36th SYMPOSIUM AND ANNUAL MEETING OF THE ASSOCIATION OF SYSTEMATIC BIOLOGISTS OF THE PHILIPPINES

BOOK OF ABSTRACTS

MAY 30 TO JUNE 1, 2018

FATHER SATURNINO URIOS UNIVERSITY

BUTUAN CITY

36th Association of Systematic Biologists of the Philippines

Symposium and Annual Meeting

30 May - 1 June 2018
Father Saturnino Urios University
Butuan City

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Association of Systematic Biologists of the Philippines

(SEC Reg. Association of Philippine Taxonomists, Inc.)

Established in 1982, the Association of Systematic Biologists of the Philippines (ASBP) aims to promote and represent the science and practice of taxonomy, systematic, and natural history in the country. Initially formed by a core group of Filipino biologists and researchers based in the National Museum, its membership has grown to encompass professionals, students, and enthusiasts all over the Philippines and abroad. Its scope has expanded in recent years outside of the traditional sphere of basic taxonomy and systematic to include ethnobiology, biodiversity conservation, and public education. Membership in the ASBP is open to all who subscribe to the goals of the organization.

Association of Systematic Biologists of the Philippines

(SEC Reg. Association of Philippine Taxonomists, Inc.)

OFFICERS 2016-2018

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Hiroshima University

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Ex-Officio
University of Santo Tomas

Father Saturnino Urios University was christened Butuan Parochial School on October 21, 1901 by Reverend Father Saturnino Urios, S.J. It began as a boys' school which later gained government recognition in 1927 as an elementary school. It was, at first, a low building made of bricks, adjacent to the old church.

The school changed its identity on several occasions over the next 50 years under the management of the Dutch Missionaries of the Sacred Heart of Jesus (MSC). In 1939, the Butuan Parochial School opened its high school department and renamed itself to Father Urios High School, after the school's founder who had died 23 years prior. With the opening of the college department in 1950, it was renamed to Father Urios College, simplified in 1970 as Urios College.

This prevailing mindset and momentum has led the university to noteworthy achievements. In 2008, FSUU was able to develop its property in Barangay Libertad. It put up the state-of-the-art Archbishop Morelos Campus, the only one of its kind in the Caraga region, built to accommodate FSUU's basic education classes. Today, it caters to a full range of students from Kinder to Senior High School.

Part of this continued construction is the creation of the Biodiversity Informatics and Research Center. It heads species-discovery expeditions in Caraga and serves as a repository of knowledge on local plants and animals. For its efforts, it was recently awarded an institutional grant by the CHED.

FSUU continues to hope, learn, and work in order to serve the greater community outside its walls. Beyond its worldly milestones and achievements, the university is proudest for staying true to its tradition of producing Mindanawons who are committed to pursue the work of Christ.

Source: http://www.urios.edu.ph/index.php/about-fsuu/history

MESSAGES

Association of Systematic Biologists of the Philippines
(SEC Reg. Association of Philippine Taxonomists, Inc.)

Message from the Convention Chair

It is with great excitement that we welcome all of you to the 36th Association of Systematic Biologists of the Philippines - Symposium and Annual Meeting (ASBP-SAM). This year's symposium brings us to the beautiful city of Butuan, and very near to unique and interesting ecosystems, namely Butuan Bay, Agus River, Agusan Marsh and Lake Mainit. Given its proximity to such interesting sites, the hosts of this year's SAM - the Father Saturnino Urios University, is in a unique place to take the lead in conducting high-level scientific researches in the area. I am sure that their hosting of this year's ASBP-SAM will help inspire them to keep soldiering on, and work towards a greater understanding of the interesting flora and fauna of this part of northern Mindanao.

Our keynote and plenary lectures showcase the importance and relevance of taxonomy and systematics in coming up with intelligent and scientifically-sound decisions which will be useful for policy-making and management initiatives. This is of great importance given the aggressive campaign of the national government to enforce environmental laws in specifically-targeted areas of the archipelago.

We have a very interesting line up of speakers, lectures, workshops and poster presentations lined up for this year. As usual, we also look forward to the Young Systematic Biologists Forum – an event where our student taxonomists and systematists showcase their outstanding research outputs.

I would like to thank all active officers, the members of the over-all steering committee, the local organizing committee headed by Dr. Marites B. Sanguila of the Father Saturnino Urios University, and our dear participants, for making sure that this year's 36th ASBP-SAM becomes a success!
Thank you and more power!

Dr. Rey Donne S. Papa
Convention Chair
36th ASBP-SAM

Vice President
Association of Systematic Biologists of the Philippines
2016-2018

MESSAGES

Association of Systematic Biologists of the Philippines
(SEC Reg. Association of Philippine Taxonomists, Inc.)

Getting to know and appreciate the rich biodiversity of the Philippines through the important work of taxonomists and systematists is admittedly still far from being fully realized in our society. For the ordinary citizen, the craft that we do and the biota that we deal with are as foreign as the Latin language which forms the centuries-old Linnaean foundations of our science. The question then pops up as to whether taxonomy and systematics are still important and relevant in these modern times, whether they can still serve the evolving purposes of mankind as a part of collective human endeavor.

The Association of Systematic Biologists of the Philippines (ASBP) has tried to ask these questions of itself. It understands the need for our science to stay relevant and for the organization to take concrete actions towards these goals. In its more than 30 years of existence, the ASBP has lately cast its net wider by bringing its annual meetings to locations outside of Manila where it has traditionally been cloistered. Various speakers have been invited to annual meetings to talk about how to make taxonomy and systematics more relevant to society and their stakeholders, how to stimulate greater public awareness, engagement and appreciation, how to humanize the science and practice of attaching names to our rich biodiversity. This journey has just began. The goals are still as elusive but we shall not be deterred.

This year, the same quest continues. We gather here in Butuan at the down streams of the mighty Agusan River draining from the vast Agusan Marsh, the country's largest wetlands whose rich flora and fauna are only beginning to be known and appreciated. Our various speakers will showcase the biological gems of our country, particularly Mindanao, and talk about the evolving multidisciplinary approaches defining the study of taxonomy and systematics like cultural history, chemistry and ecology. Furthermore, our annual meetings have continued to attract younger generations of practitioners through the Young Systematic Biologists Forum. Our membership continues to grow quantitatively and hopefully qualitatively as well.

The ASBP is deeply honored and grateful to our host this year, the Father Saturnino Urios University whose commitment to taxonomy and biodiversity is enshrined in the establishment of its Biodiversity Informatics Network Center. Together we shall pursue our common goals of showcasing our biodiversity through the many papers and posters presented this week. May we all have a productive time learning, meeting friends old and new, forging new and reinforcing existing research links and a memorable time within the halls of our host institution and city.

Lawrence M. Liao
ASBP President, 2016-2018

MESSAGES

Association of Systematic Biologists of the Philippines
(SEC Reg. Association of Philippine Taxonomists, Inc.)

Message from the Local Organizing Committee

Father Saturnino Urios University (FSUU) is honored to host the 36th Symposium and Annual Meeting of the Association of Systematic Biologists of the Philippines (36th SAM-ASBP). As a higher educational institution, FSUU is pleased to take this important role, by providing a stimulating environment for scientific discussions, as a demonstration of our continuous commitment to promote science-based research in Philippine systematic biology and related disciplines. Here in FSUU, we believe that by consolidating efforts among various institutions and relevant stakeholders, while sharing in the expertise of ASBP members, will forge strong linkages to attain biodiversity-oriented communities geared towards a sustainable Caraga region and Philippines.

Warm welcome to all the invited speakers and participants! Welcome to FSUU, Butuan City, and the southern Philippines!

Marites B. Sanguila
Father Saturnino Urios University
Chair, Local Organizing Committee
36th ASBP-SAM

<table>
<tr><th colspan="6">Wednesday, May 30, 2018</th></tr>
<tr><td>8:00 – 9:00</td><td colspan="3">Registration</td><td></td><td></td></tr>
<tr><td>9:00 – 9:30</td><td colspan="3">Opening Ceremony
Invocation
National Anthem
Opening remarks by ASBP President
Welcome Address by FSUU President
Welcome Address by LGU Representative
Recognition of guests/delegations
Introduction of the keynote speaker</td><td>FSUU Voices of Light</td><td rowspan="2">CBE Function Hall</td></tr>
<tr><td>9:30 – 10:15</td><td colspan="4">Keynote address
Acad. Jergenne Pimavera</td></tr>
<tr><td>10:15 – 10:45</td><td colspan="4">Coffee/tea break</td><td>Outside CBE Function Hall</td></tr>
<tr><td>10:45 – 11:15</td><td colspan="4">Plenary Lecture 1
Dr. Rafe M. Brown</td><td>CBE Function Hall</td></tr>
<tr><td>11:15 – 12:15</td><td colspan="5">Parallel Lectures</td></tr>
<tr><td></td><td></td><td>Function Hall 1</td><td>Function Hall 2</td><td colspan="2">Function Hall 3</td></tr>
<tr><td></td><td>11:15 – 11:30</td><td rowspan="5">Taxonomy and Diversity in Philippine Forests (Botany)</td><td rowspan="5">Taxonomy and Diversity in Philippine Forests (Zoology)</td><td colspan="2" rowspan="5">Marine Ecosystems</td></tr>
<tr><td></td><td>11:30 – 11:45</td></tr>
<tr><td></td><td>11:45 – 12:00</td></tr>
<tr><td></td><td>12:00 – 12:15</td></tr>
<tr><td></td><td>12:15 – 12:30</td></tr>
<tr><td>12:30 – 1:30</td><td colspan="5">LUNCH</td></tr>
<tr><td>1:30 – 3: 00</td><td colspan="5">POSTER PRESENTATIONS (odd numbers)</td></tr>
<tr><td>3:00 – 3:30</td><td colspan="4">Plenary Lecture 2
Ms. Kathleen Gutierrez</td><td>CBE Function Hall</td></tr>
<tr><td>3:30 – 3:45</td><td colspan="5">Coffee/tea break</td></tr>
<tr><td>3:45 – 5:00</td><td colspan="5">Parallel Lectures</td></tr>
<tr><td></td><td></td><td>Function Hall 1</td><td>Function Hall 2</td><td colspan="2">Function Hall 3</td></tr>
<tr><td></td><td>3:45 – 4:00</td><td rowspan="5">Freshwater Ecosystems (Zoology)</td><td rowspan="5">Systematics and Taxonomy (Botany)</td><td colspan="2" rowspan="5">Taxonomy and Diversity (Zoology)</td></tr>
<tr><td></td><td>4:00 – 4:15</td></tr>
<tr><td></td><td>4:15 – 4:30</td></tr>
<tr><td></td><td>4:30 – 4:45</td></tr>
<tr><td></td><td>4:45 – 5:00</td></tr>
<tr><td>5:00 – 5:30</td><td colspan="5">FSUU campus walking tour</td></tr>
<tr><td>6:00 – 8:30</td><td colspan="5">Welcome Dinner</td></tr>
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<table>
<tr><th colspan="5">Thursday, May 31, 2018</th></tr>
<tr><td>8:45 – 9:00</td><td colspan="4">Announcements</td></tr>
<tr><td>9:00 – 9:30</td><td colspan="3">Plenary Lecture 3
Dr. Makoto Hirayama</td><td></td></tr>
<tr><td>9:30 – 9:45</td><td colspan="4">Coffee/tea break</td></tr>
<tr><td>9:45 – 11:00</td><td colspan="4">Young Systematic Biologists Forum</td></tr>
<tr><td></td><td></td><td>Hall 1</td><td colspan="2">Hall 2</td></tr>
<tr><td></td><td>9:45 – 10:00</td><td rowspan="5">Undergraduate Category</td><td colspan="2" rowspan="5">Graduate Category</td></tr>
<tr><td></td><td>10:00 – 10:15</td></tr>
<tr><td></td><td>10:15 – 10:30</td></tr>
<tr><td></td><td>10:30 – 10:45</td></tr>
<tr><td></td><td>10:45 – 11:00</td></tr>
<tr><td>11:00 – 12:00</td><td colspan="3">Annual General Assembly and Business Meeting
-President’s Report
-Treasurer’s Report
-PJSB Report
-Nomination and Election for the 2018-2020 ASBP Board</td><td>CBE Board Room</td></tr>
<tr><td>12:00 – 1:15</td><td colspan="4">Lunch</td></tr>
<tr><td>1:15 – 2:45</td><td colspan="4">Poster Session (even numbers)</td></tr>
<tr><td>2:45 – 3:15</td><td colspan="3">Plenary Lecture 4
Dr. Lawrence Liao</td><td></td></tr>
<tr><td>3:15 – 3:30</td><td colspan="4">Coffee/tea break</td></tr>
<tr><td>3:30 – 4:45</td><td colspan="4">Parallel Workshops</td></tr>
<tr><td>5:30 – 6:30</td><td colspan="3">Closing Ceremony
Remarks by ASBP Vice President
Presentation of tokens
Announcement of presentation prizes
Distribution of certificates
Concluding remarks by ASBP President</td><td>CBE Function Hall</td></tr>
<tr><td>6:30 – 8:00</td><td colspan="4">Sponsored Dinner</td></tr>
<tr><td colspan="5">Friday, June 1, 2018
Lake Mainit/Agusan Marsh Tour</td></tr>
</table>

ASBP 2018 STEERING COMMITTEE

Convention Chair
Dr. Rey Donne S. Papa

Local Organizing Committee Chairs
Dr. Marites B. Sanguila (Chair)
Jeffrey Carin (Co-Chair)

Scientific Program
Dr. Lawrence Liao
Dr. Jonathan Carlo A. Briones
Eric Zeus C. Rizo

Souvenir Program
Maria Isabella Escobar

Secretariat, Registration & Membership
Dr. Florfe Acma
Dr. Axel Arriola
Maria Isabella Escobar

Scientific Lectures
Dr. Rey Donne S. Papa
Jeszianlenn L. Plaza
Dr. Astrid L. Sinco

Poster & Workshop Sessions
Dr. Hendrik Freitag
Jeszianlenn L. Plaza
Llara M. Siglos

YSBF and Awards
Dr. Lawrence Liao
Dr. Grecebio Jonathan Alejandro
Dr. Cecilia I. Banag

Sponsorships
Dr. Cecilia I. Banag
Jeffrey Carin

Certificates and Souvenirs
Dr. Axel Arriola
Elfritzson Peralta
Jeszianlenn Plaza

Documentation
Maria Isabella Escobar
Janrick Inchoco
Arthien L. Pelingen
Bret Anne Salvador
James Goloran

Fellowship
Jeffrey Carin
Kimberly de Rama

Physical Arrangement
Janrick Inchoco
Kyra Aldaba

Reception
Jeffrey Carin
Glory Mae Urbiztondo
Kaye Daquipil
Kathleen Alim
Charles Calo

Food Committee
Jeffrey Carin
Kimberly de Rama

Logistics
Jeffrey Carin

Accommodation
Jeszianlenn L. Plaza

KEYNOTE LECTURE

The Agusan Marsh— A paradise for systematists and other biologists

Jurgenne H. Primavera
Pew Fellow in Marine Conservation
Scientist Emerita, SEAFDEC Aquaculture Department
Chief Mangrove Scientific Advisor, Zoological Society of London
48 Burgos St., La Paz, Iloilo City 5000, Philippines

The Agusan Marsh is the Middle Agusan River Basin, an extensive flood plain that covers 111,540 ha in 8 municipalities of Agusan del Sur, mostly in Bunawan and La Paz, into which nine major river basins drain. It comprises 59 lakes and ponds that serve as catch basin of the Agusan-Davao plain in Eastern Mindanao draining the Diwata mountain ranges of Agusan del Norte and Agusan del Sur in the east, the mountain ranges of Bukidnon in the west, and the hills of Compostela Valley in the south. The seven main habitats of the Marsh are as varied as the wide expanse they cover – the Freshwater Swamp Forest (with *Terminalia,* Peat Swamp and Sago Palm Forest subtypes), Secondary Scrub, Herbaceous Swamp, Open Water (oxbow/floodplain lakes, pools), and Flowing Water (rivers, streams).

