300 newly emerged adult females and males co-habit in a 30 cm cubic cage for one week. After ovipositon, the spermathecae of females were examined for sperms. The results revealed that *Anopheles argyropus*, *Anopheles crawfordi*, *Anopheles nitidus*, *Anopheles pursati*, *Anopheles sinensis*, *Anopheles nigerrimus*, *Anopheles paraliae* and *Anopheles peditaeniatus* yielded insemination rates of 0%, 0%, 0%, 31%, 33%, 42%, 50% and 77%, respectively. Continuous selection to establish stenogamous colonies indicated that *An. sinensis*, *An. pursati*, *An. nigerrimus*, *An. paraliae* and *An. peditaeniatus* provided insemination rates of 33–34%, 27–31%, 42–58%, 43–57% and 61–86% in 1, 2, 5, 6 and 20 generations of passages, respectively.

Keywords

Anopheles, Hyrcanus Group, DNA barcodes, Stenogamy, Eurygamy

6.2 **Molecular Phylogenetics and Evolution, Volume 60, Issue 3, September 2011, Pages 428-444**

A non-coding plastid DNA phylogeny of Asian Begonia (*Begoniaceae*): Evidence for morphological homoplasy and sectional polyphyly

D.C. Thomas, M. Hughes, T. Phutthai, S. Rajbhandary, R. Rubite, W.H. Ardi, J.E. Richardson

Maximum likelihood and Bayesian analyses of non-coding plastid DNA sequence data based on a broad sampling of all major Asian *Begonia* sections (*ndh*A intron, *ndh*F-*rpl*32 spacer, *rpl*32-*trn*L spacer, 3977 aligned characters, 84 species) were used to reconstruct the phylogeny of Asian *Begonia* and to test the monophyly of major Asian *Begonia* sections. Ovary and fruit characters which are crucial in current sectional circumscriptions were mapped on the phylogeny to assess their utility in infrageneric classifications. The results indicate that the strong systematic emphasis placed on single, homoplasious characters such as undivided placenta lamellae (section *Reichenheimia*) and fleshy pericarps (section *Sphenanthera*), and the recognition of sections primarily based on a suite of plesiomorphic characters including three-locular ovaries with axillary, bilamellate placentae and dry, dehiscent pericarps (section *Diploclinium*), has resulted in the circumscription of several polyphyletic sections. Moreover, sections *Platycentrum* and *Petermannia* were recovered as paraphyletic. Because of the homoplasy of systematically important characters, current classifications have a certain diagnostic, but only poor predictive value. The presented phylogeny provides for the first time a reasonably resolved and supported phylogenetic framework for Asian *Begonia* which has the power to inform future taxonomic, biogeographic and evolutionary studies.

Keywords

Asia, *Begoniaceae*, *Begonia*, Phylogeny, Character evolution

6.3 **Comparative Biochemistry and Physiology Part B: Biochemistry and Molecular Biology, Volume 165, Issue 1, May 2013, Pages 1-9**

Gene expression and activity of digestive enzymes during the larval development of Asian seabass (*Lates calcarifer*)

Manee Srichanun, Chutima Tantikitti, Prapaporn Utarabhand, Trond M. Kortner

Knowledge of digestive enzyme development during larval stages provides a better understanding of the digestive and nutritional physiology of fish larvae. This study characterized the ontogeny of key digestive enzymes in Asian seabass larvae from hatching to juvenile stage (30 days post hatch, dph) using molecular and biochemical approaches. Gene expression and activity of pepsinogen (*pg*), trypsinogen (*try*), chymotrypsinogen (*ctr*), bile salt-activated lipase (*bal*), α-amylase (*amy*), leucine aminopeptidase (*lap*) and alkaline phosphatase (*alp*) were determined. Gene expression and enzyme activity of all digestive enzymes were detectable from hatching. Pepsinogen mRNA levels were close to detection limit during 0–15 dph, but were highly expressed from 18 dph and onwards. This coincided with a marked increase in specific and individual pepsin activity, indicating complete development of digestive function. Expression levels of *try*, *ctr*, *amy* and *bal* were high between 3 and 15 dph and thereafter a decreasing trend was observed. Intestinal enzymes, *lap* and *alp*, showed highest expression levels during the yolk sac stage, and thereafter levels decreased. Activity of all digestive enzymes increased from around 18 dph and onwards. In conclusion, the development of main digestive enzymes in Asian seabass larvae shows a similar pattern to that of other marine fish species.

Keywords

Asian seabass, Fish larva, Ontogeny, Digestion, Gene expression

6.4

Superlattices and Microstructures, Volume 54, February 2013, Pages 71-77

Hydrothermal synthesis of Bi_2WO_6 hierarchical flowers with their photonic and photocatalytic properties

Phattharanit Dumrongrojthanath, Titipun Thongtem, Anukorn Phuruangrat, Somchai Thongtem

Bi_2WO_6 hierarchical multi-layered flower-like assemblies were synthesized by a hydrothermal method at 180 °C for 24 h. XRD patterns were specified as pure orthorhombic well-crystallized Bi_2WO_6 phase. Their FTIR spectra show main absorption bands at 400–1000 cm^{-1}, assigned as the stretching modes of the Bi–O and W–O, and W–O–W bridging stretching modes. SEM analysis shows that the product was 3D hierarchical flower-like assemblies, constructed by orderly arranged 2D layers of nanoplates. The UV–visible absorption shows an absorbance in the ultraviolet region with 3.4 eV band gap. Photocatalytic activity of Bi_2WO_6 hierarchical flowers was determined from the degradation of rhodamine-B by Xe light at 88% for 360 min irradiation.

Keywords

Bi_2WO_6 hierarchical flowers; Photonic and photocatalytic properties; Spectroscopy; X-ray method

7.0 Taylor's University, Malaysia

7.1 Journal of Applied Phycology, Volume 25, Issue 3, June 2013, Pages 805-814

Seasonal growth rate of *Sargassum* species at Teluk Kemang, Port Dickson, Malaysia

May-Lin B.Y. , Ching-Lee W.

The seasonal growth rates of three *Sargassum* species were studied along two reef flats of Teluk Kemang, located at Port Dickson, Malaysia from September 2009 to September 2010. Systematic quadrat and line transects were sampled monthly. Nondestructive sampling was conducted, whereby *Sargassum* plants were tagged and monitored for a 13-month period. The majority of the tagged *Sargassum* samples belonged to lower length classes (<200 mm), especially in 0-99 mm (*Sargassum polycystum*, 64.20 %; *Sargassum binderi*, 68.29 %; *Sargassum siliquosum*, 56.80 %). Analysis of the monthly mean thallus length (MTL) revealed a bimodal pattern in growth rates, with two periods of high growth rates (January-February 2010 and June-July 2010) and two periods of higher degenerative rates (April 2010 and September 2010). The highest growth rates were recorded in February 2010 (4.08 mm day^{-1}) for *S. siliquosum*, and in June for *S. polycystum* (2.54 mm day^{-1}) and *S. binderi* (1.89 mm day^{-1}). Redundancy analysis (RDA) was employed to test for the overall correlation between monthly variation in MTL and the environmental parameters measured; *S. binderi* was correlated with ambient temperature (r = 0.5395), while *S. siliquosum* was correlated with seawater salinity (r = 0.5419) and ammonia (r = -0.4603). This study reviews the seasonality of *Sargassum* species on two reefs of Teluk Kemang and their correlation with the selected environmental parameters.

Keywords

Growth rate, Length classes, Phaeophyceae, Port Dickson, RDA, *Sargassum*

8.0

Universitas Airlangga, Indonesia

8.1

Fitoterapia, Volume 83, Issue 5, July 2012, Pages 968-972

Flavonoids with antiplasmodial and cytotoxic activities of *Macaranga triloba*

Ishak Zakaria, Norizan Ahmat, Faridahanim M. Jaafar, Aty Widyawaruyanti

A new flavanone derivative, malaysianone A (**1**), four prenylated flavanones, 6-prenyl-3′-methoxyeriodictyol (**2**), nymphaeol B (**3**), nymphaeol C (**4**) and 6-farnesyl-3′,4′,5,7-tetrahydroxyflavanone (**5**), and two coumarins, 5,7-dihydroxycoumarin (**6**) and scopoletin (**7**), were isolated from the dichloromethane extract of the inflorescences of *Macaranga triloba*. The structures of these compounds were elucidated based on spectroscopic methods including nuclear magnetic resonance (NMR-1D and 2D), UV, IR and mass spectrometry. The cytotoxic activity of the compounds was tested against several cell lines, with **5** inhibiting very strongly the growth of HeLa and HL-60 cells (IC_{50}: 1.3 μg/ml and 3.3 μg/ml, respectively). Compound **5** also showed strong antiplasmodial activity (IC_{50}: 0.06 μM).

Keywords

Euphorbiaceae, *Macaranga triloba*, Flavonoids, Malaysianone A, Antiplasmodial, Cytotoxic

9.0

Universiti Kebangsaan Malaysia

9.1

Sains Malaysiana, 42 (10). pp. 1455-1460. ISSN 0126-6039 (2013).

Biodiversity and protected areas in Turkey

Kucuk, M. and Erturk, E.

Turkey has three major bio-geographical regions namely Euro–Siberian, Mediterranean and Irano-Turanian. There are very different types of ecosystems such as agricultural, mountain, forests, steppes and wetlands, as well as coastal and marine. The country has rich floral and faunal diversity, high endemism and wide genetic diversity. A good progress has been made in protecting nature and biodiversity rich areas. Since 1990, the extent of protected areas has almost doubled to reach 7.2% of the territory. There are 40 national parks, 31 nature conservation areas, 107 natural monuments, 184 nature parks, 81 wildlife reserve areas, 58 conservation forests, 239 genetic conservation areas, 373 seed stands, 15 specially protected areas, 1273 natural sites, 14 Ramsar sites and 1 biosphere reserve. In this paper information on different ecosystems of the country is presented.

Keywords

Biodiversity, Ecosystems, Protected areas, Turkey

9.2 **Sains Malaysiana, 42 (10). pp. 1517-1521. ISSN 0126-6039 (2013).**

Biomass and floristic composition of Bangi Permanent Forest Reserve, a twice-logged lowland dipterocarp forest in Peninsular Malaysia

Lajuni, J.J. and Latiff, A.

A 1 ha permanent plot was established in Bangi Permanent Forest Reserve for this study. A total of 1018 trees with a diameter at breast height (DBH) of 5 cm and above were identified, marked and measured. Their DBH ranged from 5 to 83.6 cm, where most trees fell into the 5 to 14.9 cm DBH or Class 1 (65.71%) and 1.57% of them fell into Class 7 with DBH over 65 cm. The five largest trees were from the dipterocarp family. Species with the highest Relative Dominance Value was *Shorea acuminata* with a value of 10.40. The total above ground biomass was 362.13 t/ha, which can be considered high for a twice-logged forest. The total basal area was 314.97 m2. The species diversity Shannon-Wiener index for this plot is H=6.99 with evenness of 0.852 and 0.85 with Brillouin's Index. Species with the highest frequency (68.39%) and highest Importance Value Index (83.80%) was *Antidesma cuspidatum*. There were 171 species of trees representing 113 genera and 43 families plot. Wild fruit trees and trees with ethnobotanical potential were also identified. The results of this study indicated that this forest has high biomass content and high species diversity.

Keywords

Biomass, Distribution, Flora, Species composition, Species diversity

9.3 **Sains Malaysiana, 42 (9). pp. 1237-1246. ISSN 0126-6039 (2013).**

Conservation gap Analysis of dipterocarp hotspots in Sarawak using GIS, remote sensing and herbarium data

P., Stephen Teo and P.K., Paul Chai and Mui-How, Phua

Dipterocarpaceae is the dominant tree family in the tropical rain forests of Southeast Asia. Borneo is the centre of diversity for the dipterocarps. Identification of hotspots is important for forest and biodiversity conservation efforts. Species Occurrence Models (SOMs) were generated for all 247 species of dipterocarps recorded in Sarawak using herbarium occurrence data and based on the best model selected. The species occurrence density map for each genus and category (endemic and non endemic) was generated by overlaying the SOMs of all species in each genus or category. The species occurrence density maps were analyzed with land cover map from Landsat 7-EMT+ images and protected forest areas for identifying hotspots for conservation in Sarawak. Overlaying the SOM maps revealed that areas in central Sarawak and the southwest region (northwest Borneo around Kuching) are the main hotspots of dipterocarp diversity in Sarawak while the coastal lowland areas in the lower Rejang and Baram River which are mainly peat swamp forest are poorer in species occurrence density. In terms of endemism, as with dipterocarp diversity, the mixed diptercarp forest of central Sarawak is also the most important hotspot. Gap analysis revealed that most protected forest areas are in southwest Sarawak (Bako, Kubah, Tanjung Datu and Gunung Gading National Parks) and in the northern part of Sarawak (Niah, Lambir Hills and Mt Mulu National Parks). This leaves the hotspot in the central part of Sarawak least protected. Protected areas only cover between 2 and 4% of the total areas for the different hotspots (75% species density) while majority of the hotspots that are still forested are outside the protected areas.

Keywords

Dipterocarps, Endemic, Non-endemic, Protected areas, Sarawak

9.4 **Sains Malaysiana, 42 (8). pp. 1115-1119. ISSN 0126-6039 (2013)**

Condition factors of two archerfish species from Johor Coastal Waters, Malaysia

Simon, K.D. and Mazlan , A.G. and Cob, Z.C.

Archerfishes Toxotes chatareus (Hamilton 1822) and *Toxotes jaculatrix* (Pallas 1767) inhabits mangrove estuaries, which are a critically important habitat as a spawning and nursery ground as well as the full life cycle of many fish species. In order to manage and conserve resilience fish species like the archerfish, we need to know some basic parameters about their biology and life history. Our research has focused on understanding the annual condition factors of these two species of archerfishes, as a complimentary to other several biological aspects of this two species that have been published. Our results indicated that, both species are in good conditions as the mean values of condition factors (Fulton condition factor K and Relative condition factor K_n) are greater than values of unity (K, K_n >1). The average K and K_n values of T. chatareus and *T. jaculatrix* were lowest in November and highest in September, indicates the spawning and recovery condition of the fishes. Condition factors measure overall fish population health that can be used by fisheries biologists and resource managers in proper management of fish resources in Malaysia waters.

Keywords

Brackish water, Conservation, Growth, Mangrove, Toxotidae

9.5

Sains Malaysiana, 42 (10). pp. 1439-1447. ISSN 0126-6039 (2013)

Determination of environmental factors and indicator plant species for site suitability assessment of Crimean Juniper in the Acipayam District, Turkey

Gulsoy, S. and Ozkan, K.

The present study was carried out to find the environmental and biotic indicators for site suitability of Crimean juniper (*Juniperus excelsa L.)* in the Acıpayam district, Turkey. Data were collected from 100 sample plots. Environmental variables (elevation, slope, radiation index, topographical position, landform characteristics and parent material) and plant species were recorded at each sample plot. Generalised addictive model (GAM) and indicator species analysis (ISA) were applied in order to model the distribution of Crimean juniper and determine the indicator species within its range. The results of the applied GAM analysis and the distribution model obtained showed that most suitable sites for the occurrence of Crimean juniper are the areas in the higher zones (supra and mountain Mediterranean zones) covered by limestone. The results obtained from indicator species analysis (ISA) confirmed the applied GAM results, in the sense that thermo-Mediterranean plant species such as *Arbutus andrachne, Cercis siliquastrum, Cotinus coggyria, Pistacia terebinthus* and *Styrax officinalis* are the negative indicator plant species for Crimean juniper while its positive associates from supra- and mountain-Mediterranean elements are *Berberis crataegiana, Lonicera etrusca var. etrusca, Juniperus feoettidissima* and *Phlomis armeniaca*. These findings are crucial to predict the suitable sites for the utilization of Crimean juniper in afforestration efforts by field managers in degraded and forestless areas of the Acipayam district.

Keywords

Habitat suitability, Mediterranean region, Plant distribution, Reforestation

9.6

Sains Malaysiana, 42 (10). pp. 1483-1492. ISSN 0126-6039 (2013)

Density and diversity of water birds and terrestrial birds in man-made marsh, Malaysia

Zakaria , M. and Rajpar, M.N.

Many bird species are highly dependent on natural marsh habitat. Unfortunately this habitat is rapidly converted to other land uses. Therefore artificial or man-made marsh habitat may become an important alternative habitat for marsh dependent bird species. The main objective of this study was to determine the density and diversity of water and terrestrial birds at man–made marsh habitat at Putrajaya using distance sampling point count technique. A total of 20010 bird individuals of 102 species representing 31.05% water birds and 68.95% terrestrial birds were detected from March 2009 to June 2010. Density analysis showed that bird density is 0.64 + 0.02 birds ha^{-1} and range from 0.60 – 0.68 birds ha^{-1} at 95.0% confidence interval. It was found that terrestrial birds had a higher density 0.74 + 0.02 birds ha^{-1} than water birds 0.54 + 0.09 birds ha^{-1}. For water bird species, the highest density was Black-crowned Nightheron; 2.92 + 1.80 birds ha^{-1} followed by Purple Heron; 1.55 + 0.93 birds ha^{-1} and Grey Heron; 1.05 + 0.13 birds ha^{-1}. The lowest density was recorded in Pintail Snipe; 0.08 + 0.03 birds ha^{-1}, Chinese Egret; 0.08 + 0.02 birds ha^{-1} and Great Egret; 0.07 + 0.08 birds ha^{-1}, respectively. In terrestrial birds, the highest bird density was observed in Rock Pigeon 3.91 + 0.97 birds ha^{-1}, followed by Eurasian Tree Sparrow; 3.72 + 1.03 birds ha^{-1}, House Crow; 3.69 + 0.33 birds ha^{-1} and Philippine Glossy Starling; 3.38 + 0.53 birds ha^{-1}. The lowest bird density was recorded in Brown-capped Woodpecker; 0.07 + 0.02 birds ha^{-1} and Lesser Coucal; 0.09 + 0.03 birds ha^{-1}. The result also shows that terrestrial birds had higher species diversity i.e. Shannon–Wiener index (N1 = 3.10), species richness i.e. Margalef's index (R1= 8.23) and species evenness i.e. Pielou's J index (E = 0.71) as compared with water birds (N1 = 2.04; R1= 8.23 and E = 0.65). This study indicates that man–made marsh is a suitable habitat for diverse avian species and thus should be protected in order to enhance the population of avian species.

Keywords

Density, Diversity, Marsh, Point count, Terrestrial birds, Vegetation, Water birds

9.7 **Sains Malaysiana, 42 (10). pp. 1377-1386. ISSN 0126-6039 (2013)**

Floristic diversity in the Kashmir Himalaya: progress, problems and prospects

Dar, G.H. and Khuroo, A.A.

