

9th ANeT

9TH INTERNATIONAL CONFERENCE
AND MEETING

Institute for Tropical Biology and Conservation
Universiti Malaysia Sabah, Kota Kinabalu,
Sabah

28th October - 1st November 2013



PROGRAM & ABSTRACTS

<https://sites.google.com/site/9thanetinternationalconference/>

ANeT 2013

9th International Conference and Meeting



**Institute for Tropical Biology
and Conservation**

Universiti Malaysia Sabah

28 October – 1 November 2013

Message from President of ANeT

On behalf of ANeT committee, I invite you to the 9th International Conference on Ants (ANeT- 2013) at Institut Biologi Tropika dan Pemuliharaan (IBTP) [Institute for Tropical Biology and Conservation], Universiti Malaysia Sabah (UMS) Kota Kinabalu from 28th of October, 2013 to 1st of November, 2013. The theme of this meeting is "Ant Ecology, Evolution and Taxonomy - Asian Myrmecology in the 21st Century".

Since the inception of ANeT, myrmecology has generated a lot of interest among young researchers in Asia. The committee, the members have worked hard to meet the objectives of ANeT. The journal Asian Myrmecology which was initiated with the aim of promoting myrmecology in Asia has come up as an outstanding journal with scientific contributions of good academic standard.

I sincerely hope that the present meeting/conference would benefit the participants a lot and the outcome would provide an insightful direction to myrmecologists.

With best wishes,

Dr. Himender Bharti

President of ANeT Committee

Message from the Coordinator of 9th ANeT Conference and Meeting 2013

It is with great pleasure that we are hosting this year the 9th International ANeT conference and meeting 2013 at the Institute of Tropical Biology and Conservation at the Universiti Malaysia Sabah.

For this year's meeting, we will have four interesting symposia that encompass a wide range of myrmecological topics, including session on large scale and long term studies, the impacts of habitat degradation, ant taxonomy and species interactions. This year, 63 participants from 12 countries spread across four continents will attend the meeting, making it a truly international event, and highlighting the global level of interest in Asian Myrmecology.

We are also pleased that there will be participants from numerous local government and non-government organisations, in addition to our academic participants. We look forward to welcoming you to Kota Kinabalu, and to the conference on the 28th Oct 2013.

Happy *ant-ing!*

Best wishes,

Dr. Kalsum Yusah

Coordinator of 9th ANeT Meeting 2013

Message from Director of Institute for Tropical Biology and Conservation

It gives me immense pleasure to welcome all Anet 2013 participants to the Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah and the Land Below The Wind, Sabah, Malaysia. I am very delighted to see ant enthusiasts coming from various countries to continue your endeavour on ants and to have included Sabah as one of your target countries. We are excited to see some of our old friend who are back to UMS for this conference. I am also glad to see so many new names in this conference. This year, we see participation from as near as Indonesia to as far as Russia.

It has been almost twelve years since some of you attended the same conference here in Sabah in 2001. Most of you have attended the consequent conference that took place after 2001 in India, Indonesia, Thailand and Vietnam. In ITBC, those who are very close with ANeT may realize how the faces of ant researches have changed. But, let me assure you that, the research thrusts and passion on ants has increased with the return of new lecturers. We have also witnessed new enrolments of research students studying various aspects of ants.

Studies pertaining to natural history of ant are progressing with new information on ants from Danum Valley, Kalabakan Forest, Imbak Canyon, among other areas of research. Current issues that have some impacts on the studies of ants include climate change, habitat degradation, land use change and conservation related matters. This is well reflected in this year's ANeT conference. This conference includes oral and poster presentations by participants on issues of "Long Term and Large Scale Ant Studies", "Impacts of Habitat Degradation", "Cataloguing the Ants" and "Ant Interactions". I would also like to highlight the interesting topics brought to our attention in the plenary talks by prominent figures in ant research. In addition, some of these presentations will be published in the ANeT's very own journal, the Asian Myrmecology. Keeping to the tradition of this conference, participants will also be taken to nearby ecosystems for ant collection. As Sabah is imposing a Biodiversity Law, participants are

strongly advice to adhere to all advice and regulations by the conference committee.

Finally, I wish all participants a fruitful and beneficial conference. I hope this meeting will be an ideal platform to foster old friendships and create new one. ITBC will continuously support all ANeT activities, research collaboration in Sabah including the management of Asian Myrmecology.

Assoc. Prof. Dr. Charles S. Vairappan

Acting Director of Institute for Tropical Biology and Conservation

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TECHNICAL PROGRAM AND ORAL PRESENTATIONS
Day 1 (Monday 28 October 2013)

TIME	SCHEDULE	VENUE
0700-0800	Pick up from accommodations	
0800-0830	Registration	Gallery, UMS
0830-0900	Opening ceremony	Gallery, UMS

OPENING CEREMONY
9th ANeT INTERNATIONAL CONFERENCE
28 October 2013
Gallery UMS

0825	Arrival of Vice Chancellor of Universiti Malaysia Sabah Prof. Datuk Dr. Mohd. Harun Bin Abdullah
0830	MC remarks on the opening of ceremony
0835	Doa recital by Mr. Musa Muchtar
0840	Speech by Assoc. Prof. Dr. Charles S. Vairappan Acting Director of the Inst. for Tropical Biology and Conservation
0850	Opening Speech by Vice Chancellor Prof. Datuk Dr. Harun Bin Abdullah
0900	Photography session
0900	End of ceremony