Such diversity of habitats is matched by species diversity, as can be seen below:

a) *Birds* – 196 spp. of which 26 spp. are migratory, 67 spp. endemic to the Philippines, and 10 spp. Threatened
b) *Herpetofauna* – at least 126 spp. found in northeast Mindanao geographical area (Caraga Region), the highest species diversity of any comparably-sized faunal subregion in the Philippines (Sanguila et al., 2016)
c) *Mammals* – 14 spp. including the Threatened *Sus philippinensis* and *Rusa mariana* in the Peat Swamp Forest
d) *Aquatic beetles* – 27 spp. (Varela and Degamo, 2016)
e) *Aquatic fauna* – 8 fish spp., 2 reptile spp., 3 crustacean spp., 6 mollusk spp., of which 39% are native, 37% are migratory (Hubilla et al., 2008)
f) *Macroflora* – 192 spp. of vascular plants (C.I., 2009); >220 spp. of seed plants (16% endemic) in the Peat Swamp Forest (Tandang et al., 2016)

Meanwhile, the following factors threaten the ecological integrity of the Marsh: a) exotic/invasive species – the janitor fish *Pterygoplichthys disjunctivus* is the most notorious example; b) logging and deforestation; c) conversion to agriculture – drainage and burning of vegetation; d) siltation – from deforestation and agriculture; e) mining wastes; and f) increased population pressure. For example, 85, 700 ha of Marshland have been cleared, drained and converted to agriculture, mainly rice, corn and oil palm plantations as of 2010 (Varela et al., 2013). But management interventions to address the above problems must be based on solid science, i.e., studies on the hydrology, geology and ecology (including basic taxonomy) of the Marsh.

The death of the brackishwater crocodile *Crocodylus porosus* named Lolong in Agusan del Sur, and the major damage due to fungal rot of the Centennial Bitaog Tree *Calophyllum inophyllum* in Agusan del Norte reflect a lack of science-based management on the part of local and national authorities. Both individuals represent the biggest and best specimens of their species, hence their loss diminishes us all. And yet the discovery of two orchids *Cypripedium calceolus* and *Euphlebium rhodochilum* new to science (Ferreras et al., 2013) give an indication of the many more species that remain to be documented and discovered in the Agusan Marsh. Finally, there is urgent need to enforce the protected status of the Marsh – the AMWS, NIPAS, Ramsar and other conventions – otherwise the Marsh flora and fauna and their habitats will be gone even before they can be observed and appreciated by future generations of Mindanaoans and Filipinos.

Dr. Primavera is a chief mangrove scientific advisor for Zoological Society of London and is an emerita scientist of the aquaculture department of the Southeast Asian Fisheries Development Center in Iloilo, Philippines. Last 2015, she was recognized by the National Academy of Science and Technology (NAST) as one of its new academicians. Her significant and pioneering research contributions to the aquaculture of marine shrimp and the science-based utilization and conservation of mangroves, and studies on critically important beach forest ecosystem led her to be an internationally-recognized and multi-awarded scientist.

PLENARY LECTURE

White space: a colonial intellectual history of Pitogo

Kathleen Cruz Gutierrez
Visiting Professor
De La Salle University, Manila Philippines
Doctoral Candidate, Department of South and Southeast Asian Studies
University of California, USA

This presentation will examine the intellectual history of *Cycas wadei*, more commonly known as *pitogo* (Tagalog). Prior to its introduction to the international world of botany in 1936, U.S. colonists hotly debated the plant's official Latin name. Eventually, the species was named in honor of Herbert W. Wade, head physician of the Culion leper colony established by the U.S. colonial government in 1902.

How can a plant's Latin name carry with it the history of colonial botany in the Philippines? What can the colonial intellectual history of a single species tell us about the afterlives of ecological imperialism? Through an analysis of colonial-era correspondence, images, physical specimens, and botany publications, I will attempt to answer these questions that tackle colonial botanists' early fascination with *pitogo*.

Theoretically speaking, as historian Daniela Bleichmar (2012) has explored, the very practice of producing images of isolated plant life—devoid of ecosystem and environment—rendered colonial flora in an administratively governable way. Drawn onto blank sheets single species could be examined and studied in isolation. This type of epistemological "white space" could erase the violence that underpinned imperial expeditions and the local origins of plant species. In light of this, the colonial intellectual history of *pitogo* is also history of the expansion of white space across time: that seen in its first discovery in the early twentieth century to its current threat of extinction.

Kathleen Cruz Gutierrez is a doctoral candidate at the University of California, Berkeley, in the Department of South and Southeast Asian Studies. For 2018, she is Visiting Professor in International Studies at De La Salle University, Manila. Her research interests include the history of science, comparative colonialisms, and Philippine craft technologies. With current support from the U.S. Social Science Research Council and the Fulbright-Hays program she is completing research in the Philippines for her dissertation, which is a history of Philippine botany (1866 - 1926).

PLENARY LECTURE

Evolutionary and biogeographic origins of Mindanao's herpetological megadiversity: diverse timescales, adaptive scenarios, and non-adaptive mechanisms for the assembly of the southern

Rafe M. Brown
University of Kansas

Once perceived as a depauperate "fringing archipelago," the Philippines is now considered by biogeographers to be an iconic model island archipelago for the study of ecological factors governing terrestrial faunal assembly, and adaptive processes of evolutionary diversification. The southern reaches of the archipelago have long held a special significance in the eyes of biogeographers who conceived of southern Palawan, the Sulu Archipelago, and Southwestern Mindanao as the first steps in the process of downstream colonization. In this view of the Philippines, lineages may have penetrated the archipelago only as far as their relative capacity for dispersal allowed, and eventually all lineages met their own geographical limitations. This "where lineages go to die" view of the Philippines contrasts strongly with today's understanding of the diverse mechanisms of assembly and diversification that, together, have given rise to land vertebrate megadiversity in the southern Philippines. New discoveries, modern revisions of species diversity, new kinds of data, and several synthetic reviews have contributed to a biogeographers' enhanced understanding of the diversity of processes operating within the Mindanao faunal region alone. In particular, the combination of genomic data, species distribution models, collection of robust geographic sampling of genetic resources, and application of modern species concepts, are resulting in today's renaissance of systematics in Mindanao. In this presentation, we will review examples of studies in progress that have the potential to further transform our understanding of the biogeography of the southern Philippines—all in an effort to identify key focal areas for future research and international collaboration in the Mindanao faunal region.

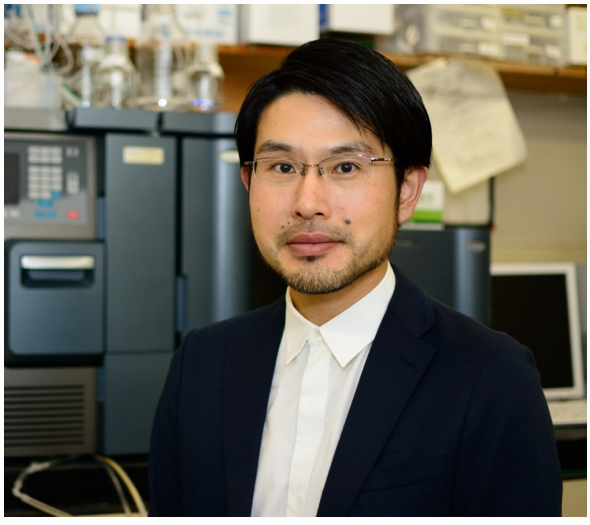
Dr. Rafe Brown, at present, is the curator-in-charge in the Herpetology Division of the Natural History Museum and Biodiversity Institute, University of Kansas. He is also a current professor in the College of Liberal Arts and Sciences, Ecology and Evolutionary Biology, KU Biodiversity Institute. His research interests are biogeography and processes of diversification in island archipelagos, phylogenetic systematics, character evolution, speciation genetics, and biodiversity conservation and taxonomy of amphibians and reptiles of Southeast Asia. As an empirical systematist, he uses molecular markers together with statistical approaches to phylogeny estimation to test his hypotheses on lineage diversification and species-specific responses to the geography of island archipelagos such as in the Philippines, Indonesia, and the Solomon Islands, where his fieldworks were primarily based.

PLENARY LECTURE

Structure, function and diversity of seaweed lectins as potential taxonomic markers

Makoto Hirayama
Graduate School of Biosphere Science, Hiroshima University

Seaweeds have attracted global attention as healthy foods and also as a potential biomass. Sugar-binding proteins such as lectins are widely distributed in viruses to humans, and have important roles in various biological processes such as infection, fertilization, host defense, metastasis, and so on, through binding to glycans in body fluids and on the cell surfaces. Within the last few decades, seaweed lectins have been analyzed for their structures, functions and applications. We have isolated more than 70 seaweed lectins in protein and DNA levels and elucidated that seaweed lectins show novelties of carbohydrate recognition mode and molecular structures which might have applications in taxonomy. Seaweed lectins are divided into at least 15 families by their primary structures. The carbohydrate-binding properties of lectins in some families are highly similar whereas those in other families are diverse: the binding properties of the lectins belonging to cyanobacterial *Oscillatoria agardhii* agglutinin (OAA) family, which are present in eubacteria, cyanobacteria and red algae, are well conserved in these organisms, while those of the lectins belonging to the green algal *Codium fragile* agglutinin (CFA) family differ according to derived species even within the same genus. Although the biological functions of seaweed lectins in algal bodies could be reflected by these differences, they are still relatively unknown. However, the unique binding properties of seaweed lectins are applicable as diagnostic tools and pharmaceuticals. Indeed, the a-fetoprotein (AFP) having the *N*-linked glycan bearing a core a1,6 linked fucose residue is the marker of liver and pancreatic cancers, and the red algal *Hypnea japonica* lectin, HypninA, specifically recognizes the glycan structure. Moreover, the seaweed lectins which strictly bind to high-mannose type (HM-) *N*-linked glycans show strong anti-viral activities against HIV and influenza viruses, which possess the HM-glycans on their envelope. In this lecture, structural and functional features of seaweed lectins are summarized and highlighted towards more advanced usage of seaweeds as beneficial bioresources of functional lectins which may prove useful for chemotaxonomy.



Dr. Makoto Hirayama is an Associate Professor of Marine Bioresource Chemistry at Hiroshima University in Hiroshima, Japan. He received a B.Sc. (2001), an M.Sc. (2003) and a Ph.D. (2006) in Agriculture from the University of Tokyo in Tokyo, Japan. After brief stints as a postdoctoral fellow at the University of Tokyo and the Hopkins Marine Station of Stanford University in Pacific Grove, California, USA, he was appointed to the Department of Biofunctional Science and Technology, Graduate School of Biosphere Science at Hiroshima University in 2008 as an Assistant Professor. He was promoted to Associate Professor in 2016. His research interests are biological functions and applications of algal lectins. Outside of the university, he pursues his hobby of coffee brewing.

PLENARY LECTURE

Dead men tell no tales but dead plants do: Herbarium specimens provide clues about recent environmental changes

Lawrence M. Liao
Graduate School of Biosphere Science, Hiroshima University

Herbarium specimens deposited in museums around the world have traditionally been used to support taxonomic studies. Lately, new uses have been identified on top of their traditional roles. Some histological and chemical features therein have been used to describe and relate with changing environmental conditions, providing proxy data potentially useful for studies in climate and environmental change. In this presentation, examples from flowering plants and marine algae showing variability in phenology and morphological characteristics including their presence or absence have been used for mapping general community changes through time and space, biogeographical shifts, invasion history, urbanization and other anthropogenic impacts, affording a record of the recent past even if sketchy and perhaps, a peek into the future. The maintenance of well curated biological samples by knowledgeable and well-trained biologists and deposited in repositories represents a valuable research resource not well appreciated in many countries especially those in the developing world. Herbaria and other natural history collections are valuable resources more than ever before in this era of rapid environmental change. They are cost-efficient facilities that need a minimum financial and manpower investment suitable for countries where research funding is often limited.

Lawrence Liao has worked with hundreds of herbarium specimens as part of his research on the taxonomy of marine algae in the USA and Southeast Asia. He took graduate courses at the University of North Carolina at Chapel Hill and the University of the Philippines and was a recipient of a research fellowship in museums management at the Smithsonian Institution in Washington, D.C. Very much active within the ASEAN network of seaweed taxonomists, he is completing a seaweed database of the South China Sea. He is the president of the Association of Systematic Biologists of the Philippines and currently holds a teaching appointment at the Graduate School of Biosphere Science of Hiroshima University. Prior to Japan, he held teaching appointments at the University of San Carlos, De La Salle University and the University of Prince Edward Island, Canada.