The Kashmir Himalaya, being nestled within north-western folds of the Himalaya, harbours a rich floristic diversity of immense scientific interest and enormous economic potential. Though scientific studies on the floristic diversity in the Kashmir Himalaya have been started about two centuries ago, yet they fall short of the requirements needed urgently in the post-Rio Summit. In fact, at the spatial scale, many far flung areas and difficult terrains in the hinterland are still either least- or totally-unexplored; and at the taxon scale, floristic studies especially with regard to the lower plants are insufficient, thus posing serious problems in assessing the floristic diversity in the region. With such a perspective in hindsight, the present paper dilates upon the progress achieved so far, highlights the problems being faced and envisages the future prospects with regard to floristic diversity in this region. First, a broad overview of the current status of floristic diversity in this Himalayan region is presented, followed by a critical analysis of the knowledge base presently available on various taxonomic groups of plants. The yawing gaps in our knowledge of floristic diversity in this region are identified and an action plan to bridge these gaps is also outlined. Hopefully, addressing these challenges in the immediate future could facilitate the documentation, conservation and sustainable use of plant resources in this region, so as to steer this 'Himalayan Paradise' towards the path of sustainable development.

Keywords

Conservation, Documentation, Floristic diversity, Kashmir Himalaya, Sustainable use

9.8

Sains Malaysiana, 42 (10). pp. 1425-1430. ISSN 0126-6039 (2013)

First record of mixed-species heron colony: cattle egret (*Bubulcus ibis*), Squacco Heron (*Ardeola ralloides*) and Little Egret (*Egretta garzetta*) breeding at Famagusta Freshwater Lake in Cyprus

Charalambidou, I. and Gucel, S.

This study constitutes the first record of a mixed-species heron colony and of a breeding population of Squacco Heron (*Ardeola ralloides*) in Cyprus. The colony, located at Famagusta Freshwater Lake, was surveyed from March to June 2007. The survey were terminated after 25 June when it was not possible to boat to the colony due to decreasing water levels. The total number of active nests, i.e. containing eggs and/or hatchlings, was 135 for Cattle Egret (*Bubulcus ibis*); 38 for Squacco Heron and 4 for Little Egret (*Egretta garzetta*). Cattle Egrets started nest building and egg laying at the beginning of March and hatching started by the end of March. Egg-laying and hatching continued throughout June, possibly due to second broods. Mean clutch size was 3.5±0.8 eggs (range 1-5; n=135). Mean hatching success was 2.9±1 hatched egg per nest (range = 1-5; n=54) and mean breeding success was 2.8±1 chick per nest (range = 0-5; n=36) for chicks surviving up to 15 days after hatching. Squacco Herons started nest building and egg laying by the end of May and hatching started by mid June. Egg-laying and hatching continued throughout June and probably in July and August. As surveys were terminated in June, it was not possible to collect sufficient data on the breeding chronology of this species. Mean clutch size was 3.1 ± 0.8 egg (range 2-4; n=38), which was lower than European estimates. A multitude of activities at and around Famagusta Freshwater Lake pose potential threats to the conservation of the colony resulting in an urgent need for management of the wetland.

Keywords

Breeding success, Cattle Egret, Clutch size, Famagusta Freshwater Lake, Hatching success, Squacco Heron

9.9

Sains Malaysiana, 41 (12). pp. 1517-1525. ISSN 0126-6039 (2012)

Fish diversity and water quality during flood mitigation works at Semariang Mangrove Area, Kuching, Sarawak, Malaysia

L, Nyanti and R, Nur 'Asikin and T.Y , Ling and G, Jongkar

This study aimed to document the fish diversity and water quality at Semariang mangrove area, Kuching, Sarawak, which is located at the eastern part of Kuching Wetland National Park. Field samplings were carried out in 2009 during the construction of the flood mitigation channel at the eastern part of the park. A total of 21 families represented by 37 species of fish were caught from the area. The six dominant families in terms of the number of individuals caught were Mugilidae (16%), Leiognathidae (16%), Ambassidae (11%), Ariidae (9%), Lutjanidae (8%) and Plotosidae (6%). In terms of the percentage of six dominant genera based on the number of individuals caught, 16% was represented by Valamugil, 11% by Ambassis, 10% by Gazza, 9% by Arius, 8% by Lutjanus and 6% by Plotosus. The values of diversity and richness indices were lower at stations located close to the flood mitigation channel. Similarly, the concentrations of dissolved oxygen were lower and total suspended solids were significantly higher at stations close to the channel and sand mining area. Therefore, fish fauna and water quality at Semariang mangrove area were affected during the construction of the flood mitigation channel.

Keywords

Fish diversity, Flood mitigation channel, Semariang mangroves, Water quality

9.10 **Sains Malaysiana, 42 (9). pp. 1219-1229. ISSN 0126-6039 (2013)**

Life-history traits of the Threatened Freshwater Fish *Cirrhinus reba* (Hamilton 1822) (Cypriniformes: Cyprinidae) in the Ganges River, Northwestern Bangladesh

Hossain, Md. Yeamin and Khatun, MST. Monira and Jasmine, Saleha and Rahman, Md. Mosaddequr and Jahan, Sharmin and Sayed Jewel, Md. Abu and Ohtomi, Jun

The threatened Reba carp, *Cirrhinus reba* is a freshwater fish species found in ponds, rivers, canals and tanks of Bangladesh, India, Myanmar, Nepal and Pakistan. The present study describes the first complete and inclusive description of life-history traits including sex ratio, length-frequency distributions (LFD), length-weight relationships (LWR), condition factors (Allometric, KA; Fulton's, KF; Relative condition, KR; Relative weight, WR), form factor (a3.0) and size at first sexual maturity of *C. reba* in the Ganges River, NW Bangladesh. Sampling was done using traditional fishing gears including cast net, square lift net and conical trap from April 2011 to March 2012. The total length (TL), fork length (FL) and standard length (SL) were measured to the nearest 0.01 cm using digital slide calipers and total body weight (BW) was measured using an electronic balance with 0.01 g accuracy. The LWR was calculated using the expression: W= a Lb, where W is the BW, L the TL. The size at first sexual maturity of *C. reba* was estimated using the empirical equation by Binohlan and Froese (2009) for male and female, separately. A total of 250 specimens ranging from 8.00 cm – 23.40 cm TL and 4.30 g – 200 g BW were analyzed in this study. The overall sex ratio did not differ significantly from the expected value of 1:1 ($\chi 2$ = 3.38, $p < 0.05$), but there was significant differences in the TL-frequency distributions (Mann-Whitney U-test, $p < 0.001$) between male (median = 12.00 cm) and female (median = 15.80 cm). The calculated b for the LWR indicated positive allometric growth (> 3.00) in male and female and there was significant differences in the intercepts (ancova, $p < 0.001$) and in the slopes (ancova, $p < 0.001$) between the sexes. In addition, the Mann-Whitney U-test showed significant differences in the Fulton's condition factor between male and female ($p < 0.001$). The one sample t-test showed that the mean WR (actual mean = 99.50) did not differ from 100 for male ($p = 0.523$) and female ($p = 0.197$) in this study, indicating the habitat was still in good condition for C. reba.

Moreover, the size at sexual maturity of male and female *C. reba* were estimated as 11.50 cm TL and 13.50 cm TL, respectively. The results of this study would be useful for the sustainable conservation of this threatened carp fishery in Bangladesh and also neighboring countries.

Keywords

Bangladesh, *Cirrhinus reba*, Condition factor, Length-weight relationship, Sex ratio, Threatened

9.11 **Sains Malaysiana, 42 (10). pp. 1493-1499. ISSN 0126-6039 (2013)**

Variations of planktonic chlorophyll-a in relation to environmental factors in a Mediterranean Coastal System (Iskenderun Bay, Northeastern Mediterranean Sea).

Polat, S. and Terbiyik, T.

Chlorophyll-a is one of the most widely used parameters to estimate trophic state of an aquatic environment. The purpose of this study was to investigate the changes in the planktonic chlorophyll-a concentrations in relation to environmental parameters in the east part of Iskenderun Bay (Northeastern Mediterranean Sea). Monthly measurements of chlorophyll-a and inorganic nutrients were done on two transects at 6 stations across the Bay. In addition, variations in temperature, salinity and some meteorological factors were also investigated, their correlation with chlorophyll-a were analyzed. The highest chlorophyll-a concentration (3.8 μg L^{-1}) was found on coastal transect nearer to the bay. The first peak in chlorophyll-a occurred in May, a second smaller peak was recorded in September. The correlation of chlorophyll-a was significantly positive for Silicate-Si and Nitrate+nitrite-N but not important for Phosphate-P. No dramatic increase in chlorophyll-a levels was encountered in the area during the study period. It was concluded that, due to the hydrodynamic structure of the area, the land-based effects influence chlorophyll-a dynamics.

Keywords

Chlorophyll-a; Dinorganic nutrients; Eutrophication; Iskenderun Bay; Northeastern Mediterranean

10.0 Universiti Malaya, Malaysia

10.1 Malaysian Journal of Science Volume 28, Issue 3 (2011)

Characterization of active landfill leachate and associated impacts on edible fish (*Orechromis mossambicus*)

C. U. Emenike, S. H. Fauziah, P. Agamuthu

Fish is an organism of both ecological and economic importance. Its existence in the water helps to sustain aquatic ecosystem via energy transfer. However, pollution can serve as a deterrent to its survival. Leachate from landfills and open dumps are generated due to waste deposition and associated water percolation which finds its way into water courses or even aquifer. Therefore this study was designed to characterize raw leachate from an active landfill and subsequently assess its potential impacts on edible fish, *Orechromis mossambicus*. The physico-chemical analysis of the leachate showed almost a neutral acid-base ratio (pH 7.35±0.6), with corresponding 27,000 and 51,200 mg/L for BOD5 and COD, respectively. Low ammonium content was recorded (0.09 mg/L) while the concentrations of some metals namely Zn (828 mg/L), Cr (25 mg/L), Ni (19.5 mg/L) exceeded allowable effluent discharge limits according to the Malaysia EQA 1974 Standards. The deep black colouration of the raw leachate was associated with high concentration of total dissolved solids (1,730 mg/L). Five different concentrations of the leachate (2.5 – 3.8% v/v) based on the range finding test, were applied definitively to obtain the effluent's lethal concentration (LC50) on the named fish. Acute toxicity test of the raw leachate on *O.mossambicus* via static method revealed an LC50 of 3.2% v/v as calculated using Finney's probit analysis from EPA. Mortality rate of the fish increased with increase in leachate concentration. It shows that the presence of some of the aforementioned components like BOD5, COD and even the metals in the leachate is not ideal since that reflects potential toxic compounds. The fish mortality observed in the research can be attributed to the physico-chemical constituents of the landfill leachate.

This study concludes that based on characterization, leachate generated from landfills contain potentially toxic components. These constituents of leachate made it very dangerous for edible fish like *O.mossambicus* as it caused its mortality.

Keywords

Leachate, Landfill, Fish, Orechromis mossambicus, Toxicity

10.2 **Arthropod Structure & Development, 42 (3). pp. 165-172. ISSN 1467-8039 (2013)**

Diversity and morphology of abdominal glands in workers of the ant genus myopias (*formicidae, ponerinae*)

Hashim, R.; Ito, F.; Billen, J.; Stroobants, Z.; Wenseleers, T.

Histological examination of serial sections through the abdomen of workers of three species of Myopias ants revealed the presence of several exocrine glands. These include the common venom and Dufour glands as well as the pygidial gland, but also more specific sternal glands and glands associated with the sting base and the gonostyli. Two of these glands have not been reported previously among ants: one is the paired oblong plate gland, that occurs next to the oblong plate and may have a pheromonal function. The other novel gland is the paired sting shaft gland, that occurs at the dorsal side in the proximal region of the sting shaft. A remarkable characteristic of these Myopias ants is that all glands of class-3 show ducts with gradually widening internal diameter. Myopias emeryi shows a clearly more simple variety of abdominal glands than *Myopias maligna* and *M. sp.1*.

Keywords

Morphology, Ultrastructure, Exocrine glands, Myopias, Ponerinae

Malaysian Journal of Science Volume 31, Issue 2 (2012)

Effect of Equilibration Duration, Vapour Temperature and Exposure Vapour Duration on Cryopreserved Sperm of African Catfish

Noor Azlina, K., Wan Khadijah, W.e., Abdullah, R. B.,

The objective of this study was to obtain the optimal freezing rate with special focus on equilibration duration, vapour temperature and exposure vapour duration on sperm motility characteristics (SMCs) of African catfish (*Clarias gariepinus*) using Fish-Ringer Extender (FRE) with fixed 10% Dimethyl-sulfoxide (DMSO) as cryoprotectant. Briefly, the straws containing the sperm were placed in a refrigerator at 4°C with three equilibration durations (120, 140 or 160 min) after which exposed to liquid nitrogen vapour at three vapour temperatures (-80, -90 or -100°C) with three exposure vapour durations (5, 10 or 15 min). Finally, the straws were directly plunged into liquid nitrogen vapour at -196°C. The frozen sperm were thawed at 30°C for 30 sec to evaluate the sperm movement characteristics using the Automated Semen Analyzer-IVOS (Hamilton Thorne, USA). Results showed that the highest values of total motility and progressive motility obtained were combination factors of 120 min equilibration duration, -100°C vapour temperature and 15 min vapour exposure duration (87.44 ± 2.07% and 28.22 ± 2.16%, respectively). Combination of 120 min, -100°C and 15 min gave the highest value of rapid velocity (38.56 ± 3.10%), while combination of 120 min, -80°C and 10 min gave the lowest value (16.33 ± 3.21%). The highest values of Velocity Average Path (VAP), Straight-line Velocity (VSL) and Curvilinear Velocity (VCL) were attained by combination of 120 min, -80°C and 15 min which produced 68.76 ± 6.42%, 60.49 ± 6.01% and 94.71 ± 6.27%, respectively. For combination of 120 min, -100°C and 15 min was probably the optimum condition in which positive correlations were shown between total motility and progressive motility; total motility and rapid; total motility and VAP; total motility and VSL; total motility and VCL; progressive motility and rapid; progressive motility and VAP; progressive motility and VSL; progressive motility and VCL; rapid and VAP; rapid and VSL; rapid and VCL; static and Straightness (STR); VAP and VSL; VAP and VCL; VSL and VCL and STR and Linearity (LIN) ($p > 0.05$).

In conclusion, under the present conditions, the optimal frozen-thawed sperm motility characteristics in African catfish using FRE extender was obtained with combination of 120 min equilibration duration, -100°C vapour temperature and 5 to 15 min exposure vapour duration. It is recommended that FRE extender using DMSO as cryoprotectant apparently is suitable to cryopreserve the sperm of African catfish (*Clarias gariepinus*).

Keywords

Cryopreservation, Sperm, Clarias gariepinus, Fish-Ringer Extender, Equilibration, Vapour exposure

Malaysian Journal of Science Volume 28, Issue 3 (2012)

Mangrove Flora and Fauna of Klang Islands Mangrove Forest Reserves, Selangor, Malaysia

Norhayati, A., Shukor, M.n., Juliana, S., Wan Juliana W.a.

The mangrove areas of the Klang Islands Forest Reserves, Selangor, have been declining in size and quality due to degazettement or removal from legal protection of the forest reserves and subsequent land reclamation and other development activities. Thus, surveys on mangrove flora and fauna were conducted to assess current status and identify impact of development. A list of mangrove flora and fauna is produced. Terrestrial vertebrates (mammals, birds and herpetofauna) surveyed revealed a total of 68 species (8 species of mammals, 57 species of birds and 3 species of reptiles). Species composition and total standing above-ground biomass of mangrove trees in ten 10 x 10 m plots, totalling 0.4 ha area, were estimated at Pulau Indah and Pulau Che Mat Zin. Both islands are within the Klang Islands Mangrove Forest Reserves (MFR), which have been declining in forest cover. The total number of individual trees recorded in all 10 plots was 222 from 10 species of three families i.e. *Rhizophoraceae, Avicenniaceae* and *Meliaceae*. *Rhizophora apiculata* was the most dominant tree species with an Important Value Index (IVI) of 28.2, contributed mainly from the density (77 trees). The total basal area of the trees was of 23.96 m2/ha with R. apiculata making up most of the total value of 6.96 m2/ha. The estimated total above-ground biomass of mangrove trees in this study was 2300.1 kg/0.1 ha with the highest contribution from *R. apiculata* and *Bruguiera gymnorrhiza*. The estimated biomass was very low compared to other pristine mangrove forest at Matang or Langkawi. The causal factors identified included clear-felling activity, coastal erosion caused by wave actions from ships, oil pollution, reclamation, and other development activities.

Keywords

Vertebrates, Small mammals, Birds, Bats, Herpetofauna, Biomass

Malaysian Journal of Science Volume 31, Issue 2 (2012)

Marine Algae Collected during the Marine Biodiversity Mini Expedition 2012 to Sembilan Group of Islands, Perak with One New Record, *Parvocaulis parvulus* (Solms-Laubach) S. Berger et al. for Malaysia

Hui-Yin Yeong, Stefano G. A. Draisma, Phang S.m.,

In May 11 -15, 2012, the Institute of Ocean and Earth Sciences, University of Malaya organized a marine expedition to the Sembilan Group of Islands, Perak (Malaysia). The objective of the expedition was to document the marine biodiversity in the waters around the islands and the coastal zone as well as documenting physical parameters. Marine algae were among the targeted groups of taxa. A total of 51 algal specimens were collected. All specimens are deposited as herbarium in the University of Malaya Seaweed and Seagrass Herbarium. The algae comprised one family, one genus and three putative species of *Cyanophyta*; five families, six genera and 13 putative species of *Chlorophyta*; seven families, ten genera and 13 putative species of *Rhodophyta* and one family, one genus and one putative species of *Phaeophyceae*. Of these, the *chlorophyte Parvocaulis parvulus (Solms-Laubach)* S. Berger et al. is a new record for Malaysia. In 2008, Phang et al. reported that a total of seven families and nine putative species of marine algae were collected during the Scientific Expeditions to the Seas of Malaysia (SESMA) I and II from the Sembilan Group of Islands (Pulau Lalang and Pulau Rumbia) Perak. Of these, an addition of six families and 11 putative species were collected during this present survey.

Keywords

Marine algae, Checklist list, Sembilan Group of Islands

Mammalian Biology. ISSN 16165047 (2013)

Morphological and genetic relationships of the *crocidura monticola* species complex (soricidae: crocidurinae) in Sundaland

Hashim, R., Ruedi, M., Omar, H., Bhassu, S.