List of Parallel Lectures

PARALLEL SESSION A
Moderator: Dr. Axel Arriola

11:15 - 11:30	**Diversity, Assessment and Conservation of Pteridophytes in Selected Mindanao LTER Sites** Fulgent P. Coritico et al.
11:30 - 11:45	**Updates of Aroid Diversity in the Philippines** Maria Melanie P. Medecilo-Guiang
11:45 - 12:00	**Macro-infauna in the Pitcher Traps of *Nepenthes peltata* in Mount Hamiguitan Range Wildlife Sanctuary** Tristan Luap P. Senarillos & Ana P. Ocenar
12:00 - 12:15	**Taxonomy of Bryophyte-Associated Fungi and Its Biointeraction with the Fungal Pathogen *Fusarium*** Arfel L. Tayona & Thomas Edison E. dela Cruz
12:15 - 12:30	**Species Richness And Assessment Of Selaginellaceae In The Philippines** Majella G. Bautista, Fulgent P. Coritico & Victor B. Amoroso

PARALLEL SESSION B
Moderator: Dr. Aimee Lynn-Barrios Dupo

11:15 - 11:30	**Anuran Assessment: Their Diversity along Different Habitat Types in Mount Talomo, Davao City** Stefanie Grace B. Ang & Marnie Grace Sonico
11:30 - 11:45	**TO SPLIT OR NOT TO SPLIT: THE DYNAMICS OF AVIAN CLASSIFICATION** Juan Carlos T. Gonzalez
11:45 - 12:00	***Taxonexpeditions* – an international Citizen Science initiative and taxonomic results of an expedition to the Maliau Basin, Borneo, with new species of *Grouvellinus* (Coleoptera: Elmidae)** Hendrik Freitag, Clister V. Pangantihon & Iva Njunjić
12:00 - 12:15	**Anthropogenic Disturbance and Edge Effect in Anuran Assemblages: Anuran Diversity across Different Land-Use Types in Mt. Apo, Philippines** Ellen Angelic A. Biene, Cherie C. Mangaoang & Bryan Lloyd P. Bretaña
12:15 - 12:30	**Species Composition, Endemism and Local Status of Hawkmoths (Heterocera: Sphingidae) in the Two Proposed Expansion Sites of Mt. Hamiguitan Range Wildlife Sanctuary, Davao Oriental, Philippines** Romeo M. Tubongbanua, Jr., et al.

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Moderator: Dr. Lawrence Liao

11:15 - 11:30	**Inventory of Mangrove Species in Katunggan Coastal Eco Park, Taguisa, Lebak, Sultan Kudarat, Philippines** Ben Raye Marco et al.
11:30 - 11:45	**Preliminary Survey of FruitBats in Mangrove Patches of Ala-ala Beach Resort, Kalamansig, Sultan Kudarat** Ruffa Mae M. Marfil et al.
11:45 - 12:00	**Community Based Awareness towards Mangroves and its Conservation in Barangay Taguisa Lebak, Sultan Kudarat** Gemma Daquila et al.
12:00 - 12:15	**Association as a tool in analyzing the social structure of Irrawaddy dolphins (*Orcaella brevirostris*) in the coastal waters of Bago-Pulupandan, Negros Occidental, Philippines** Manuel Eduardo L. de la Paz et al.
12:15 - 12:30	**Taxonomic Study of *Catenella* Greville (Rhodophyta, Caulacanthaceae) in the Sundarbans Mangrove Forest, Bangladesh** Lawrence M. Liao & Md. Ariful Islam

PARALLEL SESSION D
Moderator: Dr. Rey Donne S. Papa

3:45 - 4:00	**Environmental adaptation and microevolution of Japanese dace, *Tribolodon hakonensis*, in heavy metal contaminated river** Hisato Takeuchi et al.
4:00 - 4:15	**Distribution of Freshwater Snails in Selected Sitios of Barangay Takepan, Pikit, North Cotabato** Irish Joy L. Gacho , Genalyn P. Galas, M.Sc. & Janette P. Supremo
4:15 - 4:30	**Diversity, distribution and abundance of macroinvertebrates in response to macrophytes composition and water quality along the littoral zone of Lake Mainit, Key Biodiversity Areas, Philippines** Jesiel Cris C. Paylangco & Joycelyn C. Jumawan
4:30 - 4:45	**Zooplankton Composition and Abundance in Select Inland Water Body of Three LTER Sites in Mindanao, Philippines** Maricris Cudal et al.

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4:00 - 4:15	**Molecular Phylogeny of the Philippine Tarenna Gaertn (Rubiaceae)** Sarah Grace Zamudio and Cecilia Banag
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PARALLEL SESSION F
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3:45 - 4:00	**Contribution to the Study of the Family Deinopidae from the Philippines** Aimee Lynn A. Barrion-Dupo & Alberto T. Barrion
4:00 - 4:15	**A Review of the Cyprinid Fish Genus *Barbodes* from the Philippines with Description of an Understudied Endemic Species In Agusan Marsh** Marianne Hubilla-Travis & Jurgenne H. Primavera
4:15 - 4:30	**Initial Vertebrate Diversity Assessment in Upland Cavite, Philippines** Ronaldo D. Lagat & Rubie M. Causaren
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List of Abstracts - Parallel Session A

Diversity, Assessment and Conservation of Pteridophytes in Selected Mindanao LTER Sites

Florfe M. Acma[1], Aurfelie D. Nietes[1], Fulgent P. Coritico[1,*], Jennifer G. Opiso[1] and Victor B. Amoroso[1]
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This present study established another one hectare plot which is contiguous to the previously established plot in the three Mindanao LTER sites *viz*., Mt. Apo (North Cotabato), Mt. Hamiguitan (Davao Oriental), and Mt. Musuan (Bukidnon). Study on herbaceous pteridophytes on the 2nd hectare of the above-mentioned sites revealed a total of 120 species which are classified under 60 genera and 26 families which represents roughly 11% of the total pteridophytes in the Philippines. Eighty-three species were recorded from Mt. Apo, 28 species from Mt. Hamiguitan and 21 species from Mt. Musuan. Mt. Apo had the highest diversity value (1.60) followed by Mt. Hamiguitan (0.93) and Mt. Musuan (0.82). Mt. Hamiguitan have shown homogeneity of species composition between the 1st and 2nd hectare plots as determined by cluster analysis resulting to the abundance of concordant species (56.40%) in the area. The assessment of the conservation status of the pteridophytes in the three LTER sites revealed that there is 1 critically endangered species (*Coryphopteris borealis* (Holtum) Blume), 1 endangered (*Ophioglossum pendulum* Linn.) and 4 vulnerable species, 6 endemic species, 12 rare species and 9 economically important species. *Plagiogyria christii* Copel and *Selliguea triloba* (Houtt.) M. G. Price showed fastest growth rate with 181 mm and 59.32 mm per month respectively. Monitoring of the diversity and phenology of the pteridophytes is an important endeavor to understand the over-all characteristics of this group of flora.

Updates of Aroid Diversity in the Philippines

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Araceae or aroids is one of the most ecologically and structurally varied group of monocots occupying a wide variety of habitats. It exhibits a remarkable and diverse lifeforms ranging from geophytes, rheophytes, climbers, epiphytes and free floating aquatic with many economic uses. The Philippine Araceae is reviewed here based on herbarium materials deposited in major herbaria, publications, revisions and actual field works. Twenty-six (26) genera and more than 150 species were recorded in the Philippines, of which 46 are endemic in the country. This accounts for 23% of the Malesian aroids. The genera *Alocasia*, *Rhaphidophora* and *Amorphophallus* have most number of species in the country. Based on literature survey, most of aroid papers were done by English and American researchers. It is estimated that more than 180 species of aroids occur in the country with further field studies. It is therefore recommended that extensive field works should be conducted to document the other aroid species that are not yet recognized and described. Collections should be made on areas having few representative specimens to enrich the collections of Philippine aroids.

List of Abstracts - Parallel Session A

Macro-infauna in the Pitcher Traps of *Nepenthes peltata* in Mount Hamiguitan Range Wildlife Sanctuary

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Nepenthes pitcher plants are colonized by a variety of specialized arthropods. An account is given to the taxonomy and bionomics of macro-infauna living in the pitchers of *Nepenthes peltata* in Mount Hamiguitan Range Wildlife Sanctuary. Purposive sampling and transect method were used to sample 102 pitchers across the three vegetation types: Dipterocarp forest, Typical-mossy forest & Mossy-pygmy forest. Five taxonomic group of macro-infauna from three families were identified: *Dasyhelea* sp., *Tripteroides* sp. 1, *Tripteroides* sp. 2, *Toxorhynchites* sp. and *Hemithyrsocera* cf. *tawitawiensis*. The organization of the biotic community within the pitchers of *N. peltata* demonstrates low species diversity, uneven species distribution and dominance. Results in the analyses of physicochemical and biological parameters indicates that macro-infauna prefer pitchers that are slightly acidic, have low temperature of pitcher fluid and high fluid volume. However, the influence of these parameters is dubious since the correlation between these parameters and inquiline diversity is weak.

Taxonomy of Bryophyte-Associated Fungi and Its Biointeraction with the Fungal Pathogen *Fusarium*

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Bryophytes as primitive plants live in close association with other microbes. Bryophyte-associated fungi are a group of understudied microorganisms that may offer new, useful, active secondary metabolites. In this study, we isolated 42 specimens of bryophyte-associated fungi (BAF). These were morphologically characterized and classified into 12 morphospecies. Six morphospecies were isolated from three bryophyte hosts collected from Intramuros, Manila while the other six were isolated from a liverwort collected in Baguio City. Most of the morphospecies failed to produce spore *in vitro*, and hence, were designated as *mycelia sterilia*. Confirmation of the identities of these "sterile" BAF was done through gene sequence analysis. We studied the biointeraction of BAF with the important plant pathogens, *Fusarium verticillioides, F. miscilicaria,* and *Fusarium sp*., using the dual culture method. Results showed antagonistic activities of at least four BAF isolates against the test fungi. Our results showed the potential of BAF as biocontrol agents.

List of Abstracts - Parallel Session A

Species Richness And Assessment Of Selaginellaceae In The Philippines

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In the Philippines, *Selaginella* species are confined to island groups resulting to high endemism of the said species and species inventory has not been done. The study aimed to determine the species richness and conservation status of *Selaginella* in the Philippines. Actual field collection in different places and examinations of herbarium vouchers at CMUH of Central Mindanao University, Musuan, Bukidnon, CAHUP at UPLB and PNH, Manila were conducted. The inventory revealed a total of forty two species of *Selaginella* from different mountain ecosystems in the Philippines. The said number of species is about 90% of the total number of species recorded in the Philippines. Fourteen of the said number of species are Philippine endemics, four are possible new species, two new records and two are most widely distributed.

List of Abstracts - Parallel Session B

Anuran Assessment: Their Diversity along Different Habitat Types in Mount Talomo, Davao City

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The study identified and geotagged anuran species along the different habitat types of Mount Talomo. It also determined the diversity and abundance, as well as the conservation status through IUCN Red List. Using time constrained visual encounter surveys, 87 individuals belonging to 16 species were encountered. Species diversity in the study site was moderate while *Ansonia muelleri* has the highest value of relative abundance and species evenness. Among the habitat types, the lower montane forest holds the most number of anurans with 49 individuals. A total of eleven species of the anurans observed were Mindanao Island endemics; one species was under endangered category; four species were listed as vulnerable; and three species were listed as near threatened. However, Mt. Talomo is faced with several threats that threaten the survival of anurans and other wildlife thus, long term actions for the promotion of biodiversity conservation in the area is needed.

TO SPLIT OR NOT TO SPLIT: THE DYNAMICS OF AVIAN CLASSIFICATION

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The application of molecular phylogenetics in systematic biology has revolutionized our understanding of avian relationships at various taxon levels. It has contributed to major revisions in higher taxa and resolved species limits. However, historical changes in techniques and markers used has created variable and complementary phylogenies, based from genes to genomics. As a result, the global bird checklist continues to change, and with a standardized delimitation system, more splits have added to the list. In this paper, presents a comparison of the global checklists which provides the basis for developing the Philippine checklist of birds, putting into consideration the recent taxonomic changes and accepted splits, many of which are endemic. Included in this country list are recent new records of migrants and vagrants adopted from birding and banding information. A comprehensive checklist of nearly 700 species provides a new perspective to overall avian species richness and endemism, with implications to research in ecology, biogeography and conservation.

List of Abstracts - Parallel Session B

***Taxonexpeditions* – an international Citizen Science initiative and taxonomic results of an expedition to the Maliau Basin, Borneo, with new species of *Grouvellinus* (Coleoptera: Elmidae)**

Hendrik Freitag[1, 2,*], Clister V. Pangantihon[1] & Iva Njunjić[2]
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During the first biodiversity discovery field course for citizen scientists, termed "taxon expedition", participants collected six new species for science from Maliau Basin, Malaysian Borneo. Three of them, all belonging to the genus *Grouvellinus* (Elmidae), were recently described and are the main focus of this talk. Names for two of them were selected during a naming ceremony in Maliau Basin by the course participants and staff of the Maliau Basin Studies Centre and for a third new species, the name was elected by voting in an online public contest. The focus on publishing species discoveries by citizen scientists in peer-reviewed ISI journals makes our initiative unique, since such approaches are only seen in student volunteer funded programs before. Since there are no previously published records of *Grouvellinus* from the island of Borneo, thus our data extend the known distributional range of the genus to the largest Asian island. The talk will also focus on general advantages and problems with species discoveries by citizen scientists based on our experience and published information.

Anthropogenic Disturbance and Edge Effect in Anuran Assemblages: Anuran Diversity across Different Land-Use Types in Mt. Apo, Philippines

Ellen Angelic A. Biene*, Cherie C. Mangaoang, and Bryan Lloyd P. Bretaña
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Anurans are affected by various anthropogenic disturbances such as forest fragmentation leading to a less structured assemblages along the pasture-forest gradients. The study aimed to assess the anuran diversity across different land-use types in Mt. Apo, Philippines as affected by anthropogenic disturbance and edge effect. Visual encounter method was used for the collection of anuran specimens in the forested, forest edge and agricultural areas. A total of 254 anurans were recorded which belong to 18 species. Species Richness was highest in the forest (SR=16) compared to forest edge (SR=6) and agricultural area (SR=5). Abiotic factors such as temperature and humidity were not determinants of the occurrence anuran species in various land-use types. The anthropogenic disturbance, instead of edge effect, affects the presence of anurans in the area. Future management researches in Mt. Apo need to incorporate anthropogenic disturbances, because it strongly interacts with edge effects, affecting the habitat quality and persistence of species in the landscape.

List of Abstracts - Parallel Session B

Species Composition, Endemism and Local Status of Hawkmoths (Heterocera: Sphingidae) in the Two Proposed Expansion Sites of Mt. Hamiguitan Range Wildlife Sanctuary, Davao Oriental, Philippines

Alma B. Mohagan[1, 2], Romeo M. Tubongbanua, Jr.[2]*, Daniel O. Amper[2], Aldrin L. Hongco[1,2], Fulgent P. Coritico[1,2], Felipe S. Gorme, Jr.[3], Ruel D. Colong[3], Roy G. Ponce[4] and Victor B. Amoroso[1,2]

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Family Sphingidae, also known as the Hawkmoths or Sphinx Moths are ecological indicators that are naturally affected by environmental stresses. They have a widespread distribution from Southeast Asia and play significant roles in the environment as indicators of the quality of habitat and biomass degradation. Mt. Hamiguitan Range Wildlife Sanctuary (MHRWS), as the only world heritage site in the Philippines has been subjected to numerous conservation studies of fauna and flora for several years. There were significant studies on Lepidoptera species in MHRWS, but there were no published papers on moth species specifically on the family Sphingidae. The paper aimed to provide data on the composition, endemism and status of Hawkmoths in the two proposed expansion sites of Mt. Hamiguitan Range Wildlife Sanctuary (MHRWS). Light trap sampling were established using 3m x 4m white silk cloth and 500 watts light bulbs in Sitio Tagtigcup, Barangay La Union, San Isidro and Ecopark of Mansinagan, Governor Generoso, Davao Oriental. A total of Six (6) genera with eight (8) species of the family Sphingidae were recorded. The thirty-seven point five percent (37.5%) were endemic, *Acosmeryx socrates, Ambulyx staudengeri* and *Theretra manilae* were the endemic species. There were four (4) uncommon or local species, three (3) common species and only one rare species recorded. This concludes that the proposed expansion sites of the MHRWS are home of 8 hawkmoths of 37.5% endemic with locally rare species for conservation and protection.

List of Abstracts - Parallel Session C

Inventory of Mangrove Species in Katunggan Coastal Eco Park, Taguisa, Lebak, Sultan Kudarat, Philippines

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The coastal wetland of the Philippines is predominantly a mangrove ecosystem however experiencing different forms of threats. The LGU of Lebak, Sultan Kudarat and non-government organization were envisioning rehabilitating and conserving the Mangrove forest in the area. Inventory of mangrove species was conducted in Katunggan Coastal Eco Park, Taguisa, Lebak, Sultan Kudarat. Documentation was employed for the identification of the different mangrove species in the area. A total of 28 identified mangrove species including the near threatened *Ceriops tagal* and *Sonneratia ovata*, and a vulnerable species, *Avicennia rumphiana*. There were also 2 unidentified species documented, locally known in the area as balagon and bilang-bilang. Despite of decreasing status of Philippine mangroves, local exploitation and anthropogenic pressure such as aquaculture pond development and construction are presently arising in the area. Therefore, the documented species and the presence of near threatened and vulnerable species in the area are in need a prioritization in terms of conservation and rehabilitation activities.

Preliminary Survey of FruitBats in Mangrove Patches of Ala-ala Beach Resort, Kalamansig, Sultan Kudarat

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The mutualistic relationship of bats to flowering plants including mangrove is an important mechanism that could enhance the survival of both organismal groups. However, data on the bat species associated to mangroves is lacking in the Philippines. The study aimed to characterize and identify the bat species present in the mangrove patch of Ala-ala Beach Resort, Kalamansig, Sulatan Kudarat up to the lowest possible level of taxonomic classification. A total of eight individuals belong to three species under family Pteropodidae were captured and identified from the two days sampling in the area. *Ptenochirus jagori* was composed of four individuals followed by three *Cynopterus brachyotis* and one *Macroglossus minimus*. The following bat species were captured to areas where mangrove species such as *Brugeria parviflora, Rhizophora apiculata, Rhizophora mucronata, Rhizophora stylosa, and Avicennia marina* were observed. It is highly recommended to conduct additonal sampling efforts to have more conclusive and concrete data.

List of Abstracts - Parallel Session C

Community Based Awareness towards Mangroves and its Conservation in Barangay Taguisa Lebak, Sultan Kudarat

Gemma Daquila*, Elen Angelic Biene, Christine Bascos, Crystal Joy Dacutan, Christie Kaye Lopez, Leanne Jay Manceras, Cherie Cano-Mangaoang
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Mangrove habitats play vital roles both in marine and terrestrial ecosystem. They constitute productive ecosystem that provides both protection and resource for the community. In recent years, mangrove forests are being depleted and destroyed due to the anthropogenic activities. Recognizing the significant roles of mangroves, a community based awareness survey was conducted in Barangay Taguisa, Lebak, Sultan Kudarat, Philippines. We assessed the perception of the community towards the mangroves and the management efforts they have done to save and conserve the mangroves. Survey revealed that the community are aware of the importance of the mangroves but not all are abiding to the policies that the government implemented to protect and conserve mangroves. It is highly suggested that there should be a joint effort by both government and local communities to save and protect mangrove ecosystem.

Association as a tool in analyzing the social structure of Irrawaddy dolphins (*Orcaella brevirostris*) in the coastal waters of Bago-Pulupandan, Negros Occidental, Philippines

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This study aimed to identify and characterize the social structure model of *Orcaella brevirostris* in Bago -Pulupandan, Negros Occidental, Philippines. A total of 20 boat-based surveys were conducted from April to August 2017. Photo-identification of individual dolphins was utilized for cluster analysis, social network and social structure model type through the use of SOCPROG 2.7. Network and cluster analysis depicted the presence of the modest social network within the group and that there are two sub-groups present within the sub-population, respectively. Social structure model revealed an a3 model type, explaining the social structure as individuals having preferred companions and casual acquaintances. Repeated Measures (Unbalanced Case) Design of Mean and Maximum Simple Ration Index revealed no significant difference in the associations at different times in the morning. These results may correlate with the distinct preferences each individual portray and the availability of prey within the area.

List of Abstracts - Parallel Session C

Taxonomic Study of *Catenella* Greville (Rhodophyta, Caulacanthaceae) in the Sundarbans Mangrove Forest, Bangladesh

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Five species of *Catenella* are currently recognized around the world. They are fleshy macroalgae usually found associated with mangroves and marshes mostly in tropical regions. In Bangladesh, three species have been recorded, namely *C. impudica* (Montagne) J. Agardh, *C. nipae* Zanardini, and *C. repens* (Lightfoot) Batters. New collections were made on February 26 to March 17, 2018 from different points of Satkhira and Baherhat region of the Sundarbans, the largest mangrove forest in the world. Samples were collected with a small knife from mangrove roots and trunks, preserved in ethanol and brought to the laboratory for microscopic examination. The three species were re-collected plus two other interesting entities which cannot be placed under any of the known species and may be undescribed. External and internal morphological characters are presented and compared for the different taxa encountered. Molecular verification is expected to confirm the identity of these species prior to assigning of species names. DNA data are also expected to reveal the phylogenetic relationship among members of the genus. The results of this study also attested to the rich algal flora associated with mangroves which, however, remains poorly studied to this day.

List of Abstracts - Parallel Session D

Environmental adaptation and microevolution of Japanese dace, *Tribolodon hakonensis*, in heavy metal contaminated river

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Watarase River (WR) was seriously contaminated by heavy metals and fish population in the river had been destroyed. Nowadays, heavy metal (Cu, Zn, As, Pb, Cd, and Fe) levels in the river remain comparatively high; however, *ca*. 40 fish species are living in the river. In this study, using Japanese dace *Tribolodon hakonensis* (Cyprinid fish), we investigated how fish population adapt to heavy metal condition. Of bioaccumulation of heavy metals in dace, concentrations in liver of the dace were comparatively lower in WR. In microsatellite analysis, there was no obvious genetic differentiation between WR and OR population, whereas the genetic structure of dace population in Kusaki-dam (located in upstream of WR) was different from others. In the presentation, using other biomarker data, we will present a possibility that the dace in WR adapted to metal contamination and have evolved independently (microevolution) against long-term metal contamination.

Distribution of Freshwater Snails in Selected Sitios of Barangay Takepan, Pikit, North Cotabato

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Freshwater snails are important organisms but they received less attention in their taxonomic works and distribution. A baseline information on the distribution of freshwater snails was conducted in Sitio Gantong Saranay and Idsla from March to May 2017. A total of 3089 individuals were collected. Among the two sampling sites, the relative abundance were; Sitio Idsla n= 1,892 (39.75%) Sitio Gantong Saranay n= 1,197 (61.25%). *Pomacea canaliculata* was the most abundant species with a total of 1, 267 followed by *Lymnaea sp*. n=1,038, *Filopaludina sp.* n= 444, *Melanoides tuberculatus* n=218, and *Indoplanorbis exustus* n=121. The sites were mapped and physico-chemical parameter was recorded. A brochure was developed to give information about the freshwater snails. The two Sitios was rich in diversity of freshwater species and it is recommended to have a further research.

List of Abstracts - Parallel Session D

Diversity, distribution and abundance of macroinvertebrates in response to macrophytes composition and water quality along the littoral zone of Lake Mainit, Key Biodiversity Areas, Philippines

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The study determined the relationships between the abundance of macroinvertebrates in relation to macrophytes and to their environmental conditions. In 10 sampling stations, a total of 20,924 macroinvertebrate individuals belonging to 16 species and 13 families were randomly collected and identified. Mansayao and Tagbuyawan areas have higher diversity index (H'=1.98, 1.93). *Penaeus monodon* (37%) and *Vivapira angularis* (26%) were found to be the most abundant species. Canonical correspondence analysis reveals *Corbicula fluminea* and *Sundathelphusa philippina* are sensitive to temperature and dissolve oxygen while dragonfly nymph and *Anodonta woodiana* shows strong association to total dissolve solids. Correlation analysis revealed that there were high and moderate significant correlation between some of the macroinvertebrates, macrophytes species, and to its environmental condition. The results indicate that, the higher the macrophytes percent cover, the higher the chance for the macroinvertebrates to survive regardless of the salinity, temperature, resistivity, turbidity and depth. The abundance and taxa richness of lake macroinvertebrates provides baseline information in shaping complex food web of aquatic ecosystems.

Zooplankton Composition and Abundance in Select Inland Water Body of Three LTER Sites in Mindanao, Philippines

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A pioneering assessment study of zooplankton composition and abundance were done in year 2015 in select rivers and creek of Mt. Apo, Mt. Hamiguitan and Mt. Musuan, a Long-Term Ecological Research (LTER) Sites in Mindanao. A 1L water sample and plankton net were used for zooplankton collection. A total of 16 species belonging to Rotifera (5 species), Cladocera (2 species), Ostracoda (3 species), Copepoda (2 species), with 4 species considered as miscellaneous group that includes parasites like nematodes and platyhelminthes were recorded. In terms of abundance, Rotifers (49.23%) accounts the highest value followed by the miscellaneous group (39.46%). The 2 group were observed in all LTER sampling sites. Cladocerans (3.34%) and Ostracoda (2.88%) were observed in Dumago-oc and Ma-ug River of Mt. Hamiguitan while Copepods (5.08%) were secluded in Lumbo creek of Mt. Musuan. This information could serve as useful information on the additional distribution of freshwater microcrustaceans in Philippines.

List of Abstracts - Parallel Session E

Molecular Identification of Macrofungi from Two Lowland Forests in Mindoro Island, Philippines

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A comparative study on the macrofungi of Mindoro Island, Philippines was carried out in the lowland forests of Mt. Siburan and Mt. Malasimbo. A total of 122 specimens were collected during the onset (June) and latter (October/ November) months of the wet season. These were identified based on morphological characters as belonging to two genera under Class Ascomycetes and 23 genera under Class Basidiomycetes. We noted 17 species and 14 genera for Mt. Malasimbo as opposed to 25 species and 19 genera for Mt. Siburan. To confirm their identities, representative species were subjected to molecular identification. Genomic DNA was extracted using the CTAB method and PCR-amplified with the primer pair ITS1 and ITS4. Gene sequences were BLAST-searched for related taxa and maximum likelihood trees were generated using the MEGA5 software. The molecular identities concur with the morphological characterization. This is the first survey of macrofungi in Mindoro.

Molecular Phylogeny of the Philippine Tarenna Gaertn (Rubiaceae)

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The genus Tarenna Gaertn, is composed of 200 species occurring mostly in the continental Africa, Madagascar, the western Indian Ocean islands and Asia- Pacific region. Previous studies revealed that it is polyphyletic based on its morphological characters. The polyphyly was further supported by the results of a recent molecular study. Considering that studies failed to include any Philippine representatives, we investigated the evolutionary history and relationships among species known from the Philippines. The addition of the Philippine samples supports the circumscription of Tarenna s. str. (de Block et. al., 2015) is nested within the Asia-Pacific clade as revealed in the bayesian inference, parsimony, and maximum likelihood analyses. It also confirmed that the Philippine Tarenna species does not constitute a natural lineage. This study provided critical insights on the phytogeographic patterns of Tarenna in the Indomalayan- Australasian regions as well as the evolutionary history and relationships among Philippine Tarenna species.