Small Crocidurinae shrews (weight <8 g) from Southeast Asia have been poorly studied to date, mainly because of the difficulty to catch them and the concomitant paucity of reference specimens available in museums. Hence their systematics is still debated, and most small *Crocidura* shrews from Sundaland are assigned to the *monticola* species complex. Here, we report a study based on a survey of shrews caught with large pitfalls set on forest floors in Peninsular Malaysia. Morphometric analyses based on 14 skull measurements showed that these shrews tend to be larger with increasing altitude, but showed otherwise no consistent variation. When compared to museum specimens of the *monticola* species complex sampled in the Sundaland (total: 77 specimens), the Malay shrews tend also to be larger than those living on Kalimantan (Borneo) and Sumatra. All are, however, morphologically distinct from the other species, *C. maxi*, found in eastern Java and on the Lesser Sundas. Molecular analyses of a subset of these small shrews and based on a mitochondrial (cytochrome *b*) and a nuclear gene (Apolipoprotein B) suggest that samples from the central region of Peninsular Malaysia (Bukit Rengit and Ulu Gombak) genetically differ from other Malaysian populations (by about 7% K2P distance at the cyt *b* gene) and are more closely related to some samples from Sumatra and Borneo. These differences did not correlate with the altitudinal variation evidenced from the morphological analysis. Reference sequences from the terra typica of *monticola* and *maxi* (both species were originally described from Java) are however needed to determine if these unexpected genetic differences warrant additional taxonomic subdivision within the Sundaland.

Keywords

Cryptic species, Genetic distance, Phylogeny, Principal component analysis, Shrew

11.0 Universiti Malaysia Sabah

11.1 Organisms Diversity & Evolution, Volume 3, Issue 2, 2003, Pages 111-126

Vegetation indicates diversity of soil macroinvertebrates: a case study with termites along a land-use intensification gradient in lowland Sumatra

Andrew N. Gillison, David T. Jones, Francis-Xavier Susilo, David E. Bignell

Macroinvertebrates have an important role in the maintenance of soil structural stability and fertility in many natural and man-modified habitats. Efficient cataloguing of these animals, as a part of rapid biodiversity assessments, is hampered by high species richness, inherent inaccessibility and a strong tendency towards aggregated distribution. Current debate concerning the relative merits of transects (rapid, but at best semi-quantitative) and alternative sampling approaches such as grid-based or randomised placements of monoliths or cores (labour intensive, but statistically preferable) has initiated a search for satisfactory indicator groups or surrogates of belowground faunal diversity. Here, we use well-characterised, forest-derived plant and termite assemblages to show there can be a key role for plant indicators. We catalogued all vascular plant species, plant functional attributes (PFAs), plant functional types (PFTs), and vegetational structure in seven IBOY-designated sites along a gradient of disturbance and land-use intensification in lowland Sumatra, using a rapid survey protocol. We simultaneously sampled the termite assemblage in the same sites by a more exhaustive process involving microhabitat exploration. There were highly significant, positive correlations between species richness of all termites (and of soil-feeders, the most important termite functional group) and, respectively, mean canopy height ($r > 0.96$), woody plant basal area ($r > 0.95$), the ratio of plant species richness to richness of PFTs ($r > 0.97$), and plant species richness ($r > 0.85$). There was no significant correlation between any individual plant and termite species. There were significant correlations between 18 individual PFAs and 24 of the 54 termite species, and between 12 PFTs and 38 termite species. In addition, 6 PFTs and 10 PFAs were highly correlated with termite species richness and relative abundance.

Causal linkages between termites and their plant predictors are briefly discussed. Plant-based heterogeneity and aboveground habitat structure may therefore predict termite diversity response to disturbance. We conclude that for rapid, multi-taxon surveys including belowground macroinvertebrates, logistic efficiency may be achieved by the use of specific, readily observable plant indicators.

Keywords

Plants, Termites, Tropical forest, Bioindicators, Disturbance, Land use

11.2 **Forest Ecology and Management, Volume 261, Issue 3, 1 February 2011, Pages 531-544**

Bird community assembly in Bornean industrial tree plantations: Effects of forest age and structure

Alison R. Styring, Roslina Ragai, Joanes Unggang, Robert Stuebing, Peter A. Hosner, Frederick H. Sheldon

Plantations of exotic trees for industrial and agricultural purposes are burgeoning in the tropics, and some of them offer the opportunity to study community ecology of animals in a simplified forest setting. We examined bird community assembly in different aged groves of the industrial tree mangium *(Acacia mangium)* at two plantations in Malaysian Borneo: Sabah Softwoods near Tawau, Sabah, and the Planted Forest Project, near Bintulu, Sarawak. Bird communities were compared among three age-groups of mangium (2-, 5-, and 7-years old) and logged native forest. Mangium rapidly developed into a secondary forest consisting of a wide diversity of understory trees and shrubs. The bird community correspondingly increased in species richness and diversity, and we were able to relate these increases specifically to canopy height, secondary canopy development, and shrub cover. Species of common, small bodied frugivores, nectarivores, and insectivores were diverse in older plantation groves, as were common mid-sized insectivores. However, large, specialized, and normally uncommon taxa (e.g., galliforms, pigeons, hornbills, barbets, midsized woodpeckers, muscicapine flycatchers, and wren babblers) were rare or nonexistent in the plantations. Because we lacked species-specific data on foraging, nesting, and other behaviors of most groups of birds, it was difficult to explain the precise causes of seral diversification in any group except woodpeckers, which have been well studied in Southeast Asia. Thus, in future, particular emphasis needs to be placed on obtaining such data. Industrial plantations, by virtue of their simple structure, variably aged groves, and bird community richness, are good places to gather such data.

Keywords

Acacia mangium, Chronosequence, Logged forest, Mangium, Sabah, Sarawak, Succession

11.3 **Forest Ecology and Management, Volume 262, Issue 12, 15 December 2011, Pages 2306-2315**

The conservation value of oil palm plantation estates, smallholdings and logged peat swamp forest for birds

Badrul Azhar, David B. Lindenmayer, Jeff Wood, Joern Fischer, Adrian Manning, Chris McElhinny, Mohamed Zakaria

The expansion of industrial oil palm cultivation threatens tropical biodiversity globally, especially in developing countries. Driven by plans to generate economic revenue, large-scale plantations are emerging in Southeast Asia, Africa and Brazilian Amazon. However, the ecological impacts of the sector are poorly studied with respect to oil palm management system, and recommended conservation measures are based on limited data. We studied avifauna in oil palm landscapes in Peninsular Malaysia under different management systems (large plantation estates versus smallholdings) and age classes (uniform age versus mixed-age stands). We sampled 41 large plantation estates and 14 smallholdings, as well as 20 sites in an extensively logged peat swamp forest, the type of natural forest prior to conversion to oil palms. Compared with logged peat swamp forest, our results showed that forest conversion to oil palm cultivation may have eliminated 48–60% of bird species. We also found: (i) plantation estates and smallholdings supported similar bird assemblages but the latter supported significantly more species ($P = 0.007$); and (ii) despite reduced species richness in oil palm landscapes, we found high abundance of some individual bird species in specific types of stands including some forest, migratory, and wetland species. Conversion of natural forest to oil palm landscapes should not occur in the future through clearing of primary or secondary native forests. To complement conventional conservation approaches (e.g. the establishment of protected areas) in palm oil-producing countries, existing plantation estates and smallholdings should be managed in ways to promote improved conservation outcomes, although oil palm landscapes maintained a fraction of the original forest biodiversity. Managing habitat heterogeneity at both a local and a landscape-level is highly recommended in oil palm landscapes to maintain and/or enhance avian biodiversity.

Keywords

Bird assemblages, Management regime, Oil palm, Species richness, Stand age, Vegetation structure

Aquaculture, Volume 321, Issues 1–2, 16 November 2011, Pages 157-165

Experimental evidence of horizontal transmission of Betanodavirus in hatchery-produced Asian *seabass, Lates calcarifer* and brown-marbled grouper, *Epinephelus fuscoguttatus* fingerling

Benny Obrain Manin, Julian Ransangan

In the present study we report the experimental evidence of horizontal transmission of betanodavirus in hatchery-produced Asian seabass (*Lates calcarifer*) and brown-marbled grouper (*Epinephelus fuscogutattus*) fingerling. The experiment was conducted by incubating fish fingerlings in aerated sterile natural seawater inoculated with tissue homogenate of betanodavirus infected fish fingerling at 28° C for 30 min and after which they are transferred into the aquarium. Dead fish were collected daily for 10 days and subjected to RT-PCR and histological examinations. The cDNA of coat protein gene of betanodavirus from positive fish specimens were subjected to RFLP-PCR and DNA sequencing analyses. The result showed high fish mortality in treatment than in the control experiment. The RT-PCR and histological analyses showed all fish specimens in treatment groups except for D2 and E2 were successfully infected with *Betanodavirus*. In contrast, all fish specimens in control groups remained uninfected. The result of the present study indicate that mixing of fish fingerlings obtained from different sources and the use of surplus fish eggs for feeding supplement can potentially promote the horizontal transmission of *Betanodavirus* in hatchery. This can threaten the sustainability of aquaculture industry in Malaysia.

Keywords

Betanodavirus, Horizontal transmission, Asian seabass, Brown-marbled grouper

11.5 **Polar Science, Volume 4, Issue 2, August 2010, Pages 263-273**

Metagenomic analyses of the dominant bacterial community in the Fildes Peninsula, King George Island (South Shetland Islands)

Choon Pin Foong, Clemente Michael Wong Vui Ling, Marcelo González

There is little information on the bacterial diversity of the Fildes Peninsula, King George Island. Hence, this study was conducted to determine the bacterial population of sediments and soils from the lakes, river, glacier and an abandoned oil tank area in the Fildes Peninsula, using a metagenomic approach. DNA was extracted from the sediment and soil samples, and analyzed using the 16S rDNA polymerase chain reaction–denaturing gradient gel electrophoresis (PCR–DGGE). A total of 299 DNA fragments resolved using the DGGE were sequenced. The results of the analysis provided an overview of the predominant groups of bacteria and the diversity of the bacterial communities. The most abundant phyla of bacteria in Fildes Peninsula were Bacteroidetes, Proteobacteria, Acidobacteria, Gemmatimonadetes, Nitrospira, Firmicutes, Actinobacteria, Chloroflexi, Cyanobacteria, Spirochaetes, Deinococcus-Thermus, WS3 and BRC1. All of the sediment samples from the lakes had different representatives of dominant bacterial species. Interestingly, 15% of the operational taxonomic units (OTUs) did not group into any of the existing phyla in the Ribosomal Database Project (RDP). One of the OTUs had a similarity of <0.90 when compared to the GenBank sequences and probably was a novel bacterium specific to that location. The majority of the bacterial 16S rDNA sequences were found to be closely related to those found elsewhere.

Keywords

Bacterial diversity, DGGE fingerprinting, Sediment, Soil, Fildes Peninsula, Antarctica

11.6 **Harmful Algae, Volume 14, February 2012, Pages 301-312**

Biology, ecology and bloom dynamics of the toxic marine dinoflagellate *Pyrodinium bahamense*

Gires Usup, Asmat Ahmad, Kazumi Matsuoka, Po Teen Lim, Chui Pin Leaw

It has been 40 years since the first recorded toxic bloom of *Pyrodinium bahamense* occurred in Papua New Guinea in 1972. Subsequently this species has increased in importance as a paralytic shellfish poisoning toxin (PSTs) producer in several regions of the world, especially in the Indo-west Pacific. *P. bahamense* is a thecate tropical/subtropical euryhaline dinoflagellate. Available data indicate that it forms blooms only in waters of 20 psu or higher salinity and at temperatures above 20 °C. It is monospecies with two varieties, namely var. *compressum* and var. *bahamense*. For many years it was widely accepted that only var.*compressum* is toxic and is limited to the tropical Pacific while var. *bahamense* is nontoxic and is limited to the tropical Atlantic. It is now known, however, that there are at least two locations where the varieties co-occur and it has also been proven that var. *bahamense* in Florida waters also produce PST. *P. bahamense* has a life cycle typical of many dinoflagellates. It has a heterothallic sexual cycle that produces a large spiny spherical resting cyst. The toxicity profile of *P. bahamense* is also very simple with most isolates producing only dc-STX, STX, neoSTX, B1 and B2 toxins. Further studies are needed in order to resolve the varietal status of the species and also to understand the environmental factors that determine its toxicity and bloom dynamics.

Keywords

Harmful algal blooms, Pyrodinium bahamense, HAB biology and ecology

11.7 **Molecular Phylogenetics and Evolution, Volume 27, Issue 3, June 2003, Pages 441-452**

Molecular phylogeny of Crematogaster subgenus Decacrema ants (Hymenoptera: Formicidae) and the colonization of Macaranga (Euphorbiaceae) trees.

Heike Feldhaar, Brigitte Fiala, Jürgen Gadau, Maryati Mohamed, Ulrich Maschwitz

To elucidate the evolution of one of the most species-rich ant–plant symbiotic systems, the association between Crematogaster (Myrmicinae) and Macaranga (Euphorbiaceae) in South-East Asia, we conducted a phylogenetic analysis of the ant partners. For the phylogenetic analysis partial mitochondrial cytochrome oxidase I and II were sequenced and Maximum Parsimony analysis was performed. The analyzed Crematogaster of the subgenus Decacrema fell into three distinct clades which are also characterized by specific morphological and ecological traits (queen morphology, host-plants, and colony structure). Our results supported the validity of our currently used morphospecies concept for Peninsula Malaysia. However, on a wider geographic range (including North and North-East Borneo) some morphospecies turned out to be species complexes with genetically quite distinct taxa. Our phylogenetic analysis and host association studies do not indicate strict cocladogenesis between the subgenus Decacrema and their Macaranga host-plants because multiple ant taxa occur on quite distinct host-plants belonging to different clades within in the genus Macaranga. These results support the view that host-shifting or host-expansion is common in the ants colonizing Macaranga. Additionally, the considerable geographic substructuring found in the phylogenetic trees of the ants suggests that allopatric speciation has also played a role in the diversification and the current distribution of the Decacrema ants.

11.8 **Mammalian Biology - Zeitschrift für Säugetierkunde, Volume 76, Issue 2, March 2011, Pages 165-171**

Riverine refuging by proboscis monkeys (*Nasalis larvatus*) and sympatric primates: Implications for adaptive benefits of the riverine habitat

Ikki Matsuda, Augustine Tuuga, Henry Bernard

Riverine refuging by non-human primates, with focus on proboscis monkeys, was studied in a forest along the Menanggul River, Sabah, Malaysia from May 2005 to 2006. The results of the primate census indicated that not only proboscis monkeys but also sympatric primates inhabiting the study site preferred to utilize the riverine habitat for night-time sleeping, though the frequency of riverine usage was different among these sympatric primates. Four predation-related events in the study site and two additional predation reports at other study sites involving clouded leopards suggest a relatively high predation pressure in proboscis monkeys relative to other sympatric primates. Riverine refuging, which represents a strategy of long-range visibility, may provide non-human primates including proboscis monkeys with the common benefit of an effective means of predation avoidance. In addition, a one-male group of proboscis monkeys was studied to clarify the effects of food availability and air temperature on riverine refuging. Proboscis monkeys spent more time in the inland habitat, though the food availability was not much different between riverine and inland habitats, indicating that food availability is not a fundamental factor in their preference for riverine habitat. Air temperature only had a small effect on their preference for the riverine habitat. However, to clarify the reasons why riverine refuging is more common in proboscis monkeys than in sympatric primates, further investigation is needed.

Keywords

Proboscis monkeys; Habitat selection; Riverine refuging; Predation threats; Adaptation

11.9 **Veterinary Microbiology, Volume 156, Issues 1–2, 23 April 2012, Pages 16-44**

Genome analysis of Betanodavirus from cultured marine fish species in Malaysia

Julian Ransangan, Benny Obrain Manin

Betanodavirus is the causative agent of the viral nervous necrosis (VNN) or viral encephalopathy and retinopathy disease in marine fish. This disease is responsible for most of the mass mortalities that occurred in marine fish hatcheries in Malaysia. The genome of this virus consists of two positive-sense RNA molecules which are the RNA1 and RNA2. The RNA1 molecule contains the RdRp gene which encodes for the RNA-dependent RNA polymerase and the RNA2 molecule contains the Cp gene which encodes for the viral coat protein. In this study, total RNAs were extracted from 32 fish specimens representing the four most cultured marine fish species in Malaysia. The fish specimens were collected from different hatcheries and aquaculture farms in Malaysia. The RNA1 was successfully amplified using three pairs of overlapping PCR primers whereas the RNA2 was amplified using a pair of primers. The nucleotide analysis of RdRp gene revealed that the Betanodavirus in Malaysia were 94.5–99.7% similar to the RGNNV genotype, 79.8–82.1% similar to SJNNV genotype, 81.5–82.4% similar to BFNNV genotype and 79.8–80.7% similar to TPNNV genotype. However, they showed lower similarities to FHV (9.4–14.2%) and BBV (7.2–15.7%), respectively. Similarly, the Cp gene revealed that the viruses showed high nucleotide similarity to RGNNV (95.9–99.8%), SJNNV (72.2–77.4%), BFNNV (80.9–83.5%), TPNNV (77.2–78.1%) and TNV (75.1–76.5%). However, as in the RdRp gene, the coat protein gene was highly dissimilar to FHV (3.0%) and BBV (2.6–4.1%), respectively. Based on the genome analysis, the Betanodavirus infecting cultured marine fish species in Malaysia belong to the RGNNV genotype. However, the phylogenetic analysis of the genes revealed that the viruses can be further divided into nine sub-groups. This has been expected since various marine fish species of different origins are cultured in Malaysia.

11.10 Biological Conservation, Volume 169, January 2014, Pages 268-276

Tropical forest fragments contribute to species richness in adjacent oil palm plantations

Jennifer M. Lucey, Noel Tawatao, Michael J.M. Senior, Vun Khen Chey, Suzan Benedick, Keith C. Hamer, Paul Woodcock, Robert J. Newton, Simon H. Bottrell, Jane K. Hill

In Southeast Asia, large-scale conversion of rainforest to oil palm plantations is one of the major causes of biodiversity declines. Recommendations for reducing species losses and increasing the sustainability of palm oil production advocate the retention of natural forest patches within plantations, but there is little evidence for the effectiveness of this strategy. Here, we examine to what extent rainforest remnants with different characteristics contribute to biodiversity within surrounding plantations. We sampled ground-dwelling ants in Sabah (Malaysian Borneo) using unbaited pit-fall traps along 1 km transects spanning forest-plantation ecotones of 10 forest fragments (area 5 ha–500 ha) and two continuous forest sites which bordered plantations. Ant species richness in plantations varied according to richness in adjacent forest fragments, which increased with fragment size. A trend of declining species richness in plantations with distance from the forest ecotone was consistent with spillover of forest species into plantations adjacent to forest remnants. Ant assemblages in plantations also contained more carnivorous species adjacent to large forest fragments, suggesting large fragments may have benefits for pest control in plantations, as well as benefits for local biodiversity. Our results indicate that large forest fragments support distinctive ant assemblages and increase diversity within the planted area, but small fragments (<~200 ha) contribute little to plantation diversity. Thus retaining large fragments of forest may help mitigate the loss of species within oil palm plantations.