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Diversity, Assessment and Conservation of Pteridophytes in Selected Mindanao LTER Sites

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This present study established another one hectare plot which is contiguous to the previously established plot in the three Mindanao LTER sites *viz*., Mt. Apo (North Cotabato), Mt. Hamiguitan (Davao Oriental), and Mt. Musuan (Bukidnon). Study on herbaceous pteridophytes on the 2nd hectare of the above-mentioned sites revealed a total of 120 species which are classified under 60 genera and 26 families which represents roughly 11% of the total pteridophytes in the Philippines. Eighty-three species were recorded from Mt. Apo, 28 species from Mt. Hamiguitan and 21 species from Mt. Musuan. Mt. Apo had the highest diversity value (1.60) followed by Mt. Hamiguitan (0.93) and Mt. Musuan (0.82). Mt. Hamiguitan have shown homogeneity of species composition between the 1st and 2nd hectare plots as determined by cluster analysis resulting to the abundance of concordant species (56.40%) in the area. The assessment of the conservation status of the pteridophytes in the three LTER sites revealed that there is 1 critically endangered species (*Coryphopteris borealis* (Holtum) Blume), 1 endangered (*Ophioglossum pendulum* Linn.) and 4 vulnerable species, 6 endemic species, 12 rare species and 9 economically important species. *Plagiogyria christii* Copel and *Selliguea triloba* (Houtt.) M. G. Price showed fastest growth rate with 181 mm and 59.32 mm per month respectively. Monitoring of the diversity and phenology of the pteridophytes is an important endeavor to understand the over-all characteristics of this group of flora.

List of Abstracts - Parallel Session E

Ethnobotanical Study of Naturally-Grown Pandanaceae Plant Species in Selected Areas of the Philippines

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Few documentations regarding the use of Pandanaceae plant species have been done in the Philippines, and no studies have been published to solidify its significance in the Filipino people. Hence, this study documented the indigenous utilization of the Pandanaceae species by target communities, with the goal of preserving traditional knowledge and cultural heritage. Surveys were conducted in five sites—Davao Oriental, Bataan, Eastern Samar, Palaui Island, and Laguna—from April 2017 to February 2018. Analysis of the variables location, gender, age, and education exhibited no significant differences on the informants' plant knowledge. *Pandanus luzonensis*, *P. simplex,* and *P. amaryllifolius* yielded the highest use values ranging from medicine, cuisine, and craftsmanship whereas *Benstonea copelandii* and *P. luzonensis* reported the highest fidelity values against hypertension and urinary tract infection, respectively. Most Pandanaceae species are also important sources of income in many areas as woven crafts for local and foreign exchange.

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Contribution to the Study of the Family Deinopidae from the Philippines

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The Family Deinopidae is a small family of medium- to large spiders known to laymen as net-casting spiders or ogre-faced spiders. This spider family has been recorded worldwide with a good number of species described. In fact, genus *Deinopis* has a total of 46 nominal species. Of these, 16 are from the Oriental and Australian regions. This paper reports the new country record for this family. Representative specimens of *Deinopis* were collected from two sites, namely: (1) Mt. Makiling Forest Reserve, Laguna Province, Luzon Is. and (2) Pulacan Falls, Labangan, Zamboanga del Sur, Mindanao Is. In addition, an updated checklist is presented in this paper to include three novel species of net-casting spiders, namely: *Deinopis gubatmakiling*, *D. labangan*, and *D. luzonensis*. These new species now are counted as the 47th, 48th and 49th species within the genus.

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A Review of the Cyprinid Fish Genus *Barbodes* from the Philippines with Description of an Understudied Endemic Species In Agusan Marsh

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The cyprinid fish genus *Barbodes* has 48 valid species endemic to southeastern, eastern, and southern Asia. The Philippines ranks first in terms of endemism, comprising 28 species or 58% of total valid species. Of the 28 species, 20 (71%) are endemic to Lake Lanao and its tributaries in Lanao del Sur province, 2 (7%) are endemic to Zamboanga province, 1 (4%) is endemic to Agusan del Sur province, 4 (14%) are endemic to Palawan province, and 1 (4%) is endemic to Mindoro province. Majority of its present members were originally included in the genera *Puntius, Barbus*, *Cephalakompsus*, *Mandibularca*, *Ospatulus*, and *Spratellicypris*. Due to the recent taxonomic modification of this genus and the paucity of available information about its members, an extensive review of this genus was conducted to provide an up-to-date species distribution, population status, taxonomy, fisheries, and conservation status.

Approximately 90% (18 out of 20 species) of *Barbodes* endemic to Lake Lanao and its tributaries are in the Red List (of Threatened Species) of the International Union for Conservation of Nature (IUCN). Many of them are believed to be extinct and less than five species are considered extant. In Palawan province, 25% (1 out of 4) of the species is on the IUCN Red List, and the Mindoro province endemic was also on the list. The major causes of their disappearance and population decline are overfishing and predation by, and competition with, introduced exotic fish species. Endemic *Barbodes* from Zamboanga and Agusan del Sur provinces were least studied and were not evaluated by the IUCN. Taxonomy and distribution data of an understudied Agusan Marsh endemic was added based on a 2008 ichthyofaunal survey in the Marsh.

In conclusion, endemic *Barbodes* species in the Philippines are currently in danger of extinction. As epicenter of *Barbodes* diversity in Asia, the Philippines should put high priority in protecting and conserving these extremely rare species.

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Initial Vertebrate Diversity Assessment in Upland Cavite, Philippines

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Cavite's upland forest fragments currently experience anthropogenic threats putting vertebrate species in grave peril. The study aims to determine baseline information on the vertebrate diversity of these fragments. Vertebrate assessments were done in 15 100 X 10 transects lines for reptiles, amphibians and mammals and in 8 two-km transects for birds from October 2014 to March 2016. Species richness and biodiversity estimation was computed using Shannon-Wiener Diversity Index, cluster analysis and detection and probability modeling by using PAST. Results showed that among the vertebrate groups, the birds had the highest observed diversity and detection probability and occupancy. Data also showed that 40% of the upland forests in Cavite was crucial for wildlife survival. Similarity of vertebrate communities varied depending on the vertebrate group and community similarity for birds served as the most reliable estimate of community similarities and differences. Habitat loss and degradation due to conversion of habitats to agricultural and/or residential areas remained to be the most prevalent threat in the remaining forested areas in upland Cavite.

Noteworthy species documented in Lopez et al.*'s recent checklist of freshwater copepods (Copepoda: Calanoida & Cyclopoida) in the Philippines

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In 2017, Lopez et al., published the most updated account of freshwater microcrustaceans (Copepoda and Cladocera) in the Philippines. This paper combined all known published accounts of freshwater microcrustaeceans in the country. There are now 81 known species of freshwater microcrustaceans documented in the Philippine archipelago including 55 cladocerans and 36 copepod species belonging to 8 different taxonomic orders. This presentation highlights several interesting species, including notable endemic (*Filipinodiaptomus insulanus, Diaptomus vexillifer, Pseudodiaptomus brehmi, Mesocyclops microlasius,* and *Mesocyclops augusti*), invasive (*Arctodiaptomus dorsalis*) and widespread (*Mesocyclops thermocyclopoides, M. ogunnus, Thermocyclops crassus, T. taihokuensis*) species and expounds on several changes in terms of their taxonomy and known distribution patterns, as well as recent updates on their biology and ecology.

* Lopez MLD, Pascual JAF, Dela Paz ESP, Rizo EZC, Tordesillas DT, Guinto SK, Dumont HJ, Mamaril AC, **Papa RDS** (2017). **Annotated checklist and insular distribution of freshwater microcrustaceans (Copepoda: Calanoida & Cyclopoida; Cladocera: Anomopoda and Ctenopoda) in the Philippines**. *Raffles Bulletin of Zoology* 65: 623-654 (ISSN 2345-7600 (electronic) ISSN 0217-2445 (print))

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Undergraduate Level

9:45 - 10:00	**Phylogenetic inference within the genus Cinnamomum (Lauraceae) in the Philippines based on DNA barcoding markers** Glennica Joyce A. Abenes et al.
10:00 - 10:15	**Dietary composition, niche breadth and overlap of native and non-native anurans in lowland habitats of Maputi Watershed, Agusan del Sur** Janrick B. Inchoco & Marites B. Sanguila
10:15 - 10:30	**Novelties in Philippine Vanguerieae (Rubiaceae): Two New Endemic Species of *Pyrostria* and a New Record of *Kanapia* Supported by DNA and Morphology** Jomari Jalipa et al.
10:30 - 10:45	**Molecular Phylogeny and a New Endemic Species of Philippine *Hornstedtia* Retz. (Zingiberaceae)** Adrian Insigne et al.
10:45 - 11:00	**Use of rbcL DNA Barcode for Taxonomic Verification of *Pleocnemia spp*. at Malambo Mountain Range, Davao City** Fatima S. Carcueva, Haianne U. Manching & Yvonne Mae T. Sumalinog

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Novelties in Philippine Vanguerieae (Rubiaceae): Two New Endemic Species of *Pyrostria* and a New Record of *Kanapia* Supported by DNA and Morphology

Nicholas Raphael Arcangel[1], Jomari Jalipa[1], Joaquim Gerardo Jurilla[1], Jose Manuel Villaseñor[1], and Grecebio Alejandro[1,2]
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Studies in the tribe Vanguerieae (Rubiaceae) have allowed the establishment of definite generic limits, but at the same time have brought to light the need for expanded sampling of taxa to better understand the tribe. Recent field collections in Mt. Mingan, Dingalan, Aurora and Mt. Arayat, Pampanga afforded four samples that showed affiliations within the tribe and their exact generic positions were investigated utilizing both morphological and molecular analyses following Bayesian Inference (BI) and Maximum Parsimony (MP) of combined ITS and *trn*L-F datasets. Two samples were found nested within the *Kanapia* clade (PP=1.00; BS=100%) and were identified as *Kanapia monstrosa*. This is the first record of *Kanapia monstrosa* in Mt. Mingan. Two other samples grouped with the *Pyrostria* clade (PP=1.00; BS=71%). Comparative morphological examination showed that the samples did not match with currently known *Pyrostria* species. Thus, two new endemic Philippine *Pyrostria* species are herein proposed.

Molecular Phylogeny and a New Endemic Species of Philippine *Hornstedtia* Retz. (Zingiberaceae)

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The genus *Hornstedtia* Retz. is characterized by radically borne inflorescences, an involucre of sterile bracts, condensed rachis, absence of filament, and less pronounced staminal tube; composing of 40 species from Southeast Asia to Queensland, Australia. Five species occur in the southern regions of the Philippines, four of which are endemic. Being a potential source of natural antioxidant, Philippine species' identity confirmation is imperative for further studies. Hence, morphological and molecular analyses were conducted following the Maximum Likelihood and Bayesian inference of ITS (nrDNA) dataset. Results strongly supported Philippine species within *Hornstedtia* (PP = 0.93; BS = 91). The endemic species formed a strong monophyletic clade (PP = 1.00; BS = 96) reinforced by rugose to coriaceous with fine hair ligule, ovate sterile bracts, papery bracteoles and trilobed corolla lobes. Furthermore, a new endemic species is proposed, *Hornstedtia. annadeguzmaniae*. Comprehensive descriptions, including diagnostic features and illustrations, of the species are presented.

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Phylogenetic inference within the genus Cinnamomum (Lauraceae) in the Philippines based on DNA barcoding markers

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The Philippine *Cinnamomum* spp. (Lauraceae) are an essential component of tropical forests represented by 23 species of which 16 are endemic. Despite of its high endemicity, numerous economic and ecological significance it is one of the plant species that is least investigated. To date, no studies about Philippine *Cinnamomum* phylogeny have been elucidated, thus this served as a baseline study to aid resolve ambiguous relationship within this significant plant group. Three cpDNA markers *matK, trnH-psbA, trnL-F* and 1 nrDNA marker *ITS* were utilized in this study. Bayesian inference using concatenated sequences from the 4 markers supported the inference that *Cinnamomum* from the Philippines belong to the Asian *Cinnamomum* clade with PP=0.73, while the single clade of endemic *Cinnammomum* is supported with PP=0.70. This study indicates that multi-locus marker is useful in resolving phylogenetic relationship at the generic level within *Cinnamomum* group, but not among all Lauraceae group.

Dietary composition, niche breadth and overlap of native and non-native anurans in lowland habitats of Maputi Watershed, Agusan del Sur

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Dietary composition and niche breadth and overlap of native and non-native frog species in Maputi Watershed was determined using traditional stomach content analysis thru stomach flushing. 100 post -metamorphic individuals representing four species (*Occidozyga laevis, Fejervarya vittigera, Hoplobatrachus rugulosus*, and *Rhinella marina*) were examined for stomach contents. Dietary composition data indicated 18 prey types. Niche breadth values for these species are low (ranges from 0.18–0.30) suggesting diet specialization, but native species have lower niche breadth than non-native frogs. Niche overlap ranges from 0.5 (moderate overlap) to 0.9 (complete overlap) between pairs of species, with lesser degree of overlap between native species pairs and higher overlap with non-native-native and both non-native species pairs.

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Young Systematic Biologist Forum
Undergraduate Level

Use of rbcL DNA Barcode for Taxonomic Verification of *Pleocnemia spp*. at Malambo Mountain Range, Davao City

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Pteridophytes has a longer evolutionary history than any other vascular plants and as a result many phylogenetic characters have been lost in the process. This study was conducted to verify the of occurrence of phenotypic plasticity in the genus Pleocnemia. Morphological identification and DNA Barcoding of the collected samples from Mt. Malambo were done on the following species, *Pleocnemiairregularis, P. macrodonta, Tectariameyanthidis, Tectaria sp., and Pleocnemia sp.* Results revealed that all samples collected were *Pleocneamia irregularis.* It is also important to note that these molecular results were based on rbcL gene only. Based on molecular verification, the five samples were very close to *P. irregularis* only in contrast to the morphological identification which can lead to a tentative ecological conclusion that phenotypic plasticity may also be occurring in the genus *Pleocnemia.* Thus, further tests are recommended to be done to verify the results of this study.

Young Systematic Biologists Forum
Graduate Level

9:45 - 10:00	**The Molecular Phylogeny of Philippine *Ophiorrhiza* L. (Ophiorrhizeae-Rubiaceae): A Proposal on its Infrageneric Classification and Four New Endemic Species** Niña Kathryn G. Alfeche & Grecebio Jonathan D. Alejandro
10:00 - 10:15	**Overview of Philippine Stoneflies (Insecta: Plecoptera) with new records of *Neoperla* Needham, 1905 from Mindoro Island** Arthien Lovell Pelingen & Hendrik Freitag
10:15 - 10:30	**Taxonomic studies and ethnomedicinal uses of Zingiberaceae in the mountain ranges of Northern Antique, Philippines** Jade Ann Grace P. Dalisay, Mark Arcebal K. Naïve & Porferio S. Bangcaya
10:30 - 10:45	**Radular Structures of Neritidae and Thiaridae (Gastropoda)** Llara M. Siglos & Hendrik Freitag, Ph. D.
10:45 - 11:00	**Feeding niche analysis on sympatric stream anurans of Taguibo River Watershed Forest Reserve, North Eastern Mindanao, Philippines** Jeszianlenn L. Plaza, Marites B. Sanguila & Ephrime B. Metillo

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The Molecular Phylogeny of Philippine *Ophiorrhiza* L. (Ophiorrhizeae-Rubiaceae): A Proposal on its Infrageneric Classification and Four New Endemic Species

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Ophiorrhiza L. is a species-rich but taxonomically complex genus of the family Rubiaceae. Currently, there is no published study on the phylogenetic relationships of the species within the genus to test the proposed formal classification sensu Schumann. Phylogenetic analysis of the combined nuclear and plastid markers resolved a strongly supported (PP=1.00;BS=100%) monophyletic Ophiorrhizeae. The Philippine *Ophiorrhiza* created a strongly supported monophyletic group (PP=1.00,BS=88%) which was delineated into two distinct subgroups. This study proposes the establishment of the infrageneric classification for Philippine *Ophiorrhiza*: Subclade A (PP=0.99) with caducous stipules, axillary inflorescences, and glabrous stems; and Subclade B (PP=0.87) with species having persistent stipules, terminal inflorescences, and pubescent stems. Through morphology and supported by molecular data, this study also revealed the presence of four enigmatic *Ophiorrhiza* species. Diagnosis, descriptions and illustrations are provided for the new endemic species namely, *O. amplistipula* sp. nov., *O.*

Overview of Philippine Stoneflies (Insecta: Plecoptera) with new records of *Neoperla* Needham, 1905 from Mindoro Island

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Taxonomic research dealing with Plecoptera (stoneflies) is one of the most overlooked gaps in freshwater studies in the Philippines, despite stoneflies' high suitability as bioindicators of clean freshwater systems. In the tropics, stoneflies have low diversity on family level though, due to the geologic profile of the country, species richness and endemism are expected to be high. Presently, Philippine representatives comprise three stonefly families: Perlidae, Peltoperlidae, and Leuctridae, with four genera, namely *Neoperla* Needham, 1905 (Perlidae); *Phanoperla* Banks, 1938 (Perlidae); *Peltoperla* Needham, 1905 (Peltoperlidae); and *Rhopalopsole* Klapálek, 1912 (Leuctridae). From these genera, 41 species were documented in a few limited studies within a century, however, all of them from Greater Luzon and Mindanao. We provide a checklist of the Philippine stoneflies with new records from Mindoro. Large knowledge gaps in stonefly diversity and distributions are pointed out and specific taxa are discussed briefly.

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Young Systematic Biologist Forum
Graduate Level

Taxonomic studies and ethnomedicinal uses of Zingiberaceae in the mountain ranges of Northern Antique, Philippines

Jade Ann Grace P. Dalisay[1,*], Mark Arcebal K. Naive[3] & Porferio S. Bangcaya[2]
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The gingers are well-known for their medicinal and economic significance. However, Zingiberaceae are one of the least known group in rapidly expanding recent knowledge of Philippine biodiversity. Thus, this study was conducted to identify the Zingiberaceae species present in the mountain ranges of northern Antique, determine their species richness, diversity and ethnomedicinal uses. Twenty three species in three tribes and nine genera of Zingiberaceae were collected. Among the 23 species collected, 16 species of Zingiberaceae are used traditionally by Antiqueños to alleviate and cure ailments such as the rhizomes of *Alpinia elegans* for post-partum relapse, the fruits of *Amomum dealbatum* and *Alpinia romblonensis* for loss bowel movement and the leaves of *Alpinia gigantifolia* for fever. These results contribute to not only to the future phylogenetic and pharmacologic studies of the family Zingiberaceae, but also to help define and refine conservation policies in the Philippines in order to offer better protection for narrowly endemic and economically important plant taxa.

Radular Structures of Neritidae and Thiaridae (Gastropoda)

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The radular structures of some species of freshwater snails were analyzed. The studied species were *Clithon* sp., *Neritina* sp. and *Neritodryas* sp. of Family Neritidae and *Melanoides* sp., *Stenomelania* sp., *Tarebia* sp. and *Thiara* sp. of Family Thiaridae. The samples were dissected and radulae were extracted. Representative species of Family Neritidae have rhipidoglossate radula with a central tooth, on each side of which several lateral teeth and many marginal teeth are found. The radula of the representative species of Family Thiaridae is of taenioglossate type consisting of a central tooth, on each side of which a lateral tooth and two marginal teeth are found. The radular morphology is discussed in relation to their food and ecological preferences.

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Young Systematic Biologist Forum
Graduate Level

Feeding niche analysis on sympatric stream anurans of Taguibo River Watershed Forest Reserve, North Eastern Mindanao, Philippines

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Anurans coexist, share niche dimensions, and are important consumers in riparian communities. Utilizing stomach content and stable isotope analysis (SIA) to determine trophic interactions of sympatric stream anurans (e.g. *Limnonectes magnus, Pulchrana grandocula,* etc.), dietary composition data showed that Insect prey (e.g. Hymenoptera: Formicidae, Coleoptera) are the most important prey types. There is contraction and expansion of niche breadth, but overall, niche breadth is narrow suggesting diet specialization. And niche overlap between pairs of species ranges from 0 (no overlap) to 1 (complete overlap) across months. Mean $\delta^{13}C$ and $\delta^{15}N$ values indicated that *Occidozyga laevis* showed the most depleted $\delta^{13}C$ and most enriched $\delta^{15}N$ values as it assimilated mostly predatory species of spiders (Araneae). *L. magnus* and *P. grandocula* showed comparable $\delta^{13}C$ and $\delta^{15}N$ mean values indicating very similar diets, but SIAR Bayesian simulation showed a much broader diet of ants, dragonflies and wasps for *L. magnus* than *P. grandocula* which assimilated dragonflies mainly. SIA clearly delineated the three anurans as predators, but *O. laevis* is a specialist on spiders, while the other two species are insectivorous carnivore but appeared to show preferential insect groups (Odonata, Formicidae, and Vespidae) as prey.

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Inventory of orchids in the Mount Hamiguitan Range Wildlife Sanctuary, Davao Oriental, Philippines

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The orchid family is the most threatened group of plants in the Philippines, yet remains to be poorly known and studied. A thorough survey was done from the base to the peak of Mount Hamiguitan Range Wildlife Sanctuary (MHRWS) to record and identify the orchid species. Results of the study revealed that MHRWS harbors 45 species of orchids, 23 of them are Philippine endemic, a few may be undescribed. About 53% are epiphytes and 47% are terrestrial. Five threatened taxa are recorded namely, *Bulbophyllum loherianum*, (EN), *Cymbidium ensifolium* (EN), *Dendrobium sanderae* (VU), *Paphiopedilum adductum* (CR), *P.ciliolare* (CR). The remarkable richness of orchids found in the present study highlights the importance for conservation of flora in MHRWS and other mountains and forests reserves in the island Mindanao.

Weeds in Conventional Rice Field of Barangay Antipolo, Marihatag, Surigao del Sur

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The study was conducted in a conventional rice farm in Barangay Antipolo, Marihatag, Surigao del Sur to identify the most common and prevalent weeds associated with rice. The study area was divided into 10 paddy fields. A total of fifty quadrats (0.25 m^2) were randomly allocated to all paddy fields. Weeds were collected and the data were used to calculate frequency, field uniformity, mean field density, mean occurrence field, and relative abundance values for each species. A total of six weed species belonging to four families of which one grass, three sedges, and two broadleaves were identified. The values for frequency ranges from 40-100%; 12-58% for field unifomity; 1.12-8.99 plants m^{-2} for mean field density; 2.8-9.574 plants m^{-2} for mean occurrence field density; and 0.2146-0.9498 for relative abundance of weed species. The most abundant weed species were *Sphenoclea zeylanica*, *Ludwigia hyssopifolia*, *Paspalum distichum*, *Cyperus difformis*, *Schoenoplectus juncoides,* and *Cyperus iria* respectively.

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EPIPHYLLOUS GREEN ALGAE IN THE PHILIPPINES: *Phycopeltis* (Trentepohliaceae) and *Ulothrix* (Ulothrichaceae)*

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A species of an aerophytic, epiphyllous green alga, *Phycopeltis epiphyton* (Trentepohliaceae) causing the reddening of the leaves of some fruit-bearing trees in Quezon, Laguna, and Cavite is reported for the first time in the Philippines. Randomly associated with this alga was a species of another green alga, *Ulothrix.* The morphological characteristics of these algae are described and their distributional pattern will be discussed.

Inventory and new records of Mosses in Mount Arayat, Pampanga, Luzon, Philippines

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The cryptogam species belonging to Phylum Bryophyta is especially challenging because of their size, chemical distinguishing features and enormous diversity. Consequently, mosses are known to be an extremely important group in early stages of ecological successions and an ideal indicator of environmental conditions. However, before further studies on mosses, a rapid inventory is necessary since moss flora of the Philippines have been undertreated before. Collection and identification of mosses was conducted in Mount Arayat, Pampanga using a 2 km transect belt. The study revealed a total of 18 species, 16 genera and 14 families. Among the collected 18 species, there are a total of 3 species that are considered new records for Mt Arayat (*Sphagnum sericeum* C. M., Bot. Zeit, *Fissidens flaccidus* Mitt., and *Leucophanea octoblepharioides* Brid., Bryol.). The presence of these species highlights the role of Mt. Arayat in the diversity of moss flora in the Luzon Island, Philippines.

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Epiphytic Pteridophytes in Montane Forest of Mt. Apo Natural Park, Cotabato Province, Philippines

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Epiphytic pteridophytes are important ecosystem health indicators due to sensitivity to environmental changes and disturbances because of their unique morphological characteristics i.e, the simplicity of its vascular system and narrow climatic requirements. The species diversity of epiphytic pteridophytes in Mt. Apo Natural Park, Cotabato Province (Energy Development Corporation and Makalangit) was assessed using line transect method. A total of 104 species of epiphytic pteridophytes were identified belonging to 35 genera and 14 families which represents 10% of Philippine pteridophytes. Of the species identified, 3 are endangered, 2 are vulnerable, 2 are considered as Other Threatened Species and 1 Other Wildlife Species. The family Polypodiaceae was the most species rich (35) species. Among genera, *Prosaptia* is the most abundant followed by *Selliguea* (9 and 5 species respectively). *Lindsaea pulchella* had the highest Species Importance Value (71.01). Furthermore, noteworthy is the presence

Aboveground Biomass Estimation of Different Forest Type in Mt. Apo Natural Park (MANP) Philippines

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With the growing problem on climate change, quantifying above-ground biomass has become important for mitigation efforts. This study aimed to estimate the aboveground biomass (AGB) of two forest types in Mt. Apo Natural Park, Philippines, specifically Tropical Evergreen Forest and Tropical Lower Montane Forest. Two one-kilometer line transect with five plots were utilized for each forest type. Diameter-at-breast height (dbh), tree height and wood specific gravity of the trees (>10cm dbh) were obtained. Three allometric equations were used in estimating aboveground biomass. Results of the study revealed that Tropical Lower Montane Forest has higher AGB estimates than Tropical Lowland Evergreen Forest. It was also found out that the exclusion of wood specific gravity and tree height resulted to overestimation of AGB. The overall results of the study indicated that different forest types have different AGB values. Nevertheless, these forests have the potential to store large amount of carbon and can play in the role of climate change mitigation.

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Effects of heavy metal contamination on algae microevolution

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Flowing of heavy metals into water environments causes adverse effects on biodiversity. Watarase River may have lost its biodiversity in the past due to leakage of heavy metals, especially by copper (Cu), from Ashio Copper Mine. The biodiversity in this river has gradually recovered as a consequence of the decrease in Cu concentration over time. In this study, we targeted the mechanisms of adaptation of algae to the high Cu concentrations. Two *Sticococcus bacillaris* Nägeli strains, isolated from Watarase River and Antarctica, were used to our study. The Cu exposure tests revealed that the Watarase strain shows higher tolerance to Cu toxicity than the Antarctica strain. The DAPI staining suggested that the exposure of algal cells to Cu might cause nuclear hypertrophy. We also conducted the genome analysis of two strains, and the findings will be discussed in our poster session.

On the identity of *Miliusa vidalii* inferred from multiple cpDNA sequence data

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Miliusa (Annonaceae) are shrubs and small trees that are distributed in the tropical regions of Indo-china, Malesia and Australia. The genus was prioritized and accommodated species from *Hyalostema* and *Saccopetalum* due to weak morphological delimitations. Phylogenetic study utilizing multiple cpDNA sequence data (rbcL, trnLF, matK, ndhF, psbA-trnH and ycf1) revealed the monophyly of *Miliusa*. Interestingly, four subclades for *Miliusa* were recognized based on the type of habitat *Miliusa* species thrives (e.g., deciduous/dipterocarp forests and dry moist evergreen forests). In the Philippines, *Miliusia* is only represented by the endemic *Miliusa vidalii* and unfortunately it was never included in any molecular phylogenetic study. Therefore in this study, the phylogenetic position of *M. vidalii* was determined using seven cpDNA markers. Majority of a rule-consensus tree from combined cpDNA data sets revealed a robust *Miliusa* clade (PP = 1.00; BS = 93%). For the first time, the position *M. vidalii* as sister to *M. lanceolata* (PP=1.00; BS = 85%) was revealed. Meanwhile, the four subclades based on habitat preferences were likewise recovered and interestingly, *M. vidalii* is nested within the clade that prefers dry deciduous/dipterocarp habitat which is a typical feature of lowland forest in the Philippines.

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The True Identities of 'Lunas-Bagon' species from Agusan del Sur, Philippines Inferred from ITS and *rbc*L Sequences

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Morphology-based identification of plants remains inconclusive when its reproductive parts are lacking. This study aims to resolve the familial and generic affinity of indigenous species among Agusan Manobos locally known as 'Lunas-bagon'. The two folkloric varieties were collected and two barcode regions using the nuclear ITS and the plastid *rbc*L, were amplified, sequenced and aligned. Molecular results revealed that the two 'Lunas-bagon' species were members of the family Piperaceae with 99% identity to *Piper* L. species using BLASTn algorithm. Maximum parsimony analyses of separated ITS and *rbc*L datasets, supported their phylogenetic position within the genus *Piper* with a strong and accepted bootstrap support (BS=96% and BS=76%), respectively. On that account, integrated molecular approach is powerful to resolve misidentification of species from limited morphological data. This study further suggests a detailed examination of reproductive parts and combined genetic markers to finally resolve the specific epithets of the species.