Keywords

Agricultural matrix, Ants, Borneo, Fragmentation, Spillover, Trophic level

11.11 Biological Conservation, Volume 163, July 2013, Pages 58-67

Lack of trophic release with large mammal predators and prey in Borneo

Jedediah F. Brodie, Anthony Giordano

When humans reduce top carnivore abundance in insular systems, herbivore populations may increase, with cascading impacts on the community. But the prevalence of such "trophic release" effects in non-insular ecosystems remains little known, particularly in tropical ecosystems. We assessed whether areas with low top carnivore abundance were associated with greater abundance of herbivores across seven rainforest study areas in Malaysian Borneo. We deployed 134 camera-trap stations and analyzed the resulting photographic detections from 16,608 trap-days using multi-species occupancy models that estimate abundance while accounting for imperfect detectability. Estimated local abundance of Sunda clouded leopards *(Neofelis diardi)*, the apex mammalian predator, varied from 0.0 to 3.5 individuals per camera location. Clouded leopard abundance was not negatively correlated with the abundance of any of the four prey species that we analyzed. Rather, sites with few or no clouded leopards also had the lowest estimated abundance of pig-tailed macaques *(Macaca nemestrina)*. Estimated abundance of muntjac (*Muntiacus* spp.) and mousedeer (*Tragulus* spp.) was statistically unrelated to estimated clouded leopard abundance. Bearded pig *(Sus barbatus)* abundance was likewise unaffected by predator abundance, but pigs appear to live in larger groups when clouded leopards are common, possibly to better defend their young. We found no evidence of trophic release, an important conservation threat in other areas, in this ecosystem, particularly relative to the massive impacts of agricultural conversion, habitat degradation, and unsustainable wildlife exploitation.

Keywords

Abundance, Food web, Hunting, Indirect effects, Logging, Occupancy, Predator-prey relationships, Trophic cascade

11.12 **Asian Pacific Journal of Tropical Biomedicine, Volume 3, Issue 2, February 2013, Pages 95-99**

Blood meal analysis of tabanid fly after it biting the rare Sumatran rhinoceros

Jeffrine Japning Rovie-Ryan, Zainal Zahari Zainuddin, Wahap Marni, Abdul Hamid Ahmad, Laurentius N. Ambu, Junaidi Payne

Objective: To demonstrate a noninvasive large mammalian genetic sampling method using blood meal obtained from a tabanid fly.

Methods: Blood meal was recovered from the abdomen of an engorged tabanid fly (*Haematopota* sp.) which was captured immediately after biting a Sumatran rhino in captivity. The blood was applied on to a Whatman FTA(®) blood card. Subsequent laboratory work was conducted to extract, amplify and sequence the DNA from the sample. Validation was done by sampling the hair follicles and blood samples from the rhinoceros and subjecting it to the same laboratory process.

Results: BLAST search and constructed phylogenetic trees confirmed the blood meal samples were indeed from the rhino.

Conclusions: This method could be used in the field application to noninvasively collect genetic samples. Collection of tabanids and other haematophagous arthropods (e.g. mosquitoes and ticks) and other blood-sucking parasites (e.g. leeches and worms) could also provide information on vector-borne diseases.

Keywords

Blood meals, Noninvasive DNA sampling, Sumatran rhino, Tabanid fly

11.13 **Molecular Phylogenetics and Evolution, Volume 63, Issue 3, June 2012, Pages 714-723**

Molecular phylogeny and biogeography of caecilians from Southeast Asia (Amphibia, Gymnophiona, Ichthyophiidae), with special reference to high cryptic species diversity in Sundaland

Kanto Nishikawa, Masafumi Matsui, Hoi-Sen Yong, Norhayati Ahmad, Paul Yambun, Daicus M. Belabut, Ahmad Sudin, Amir Hamidy, Nikolai L. Orlov, Hidetoshi Ota, Natsuhiko Yoshikawa, Atsushi Tominaga, Tomohiko Shimada

We investigated the phylogenetic relationships and estimated the history of species diversification and character evolution in two ichthyophiid genera: Caudacaecilia and Ichthyophis. We estimated the phylogenetic relationships of 67 samples from 33 localities in Southeast Asia from 3840-bp sequences of the mitochondrial 12S rRNA, 16S rRNA, and cyt b genes using Bayesian inference, maximum likelihood, and maximum parsimony methods. The Southeast Asian samples formed a well-supported clade differentiated from a South Asian sample. The Southeast Asian clade was divided into two subclades, one containing samples from South China, Indochina, Malay Peninsula, and Java. The other consisted of samples from Borneo and the Philippines. Neither Caudacaecilia nor Ichthyophis was monophyletic, nor did samples with or without light stripes lateral to the body form clades. We found several distinct sympatric lineages and undescribed species, especially from Sundaland.

Keywords

Caecilians, Mitochondrial DNA, Phylogeny, Biogeography, Southeast Asia, Sundaland

11.14 **Marine Policy, Volume 44, February 2014, Pages 222-231**

Time preference of small-scale fishers in open access and traditionally managed reef fisheries

Louise S.L. Teh, Lydia C.L. Teh, U. Rashid Sumaila

Individuals with high discount rates are likely not partial to conservation because they are unwilling to sacrifice short term benefits for potentially higher gains in the future. Many reef fisheries worldwide are open access, and fishers under open access systems are theorized to discount the future at an infinite rate. In contrast, fishers in a customary managed fishery can be expected to be more long term oriented, and thus possibly have lower discount rates. The present study tests this hypothesis by eliciting the discount rates of fishers in an open access small-scale reef fishery, and compares these rates to those of fishers in a customary managed reef fishery. Results indicate that fishers in both open access and traditionally managed reef fisheries have high annual discount rates that are on average over 200%. Contrary to expectations, fishers under an open access system are not associated with higher discount rates compared to customary management. It also appears that a larger proportion of open access fishers are more long-term oriented than those in the customary managed fishery, which is encouraging for the future conservation and sustainability of open access fisheries resources.

Keywords

Time preference, Discount rates, Small-scale fisheries, Coral reef fisheries, Fiji, Malaysia

11.15 Biological Conservation, Volume 167, November 2013, Pages 396-404

Combining human preference and biodiversity priorities for marine protected area site selection in Sabah, Malaysia

Lydia C.L. Teh, Louise S.L. Teh, Robecca Jumin

High human reliance on marine resources in developing countries is a challenge for implementing marine protected areas, which usually seek to limit or restrict fishing in selected areas. Fishers' spatial preferences should be considered during the site selection process, but biodiversity considerations are generally the primary focus. The Protected Area Suitability Index (PASI) is a fuzzy logic spatial planning tool that combines human preferences and conservation criteria to assess the suitability of marine sites for being protected from fishing and other extractive use. We apply the PASI in zoning a marine sanctuary in Sabah, Malaysia, with the objectives of (i) assessing the PASI's ability to capture fishers' spatial preferences; and (ii) comparing the nuances of community based and fuzzy logic approaches in spatial planning. There was overlap in sites chosen for protection by both approaches, and multi-dimensional scaling results suggest that the PASI captures fishers' preferences. Community consultations enable direct integration of local knowledge to fill gaps in scientific knowledge, but can be time consuming and expensive. The PASI is an alternative to data and labour intensive conservation planning tools that are currently available, and can be particularly useful for zoning marine protected areas in data poor developing countries where conservation requires quick action.

Keywords

Fishers' spatial preferences, Fuzzy logic, Marine spatial management, Marine protected area zoning, Sabah, Malaysia, Community consultation

11.16 **Marine Pollution Bulletin, Volume 64, Issue 11, November 2012, Pages 2556-2563**

Trace metal (Cd, Cu, Fe, Mn, Ni and Zn) accumulation in Scleractinian corals: A record for Sabah, Borneo

Mazlin Bin Mokhtar, Sarva Mangala Praveena, Ahmad Zaharin Aris, Ow Cher Yong, Ai Phing Lim

This study was designed as the first to assess the trace metal (Cd, Cu, Fe, Mn, Ni and Zn) in coral skeleton in relation to metal availabilities and sampling locations in Sabah. The study also aims to determine the differential abilities of Scleractinian coral species as a bioindicator of environmental conditions. Skeletons of Scleractinian coral (*Hydnophora microconos, Favia speciosa* and *Porites lobata*) showed concentrations of Fe, Mn and Ni relatively higher than Cd and Zn in the skeletons. Statistical analyses outputs showed significant relationships between trace metal concentrations in coral species and those in seawater and sediment. The highest bioaccumulation factors among three Scleractinian coral species investigated was for Zn followed by Mn, Ni, Fe, Cd and Cu can provide a sign about pollution levels. However, metal tolerance, coral structure and morphology as well as multispecies monitoring are factors that need to be a focus in future studies.

Keywords

Coral reefs, Skeleton, Trace metal, Seawater, Sediment

11.17 **Biological Conservation, Volume 144, Issue 12, December 2011, Pages 2770-2786**

The global extent and character of marine mammal consumption by humans: 1970–2009

Martin D. Robards, Randall R. Reeves

The killing and consumption of marine mammals fuels tense global struggles between advocates of sustainable use and advocates of complete protection for these animals. However, reporting on the extent and character of marine mammal consumption by people is uneven and often anecdotal. We developed a consistent approach to summarize information from approximately 900 sources. It is now clear that human consumption of marine mammals is geographically widespread, taxonomically diverse, and often of uncertain sustainability. Since 1990, people in at least 114 countries have consumed one or more of at least 87 marine mammal species. Although changing social, ecological, or political circumstances are leading to reduced killing and consumption of marine mammals in some regions, in other regions the prevailing socio-economic conditions and new technologies are leading to increased killing and consumption, particularly of small cetaceans. Consumption of marine mammals is considered a significant aspect of food security and cultural wellbeing in many regions, and provides some economic (including cash) benefits to people in at least 54 countries. Our review highlights an escalation in utilization of small cetaceans caught in conjunction with fishing activities since 1970, a form of fishing-up-the-food-chain. Where consumption relates to food security and poverty, we found evidence of deliberate killing of animals caught both deliberately and accidentally in fishing gear. Constraints on government agencies responsible for implementing regulations, often due to the geographic remoteness of catches, mean that greater understanding is needed of the motivations that underlie consumption of marine mammals so that more effective conservation measures can be designed and implemented.

Keywords

Marine mammal, Bush meat, Food security, Subsistence, Bycatch, Common pool resource

11.18 **Advances in Ecological Research, Volume 48, 2013, Pages 183-224**

Quantifying the Biodiversity Value of Repeatedly Logged Rainforests: Gradient and Comparative Approaches from Borneo

Matthew J. Struebig, Anthony Turner, Emily Giles, Felicia Lasmana, Simon Tollington, Henry Bernard, Diana Bell

There is substantial variation in the reported effects of logging on tropical forest fauna. In addition to inherent variation in disturbance sensitivity among taxa, another contributing factor is that most studies use comparative analyses of unlogged versus logged forests, which cannot fully account for heterogeneity in disturbance as well as underlying environmental gradients. To better understand how logging affects biodiversity, we examined changes in bat assemblages across a disturbance gradient ranging from old growth to forest logged several times. In one of the first evaluations of repeatedly logged forest, we use both comparative and gradient analyses to reveal substantial signals in assemblage change in response to habitat alteration. Despite multiple rounds of extraction in the most degraded forest, neither approach revealed a definitive effect of logging on site-based richness. However, each approach generated insight into assemblage compositional responses to forest degradation. Structural differences were evident between old-growth and repeatedly logged forest, and depauperate assemblages characterised degraded sites with low, open canopy. Ordinations identified species that best contributed to the signal of assemblage change, and also key associated forest-structure variables. Models of trap-based abundance confirmed not only the importance of forest height in determining assemblage change but also the role of tree-cavity availability in supporting forest specialists, indicating that efforts to supplement this resource could aid restoration. While highlighting the ecological importance of unlogged stands, we show that heavily degraded forests—even those that have been repeatedly logged—still hold some potential value for tropical biota and could have a role in conservation.

Keywords

Habitat restoration, Southeast Asia, Forest management, Conservation

11.19 **Landscape and Urban Planning, Volume 71, Issues 2–4, 28 March 2005, Pages 207-222**

A GIS-based multi-criteria decision making approach to forest conservation planning at a landscape scale: a case study in the Kinabalu Area, Sabah, Malaysia

Mui-How Phua, Mitsuhiro Minowa

This paper presents a geographic information system (GIS)-based multi-criteria decision making approach for forest conservation planning at a landscape scale. This approach enables decision makers to evaluate the relative priorities of conserving forest areas based on a set of preferences, criteria and indicators for the area. Compromise programming techniques are used to integrate the forest conservation priority maps of decision groups where a separation distance is calculated. A clustering analysis was applied to identify potential conservation areas as the basis of delineating potential new protected areas. The study was conducted in the Kinabalu area, Sabah, Malaysia where two polygons neighboring the Kinabalu Park were delineated. A group of 11 polygons totaling 2050 ha has also been detected in the western part of Kinabalu Park. The study recommends the inclusion of a forest polygon (359 ha) neighboring Kinabalu Park and another (4361 ha) to the west of the park as new protected areas. A green corridor linking the potential new protected areas and Kinabalu Park should also be constructed to facilitate animal movement and interaction. This study reveals that riparian vegetation is an important aspect to forest conservation and the legislation to protect riparian zones should be strengthened.

Keywords

Forest conservation planning, GIS, Multi-criteria decision making, Kinabalu

11.20 **Journal of Environmental Management, Volume 88, Issue 4, September 2008, Pages 784-795**

Detecting deforestation with a spectral change detection approach using multitemporal Landsat data: A case study of Kinabalu Park, Sabah, Malaysia

Mui-How Phua, Satoshi Tsuyuki, Naoyuki Furuya, Jung Soo Lee

Tropical deforestation is occurring at an alarming rate, threatening the ecological integrity of protected areas. This makes it vital to regularly assess protected areas to confirm the efficacy of measures that protect that area from clearing. Satellite remote sensing offers a systematic and objective means for detecting and monitoring deforestation. This paper examines a spectral change approach to detect deforestation using pattern decomposition (PD) coefficients from multitemporal Landsat data. Our results show that the PD coefficients for soil and vegetation can be used to detect deforestation using change vector analysis (CVA). CVA analysis demonstrates that deforestation in the Kinabalu area, Sabah, Malaysia has significantly slowed from 1.2% in period 1 (1973 and 1991) to 0.1% in period 2 (1991 and 1996). A comparison of deforestation both inside and outside Kinabalu Park has highlighted the effectiveness of the park in protecting the tropical forest against clearing. However, the park is still facing pressure from the area immediately surrounding the park (the 1 km buffer zone) where the deforestation rate has remained unchanged.

11.21 **Molecular Phylogenetics and Evolution, Volume 56, Issue 1, July 2010, Pages 259-272**

Phylogenetic relationships of megophryid frogs of the genus Leptobrachium (Amphibia, Anura) as revealed by mtDNA gene sequences

Masafumi Matsui, Amir Hamidy, Robert W. Murphy, Wichase Khonsue, Paul Yambun, Tomohiko Shimada, Norhayati Ahmad, Daicus M. Belabut, Jian-Ping Jiang

By investigating genealogical relationships, we estimated the phylogenetic history and biogeography in the megophryid genus Leptobrachium (sensu lato, including Vibrissaphora) from southern China, Indochina, Thailand and the Sundaland. The genealogical relationships among the 30 named and unnamed taxa were estimated using 2009 bp of sequences from the mitochondrial DNA genes 12S rRNA, tRNAval, and 16S rRNA using maximum parsimony, maximum likelihood, and Bayesian inference methods. The genus Leptobrachium was a well-supported monophyletic group that contained two major clades. One clade had three subclades primarily from disjunct regions including Borneo, Peninsular Malaysia and Java, and Thailand. The Bornean subclade included one species each from the Philippines and Sumatra. The other major clade consisted of two subclades, one from Indochina and the other from southern China (Vibrissaphora). Divergence times estimated an old evolutionary history of each subclade, one that could not be explained by the geohistory of Southeast Asian major landmasses.

Keywords

Leptobrachium, Vibrissaphora, Sundaland, Indochina, Southern China, mtDNA, Phylogenetics

11.22 **Molecular Phylogenetics and Evolution, Volume 54, Issue 2, February 2010, Pages 561-570**

Phylogenetic relationships of *Ansonia* from Southeast Asia inferred from mitochondrial DNA sequences: Systematic and biogeographic implications (Anura: Bufonidae)

Masafumi Matsui, Atsushi Tominaga, Wanzhao Liu, Wichase Khonsue, Lee L. Grismer, Arvin C. Diesmos, Indraneil Das, Ahmad Sudin, Paul Yambun, Hoisen Yong, Jeet Sukumaran, Rafe M. Brown

We investigated the phylogenetic relationships and estimated the history of species diversification and biogeography in the bufonid genus Ansonia from Southeast Asia, a unique organism with tadpoles adapted to life in strong currents chiefly in montane regions and also in lowland rainforests. We estimated phylogenetic relationships among 32 named and unnamed taxa using 2461 bp sequences of the mitochondrial 12S rRNA, tRNAval, and 16S rRNA genes with equally-weighted parsimony, maximum likelihood, and Bayesian methods of inference. Monophyletic clades of Southeast Asian members of the genus Ansonia are well-supported, allowing for the interpretation of general biogeographic conclusions. The genus is divided into two major clades. One of these contains two reciprocally monophyletic subclades, one from the Malay Peninsula and Thailand and the other from Borneo. The other major clade primarily consists of Bornean taxa but also includes a monophyletic group of two Philippine species and a single peninsular Malaysian species. We estimated absolute divergence times using Bayesian methods with external calibration points to reconstruct the relative timing of faunal exchange between the major landmasses of Southeast Asia.

Keywords

Ansonia, Southeast Asia, Borneo, mtDNA, Phylogenetics, Speciation

11.23 **Mammalian Biology - Zeitschrift für Säugetierkunde, Volume 78, Issue 1, January 2013, Pages 63-67**

Occurrence of the Sunda colugo (*Galeopterus variegatus*) in the tropical forests of Singapore: A Bayesian approach

Norman T-L. Lim, Xingli Giam, Greg Byrnes, Gopalasamy R. Clements

Dermopterans are taxonomically-unique mammals, but little is known about their habitat requirements. The Sunda colugo (*Galeopterus variegatus*), which is one of only two living species of dermopterans confined to Southeast Asia, reportedly occurs in tropical forests, plantations, and gardens. Based on their ecology, however, we predict that tropical forests are likely to be their primary habitats. Here, we investigate environmental variables that account for the occurrence of G. variegatus in Singapore using Bayesian inference. Our results show that G. *variegatus* was only detected in transects with over 95% canopy cover, which was ultimately the most important predictor of colugo occurrence. Tropical forests, including disturbed forests, with relatively intact canopies are therefore vital for colugos to persist.

Keywords

Galeopterus variegatus, Bayesian, Canopy cover, Conservation, Dermoptera

11.24 **Forest Ecology and Management, Volume 258, Issue 9, 10 October 2009, Pages 2007-2012**

Reduced soil respiration in gaps in logged lowland dipterocarp forests

Philippe Saner, Robin Lim, Bo Burla, Robert C. Ong, Michael Scherer-Lorenzen, Andy Hector

We studied the effects of forest composition and structure, and related biotic and abiotic factors on soil respiration rates in a tropical logged forest in Malaysian Borneo. Forest stands were classified into gap, pioneer, non-pioneer and mixed (pioneer, non-pioneer and unclassified trees) based on the species composition of trees >10 cm diameter breast height. Soil respiration rates did not differ significantly between non-gap sites (1290 ± 210 mg CO2 m–2 h–1) but were double those in gap sites (640 ± 130 mg CO2 m–2 h–1). Post hoc analyses found that an increase in soil temperature and a decrease in litterfall and fine root biomass explained 72% of the difference between gap and non-gap sites. The significant decrease of soil respiration rates in gaps, irrespective of day or night time, suggests that autotrophic respiration may be an important contributor to total soil respiration in logged forests. We conclude that biosphere-atmosphere carbon exchange models in tropical systems should incorporate gap frequency and that future research in tropical forest should emphasize the contribution of autotrophic respiration to total soil respiration.

Keywords

Tropics, Borneo, Logged forest, Carbon cycle, Gap dynamics, Soil ecology

11.25 **Biological Conservation, Volume 159, March 2013, Pages 405-412**

Risky business or simple solution – Relative abundance indices from camera-trapping

Rahel Sollmann, Azlan Mohamed, Hiromitsu Samejima, Andreas Wilting

Camera-traps are a widely applied to monitor wildlife populations. For individually marked species, capture–recapture models provide robust population estimates, but for unmarked species, inference is often based on relative abundance indices (RAI, number of records per trap effort), although these do not account for imperfect and variable detection. We use a simulation study and empirical camera-trapping data to illustrate how ecological and sampling-related factors can bias RAIs. Our simulations showed that (1) differences in detection between species led to bias in RAI ratios toward the more detectable species, especially at low detection levels, (2) species with larger home ranges were photographed more often, inflating RAIs, (3) species specific responses to different types of trap setup biased RAI ratios, and (4) changes in detection over time blurred true population trends inferred from RAIs. Empirical data for leopard cats *Prionailurus bengalensis* and common palm civets *Paradoxurus hermaphroditus* showed that traps set up along roads led to higher RAIs than off-road traps, but targeting roads increased detection more for leopard cats than for common palm civets. Comparing RAIs of Sunda clouded leopards Neofelis diardi and leopard cats with spatial capture–recapture based density estimates across sites, RAIs did not reflect differences in density. Analytical options for estimating density from camera-trapping data of unmarked populations are limited. Consequently, we fear that RAIs will continue to be applied. This is alarming, since these measures often form the basis for conservation and management decisions. We suggest considering alternative analytical and survey methods, especially when dealing with threatened species.

Keywords

Density estimation, Detection bias, Medium to large sized mammals, Individual identification, Population monitoring

11.26 **Molecular Phylogenetics and Evolution, Volume 62, Issue 2, February 2012, Pages 597-611**

Molecular phylogeny of hipposiderid bats from Southeast Asia and evidence of cryptic diversity

Susan W. Murray, Polly Campbell, Tigga Kingston, Akbar Zubaid, Charles M. Francis, Thomas H. Kunz

Old World leaf-nosed bats (Hipposideridae) are among the most widespread and ecologically diverse groups of insectivorous bats in the Old World tropics. However, phylogenetic relationships in Hipposideridae are poorly resolved at both the generic and species levels, and deep genetic divergence within several Southeast Asian species suggests that current taxonomy underestimates hipposiderid diversity in this region. We used mitochondrial and nuclear sequence data to conduct the first extensive molecular phylogenetic analysis of Southeast Asian hipposiderid bats. Inclusion of multiple samples per taxon allowed testing for evidence of evolutionarily distinct lineages within taxa currently defined as single species. In contrast to earlier phylogenies based on morphometrics, molecular data support monophyly of Hipposideros, but are ambiguous regarding the monophyly of Hipposideridae. With a few exceptions, molecular data also support currently recognized species groups classified by qualitative morphological characters. Widespread paraphyly and polyphyly within many currently recognized species of Hipposideros indicates that evolutionary diversity in the genus is underrepresented by current nomenclature. Comparison of available morphological and echolocation data suggest that both geographic isolation and ecological selection have contributed to the diversification of Southeast Asian hipposiderid bats.

11.27 **Molecular Phylogenetics and Evolution, Volume 68, Issue 3, September 2013, Pages 567-581**

Diversification in a biodiversity hotspot – The evolution of Southeast Asian rhacophorid tree frogs on Borneo (Amphibia: Anura: Rhacophoridae)

Stefan T. Hertwig, Manuel Schweizer, Indraneil Das, Alexander Haas

The tree-frog family Rhacophoridae is a major group contributing to the high pecies richness and reproductive diversity among vertebrates of Sundaland. Nonetheless, rhacophorid evolution, especially on Borneo, has not been studied within a phylogenetic context. In this study, we examine the phylogenetic relationships of 38 (out of 41) Bornean species of Rhacophoridae, in combination with data from previous phylogenetic studies. In the final super matrix of 91 species, we analyse sequence data from two mitochondrial and three nuclear genes. The resulting trees show the genus *Rhacophorus* as a paraphyletic assemblage. As a consequence, we transfer *Rhacophorus appendiculatus* and *R. kajau* to two other genera and propose the new phylogeny-based combinations-*Kurixalus appendiculatus* and *Feihyla kajau*, respectively. Furthermore, we use our phylogenetic hypotheses to reconstruct the evolution of reproductive modes in rhacophorid tree frogs. Direct development to the exclusion of a free larval stage evolved twice independently, once in an ancestor of the*Pseudophilautus* + *Raorchestes* clade in India and Sri Lanka, and once within *Philautus* in Southeast Asia. The deposition of egg clutches covered by a layer of jelly in *Feihyla* is also present in *F. kajau* and thus confirms our generic reassignment. The remarkably high diversity of rhacophorid tree frogs on Borneo is the outcome of a complex pattern of repeated vicariance and dispersal events caused by past changes in the climatic and geological history of the Sunda shelf. We identified geographic clades of closely related endemic species within *Rhacophorus* and *Philautus*, which result from local island radiations on Borneo.T

11.28 APCBEE Procedia, Volume 4, 2012, Pages 53-57

Logistic Regression to Predict Termite Occurrences with Environmental Variables in Primary Forest and Oil Palm Ecosystem: The Case Study in Sabah, Malaysia

Wong Mum Keng, Homathevi Rahman

The aim of this research was to study the relationship between presence of termite and environmental variables in primary forest and adjacent oil palm plantation located in Sabah province, Malaysia. Termite sampling was conducted with manually dug and sorted soil pits (25 cm × 25 cm × 10 cm) at a minimum extent of 64 m and lag of 2 m. Logistic regression technique was used to analyze the collected data. In general, termite species richness and relative abundances are lower in oil palm plantation in comparison with primary forest. The result showed that probability of termite occurrences in primary forest are mainly related to dead woods, trees and non-predatory ants. Likewise, probability of termite occurrences in oil palm plantation was affected with the appearance of dead woods, pruned stacked fronds, non- predatory ants and earthworms. This result indicated that pruned stacked fronds and dead woods play an important role of recovery of termite assemblages in oil palm plantation.

Keywords

Logistic regression, Termite occurrences, Environmental variables

Journal of Human Evolution, Volume 65, Issue 6, December 2013, Pages 770-797

First discovery of Pleistocene orangutan (*Pongo* sp.) fossils in Peninsular Malaysia: Biogeographic and paleoenvironmental implications

Yasamin Kh. Ibrahim, Lim Tze Tshen, Kira E. Westaway, Earl of Cranbrook, Louise Humphrey, Ros Fatihah Muhammad, Jian-xin Zhao, Lee Chai Peng

Nine isolated fossil Pongo teeth from two cave sites in Peninsular Malaysia are reported. These are the first fossil Pongo specimens recorded in Peninsular Malaysia and represent significant southward extensions of the ancient Southeast Asian continental range of fossil Pongo during two key periods of the Quaternary. These new records from Peninsular Malaysia show that ancestral Pongo successfully passed the major biogeographical divide between mainland continental Southeast Asia and the Sunda subregion before 500 ka (thousand years ago).

If the presence of Pongo remains in fossil assemblages indicates prevailing forest habitat, then the persistence of Pongo at Batu Caves until 60 ka implies that during the Last Glacial Phase sufficient forest cover persisted in the west coast plain of what is now Peninsular Malaysia at least ten millennia after a presumed corridor of desiccation had extended to central and east Java. Ultimately, environmental conditions of the peninsula during the Last Glacial Maximum evidently became inhospitable for Pongo, causing local extinction. Following post-glacial climatic amelioration and reforestation, a renewed sea barrier prevented re-colonization from the rainforest refugium in Sumatra, accounting for the present day absence of Pongo in apparently hospitable lowland evergreen rainforest of Peninsular Malaysia. The new teeth provide further evidence that Pongo did not undergo a consistent trend toward dental size reduction over time.

Keywords

Badak Cave C, Batu Caves, Evergreen rainforest, Hominoid fossils, Luminescence dating, Quaternary, Southeast Asia

12.0 **Universiti Malaysia Sarawak**

12.1 **Raffles Bulletin of Zoology, Issue SUPPL. 29, 2013, Pages 269-277**

Species richness and endemicity of the herpetofauna of South and Southeast Asia

Das I., Van Dijk P.P.

Southern and Southeast Asia, extending from Pakistan to islands on the Sunda Shelf of the Indo-Malayan Archipelago and the Philippines, are home to a highly diverse herpetofauna. Based on the ecoregional classification presented in Wikramanayake et al. (2002) and a species listing database from 2000, we analyse herpetofaunal distribution, while taking into account the uneven survey efforts in different ecoregions. Larger ecoregions that are adequately sampled show greater species richness, contain more diverse topography and support a mosaic of habitat subtypes. In contrast, some of the smaller ecoregions are restricted to a specific habitat type. A latitudinal gradient in species diversity is evident and the ecoregions of the highest species richness straddle the equator, presumably for their tropical rainforests, aseasonal climate, high precipitation, and complex vegetation. Rainforests of lowlands and low elevation regions are richest in species richness, due to structural complexity and climatic conditions. Examples of vicars are evident in insular-insular or continental-insular comparisons of assemblages, many being the presumed result of Pleistocene sea level lowering. Endemicity is high on islands, waif dispersal selectively biased towards certain large species of reptiles, although amphibians are excluded. Herpetofaunal communities in different rainforest ecoregions share relatively few species: the same genera are usually present, but represented by different species. In many cases, these species are restricted-range or locally endemic species. The herpetofauna of monsoon forests is relatively similar within mainland Southeast Asia, but the herpetofaunal species inhabiting two mountain sites in close proximity can be remarkably different. A majority of regionally endemic species inhabit rainforest ecoregions, and particularly montane areas.

A number of regional endemics inhabit monsoon forest or specialised habitats (caves, open rivers or swamps), but tend to occur locally at spots across a wide geographic range. Knowledge of the taxonomy of the region's herpetofauna remains poor, but sufficient to indicate regions of high conservation value, as well as priority areas for survey. Reptiles and amphibians are also known to be of value as indicator species for habitat quality and to for learning the earth's evolutionary and biogeographic processes.

Keywords

Amphibians, Asia, Biogeography, Ecoregions, Reptiles

Check List, Volume 9, Issue 6, November 2013, Pages 1439-1448

Diversity and conservation status of mammals in Wang Kelian State Park, Perlis, Malaysia

Jayaraj V.K., Daud S.H.M., Azhar M.I., Sah S.A.M., *Mokhtar S.I., Abdullah M.T.*

A series of surveys in Wang Kelian State Park, Perlis were carried out since 2009 to 2011 to document the diversity of mammals. Two sampling stations; 1) the Wang Burma cave trail and 2) the Orchard leading to Tasik Meranti were sampled for small mammals using mist-nets, harp traps, cage traps and were accounted through direct observation. The highlight of this study includes new geographic records for *Rhinolophus chiewkweeae* and *Rousettus leschenaultii* for the state of Perlis. Additionally, there were also 30 new distributional records of mammals in this protected area, increasing the total known mammals of Wang Kelian State Park to 86 species. Although having poorly known mammals such as *R. chiewkweeae* and *Macaca arctoides* in this park, the diversity of mammals in Wang Kelian State Park is still underestimated as the species cumulative curve over time has yet to reach a stationary phase. In conclusion more surveys need to be done especially the northern part of the park near the Malaysia-Thailand border and Tasik Meranti in order to look at possible occurrences of threatened mammals highlighted in this study.

12.3 **Biological Conservation, Volume 144, Issue 9, September 2011, Pages 2134-2141**

The effect of the surrounding landscape matrix on mangrove bird community assembly in north Australia

J. Mohd-Azlan, Michael J. Lawes

Mangroves are highly threatened ecosystems yet their community ecology is poorly understood. We examined the ecological determinants of bird community assemblage in floristically depauperate mangroves. Birds were surveyed using line transect methods. Large mangrove patches supported fewer species than smaller patches. Patches did not comprise nested species subsets and the bird species richness of several small patches combined was greater than a single large area. The number of mangrove dependent species in a patch was area-dependent suggesting these species may be resource limited, although there was no species density compensation. There was a clear effect of the surrounding habitat, with matrix species accounting for ~45% of bird species in a patch. Patches surrounded by tropical savanna were relatively species-poor, while regardless of size, patches including monsoon rainforest were relatively species rich. Null model analysis of non-random assemblage structure (nestedness and species co-occurrence) revealed no deterministic structure to the overall mangrove species assemblage. These analyses described a random pattern of bird distribution and with no evidence of density compensation this suggests that competition is a weak structuring force of mangrove bird assemblages. The lack of nestedness and the random co-occurrence of species are consistent with the matrix-dependence of bird community composition. Conservation plans should treat mangrove patches as part of a habitat mosaic and incorporate many smaller mangrove patches rather than just big ones. Consideration of the nature, extent and diversity of the surrounding matrices is vital in managing and conserving mangrove bird communities.

Keywords

Matrix effect, Species–area relationship, Density compensation, Nestedness, Species saturation, Co-occurrence

12.4 **Check List, 2013, Volume 9, Issue 6, December 2013, Pages 1588-1589, Published by Check List and Authors**

New records of *Limnonectes rhacodus* (Inger, Boeadi and Taufik, 1996) (Lissamphibia: Anura: Dicroglossidae) from Sarawak, east Malaysia (northwestern Borneo)

Min P.Y., Das I., Haas A.

We comment on the termination of the species nomen of *Limnonectes rhacodus* (originally described as *Rana rhacoda*) and report the species from two separate localities in Sarawak State, East Malaysia, based on individuals collected from Kubah National Park, Matang Range and Gunung Penrissen, Padawan, both in western Borneo. The species was previously known from central, western, and southern Kalimantan, Indonesia. These records are the first for Malaysia and extend the distribution range ca. 220 and 264 km northwest of the nearest locality of Bukit Baka-Bukit Raya National Park (West Kalimatan) and increase the species' elevational range from 500 m to 1,120 m asl.

12.5 **Journal of Cetacean Research and Management, Issue SPEC. ISS. 3, 2011, Pages 185-198**

Seasonal distribution, abundance, habitat use and population identity of humpback whales in Oman

Minton G., Collins T., Findlay K., Ersts P., Rosenbaum H., Berggren P., Baldwin R.

Previously published data on the occurrence of humpback whales (*Megaptera novaeangliae*) in the Arabian Sea suggests that the region hosts a non-migratory population that adheres to a Northern Hemisphere breeding cycle. In order to investigate the distribution and abundance of this population, twelve small boat surveys were conducted in three main locations off the coast of Oman between February 2000 and November 2004. Humpback whales were observed during surveys in Dhofar and Gulf of Masirah on Oman's Arabian Sea coast, but not during surveys in the Muscat region in the Gulf of Oman. An even ratio of males to females was observed and sampled during surveys in the Gulf of Masirah, which was surveyed in October and November (n = 38), while almost all whales sampled in Dhofar in February/March were male (n = 28). Song was detected frequently in the bay surrounding the Halaniyat Islands (formerly known as the Kuria Muria Bay) in February/March, but observations of mother-calf pairs were sparse, and competitive groups were absent. Feeding was observed in both October/November and February/March, but behavioural and environmental observations indicate that the Gulf of Masirah is primarily an important feeding ground, while the Dhofar region, particularly the Halaniyat Bay, may be a breeding area. However, limited survey effort and a lack of recent observations of mother-calf pairs or competitive groups raises the possibility that the primary mating, calving and nursing areas are yet to be identified. Sixty-four individual whales were identified using photographs of dorsal fins or tail flukes. A high rate of re-sightings between years and between survey areas at different times of the year indicates year-round residence off the coast of Oman. A Chapman's modified Petersen estimator was applied to various data pairings to calculate abundance. AU pairings yielded estimates of less than 100 individuals, but sample sizes were small and there were various sources of possible bias.

Analysis of scarring on the caudal peduncle region of identified individuals in Oman indicates that between 30 and 40% are likely to have been involved in entanglements with fishing gear. Comparison of the Oman photo-identification catalogue with those from Zanzibar, Antongil Bay (Madagascar) and Mayotte and the Geyser Atoll (Comoros Archipelago), yielded no photographic matches. These data are consistent with the hypothesis of a discrete population. The distribution of fluke pigmentation rankings from the Oman catalogue, which varied significantly from those of Madagascar and Mayotte, provides further evidence for this theory. The evidence presented here provides a strong underpinning for the recent IUCN Red List classification of the Arabian Sea sub-population of humpback whales as Endangered. In light of ongoing coastal development and other threats to this population's habitat and future survival, urgent research and conservation measures are recommended.