A comparative study on different populations of *Vanoverberghia sepulchrei* Merr. (Zingiberaceae) using molecular and morphological data

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The type species of the genus *Vanoverberghia* (*V. sepulchrei*) is known be restricted in Northern Luzon. Herbarium specimens and photographs posted online, however, documents that *V. sepulchrei* also occurs to the provinces of Antique, Aurora, Capiz, Quezon, Negros Occidental, Rizal, and Sorsogon. Recent examinations of herbarium material and photographs identified as *V. sepulchrei* revealed that populations from the latter provinces and some populations from Northern Luzon may represent a separate taxon. To investigate further whether these populations are distinct from *V. sepulchrei*, new vegetative and flowering material were collected and subjected to molecular analyses and morphological examination. The combined analyses of the ITS and *mat*K region revealed that the specimens from Antique, Aurora, and Quezon did not form a monophyletic clade *V. sepulchrei*. In addition, after comparing these specimens to the protologue and specimens of *V. sepulchrei*, this study confirms the presence of a species new to Science.

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Taxonomy and Diversity of Terrestrial Algae from Agricultural Soils found in Los Baños, Laguna (Philippines) and Screening for Antibacterial and Nitrogen Fixation Capabilities

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Taxonomic survey of terrestrial algae occurring in seven agricultural soils in Los Baños, Laguna was studied. A total of 24 species of cyanobacteria and microalgae under 15 genera and 6 families were recorded. Of these taxa, non-heterocystous filamentous were found to be dominant (48%) over the other forms. These organisms are dominant in all of the sampling sites followed by Chlorococcaceae (32%), Microcoleaceae (12%), Nostocaceae (4%), Hapalosiphonaceae (2%) and Euglenophyceae (2%), respectively. Of these taxa, five species were confirmed to have nitrogen-fixing capabilities by exhibiting proliferous growth in BG 11 medium without sodium nitrate. Methanolic extract of two species of cyanobacteria (*Oscillatoria subbrevis* and *Hapalosiphon welwitschii*) exhibited antibacterial activity against Methicillin-Resistant *Staphylococcus aureus* (BIOTECH 10378). Algal population for each soil sample showed that it ranged in between 1.8 $x10^4$ CFU/g to 7.1 $x10^5$ CFU/g. The study indicates ubiquitous distribution of terrestrial algae in agricultural soils that could be exploited for biofertilizer and alternative source of bioactive compounds.

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Morphology and *in vitro* Studies on Pollen Viability, Pollen Germination and Pollen Tube Growth of *Hornstedtia conoidea* Ridl. – a Philippine endemic ginger

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Zingiberaceous plants are predominantly reproduced asexually and their propagation is often through underground rhizomes. In this study, the morphology of Philippine endemic *Hornstedtia conoidea*, variability of pollen viability, rate of pollen germination and length of pollen tubes were studied following the recommendation of the same authors. The determination of pollen viability was made using stain tests, such as IKI (iodine + potassium iodide) solution and safranin and measured after the collection and after 1 week. Likewise, germinability tests were carried out *in vitro* on agar medium and measured after 24 hours and 1 week of incubation from initial plating. Data revealed that safranin test had the highest percentage pollen viability with 92.43%, while lower in iodine test with 89.36% just after the collection, while the stored pollen measured 47.29% for safranin test and 33.14% for iodine test after 1 week. The percentage germination of pollen after 24 hours was 72.65%, while 11.13% after 1 week. The pollen which were subjected to tube growth were examined for 2 weeks and gave positive results. Overall, it can be concluded that the viability of *H. conoidea* pollen does not seem to be a limiting factor for reproductive success and can be successfully collected and stored for certain time. Knowledge regarding the pollen viability, pollen germination and pollen tube growth of this species will be practical benefit for plant breeding and conservation purposes, as this species is rarely found in the wild, and up to now has been found only in the Philippines.

Dragonflies in the City: Diversity of Odonates in Urban Davao

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Dragonflies are well-known group of insects because of their biological and ecological importance in a community, that is, they indicate the environmental health of an ecosystem. However, in an urban ecosystem like Davao City, there are many threats that can affect the assemblages of dragonflies species such as the intensification of modern urbanization which contributes factors to biodiversity loss of most dragonflies species. This study aimed to identify dragonflies species and determine the relative abundance, species diversity, evenness, effective number of dragonflies in selected areas in Davao City. Transect walk and opportunistic sampling using sweep net were employed. The sampling lasted for three months. A total of 962 individuals of dragonflies were recorded comprising of six species from six different genera of one family. The Shannon-Weiner diversity index was 0.882772.

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Diversity of Nematodes in Lake Agco, Mt.Apo Natural Park, Philippines

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Nematodes are most abundant metazoan and recognized are as cosmopolitan. They are considered as an excellent ecological-indicator. This study was conducted to determine the diversity of nematodes in Lake Ago, Mt. Apo, Philippines. Soil samples were taken from three stations and diversity parameters were obtained. A total of 178 individuals were recorded belonging to 29 nematode taxa of both free-living and plant parasitic nematodes. Overall results showed that station 2 had the highest population of nematodes comprising 68.54% followed by Station 3 with 16.29% and Station 1 with 15.17% of the nematode total population. The diversity parameters differ significantly in all sampling stations using one way ANOVA to attained the p-value<0.005 except for evenness, similarity level of nematode assemblage per stations is 15-30% indicates that each station has 70% unique nematode assemblage. Abiotic variables such as soil pH, temperature, P, and K content are not significantly different (p-value >0.05) except for % N which shown in station 3 this means that the abiotic parameters measured do not necessarily contribute to the abundance of nematodes. Biomonitoring is essential to update

Review of the Taxonomic Status and Distribution of Genus *Dudgeodes* SARTORI (Insecta, Ephemeroptera, Teloganodidae) in the Philippines

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The insect order Ephemeroptera (mayflies) has been used for monitoring environmental changes in running waters and streams. As part of an effort to increase knowledge on aquatic macroinvertebrate biodiversity, the Biodiversity Laboratory of the Department of Biology, Ateneo de Manila University has been conducting surveys in rural landscapes of the Philippines to increase knowledge especially on this ephemeral organism. The Family Teloganodidae ALLEN 1965 distributed through the Afrotropic and Oriental realms is represented with Genus *Dudgeodes* SARTORI 2008 in the Philippines. Oriental species including those present in the country have extremely reduced median filament. In this contribution, additional characters and new distribution records for *Dudgeodes pescadori* SARTORI 2008 are presented. Moreover, diagnoses and COI mtDNA sequences of two new species are presented.

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Species Diversity of Reptiles in Mimbilisan Protected Landscape, Balingoan, Misamis Oriental, Philippines

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Mindanao is the second largest island in the Philippines having a diverse ecosystem. This study was conducted to determine species diversity of reptiles in Mimbilisan Protected Landscape. Fieldwork was conducted from July 18 to 28 and October 5 to 6, 2017 in riparian and forested sites employing the cruising method. Eighteen reptile species under seven families were documented. A 61 % endemism was recorded but no threatened species was found. Moderate species diversity (H'= 2.248) was recorded. *Eutropis multicarinata* was the most abundant species found in Site 2 (forested trail). The high endemism indicates the importance of Mimbilisan Protected Landscape as habitat of reptiles.

Species Diversity of Spiders of Aurora, Zamboanga Del Sur, Philippines.

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Spiders are widespread in nature and play vital ecological roles in controlling many insect pest populations. The study was conducted to determine the species diversity of spiders in selected areas of Aurora, Zamboanga del Sur, Philippines. Sampling was conducted for 12 field days on July 25 - August 5, 2017 in four sites using vial tapping, beat-netting, aerial hand and ground hand collection methods. Sixty-six spider species under 10 families were recorded. Four species are Philippine endemic. *Neoscona punctigera* of family Araneidae was the most abundant species. Species diversity was highest (H'=3.50) in Barangay Cabilinan and lowest (H'=3.21) in Barangay Lubid. The spiders were found to belong to six guilds based on their foraging behavior in the field. The orb weaver was the dominant guild (56%) followed by the foliage runner (23%). Results indicate that vegetation and disturbances affect the spiders' species diversity and distribution.

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Species Diversity of Ants in Mimbilisan Protected Landscape, Misamis Oriental, Mindanao, Philippines

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The Philippines has very high ant diversity with many undescribed species. This study was conducted to determine the species diversity of ants in Mimbilisan Protected Landscape. Ants were collected in two forested sites and one riparian site using active searching and baiting methods. Sixteen species under 15 genera and six families were recorded. *Myrmicaria brunnea* had the highest relative abundance. Results showed higher species richness (S=11) and diversity (H'=1.746) in the riparian site. The invasive ants, *Anoplolepis gracilipes* was found in mixed dipterocarp while another invasive, *Paratrechina longicornis* was found in the riparian site. *Camponotus albocinctus*, previously recorded in Luzon, was present in the riparian site. The presence of invasive species and two opportunistic species in the forested and riparian site indicate disturbance in the area. Despite moderate species diversity in the sampling sites, the presence of invasive species indicates a threat to the biodiversity in the protected landscape.

Diversity of Class Bivalvia in Selected Public Markets of Davao del Norte and Davao City

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Selected public markets of Davao del Norte and Davao City were assessed on the kinds of bivalve species. There were 15 species of bivalves from 7 families namely; *Anadara granosa, Anadara trapezia, Batissa violacea, Polymesoda erosa, Anodontia edentula, Austriella corrugata, Codakia tigerina, Perna viridis, Simpsonella purpurea, Gafrarium divaricatum, Gafrarium tumidum, Circe scripta* f. *tumefacta, Marcia hiantia, Saccostrea cucullata* and *Meretrix meretrix.* Tagum City public market in Davao del Norte has the most varied bivalves being sold and next is Agdao public market in Davao City. *Anodontia edentula* and *Polymesoda erosa* were commonly sold in these markets. These species were subjected for sex determination and found out that the female to male ratio are 50% male and 50% female for *Anodontia edentula* while 38.63% male and 61.36% female for *Polymesoda erosa.*

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Flying Insects in an Organic Rice Field in M'lang, North Cotabato

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This study identified insects in an organic rice field in Barangay Langkong, M'lang North Cotabato. The methods used were sweep net and light trap. The collected species were identified morphologically and were classified as pest or beneficial to the crops. Results showed a total of 1,237 species. The insects identified under sixteen species, were: *Nephotettix nigropictus*, *Recilia dorsalis*, *Cofana spectra*, *Leptocorisa oratorius*, *Scotinophara coarctata*, *Scotinophara lurida, Podisus maculiventris*, *Opius sp.*, *Creatonos gangis*, *Scirpophaga innotata*, *Atractomorpha bideli*, *Agriocnemis femina femina*, *Diplacodes trivialis*, *Miscrapis discolor*, *Harmonia octomaculata* and *Coccinella transversalis*. Result shows that there are seven species found as beneficial and nine species are pest insects. *Nephotettix sp.* (527) has the highest number of individuals and *Opius sp.* (1) has the least number of individuals.

Reptilian Faunal Communities and Endemism with Notes on Socio-economically Important Species in Andanan Watershed Forest Reserve, Calaitan, Bayugan City, Mindanao Island, Philippines

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Philippines is one of the megadiverse countries of the world and home of endemic vertebrate fauna. However, few studies had been conducted in Mount Magdiwata ranges particularly on reptilian inventory, diversity and endemism. The study aimed to assess the reptilian faunal communities and endemism with Notes on Socio-economically Important Species in Andanan Watershed Forest Reserve. We used line transect and visual encounter survey in the three sampling sites. Results of the study documented 13 species of reptiles (one order and nine families). Of the 13 species documented, 10 were Philippine endemic and 3 non-endemic in the area. Endemicity in lower elevations reached 90% for reptilian communities. Reptiles endemic to Mindanao Island constituted 15% of the reptilian species we identified. Three reptilian species has been considered as socio-economically important species by the local people. We highlight ecological and environmental threats (conversion to agricultural land, wildlife hunting, slash and burn, and increasing population) in the area as deserving mitigation. Andanan watershed forest reserve is home to 10 Philippine endemic reptilian species and should therefore be better managed and protected.

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Spatial Distribution of Freshwater Crabs in the Selected Eco-Tourism Sites of Libungan, North Cotabato

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Freshwater crabs are most abundant among the Decapod crustaceans and most ecologically important macro-invertebrate groups of worldwide. In this study, the selected eco-tourism sites of Libungan namely the Tinago falls, Simone falls, and Samveren falls were assessed to determine the spatial distribution and abundance of freshwater crabs. Opportunistic method was employed to collect the samples. *Isolapotamon mindanaoense* was the only species documented and considered as a Philippine endemic species. The findings indicated that there was no diversity of freshwater crabs documented in the sampling sites. Among the three sampling areas, freshwater crabs were found to be highest in the Tinago Falls (n=50) specifically in the upstream portion. Moreover, the presence *Isolapotamon mindanaoense* was positively and negatively by air and water temperature, relative humidity, dissolved oxygen, water pH, and velocity. The differences in the physico-chemical parameters showed relative influence on the spatial distribution of freshwater crabs in eco-tourism sites of Libungan.

Survey of Spiders at Mt. Hamiguitan, Davao Oriental

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A survey of spiders was conducted at Mt. Hamiguitan, Davao Oriental. A belt transect line measuring 100m by 10m in four sampling stations were established. A total of 35 individuals belonging to nine families were identified from different sampling stations viz. Araneidae, Clubionidae, Ctenizidae, Lycisidae, Oxyopidae, Pisauridae, Salticidae, Tetragnathidae and Thomisidae. On the basis of their capability of building webs, two (2) were orb weaver, four (4) were ground spiders and three (3) were aero-terrestrial. The family Araneidae outnumbered (21 species) other families identified in the dipterocarp forest, pygmy forest, and secondary growth forest. The study suggests establishment of sampling stations in other parts of Mt. Hamiguitan not covered in study for more characterization and identification of species of spider. It is further recommended that study be conducted during summer time to compare whether seasons and precipitation can influence abundance and distribution of spiders.