Keywords

Arabian sea, Breeding grounds, Distribution, Entanglement, Feeding grounds, Genetics, Humpback whale, Mark-recapture, Northern hemisphere, Oman, photo-id

Raffles Bulletin of Zoology, Volume 61, Issue 1, 28 February 2013, Pages 397-405

Camera trapping and conservation in Lanjak Entimau wildlife sanctuary, Sarawak, Borneo

Mohd Azlan J., Engkamat L.

Information on the distribution of species is important in prescribing sound management practices for a protected area. In view of this, we conducted a series of camera trapping surveys in Lanjak Entimau Wildlife Sanctuary, Sarawak, Malaysian Borneo. A total of 20 camera traps was deployed primarily in riverine forests over two sampling periods (2003 and 2006) spanning 10 months altogether. A total of 1945 camera trap days yielded 537 of photographs of at least 21 species of mammals and five species of birds. Of these, four mammalian species are endemic to Borneo and two species are listed as endangered by the IUCN. In addition, our camera trapping survey has provided more detailed information on activity patterns of some cryptic mammal species. Finally, we discuss potential threats to selected mammal species in this area and suggest possible mitigation measures. We emphasize that regular monitoring of wildlife in protected areas should not be neglected, especially when biodiversity in this region is experiencing accelerated and unprecedented rates of extinction.

Keywords

Activity patterns, Borneo, Camera trapping, Mammals, Riverine forest

12.7 **Molecular Phylogenetics and Evolution, Volume 63, Issue 3, June 2012, Pages 915-921**

Testing the phylogenetic affinities of Southeast Asia's rarest geckos: Flap-legged geckos (Luperosaurus), Flying geckos (Ptychozoon) and their relationship to the pan-Asian genus Gekko

Rafe M. Brown, Cameron D. Siler, Indraneil Das, Yong Min

Some of Southeast Asia's most poorly known vertebrates include forest lizards that are rarely seen by field biologists. Arguably the most enigmatic of forest lizards from the Indo Australian archipelago are the Flap-legged geckos and the Flying geckos of the genera Luperosaurus and Ptychozoon. As new species have accumulated, several have been noted for their bizarre combination of morphological characteristics, seemingly intermediate between these genera and the pan-Asian gecko genus Gekko. We used the first multilocus phylogeny for these taxa to estimate their relationships, with particular attention to the phylogenetic placement of the morphologically intermediate taxa Ptychozoon rhacophorus, Luperosaurus iskandari, and L. gulat. Surprisingly, our results demonstrate that Luperosaurus is more closely related to Lepidodactylus and Pseudogekko than it is to Gekko but that some species currently classified as Luperosaurus are nested within Gekko. The Flying Gecko genus Ptychozoon is also nested within Gekko, suggesting that higher-level taxonomic revision of the generic boundaries within Southeast Asian gekkonines will be a priority for the immediate future.

Keywords

Coastal forest species, Enigmatic taxa, Flap-legged geckos, Forest geckos, Forest canopy species, Parachute geckos

12.8

Kew Bulletin, Volume 68, Issue 4, 2013, Pages 673-678 © 2013 The Board of Trustees of the Royal Botanic Gardens, Kew.

Mapania multiflora, a distinctive new species of Cyperaceae (Mapanioideae) from Borneo

Shabdin Z., Culham A., Simpson D.A., Meekiong K.

Mapania multiflora is described and illustrated. It is vegetatively similar to taxa with broad leaves and pseudopetioles, such as M. cuspidata. However, it is reproductively similar to sect. Thoractostachyum with a paniculate inflorescence and furrowed fruit. The DNA is similar to M. bancana in sect. Thoractostachyum, in the three sampled cpDNA regions: atpH-F, trnL-F and psbA-trnH. However, it is identical to none of these due to its unique combination of vegetative, reproductive and molecular characteristics.

Keywords

Conservation, Hypolytreae, Taxonomy

12.9 **Molecular Phylogenetics and Evolution, Volume 68, Issue 3, September 2013, Pages 567–581**

Diversification in a biodiversity hotspot – The evolution of Southeast Asian rhacophorid tree frogs on Borneo (Amphibia: Anura: Rhacophoridae)

Stefan T. Hertwig, Manuel Schweizer, Indraneil Das, Alexander Haas

The tree-frog family Rhacophoridae is a major group contributing to the high pecies richness and reproductive diversity among vertebrates of Sundaland. Nonetheless, rhacophorid evolution, especially on Borneo, has not been studied within a phylogenetic context. In this study, we examine the phylogenetic relationships of 38 (out of 41) Bornean species of Rhacophoridae, in combination with data from previous phylogenetic studies. In the final super matrix of 91 species, we analyse sequence data from two mitochondrial and three nuclear genes. The resulting trees show the genus Rhacophorus as a paraphyletic assemblage. As a consequence, we transfer Rhacophorus appendiculatus and R. kajau to two other genera and propose the new phylogeny-based combinations-Kurixalus appendiculatus and Feihyla kajau, respectively. Furthermore, we use our phylogenetic hypotheses to reconstruct the evolution of reproductive modes in rhacophorid tree frogs. Direct development to the exclusion of a free larval stage evolved twice independently, once in an ancestor of the Pseudophilautus + Raorchestes clade in India and Sri Lanka, and once within Philautus in Southeast Asia. The deposition of egg clutches covered by a layer of jelly in Feihyla is also present in F. kajau and thus confirms our generic reassignment. The remarkably high diversity of rhacophorid tree frogs on Borneo is the outcome of a complex pattern of repeated vicariance and dispersal events caused by past changes in the climatic and geological history of the Sunda shelf. We identified geographic clades of closely related endemic species within Rhacophorus and Philautus, which result from local island radiations on Borneo.

Keywords

Amphibia, Anura, Rhacophoridae, Southeast Asia, Phylogeny, Taxonomy, Evolution of reproductive modes

Sains Malaysiana, Volume 41, Issue 6, June 2012, Pages 659-669

Small mammals from Kuala Atok, Taman Negara Pahang, Malaysia

Tingga R.C.T., Anwarali F.A., Ridwan A.R.M., Senawi J., Abdullah M.T.

A faunal survey aimed to document small mammals was conducted at Nature Study Centre of Kuala Atok, Taman Negara Pahang from 16th to 23rd May 2008. This survey was part of the Biodiversity Inventory Programme that was organised by the Department of Wildlife and National Parks (DWNP). On average, ten mist nets, two four-bank harp traps, 100 cage traps and 40 Sherman traps were set for six trapping nights. A total of 79 individuals from three orders, seven families and 23 species were caught in this study. Of the 23 species, three were frugivorous bats, 15 were insectivorous bats, four were rodents and one was treeshrew. Our sampling site was bounded by Pahang River and mainly covered with lowland secondary forest. This is evidence by the highest abundance of Long-tailed Giant Rat *(Leopoldamys sabanus)* for non-volant small mammals, and Fawn Roundleaf Bat *(Hipposideros cervinus)* for volant small mammals that are adapted to disturbed habitat. The increasing species cumulative curve for Chiropteran indicates that there may be more species yet to be recorded from this study site compared to rodents and treeshrews. Preliminary analysis on the species similarity between our study site to other survey reports in Peninsular Malaysia, positioned Kuala Atok with Krau Wildlife Reserve and Bukit Fraser Forest Reserve that are located adjacent to our study site. This similarity further indicate the importance of future survey in Kuala Atok especially for Chiropterans to properly document the species diversity in this site that may be as rich as other well studied area e.g. Krau Wildlife Reserve.

Keywords

Biodiversity, Chiroptera, Inventory, Rodentia, Scandentia

13.0

Universiti Putra Malaysia

13.1 **JTAS Vol. 36 (1) Feb. 2013 Article ID: JTAS-0429-2012**

Review Article- Micropropagation: An Important Tool for Conserving Forest Trees

Kataria, N., Yadav, K., Kumari, S. and N. Singh

Forest trees are renewable sources of food, fodder, fuel wood, timber and other valuable non-timber products. The ever increasing human and livestock populations have put heavy demands for plant products, resulting in over exploitation of forest trees. Therefore, there is an urgent need for conservation of germplasm and also for propagation of a sustainable utilization of forest trees. Micropropagation of tree species offers a rapid means of producing clonal planting stock for afforestation, woody biomass production and conservation of elite and rare germplasm. This review provides an overview of the success achieved on in vitro work done for a number of important forest trees.

Keywords

Micropropagation, Multipurpose, Albizia lebbeck, Leucaena leucocephala, Prosopis cineraria

JTAS Vol. 35 (4) Nov. 2012 Article ID: JTAS-0348-2011

Relationship between Size of Fish and Parasitic Intensity in Four Freshwater Fish Species from Tasik Merah, Perak, Peninsular Malaysia

Rahman, W. A. and Hamidah Saidin

A total of 79 fish from Tasik Merah, Perak, Peninsular Malaysia were examined for the presence of fauna. The fish species examined included *Puntius schwanenfeldii, Puntius gonionotus, Hampala macrolepidota* and *Notopterus notopterus*. Meanwhile, a total of ten species of the parasites were found to be belonging to two major groups of nematode and trematode. The nematodes were Capillaria sp., Spinictus inermis, Echinocephalus sp., Microtetrameres sp., and Cucullanus sp. The trematodes were Paradiplozoon malayense, Paradiplozoon barbi, and Dactylogyrus sp.

Keywords

Freshwater fish, Tasik Merah, Parasite, Fish size

13.3 JTAS Vol. 35 (2) May. 2012 Article ID: JTAS-0310-2010

Level of Polychlorinated Biphenyls (PCBs) in Selected Marine Fish (pelagic) from Straits of Malacca

Mohamad, A., Azlan, A., Razman, M. R., Ramli, N. A., and Latiff, A. A.

Fish is a good source of protein, supply important vitamins and other essential nutrients including essential fatty acids (EFA), the EPA and DHA which help to reduce risk of death from coronary heart diseases. However, diet and food of animals' origin are the most predominant sources of polychlorinated biphenyls (PCBs) to human which accounts to over 90%, with fish as one of the major routes of contaminants in human body. PCBs are a group of extremely stable aromatic chlorinated compounds which are relatively resistant to biological degradation and very persistent in the environment. This study has identified the type and level of 12 congeners of PCBs that are most toxic to humans. The maximum permitted level of PCBs in muscles meat of fish and fishery products is 4 pg/g, as recommended by World Health Organization (WHO) using the WHO-TEFs. Meanwhile, the highest amount of PCBs concentration was in Rastrelliger kanagurta (Indian mackerel), with the level of PCBs at 1.37 pg/g wet weight. Other species like Scomberomorus guttatus (Spanish mackerel), Pampus argenteus (Silver pompret), Megalapsis cordyla (Hardtail scad), Eleutheronema tradactylum (Fourfinger threadfin) and Chirocentrus dorab (Dorab wolfherring) showed PCBs levels ranging from 0.35 pg/g to 1.05 pg/g wet weight. Thus, the PCBs in all the samples were below the permitted level. It can be concluded that the studied pelagic fish are safe to consume. Although the levels were not high, it is still important to set limits for the PCBs in fish and shellfish species so as to make a better estimation of the risk of exposure to human through dietary intake of fish, specifically fatty fish to meet nutritional requirement for EPA and DHA.

Keywords

Fish, Polychlorinated biphenyls, PCBs, Pelagic

13.4 JTAS Vol. 35 (2) May. 2012Article ID: JTAS-0204-2009

Is a Mussel Processing Site a Point Source of Zn Contamination? Evidence of Zn Remobilization from Boiled Mussel, *Perna viridis*

Yap, C. K., Rashiq, M. and Edward, F. B.

Sediment sampling in the Straits of Johore revealed that the surface sediments collected at a jetty near a mussel processing factory in Kg. Sg. Melayu had elevated Zn concentration in its first geochemical fraction; namely, easily, freely, leachable or exchangeable (EFLE) and its total concentration. This total Zn level in the sediment was comparable to the polluted sites on the west coast of Peninsular Malaysia. It was assumed that the tap water, in which mussels had been boiled, might have contained high levels of Zn which would then be released to the drainage system and finally emptied into the coastal waters where the jetty is located. In order to confirm this point source of Zn contamination, a laboratory study was designed to ascertain if the boiled mussels contained higher concentrations of metals compared to a control group. The laboratory results showed that distilled water, in which fresh mussel tissues had been boiled for 15 minutes, possessed significantly ($P < 0.05$) higher levels of dissolved Zn. In addition, Zn concentrations in the total boiled soft tissues and boiled shells of fresh mussel *Perna viridis* were significantly ($P < 0.05$) lower than the Zn levels before boiling, and this finding evidently showed that Zn in the mussel tissues was remobilized and thus released to the water. Therefore, these results supported the conclusion that the mussel processing factory at Kg. Sg. Melayu, which used tap water to boil the mussels before shucking, was a point source of Zn contamination in this area in the Straits of Johore.

Keywords

Perna viridis, Zn contamination, Boiled mussels

JTAS Vol. 35 (2) May. 2012 Article ID: JTAS-0243-2010

Amphibian Biodiversity of Gunung Inas Forest Reserve, Kedah, Malaysia

Ibrahim J., Nur Hafizah I., Nurul Dalila A. R., Choimmber T. and M. A. Muin

A study on the biodiversity of frogs and toads from Compartment 15 of Gunung Inas Forest Reserve, Kedah, was carried out for a 6 month period, beginning August 2008 till end of January 2009. Samplings were conducted once a month comprising a total catch effort of about 85 man-hours. Positive identification of specimens follows that of Berry (1975), Sukumaran (2006) and Norhayati et al., (2009). Twenty-eight species of anurans from six families were found to inhabit the site. The two most abundant species were *Amolops larutensis* and *Phrynoidis aspera*. Thirteen species namely *Megophrys nasuta, Leptobrachium hendricksoni Duttaphrynus melanostictus, Limnonectes malesianus, Limnonectes laticeps, Limnonectes plicatellus, Hylarana doriae, Hylarana erythraea, Hylarana luctuosa, Humerana miopus, Hoplobatrachus rugulosus, Rhacophorus tunkui,* and *Nyctixalus pictus* were considered rare. The Shannon-Wiener Diversity Index (H') was low at 0.745, while the Evenness Index (J) was low with the value of 0.149. The presence of clean water species, such as *Hylarana luctuosa, Hylarana labialis, Odorrana hosii,* and *Phrynoidis aspera* showed that the habitat at Compartment 15 of Gunung Inas Forest Reserve was largely undisturbed and pristine. It is hoped that future development of the site into a recreational facility does not degrade the uncontaminated riparian ecosystem that is essential for amphibian survival.

Keywords

Amphibians, Biodiversity, Primary forest, Gunung Inas, Malaysia

JTAS Vol. 35 (2) May. 2012 Article ID: JTAS-0278-2010

Diversity of *Fusarium* species Isolated from Soil Cultivated with Cucurbits within East Coast, Peninsular Malaysia

Siti Nordahliawate M. S., Nur Ain Izzati M. Z., Nur Azlin A. and Salleh B.

Fungi in the genus *Fusarium* are well known as soil-borne pathogen with worldwide distribution. Therefore, this study focused on isolation of *Fusarium* species from soil cultivated with watermelons, muskmelon, pumpkins, and cucumber in the east coast of Peninsular Malaysia by using dilution plate technique, direct plating and debris plating. The highest number of *Fusarium* species isolated was *F. oxysporum* with 687 (26.2%) colonies counted based on colony formation unit (CFU); the colonies of *Fusarium*/g soil = mean of *Fusarium* colonies x dilution factor/ weight of dried soil (g). Other *Fusarium* species isolated were *F. semitectum, F. solani, F. proliferatum, F. subglutinans* and *F. chlamydosporum*. Throughout the studies, peptone pentachloronitrobenzene (PPA) medium, potato dextrose agar (PDA) and carnation leaf-piece agar (CLA) were regularly used to identify each *Fusarium* species by morphological means. Based on the Shannon-Weiner Index, *Fusarium* species diversity is much higher in Besut, Terengganu (H'=1.59). Fusarium species can be considered as a functionally important biological component of *Fusarium* fruit rot disease study in cucurbits.

Keywords

Fusarium, Rot disease, Cucurbits, Soil microbiology

13.7 JTAS Vol. 35 (1) Feb. 201 2Article ID: JTAS-0350-2010

Bioaccumulation of Heavy Metals (Cd, Pb, Cu and Zn) in *Scylla serrata* (Forsskal 1775) Collected from Sungai Penor, Pahang, Malaysia

Kamaruzzaman, B. Y., Akbar John, B., Maryam, B. Z., Jalal, K. C. A. and Shahbuddin, S.

A study was conducted to assess the bioaccumulation levels of heavy metals (copper, zinc, cadmium andlead) in different body parts (carapace, claw, walking legs and intestinal tract) of the common mud crab *Scylla serrata* collected from Sungai Penor, Pahang, on January 2009. Accumulation of metal was determined using Inductively Coupled Plasma Mass Spectrometry (ICP-MS). Average Cu concentrations in carapace, claws,walking legs and gut were 43.83 ± 16.43µgg^{-1}, 21.54 ± 7.14µgg^{-1}, 28.2 ± 12.76µgg^{-1} and 57.06 ± 13.47µgg^{-1}, respectively. Meanwhile, average Zn concentrations in carapace, claws, walking legs and gut were 387.38 ±17.89µgg^{-1}, 376.62 ± 21.91µgg^{-1}, 361.92 ± 26.68µgg^{-1} and 496.31 ± 20.59µgg-1, respectively. Since Zn and Cu are the precursors of most enzymatic activities, all the body parts have significantly higher tendency to accumulate Zn and Cu. It was apparent that Zn concentration was higher in crab body parts, followed by Cu. It was also observed that intestinal track had higher levels of metals than other body parts. Since high calcium content inhibits lead uptake into the gut, a large portion of the lead burden was sequestered in the carapace. Average Pb concentrations in carapace, claws, walking legs and gut were observed to be 7.17 ±0.46µgg^{-1}, 6.27 ± 0.75µgg-1, 6.52 ± 0.37µgg^{-1} and 2.27 ± 0.82µgg^{-1}, respectively. Among the analyzed heavy metals, Cd concentration was low in all the body parts of the crab. Average Cd concentrations in carapace, claws, walking legs and gut were 0.68 ± 0.05µgg^{-1}, 0.42 ± 0.05µgg^{-1}, 0.35 ± 0.04µgg^{-1} and 0.13 ± 0.05µgg^{-1},respectively. Exoskeleton absorbs higher level of Cd than internal gut region, but the accumulation of Pb was higher in gut region than the exoskeleton of the crab. It was evident from this study that all the heavy metal(Cd, Pb, Cu and Zn) accumulations in *Scylla serrata* were higher than the international standard Maximum Permissible Level (MPL). Hence, a detailed investigation needs to be addressed on this issue to determine the pollution status in crabs inhabiting along the Sungai Penor waters.

Keywords

Bioaccumulation, Heavy metal, ICP-MS, *Scylla serrata*, Sungai Penor

JTAS Vol. 35 (3) Aug. 2012Article ID: JTAS-0064-2007

Distributions of Cu and Zn in the Shell Lipped Part Periostracum and Soft Tissues of *Perna viridis:* The potential of Periostracum as a Biomonitoring Material for Cu Contamination

Yap, C. K.

Periostracum is the outer shell layer composes mainly of organic materials. In the present study, the green-lipped mussel *Perna viridis* was used to investigate the distributions of Cu and Zn in the periostracum and soft tissues of the *P. viridis* which were sampled from 17 geographical sites [23 populations] along the coastal waters of Peninsular Malaysia. The concentrations of Cu in the periostracum and the soft tissues of *P. viridis* were 7.41- 42.63 µg/g dry weight and 3.49-31.1 µg/g dry weight, respectively. Meanwhile, the concentrations of Zn in the periostracum and soft tissues of *P. viridis* were 4.90-39.79 µg/g dry weight and 65.75-144.9 µg/g dry weight, respectively. The ratios of the metals in periostracum to soft tissues were 0.73-3.99 µg/g for Cu and 0.05-0.36 µg/g for Zn. These ratios indicated that the concentrations of Cu in the periostracum were generally greater than those in the soft tissues while the concentrations of Zn were generally higher in the soft tissues than those in the periostracum. The higher Cu levels in the soft tissues compared to that in the periostracum (Fig. 2) and the relatively close relationships of Cu between periostracum and sediment indicated that the periostracum was a good biomonitoring material for Cu, but periostracum was not a good biomonitoring material for Zn because it did not reflect the environmental contamination as reflected in the low correlation between the periostracum and sediment.

Keywords

Periostracum, *Perna viridis,* Biomonitoring material, Cu and Zn

JTAS Vol. 35 (2) May. 2012 Article ID: JTAS-0284-2010

Phylogenetic Relationships among Several Freshwater Fishes (Family: Cyprinidae) in Malaysia Inferred from Partial Sequencing of the Cytochrome *b* Mitochondrial DNA (mtDNA) Gene

Yuzine B. Esa, Jeffrine Rovie R. Japning, Khairul Adha A. Rahim, Siti Shapor Siraj, Siti Khalijah Daud, Soon Guan Tan, Stephen Sungan

The phylogenetic relationships among 23 species of Malaysian freshwater fishes in the family Cyprinidae was inferred by partial sequencing of the Cytochrome *b* (Cyt *b*) mitochondrial gene. Samples were collected from various localities in Sarawak, Sabah and Peninsular Malaysia. The inferred phylogeny appeared to match major groupings currently recognized in the taxonomy but no support was evident for nearly all the higher level groupings. Nevertheless, some interesting insights were gained in relation to the phylogenetic relationships among some genera under study. Meanwhile, the phylogenetic relationship among Mahseer fishes (genus *Tor* and *Neolissochilus*) were poorly resolved using the current data alone, but the taxonomic revision of other genera particularly for the genus *Puntius* could improve this. The current study suggest that *P. binotatus* and *P. sealei* could be representative of the genus *Puntius*, while any other species identified as belonging to the genus *Puntius* should cluster with this group. The study also revealed that two morphologically similar *Barbonymus* species (namely, *B. gonionotus* and *B. schwanenfeldii*) were phylogenetically distinct (13.0% K2P genetic distance). This indicated that a taxonomic revision of *B. gonionotus* would be required from its current position within the genus *Barbonymus*. The results of the current study also revealed two interesting findings for *Hampala*; (1) the Borneo endemic *Hampala* forms are distinct from the widespread *H. macrolepidota,* and (2) two distinct lineage were evident in *H. bimaculata* from Sarawak. In general, the sequence analysis of the cytochrome *b* mtDNA region has been proven to be useful for assessing phylogenetic relationships among indigenous freshwater fishes in Malaysia.

Keywords

Cytochrome *b*, Sequence, Mitochondrial DNA, Molecular phylogeny

13.10 JTAS Vol. 35 (4) Nov. 2012 Article ID: JTAS-0398-2011

The Effects of Culture Systems and Explant Incision on *In vitro* Propagation of *Curcuma zedoaria Roscoe*

Chong, Y. H., Khalafalla, M. M., Bhatt, A. and Chan, Lai Keng

Three types of culture systems, solid medium system, liquid shake flask system, and temporary immersion system (TIS) were used for testing their efficiency in propagating *Curcuma zedoaria* plantlets. The proliferation medium used in shoot multiplication was the Murashige and Skoog medium supplemented with 0.5 mg/L 6-benzylaminopurine (BA) and 0.5 mg/L Indole-3-butyric acid (IBA). Among the three systems used, the liquid shake flask system significantly induced more shoot formation and larger shoots from the shoot explants of *C. zedoaria*. Meanwhile, divided shoot explants produced significantly higher number of shoots than the undivided shoot explants. The *in vitro* plantlets derived from the three different culture systems produced healthy and morphologically similar to the mother plants after acclimatization and being transferred to the field.

Keywords

Acclimatization, *Curcuma zedoaria,* Liquid shake flask system, Temporary Immersion system

13.11 JTAS Vol. 35 (4) Nov. 2012Article ID: JTAS-0201-2009

Distribution and Concentrations of Ni in Tissues of the Gastropod *Nerita lineata* collected from Intertidal Areas of Peninsular Malaysia

Cheng, W. H., Yap, C. K., Ismail, A. and Abdul Rahim, I.

Nickel (Ni) is an essential metal but not a well-studied metal in gastropods. In this study, *Nerita lineata* snails were collected from 20 sites along the western coast of Peninsular Malaysia from December 2005 to December 2010. The concentrations of Ni were determined in the total soft tissues, opercula and shells of the snails. Different patterns of Ni distribution were found in different tissues (shells, opercula and soft tissues) as well as spatial differences and distributions. This finding showed that the distributions of Ni in the shells and total soft tissues of N. lineata were significantly different, and this could be due to the different rates of Ni accumulation, excretion and sequestration. Since *N. lineata* can be abundantly found in rocky shores, below jetties and mangrove trees along the intertidal areas of the west coast of Peninsular Malaysia and it can show the ability to accumulate Ni, the snails can therefore act as potential biomonitors of Ni pollution in the western coast of Peninsular Malaysia.

Keywords

Ni, *Nerita lineata*, Peninsular Malaysia, Opercula

JTAS Vol. 35 (3) Aug. 2012Article ID: JTAS-0309-2010

Herpetofauna of Peta Area of Endau-Rompin National Park, Johor, Malaysia

Shahriza, S., Ibrahim, J., Shahrul Anuar, M. S. and Abdul Muin, M. A.

The amphibians and reptiles of Peta, Endau-Rompin, Johor, Malaysia were briefly investigated during a scientific expedition organized by the School of Biological Sciences, Universiti Sains Malaysia from 17 to 23 August 2008. A total number of 47 species of amphibians and reptiles were recorded during the survey. Out of this number, 25 species of amphibians from 15 genera and 6 families were found. Meanwhile, six species of frogs are considered as commensal species and could easily be found in disturbed areas, and the others are forest frogs. A single species of caecilian, namely, Caudacaecilia nigroflava, from the family Ichthyophiidae was also recorded. As for the reptiles, 11 species of snakes from three families and 11 species of lizards from four families were recorded to inhabit the area. This report constitutes the first checklist of herpetofauna of Peta, Endau-Rompin, Johor, covering 24.3% of 103 frogs, 14.1% of 78 snakes and 10.2% of 108 lizard species that have been reported in Peninsular Malaysia thus far.

Keywords

Peta, Endau-Rompin, Johor, Peninsular Malaysia, Amphibian, Reptilian

13.13 JTAS Vol. 35 (3) Aug. 2012 Article ID: JTAS-0258-2010

Improvement of Malaysian Ornamental Plants through Induced Mutation

Ahmad, Z., Abu Hassan, A., Salleh, S., Ariffin, S., Shamsudin, S. and Basiran, M. N.

Malaysian Nuclear Agency (Nuclear Malaysia) has started research on the improvement of ornamental plants through induced mutation (mutagenesis) since the early 1990s. The research emphasis was initially on creating new ornamental varieties through the use of the nuclear technology and later through a combination with biotechnology. Concurrently, several other species of landscaping plants, flowering and foliage were also subjected to radiation for further improvement. To date, Nuclear Malaysia has produced more than 20 new varieties of ornamental and landscaping plants. These new varieties have been transferred to various end-users, private nurseries and government agencies, such as the National Landscape Department and local councils, through collaborations and partnerships. Besides diversifying local ornamental germplasms, these efforts are also in line with the government's vision to make Malaysia a "Beautiful and Advanced Garden Nation" by the year 2020.

Keywords

Ornamental plants, Induced mutation, Mutation breeding

13.14 JTAS Vol. 35 (3) Aug. 2012 Article ID: JTAS-0257-2010

Three Months' Monitoring of Environmental Factors, Biomass, Length and Size Classes Variation of *Sargassum* Species at Cape Rachado, Port Dickson

Yeong, B. M. L. and Wong, C. L.

Seasonality in biomass, thallus length and size classes of three *Sargassum* species, namely, *S. baccularia* (Mertens) C. Agardh, *S. binderi* Sonder ex J. Agardh and *S. siliquosum* J. Agardh, was analysed based on destructive sampling using line-transect-quadrat method from October to December 2008. Results showed that *S. baccularia* was most abundant among the three species. The plant was frequently found in the length class of 0 - 4.9 cm (79.68 %), and this was followed by *S. binderi* in length class of 5.0 - 9.9 cm (44.12 %), and *S. siliquosum* in the length class of 0 - 4.9 cm (66.67 %). The *Sargassum* species were observed to increase gradually in their biomass and mean thallus length further away from shore. Within three months, *S. baccularia* experienced a growth in its biomass and mean thallus length, while both *S. binderi* and *S. siliquosum* experienced a decrease in terms of biomass but an increase in their mean thallus length. Data also showed a correlation with environmental parameters, such as pH, DO, salinity, nitrate, phosphate and ammonia.

Keywords

Biomass, Cape Rachado, Port Dickson, Environmental parameters, Mean thallus length, *Sargassum*

13.15 JSSH Vol. 20 (S) Jun. 2012Article ID: JSSH-0579-2012

Traditional Knowledge Documentation: Preventing or Promoting Biopiracy

Rohaida Nordin, Kamal Halili Hassan and Zinatul A. Zainol

One of the issues currently being addressed concerning the management of biological resources is the protection of indigenous peoples' resources and traditional knowledge. The reason is the existing legal frameworks especially with regards to intellectual property (IPR) system do not provide adequate protection for the indigenous peoples' resources and knowledge. While the Convention on Biological Diversity (CBD) has introduced an obligation to seek prior informed consent for the use of any traditional knowledge and ensure benefit-sharing, the existing IPR system does not have the requirement for benefit-sharing. The IPR system was also not designed for the protection of traditional knowledge in its original form (i.e. in its oral and non-documentation existence). Such features make the knowledge inaccessible for inspection by the patent officers and therefore "facilitate" biopiracy when patents were granted on innovations that were based on existing knowledge. As a consequence, traditional knowledge documentation (TKD) project has been accepted as an interim tool to overcome the shortcomings of the existing legal framework. This paper evaluates the objectives, form and required framework for TKD. As a case study, this paper specifically looks at the TKD projects in India and identifies the issues and lessons that can be learnt from the Indian experience. As a comparison, similar efforts by Malaysia's Sarawak Biodiversity Centre are also studied. This paper will demonstrate the weaknesses of the existing TKD projects that could eventually lead to "promotion" instead of "prevention" of biopiracy.

Keywords

Traditional knowledge, Indigenous peoples, Biological resources, Biopiracy, Intellectual property

13.16 JTAS Vol. 35 (1) Feb. 2012Article ID: JTAS-0226-2010

Fish Biodiversity Survey (2009) of Streams in the Ayer Hitam Forest Reserve, Puchong, Selangor

Yu Abit, L., I. S. Kamaruddin, Z. Mohd-Rozhan, M. Y. Ina-Salwany and A. S. Mustafa- Kamal.*

A study was carried out to determine the different fish species inhabiting the streams of Ayer Hitam ForestReserve (AHFR) in Puchong, Selangor. The study was carried for a period of days (from 13 to 16 April 2009) during the Scientific Expedition of AHFR, Puchong, organized by the Faculty of Forestry, Universiti PutraMalaysia (UPM). The samples were collected using a variety of methods at three stations that were designatedas Station A, Station B and Station C within the AHFR riverine system. These samples were then preserved in 90% ethanol solution and sent to the laboratory for identification. From the sampling, eleven indigenous fishspecies (namely, *Puntius binotatus, Luciocephalus pulcher, Clupeithys sp., Rasbora einthoveni, Hemiramphodon pogognathus, Rasbora heteromorpha, Sphaerichtys osphronemoides, Rasbora sumatrana, Beta pugnax,Glossogobous giuris* and *Clarias macrocephalus)* were identified to inhabit the AHFR riverine system.

Keywords

Fish biodiversity, Stream, Ayer Hitam Forest Reserve, Puchong

JTAS Vol. 35 (2) May. 2012Article ID: JTAS-0263-2010

Over-expression of *Escherichia coli* Transaldolase in the Cytosol of Arabidopsis thaliana

R. Nulit

Transaldolase (TAL) is an enzyme of the oxidative pentose phosphate pathway (OPPP) which catalyzes the reversible reaction of sedoheptulose-7-phophate into fructose-6-phosphate and erythrose-4-phosphate. In some micro-organisms, fungi and plants, erythrose-4-phosphate condenses with phosphoenolpyruvate (PEP) from glycolysis to form chorismate which is a precursor for many secondary metabolic pathways such as aromatic amino acids, flavonoids, lignin, indole acetate and UV light protectants. An analysis of plant genome databases reveals that the OPPP is incomplete in the cytosol of plants as no genes encoding for a cytosolic transaldolase (TAL) and transketolase (TK) have been identified so far. Thus, this study attempted to complete the compartmentation of TAL in the cytosol and plastid of plants by over-expressing it in the cytosol of *A. thaliana*. For this purpose, homozygous transgenic plants were obtained in these studies; it was found that the transaldolase activity of transgenic lines increased as compared to wild type plants. The findings of the current study also demonstrated that transgenic plants did not show any distinct phenotypes and there was no difference in a range of growth parameters compared with *A. thaliana* Col-0 (wild type).

Keywords

Agrobacterium tumefaciens, Transaldolase, Oxidative pentose phosphate pathway, Transgenic plants, Shikimate pathway

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PCDDs and PCDFs in Pelagic Fish along the Straits of Malacca

Nurul Nadiah Mohamad Nasir, Azrina Azlan, Muhammad Rizal Razman, Nor Azam Ramli and Aishah A. Latiff

Fish and shellfish are rich sources of long chain fatty acids, especially DHA and EPA. High consumption of fish helps to elevate the level of these compounds in the body. However, fish also are easily exposed to chemical contaminants, such as dioxins (PCDDs) and furans (PCDFs). Exposure to PCDDs and PCDFs may lead to negative health effects, such as cancer, chloracne, hyperpigmentation and others. Level and type of PCDDs and PCDFs were determined in 20 pelagic fish samples of six different species collected from the Straits of Malacca using HRGC/ HRMS. The most toxic congener (2,3,7,8-TCDD) was found in all the samples at a very low level of 0.04-0.05 pg/g sample, except in Spanish mackerel (south-T2) and Indian mackerel (middle-T1). Meanwhile, the level of the total PCDDs and PCDFs ranged from 0.13 pg/g to 0.38 pg/g of the wet weight of the samples. The value of the total PCDDs and PCDFs was in a descending order of Hardtail scad, Spanish mackerel, Indian mackerel, fourfinger threadfin, silver pomfret and dorab wolfherring. Generally, the results of this study indicate that fish and shellfish caught along the Straits of Malacca are safe as in terms of PCDDs and PCDFs levels and the data can serve as baseline information for future monitoring of these organochlorine compounds.

Keywords

PCDDs, PCDFs, Pelagic fish, HRGC/ HRMS, The Straits of Malacca

13.19 JTAS Vol. 35 (1) Feb. 2012Article ID: JTAS-0147-2009

Urban Trees Diversity in Kuching North City and UNIMAS, Kota Samarahan, Sarawak

Zainudin, S. R., Mustafa, K. A., Austin, D., Helmy, J. and Lingkeu, D. A.

Tree species composition often varies widely amongst cities, depending to their geographical locations, urbanhistory, land area or population. The objective of the study was to identify the species diversity of urbantrees planted along the roadsides of Kuching North city and Universiti Malaysia Sarawak (UNIMAS), KotaSamarahan. A total of 31,181 trees representing 186 species were sampled. The roadside trees of KuchingNorth city were more diverse with 176 species of trees while 28 species were recorded from UNIMAS. Inverseof Simpson Index of diversity of the roadside trees in Kuching North city and UNIMAS was 21.0 and 10.7,respectively. In particular, five common species dominated the whole study area with indigenous speciesdominating UNIMAS, while exotic species exceed indigenous species at roadsides in Kuching North city.Five popular species accounted for one third of the total trees planted with Mimusops elengi as the dominantspecies planted at both sites. All the species recorded from both the study areas were less than 10 % and theycomplied with the urban forest health status guideline, whereby a diverse tree population might slow or preventthe spread of insects or diseases, and in the event that such pests should become established, the impact on adiverse tree population may be less severe. Data on species floristic composition will assist the local authoritiesin the planting, maintaining and planning for future replanting activities.

Keywords

Urban environment, Urban trees, Species diversity, Mimusops elengi

13.20 JTAS Vol. 35 (2) May. 2012 Article ID: JTAS-0101-2008

The Semen Characteristics of Pubertal West African Dwarf Bucks

Immanuel I. Bitto and Gabriel N. Egbunike

Semen was collected twice weekly between 0800 and 0900 hours from 6 healthy pubertal West African Dwarf (WAD) bucks for three months by electrical stimulation, and later evaluated and compared with values from healthy adult bucks of the same breed. Apart from semen colour, which was similar between pubertal and adult bucks, adult bucks were significantly superior ($p < 0.05$) to pubertal bucks in semen volume, massactivity, sperm progressive motility, sperm concentration, live sperm, total sperm/ejaculate and normal sperm morphology. In addition, pubertal buck semen also had significantly higher ($p < 0.05$) incidences of abnormal and dead spermatozoa. The incidence of coiled tails was however similar ($p > 0.05$) between the two age groups. The sperm concentration in the pubertal buck was highly significantly and positively correlated with total sperm/ejaculate ($r = 0.72$; $p < 0.001$), while semen volume was significantly but negatively related to the total sperm/ejaculate ($r = -0.37$; $p < 0.05$). Based on the findings of this study, it is concluded that pubertal buck semen, though inferior in quantity and quality to that of the adult, may be sparingly used for AI, and that good sires may be selected at puberty on the basis of the physical characteristics of their semen.