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Anurans from Mt. Apo Natural Park, Philippines: A Study on the Diversity and Abundance of Anuran Species in a Lower Dipterocarp Forest

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Mt. Apo Natural Park, an important biodiversity conservation site in the Philippines is an exceptional area for anuran diversity where limited studies have been conducted. With this, a study on the diversity and abundance of anurans in a Lower Dipterocarp Forest of Mt. Apo Natural Park in Kidapawan City was conducted. Anurans were collected using opportunistic/visual encounter survey within a one-hectare sampling area. Shannon-Weiner index was used to test the species diversity. Results showed a total of 16 anuran species belonging to 7 families: Bufonidae, Ceratobatrachidae, Dicroglossidae, Megophryidae, Microhylidae, Ranidae and Rhacophoridae were documented. Of this, 75% are identified as Philippine endemic. One species was recorded as near threatened and seven species are considered vulnerable. The Shannon-Wiener index of species diversity showed that the diversity was higher at lower part of the forest. Overall, the most abundant and common species is *Pulchrana grandocula* (RA= 29.67%). Results suggest that the sampling area support a number of endemic and threatened species. Studies on the ecology, population dynamics and assessment of threats to may be considered for future research.

Beta Diversity of Herpetofauna in 3 Different Protected Areas (Mt. Apo, Libungan-Alamada Natural Biotic Area - LANBA and Ligawasan Marsh) of North Cotabato

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Herpetofauna can inhabit a wide range of ecosystem setting for they play a vital role in the environment. A study of herpetofauna β-diversity on three areas with existing environmental protection in North Cotabato (Ligawasan Marsh, Mt. Apo and LANBA) was conducted last 2016. Vegetation type varies from lower dipterocarp forest, secondary forest and wetlands. One transect, each 2km long was established along the sampling area and visual encounter surveys conducted within the transect at night. Whittaker's measure was used to test β-diversity between the different sites. A total of 16 families representing 35 species of herps were recorded of which 57% are Philippine endemic, 8 species were Vulnerable and one was reported to be Critically Endangered. Over all, the β-diversity of the 3 areas is 89% species that are dissimilar and the remaining 11% intercept on the two high elevational areas (Mt. Apo and LANBA) but there are no same recorded species in Ligawasan Marsh. This uniqueness in species diversity especially in Ligawasan marsh suggests that, a need for full protection and conservation attention must be done in these areas to ensure the survival of these organisms.

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Comparative Abundance of two Gastropod Families in Bucas Grande Island, Surigao del Norte, Philippines

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This study was conducted to determine the comparative abundance of two gastropod families, namely Conidae and Cypraeidae in the coastal shores of Bucas Grande Island, Surigao del Norte, Philippines. The sampling was done in Socorro, Pamosaingan, Puyangi and Mabua on May 2014. Sampling plots with an area of 20x20 meters were laid on each study site for species acquisition. All species of Conidae and Cypraeidae seen in the sampling plots were counted to determine and compare their abundance. Data revealed that a total of 12 species were collected and identified from both families with 458 individuals. The collected species of Conidae were *Conus coronatus, Conus ebraeus*, *Conus magus*, *Conus marmoreus, Conus miles* and *Conus vexillum*, while the collected species of Cypraeidae were *Cypraea annulus*, *Cypraea arabica*, *Cypraea argus*, *Cypraea eglantina*, *Cypraea isabella* and *Cypraea vitellus.* Of these, Conidae (69%) was the most abundant with 316 individuals compared to Cypraeidae (31%) with only 142 individuals. Among the species, *C. ebraeus* (35.13%) of Conidae was the most abundant with 11 individuals, while *C. annulus* (87.32%) of Cypraeidae was the most abundant with 124 individuals. The Shannon-Weiner Index revaled that among the 4 sampling sites, Socorro (H'=0.71) had the highest diversity of gastropods with respect to what family it belongs, followed by Pamosaingan (H'=0.51), Mabua (H' 0.46) and Puyangi (H'=0.06), respectively. Slight differences which were observed in the sampling sites might be affected by some environmental factors such as water pH, temperature, salinity and substrate cover.

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Heavy metal contamination as environmental factor of microevolution in Japanese dace, *Tribolodon hakonensis*

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Due to Ashio copper mining activities (1610 to 1973), the Watarase River (WR) was seriously contaminated by heavy metals and fish population in the river had been destroyed. Nowadays, heavy metal levels in the river remain comparatively high; however, *ca*. 40 fish species are living in the river. In this research, river-water, sediment, and domestic fish *Tribolodon hakonensis* were collected in upstream and midstream of Watarase River and Omoi River (OR, as a reference river), respectively. Then, concentrations of heavy metals (Cu, Cd, As, Pb, Fe and Zn) were measured by ICP-MS. Heavy metal concentrations in river-water and sediment of WR were generally higher than those of OR; whereas, concentration of Zn, As, Pb and Cd in liver of *T. hakonensis* in WR were significantly lower than those in OR. These results suggested domestic fishes in WR may have been adapted to heavy metal contamination through microevolution.

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Genetic structure of Japanese dace *Tribolodon hakonensis* in heavy metal contaminated river

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Watarase River (WR), running through the north Kanto region of Japan, has a long history of heavy metal contamination originating from Ashio copper mine (located nearby upstream of WR), and heavy metal concentrations remain higher than those in a nearby unpolluted river, Omoi River (OR). In the present study, we investigated effects of heavy metal contamination on the genetic structure of Japanese dace *Tribolodon hakonensis* (Cyprinid fish), that collected in upstream and midstream of WR and OR and then analyzed by using multi-locus microsatellite analysis. There was no significant different among populations of midstream of WR, upstream and midstream of OR, due to past releases of farm-raised dace. On the other hand, the genetic structure of population of upstream WR (isolated by dam) was different from others. These results may indicate population of upstream of WR have evolved independently (microevolution) for adaption to long-term metal contamination.

Species Richness and Endemism of Odonatofauna in Waterfalls in Dalipuga, Iligan City

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Despite several Odonatological surveys in Mindanao, some areas are still unexplored. This study was conducted to determine the species richness and endemism of Odonatofauna in three waterfalls in Dalipuga, Iligan City. Opportunistic collection using sweep-netting was conducted on April 3-4 and 7-9, 2018. Seventeen species were identified under eight families and 13 genera. *Trithemis festiva* and *Prodasineura integra* were the most abundant dragonfly and damselfly species, respectively. Mindanao endemic and near threatened *Drepanosticta krios* was also documented. The present study recorded 76.46% endemism where 11 are Philippine-endemic and two Mindanao-endemic species. Highest diversity was noted in Dalipuga falls (H'=2.059). On-site disturbances such as agriculture and tourism activities were observed. High level of endemism with moderate diversity provides evidence of the need for the area to be protected and conserved.

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Faunistic Study of Aquatic Bugs (Heteroptera) on the Four Rivers of Subic Bay Freeport Zone, Olongapo City

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Studies on aquatic insects are limited throughout the Philippines. Thus, a faunistic study was conducted in four rivers (El Kabayo, Jadjad, Malawaan and Triboa) of the Subic Bay Freeport Zone (SBMA) to generate additional knowledge on the species-level diversity and distribution of Gerromorpha and Nepomorpha of Luzon. The samples were retrieved by hand-net random collections for 20 minutes each in all suitable lotic and lentic stream micro-habitats on February 24 to 25, 2018. Additionally, previous collections by undergraduate students from the same sites of the years 2012 to 2014 were included. Thirteen species from families Aphelocheiridae, Gerridae, Helotrephidae, Mesoveliidae, Nepidae and Veliidae were recorded in the areas. All of them have been previously recorded from Luzon, but several never been recorded in Zambales/SBMA area. About 80% of the species are Philippine-endemics. The species richness and the occurrence/absence patterns of specific taxa are briefly discussed.

Aquatic Bugs (Hemiptera:Heteroptera:Nepomorpha,Gerromorpha) of Mindoro Island – an update on diversity and distribution

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Aquatic bugs were collected from the Baroc River Catchment and further sites in Oriental Mindoro in order to update their insufficiently known diversity and distribution on the island. Species from seven families of Infraorder Nepomorpha and five families of Infraorder Gerromorpha were identified. Some notable island-endemic taxa among the collections are such as *Aphelocheirus freitagi*, four *Rhagovelia* spp., *Enithares martini mindoroensis* and *Hydrotrephes steroides mindoroensis. Anisops rhomboides* is record for the first time from Mindoro. Additional notes on the taxa's habitat and ecology are presented, since distinct habitat preferences or even habitat restrictions were observed.

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LEAF ARCHITECTURE OF *Cinnamomum mindanaense* Elmer IN CEBU ISLAND, PHILIPPINES

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Heterophylly and heteroblasty contribute to the intraspecific variation and taxonomic controversy of *C. mindanaense*. Here, we examined 26 leaf morphological characters of *C. mindanaense* trees obtained from (a) Nug-as, Alcoy, (b) Cansuje, Argao and (c) San Antonio, Boljoon, Cebu. Leaf clearing was adopted, with modification, from Vasco et al., (2014) and Buechler (2010) and characters were based from Hickey (1973) and Manual of Leaf Architecture (1999). Leaf architecture comparison was evaluated through visual and Image J analysis software. PCA and Cluster Analysis were utilized to analyze morphometric data matrices. Results show that the continuous characters (e.g. leaf length and width) of old vs young leaves were more variable compared to the discrete characters, namely: 1^o, 2^o, 3^o, 4^o and 5^o vein categories, areole shape, areole development, veinlets, blade margin, presence of petiole, venation pattern and midrib structures. The study concluded that these discrete characters may define, morphologically, *C. mindanaense* as a species.

Comparative Abundance of Gobioid Species in Select Two Rivers of Mt. Apo and Mt. Hamiguitan, Mindanao, Philippines

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Mount Apo and Mount Hamiguitan are declared Protected Areas in the Philippines and belongs to Long -Term Ecological Research (LTER) Sites in Mindanao. The collections of gobioid species were done in 2 select rivers of the two mountains last January, May and October 2015 using electricfishing, seining and traditional local fishing gear called "*pana*". A total of 1,076 individuals representing 22 species belonging to 3 families (Eleotridae, Gobiidae and Rhyacichthyidae) were identified. Family Gobiidae were the only collected group in Mount Apo. In terms of species richness, Dumago-oc River (18 species) and Ma-ug River (9 species) of Mt. Hamiguitan accounts the highest number compare to Marble River (2 species) and Matingaw River (3 species) of Mt. Apo. Shannon-Weiner Diversity (H') value was high in Mt. Hamiguitan (0.9 to 1.0) and low in Mt. Apo (0.22 to 0.41). Sorenson's coefficient (CC) shows no overlap or similarity of species between two mountains (0.09).

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Comparing the Life Histories of the Temperate *Daphnia magna* Straus, 1820 and Tropical *Moina micrura* Kurz, 1874 Under Controlled Ex-Situ Tropical Conditions

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The water fleas *Daphnia magna* Straus, 1820 and *Moina micrura* Kurz, 1874 are temperate and tropical cladocerans, respectively. Life histories were compared to observe its population growth, survivorship, and mortality rate. They were fed with *Chlamydomonas reinhardtii* Dangeard, 1888 with a concentration of 5.0×10^4 cells/mL once a day for 21 days under a temperature of 18-21°C for *D. magna* and 23-25°C for *M. micrura* with a photoperiod of 12D:12L at ~60lx. *M. micrura* was observed to have a high death during the first few days of the experiment, but eventually exhibited a higher survival followed by a low rate of mortality. By the end of the 21-day observation period, 1,007 individuals of *M. micrura* are still alive. For *D. magna*, they had significantly lower population size which reached its maximum of 137 individuals during the 6th day and rapidly declined. This validates why *M. micrura* is a species common to tropical aquatic environments while *D. magna* is restricted to temperate environments. Furthermore, this is the first successful attempt to culture *D. magna* in the tropics.

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Effects of Irradiance and Water Temperature on the Growth of Sporelings of the Nongeniculate Coralline Alga *Lithophyllum Okamurae* Foslie (Corallinales, Rhodophyceae)

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Coralline algae are found under canopy-forming brown algae and also on barren ground where seaweeds had declined. They play pivotal roles as morphogenetic inducers for marine invertebrate larvae such as sea urchins or abalone. Although ample studies have demonstrated the impact of elevated water temperature on temperate brown algae, very few data are available with regards to coralline algae. In this research, we revealed the effects of water temperature and irradiance on the growth of sporelings of *Lithophyllum okamurae* common to the temperate Western Pacific in laboratory culture. Mature plants of *L. okamurae* were collected at the tide pools. In the water temperature experiment, the effect was investigated using culture conditions adjusted to 10, 15, 20, 25, 30 and 35℃. The irradiance was adjusted to 100 µmol/m^2/s. In the irradiance experiment, the sporelings were cultured at 1, 5, 10, 50, 100, 200, 400 µmol/m^2/s with water temperature adjusted to 20℃. These experiments were conducted for 4 weeks. Growth rate was evaluated by the area occupied by sporelings. Optimal growth temperature of the sporelings was 20℃, which is similar to those of temperate brown algae. Saturating irradiance was approximately 106.8 µmol/m^2/s in accordance with Platt et al. (1980)'s equation. Photoinhibition was observed at more than 106.8 µmol/m^2/s . In comparison with temperate brown algae, sporelings of *L. okamurae* cannot tolerate higher intensity of irradiance. These results matched to the fact that *L. okamurae* is usually observed under the canopy of these brown algae.

First Records oftThe Marine Benthic Algae of Southeastern Siargao Island, Philippines

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The southeastern coast of Siargao Island, facing the Pacific Ocean has been placed on the tourism spotlight threatening the environment. A preliminary survey of the diversity of the marine benthic algae was conducted for the first time to help assess the state of its marine environment. Three sites representing two islands and one mainland site were sampled on March, June and September 2017. A total of 42 species were identified including 22 species of Chlorophyta, 10 species of Phaeophyceae and 10 species of Rhodophyta. There were 26 species in March while only 14 and 10 species in June and September, respectively. The higher diversity observed in island sites may be attributed to the relatively lower human traffic there, among other reasons. It is suggested that a more intensive survey