Keywords

Pubertal, Bucks, Semen characteristics, Humid, Tropical environment

14.0 Universiti Sains Islam Malaysia

14.1 World Applied Sciences Journal 17 (SPL.ISS1) , pp. 71-74. 2012

Unique flowers produced from West Indian Lemongrass, *Cymbopogon citratus* (DC.) Stapf. through induced mutation

Sharifah, N.R.S.A., Mahir, A.M., Jusoff, K.

West Indian Lemongrass, *Cymbopogon citratus,* is hardly seen to flower which contributes the major obstacle for hybridization. Induced mutation with gamma irradiation has been suggested as the solution to this problem. The objective of this study is to analyse the effect of gamma irradiation dosage on the survival rate of lemongrass prior to mutation. Vegetative stalks of lemongrass were exposed to different doses of gamma rays at doses of 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120 Gy. Results showed that the practical ranges for induced mutation were 40, 60 and 80 Gy with mutation rates were 25.8%, 36.4% and 69.2% respectively. Dose 80 Gy was identified as the dose for LD 50. Irradiation caused plants to produce long above ground stem 50 (not stalk) with obvious appearance of nodes and internodes together with unique production of flowers. This phenomenon has created an astonishing opportunity for future studies in this flower of West Indian Lemongrass mutant as another potential source of Halal traditional medicine.

Keywords

Gamma irradiation, Induced flowering, *Cymbopogon Citratus,* Lemongrass, Halal medicine

15.0 Universiti Teknologi Mara, Malaysia

15.1 Social and Behavioral Sciences, Volume 42, 2012, Pages 144-152

An Approach for Environmental Education by Non-Governmental Organizations (NGOs) in Biodiversity Conservation

Harinder Rai Singh, Serina Abdul Rahman

A well structured environmental education programme should have objectives related to awareness creation, knowledge accumulation, positive attitude inculcation, problem solving skills acquisition and citizen participation. Environmental education works at both school (passive, interactive, experiential education and empowerment) and public levels (behaviour modification). Social marketing strategies include changing behaviour, overcoming behavioural barriers, and providing easy access and channels. The challenges include finance, plan effectiveness, behaviour modification, human resource needs, participating agencies and political will. The environmental message must be accessible and tailored to the existing knowledge and interests of the target audience and it must also be clear, uncomplicated and empowering.

Keywords

Environmental education, Biodiversity conservation, Behaviour modification, Stakeholder participation, NGOs

15.2 Social and Behavioral Sciences, Volume 105, 3 December 2013, Pages 823-839

Biodiversity by Design: The attributes of ornamental plants in urban forest parks

Nik Hanita Nik Mohamad, Sabrina Idilfitri, Sharifah Khalizah Syed Othman Thani

Most bird species in urban parks depend on native plant community due to their selective dietary and nesting needs and are vitally affected by invasion of exotic plant community. Against this background, this study aims to investigate the significance of ornamental plants as birds' food plants and cover in forest parks. The study will investigate the attributes of ornamental plants in term of the plant parts by adopting field observation techniques on a study area for duration of six months. The findings established that native species provide better food plants for urban birds and reaffirm that forest parks should cater for both human and bird habitats through selection of native plants; and be adopted as an urban conservation strategy.

Keywords

Urban biodiversity, Ornamnetal plants, Birds' food plants

Social and Behavioral Sciences, Volume 50, 2012, Pages 574-581

The Laws of Wetness: The Legislative Framework in Malaysia Regarding Wetlands Conservation

Irini Ibrahim, Norazlina Abdul Aziz, Norha Abu Hanifah

In Malaysia, there is no single comprehensive legislation that relates to bio-diversity conservation and management as a whole, especially wetlands. Much of the legislation is sector-based. Other international laws that are relevant include the Langkawi Declaration, the Rio Declaration, and also the Ramsar Convention. This paper is part of an ongoing PhD thesis on wetlands conservation. The objectives of this research are to investigate the adequacy of the current legal framework in Malaysia, and its application concerning the conservation of biodiversity of wetlands. This is a qualitative research and an exploratory research to explain and identify the conservation of biodiversity.

Keywords

Legislation framework, Biodiversity, Wetland, Environment, Conservation

16.0

University Sumatera Utara, Indonesia

16.1 **Biological Conservation, Volume 162, June 2013, Pages 107-115**

Cryptic mammals caught on camera: Assessing the utility of range wide camera trap data for conserving the endangered Asian tapir

Matthew Linkie, Gurutzeta Guillera-Arroita, Joseph Smith, Anton Ario, Gregoire Bertagnolio, Francis Cheong, Gopalasamy Reuben Clements, Yoan Dinata, Somphot Duangchantrasiri, Gabriella Fredriksson, Melvin T. Gumal, Liang Song Horng, Kae Kawanishi, Faesal Rakhman Khakim, Margaret F. Kinnaird, Dedy Kiswayadi, Abu H. Lubis, Antony J. Lynam, Maryati, Myint Maung, et al.

The loss and fragmentation of substantial areas of forest habitat, in combination with rampant hunting, has pushed many of Southeast Asia's megafauna species to the verge of extinction. However, the extent of these declines is rarely quantified, thereby weakening lessons learned and species-based management. This need not be the case as a proliferation of camera trap surveys for large-bodied mammals across Southeast Asia, which use a standardized sampling technique, presents a rich yet under-utilized wildlife data set. Furthermore, advances in statistical techniques for assessing species distribution provide new opportunities for conducting comparative regional analyses. Here, we focus on one of Southeast Asia's least known species of megafauna, the Endangered Asian tapir *(Tapirus indicus)*, to investigate the performance of a camera trap-based spatial modeling approach in conducting a range-wide species assessment. Detection data were collectively collated from 52,904 trap days and 1,128 camera traps located across 19 study areas drawn from the Asian tapir's entire range. Considerable variation in tapir occurrence was found between study areas in: Malaysia (0.52–0.77); Sumatra, Indonesia (0.12–0.90); Thailand (0.00–0.65); and, Myanmar (0.00–0.26), with generally good levels of estimate precision. Although tapirs were widespread (recorded in 17 of the 19 study areas), their occurrence was significantly and negatively correlated with human disturbance.

Thus, this study extends the previously known applicability of camera traps to include a threatened and cryptic species by identifying where and how tapirs persist (including new records of occurrence), where future surveys should be conducted and providing a benchmark for measuring future conservation management efforts.

Keywords

Camera trap, Deforestation, Detection probability, Human footprint, Large-bodied mammal, Species distribution, Tropics

16.2 **Journal of Plant Physiology, Volume 169, Issue 18, 15 December 2012, Pages 1903-1908**

Salt-dependent increase in triterpenoids is reversible upon transfer to fresh water in mangrove plants *Kandelia candel* and *Bruguiera gymnorrhiza*

Mohammad Basyuni, Shigeyuki Baba, Yuji Kinjo, Lollie A.P. Putri, Luthfi Hakim, Hirosuke Oku

This study examined the salinity dependence of triterpenoid content and triterpenoid synthase gene expression in mangrove plants, *Kandelia candel* and *Bruguiera gymnorrhiza* (Rhizophoraceae) after long-term exposure to salinity and subsequent re-adaptation. Seedlings of the two mangrove species grown in varying salt concentrations for 4 months were divided into two treatment groups and grown for another 4 months, one group continued under the respective saline condition and the other in fresh water for re-adaptation. The total content of triterpenoids increased with increasing salinity in roots and leaves of *K.candel,* but only in roots in *B. gymnorrhiza*. This increase was reversed to a variable extent, depending on the species and organ, after transfer to fresh water. In contrast, the total content of phytosterols showed no correlation with salinity throughout the experiment. The increase in total triterpenoids was accompanied by an up-regulation of several triterpenoid synthase genes: *KcMS*, a multifunctional triterpenoid synthase, in roots and leaves of *K. candel* and *BgLUS,* a lupeol synthase, and *BgbAS*, a β-amyrin synthase, in roots of *B.gymnorrhiza*. The expression of root *KcCAS*, a cycloartenol synthase, which is involved in phytosterol biosynthesis, was not modulated by the salinity conditions but decreased with increasing salinity in leaves, followed by the restoration to the initial level after transfer to fresh water. The concentrations of individual triterpenoids, but not of phytosterols, in the roots positively correlated with the salinity. These results reinforced the importance of triterpenoids in the adaptation of mangroves to withstand salt and/or water stress.

Keywords

Mangrove plant, Re-adaptation, Salinity, Triterpenoid, Triterpenoid synthase

Current Biology, Volume 22, Issue 23, 4 December 2012, Pages 2231-2235

Sumatran Orangutans Differ in Their Cultural Knowledge but Not in Their Cognitive Abilities

Thibaud Gruber, Ian Singleton, Carel van Schaik

Animal cultures are controversial because the method used to isolate culture in animals aims at excluding genetic and environmental influences rather than demonstrating social learning. Here, we analyzed these factors in parallel in captivity to determine their influences on tool use. We exposed Sumatran orangutan *(Pongo abelii)* orphans from tool-using and non-tool-using regions (western swamps and eastern Langkat, respectively) that differed in both genetic and cultural backgrounds to a raking task and a honey-dipping task to assess their understanding of stick use. Orangutans from both regions were equally successful in raking; however, swamp orangutans were more successful than Langkat orangutans in honey dipping, where previously acquired knowledge was required. A larger analysis suggested that the Alas River could constitute a geographical barrier to the spread of this cultural trait. Finally, honey-dipping individuals were on average less than 4 years old, but this behavior is not observed in the wild before 6 years of age. Our results suggest first that genetic differences between wild Sumatran populations cannot explain their differences in stick use; however, their performances in honey dipping support a cultural differentiation in stick knowledge. Second, the results suggest that the honey-dippers were too young when arriving at the quarantine center to have possibly mastered the behavior in the wild individually suggesting that they arrived with preestablished mental representations of stick use or, simply put, "cultural ideas."

16.4 **Global Ecology and Biogeography 22 (12) , pp. 1261-1271, 2013**

Large trees drive forest aboveground biomass variation in moist lowland forests across the tropics

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Aim: Large trees (d.b.h.≥70cm) store large amounts of biomass. Several studies suggest that large trees may be vulnerable to changing climate, potentially leading to declining forest biomass storage. Here we determine the importance of large trees for tropical forest biomass storage and explore which intrinsic (species trait) and extrinsic (environment) variables are associated with the density of large trees and forest biomass at continental and pan-tropical scales.

Location: Pan-tropical.

Methods: Aboveground biomass (AGB) was calculated for 120 intact lowland moist forest locations. Linear regression was used to calculate variation in AGB explained by the density of large trees. Akaike information criterion weights (AICc-wi) were used to calculate averaged correlation coefficients for all possible multiple regression models between AGB/density of large trees and environmental and species trait variables correcting for spatial autocorrelation.

Results: Density of large trees explained c. 70% of the variation in pan-tropical AGB and was also responsible for significantly lower AGB in Neotropical [287.8 (mean)±105.0 (SD) Mg ha-1] versus Palaeotropical forests (Africa 418.3±91.8 Mg ha-1; Asia 393.3±109.3 Mg ha-1). Pan-tropical variation in density of large trees and AGB was associated with soil coarseness (negative), soil fertility (positive), community wood density (positive) and dominance of wind dispersed species (positive), temperature in the coldest month (negative), temperature in the warmest month (negative) and rainfall in the wettest month (positive), but results were not always consistent among continents.

Main conclusions: Density of large trees and AGB were significantly associated with climatic variables, indicating that climate change will affect tropical forest biomass storage. Species trait composition will interact with these future biomass changes as they are also affected by a warmer climate. Given the importance of large trees for variation in AGB across the tropics, and their sensitivity to climate change, we emphasize the need for in-depth analyses of the community dynamics of large trees.

Keywords

Climate, Ectomycorrhizal associations, Large tree density, Pan-tropical analysis, Soils, Species traits, Tree size, Tropical forest biomass, Wood density, Wind dispersal

Advances in Environmental Biology 7 (SPEC. ISSUE 12) , pp. 3857-3860, 2013

Mechanical properties of paper from oil palm pulp treated with chitosan from horseshoe crab

Agusnar, H., Nainggolan, I., Sukirman

The application of chitosan as an additive in papermaking to improve the strength and water resistant properties is described. Unbleached sulphate pulp from oil palm stem was treated with chitosan. The chitosan was prepared in the laboratory using the chitin obtained from horseshoe crab shells. The optimum condition for the addition of chitosan to the sulphate pulp was found to be 0.4% chitosan of medium molecular weight at pH 10. Substantial improvement in strength properties, particularly tear and stretch was observed for the paper treated with chitosan. The freeness of the pulp increased with decreasing viscosity of chitosan.

Keywords

Chitosan, Mechanical properties, Paper, Oil palm pulp

16.6 **Conservation Genetics Resources 4 (4) , pp. 951-954, 2012**

Isolation and characterization of 14 microsatellite markers for *Rhizophora mucronata* (Rhizophoraceae) and their potential use in range-wide population studies

Yoshimi Shinmura, Alison K. S. Wee, Koji Takayama, Sankararamasubramanian Halasya Meenakshisundaram, Takeshi Asakawa, Onrizal, Bayu Adjie, Erwin Riyanto Ardli, Sarawood Sungkaew, Norhaslinda Binti Malekal, Nguyen Xuan Tung, Severino G. Salmo III, Orlex Baylen Yllano, M. Nazre Saleh, Khin Khin Soe, Emiko Oguri, Noriaki Murakami, Yasuyuki Watano, Shigeyuki Baba, Edward L. Webb, Tadashi Kajita

A set of 14 new microsatellite markers was developed for mangrove species *Rhizophora mucronata* (Rhizophoraceae) by using pyrosequencing. Fifty-six samples from 9 populations of *R. mucronata* in the Indo-West Pacific region were genotyped; all loci were polymorphic, with the number of alleles ranging from 2 to 9. The mean expected heterozygosity per locus was 0.16 in a population from Sabah, no significant linkage disequilibrium was found among loci, and significant deviation from Hardy–Weinberg equilibrium was found in 3 loci. The polymorphic microsatellite markers with samples covering most of the species' distribution range can be applied in genetic diversity studies covering a broad geographical range of the species.

Keywords

Genetic diversity, Mangrove , Pyrosequencing, SSR

16.7 **Stilt 61, pp. 37-44, 2012**

Observations of shorebirds along the deli-serdang coast, North Sumatra Province, Indonesia: 1995-2006

Crossland, A.C., Lubis, L., Sinambela, S.A., Sitorus, A.S., Sitorus, A.W., Muis, A.

This paper reports the presence of large populations of shorebirds on the Deli-Serdang coastline of North Sumatra Province, western Indonesia. We estimate that upwards of 22,000 shorebirds of 32 species (25 waders, six terns, one gull) occurred in this area during 1995 to 2006, including internationally significant concentrations of Lesser Sand Plover, Greater Sand Plover, Asian Dowitcher, Bar-tailed Godwit, Eurasian Curlew, Common Redshank, Terek Sandpiper and Curlew Sandpiper. This confirms the international importance of this area to shorebirds and, as the area is under threat from development and other human uses, it will benefit from increased international recognition.

16.8 **International Wound Journal 8 (5) , pp. 484-491, 2011**

Wound healing effect of Haruan (Channa striatus) spray

Laila, L., Febriyenti, F., Salhimi, S.M., Baie, S.

Haruan (Channa striatus) is a type of fresh water fish in Malaysia that is known to promote wound healing. Haruan water extract has been formulated in an aerosol system which can produce a film for wound dressing. As topical preparation, Haruan spray needs to be evaluated in terms of the possibility to cause irritation reaction or toxic response. Three experiments were carried out to evaluate the safety of Haruan spray which is Primary Skin Irritation test, intracutaneous test and Systemic Injection test. The result shows that Haruan spray gave no significant responses to all the above tests. The investigation of the effect of Haruan spray as wound dressing in the healing process was performed in Sprague-Dawley rats where 6-cm long full-thickness incision wound and burn wound were made on the back of the animals. Haruan spray was tested and compared with blank formula as control. Tensile strength test of treated wound was carried out at the 3rd, 6th, 9th and 12th day after wounding and treatment. The burn wounds contraction was measured daily for 21 days. Results showed that haruan water extract spray formula is not only effective but also safe for application to both incision and burn wounds.

Keywords

Aerosol, Burn wound, Irritation test, Tensile strength, Wound healing

16.9 **Plant Molecular Biology Reporter 29 (3) , pp. 533-543, 2011**

Isolation of Salt Stress Tolerance Genes from Roots of Mangrove Plant, Rhizophora stylosa Griff, Using PCR-Based Suppression Subtractive Hybridization

Basyuni, M., Kinjo, Y., Baba, S., Shinzato, N., Iwasaki, H., Siregar, E.B.M., Oku, H.

Salinity is a major abiotic stress that seriously limits plant growth and crop productivity. The halophytic Rhizophora stylosa is useful for the study of the molecular mechanisms behind salinity tolerance in mangrove trees. To isolate anti-salt stress genes from mangrove plants, a cDNA library of R. stylosa roots was constructed and screened for stress-related genes by polymerase chain reaction (PCR)-based suppressive subtractive hybridization (SSH). The mangrove seedlings were grown for 8 months under two conditions: exposure to water with 3% salt and exposure to fresh water. cDNA of seedlings exposed to water with 3% salt was used as a tester and cDNA for freshwater germination was used as a driver. We isolated and sequenced 240 up-regulated expressed sequence tags (ESTs) from the SSH library. Among these up-regulated ESTs, 48 unique clones were putatively identified and classified into ten functional categories, such as cell rescue and defense, secondary metabolism, protein synthesis, and metabolism. Fifteen genes from different categories were selected and their expression was studied by real-time RT-PCR. Significantly increased expression levels were confirmed for 13 of these 15 transcripts, which suggest that these genes contribute to the salt tolerance of this plant. Among them, two transcription factors and several genes involved in isoprenoid biosynthesis were identified from mangrove trees as salt tolerance genes for the first time. The physiological significance of the increased expression of these genes in the long-term adaptation of mangrove trees to salt stress is discussed.

Keywords

Expressed sequence tag, Isoprenoidbiosynthesis, Mangrove, Rhizophora *stylosa, Salt* tolerance, Suppressive subtractive hybridization library

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