SESSION 1

Theme : Long Term and Large Scale Myrmecology Studies MC : Thilaghavani a/p Nagappan Repertoire : Hasrin RossleyKho & Kevin Fernandez Chairperson: Dr. Carsten A. Brühl		Gallery, UMS
Time	Schedule	Venue
0900-0930	Plenary 01: Planning for long-term ant studies - a personal perspective by	Gallery, UMS

	Jonathan Majer	
0930-0950	Speaker 01: Global ant biogeography and the importance of Asia in its modern and past diversity history by Benoit Guénard, Vincent Perrichot and Evan Economo	Gallery, UMS
0950-1010	Speaker 02: What happened in 12 years of ant museum in Thailand? by Decha Wiwatwitaya	Gallery, UMS
1010-1030	Speaker 03: Factors controlling CO₂ efflux rates from subterranean nests of ants in a seasonal tropical forest, Northeast Thailand by Sasitorn Hasin, Akinori Yamada, Yoshiaki Hashimoto, Seiki Yamane, Tomonori Kume, Wattanachai Tasen and Mizue Ohashi	Gallery, UMS
1030-1050	- Tea break - Registration continues	De' Sireh
1050-1110	Speaker 04: Habitats, occurrence and nest density of <i>Aneuretus simoni</i> Emery (Sri Lankan Relict Ant) in Sri Lanka : 2001-2013 by A. K. Sriyani Dias	Gallery, UMS
1110-1130	Speaker 05: Ant distribution patterns in Borneo – an approach using species envelope modeling by Carsten A. Brühl	Gallery, UMS
1130-1150	Speaker 06: Samsun Ant, <i>Pachycondyla sennaarensis</i> (Hymenoptera: Formicidae: Ponerinae): Distribution in Saudi Arabia by Mohammed Saleh Al-Khalifa and Mohammed Iqbal Siddiqui	Gallery, UMS
1150-1210	Speaker 07: Paleontological history and taxonomical divergence of Dolichoderinae of Eurasia by Dmitry A. Dubovikoff	Gallery, UMS
1210-1230	Speaker 08: Biodiversity of forest litter ant assemblages in Indian Cardamom Hills (Spur Hills – Megamalai) of Western Ghats by Selvarani, S.*	Gallery, UMS
1300-1400	- Lunch - Registration continues	De' Sireh

SESSION 2		
Theme : The Impact of Habitat Degradation and Conversion on Ants MC : Thilaghavani a/p Nagappan Repertoire : Anati Sawang & Mohd Afifi Ahmad Hamdan Chairperson: Assoc. Prof. A. K. Sriyani Dias		Seminar Room, ITBC
Time	Schedule	Venue
1400-1430	Plenary 02: What is the worth of an ant? by Maryati Mohamed	Seminar Room, ITBC
1430-1450	Speaker 01: Effect of habitat transformation on shaping ant community structure in jambi Ratna Rubiana, Akhmad Rizali, Lisa Denmead, Damayanti Buchori, Pudjianto, Dadan Hindayana, Yann Clough, Teja Tscharntke	Seminar Room, ITBC
1450-1510	Speaker 02: Beta diversity of ants in an oil palm landscape (Sabah, Malaysia) – heterogeneity in a monoculture by Wendy W.Y. Wang and William A. Foster	Seminar Room, ITBC
1510-1530	Speaker 03: Ecological impact of ants on soil modification in a tropical rainforest floor in Borneo, Malaysia by Mizue Ohashi, Tomonori Kume, Yuko Maekawa, Yoshiaki Hashimoto, Natsukio Yoshifuji, Sasitorn Hasin, Seiki Yamane	Seminar Room, ITBC
1530-1550	Speaker 04: Community patterns of ants by using the Self-Organizing Map by Sang-Hyun Park, Shingo Hosoishi, Kazuo Ogata and Yuzuru Kuboki	Seminar Room, ITBC
1550-1610	- Tea Break and Poster session - Registration continues	Pantry, ITBC
1610-1630	Speaker 05: <i>Oecophylla smaragdina</i> queen nest location and external characteristics by Mr. Joost Van Itterbeeck	Seminar Room, ITBC
1630-1700	Speaker 06: Ants of ports – monitoring of alien ant species by Kana Nishimuta, Taiga Yamaguchi and Yutaka Harada	Seminar Room, ITBC
1650-1710	Speaker 07: Agent Based Models Of Ant Reproductive Strategies by Adam L Cronin & Thibaud Monnin	Seminar Room, ITBC

1710-1730	Speaker 08: Spatial Pattern of Invasive Ant, <i>Anoplolepis gracilipes</i> in Bogor Botanical Garden, Indonesia by Rion Apriyadi	Seminar Room, ITBC
1730-1750	Speaker 09: The diversity and abundance of ants (Hymenoptera: Formicidae) in relation to human disturbance in selected areas of Terengganu, Malaysia by Wahizatul Afzan Azmi*	Seminar Room, ITBC
1900	Welcoming Dinner # <i>casual attire</i>	Kampung Nelayan

Day 2 (Tuesday 29 October 2013)

Time	Activities	Venue
0700	Pick up from accomodation	Respective accommodation
0800	Field Excursion	a) Utan Paradise, Crocker Range b) Gaya Island
1230	Lunch	a) Utan Paradise, Crocker Range b) Gaya Island
1530	Return to Kota Kinabalu	

Day 3 (Wednesday 30 October 2013)

SESSION 3

Theme : Cataloguing The Myrmecological World - Ant Taxonomy In Asia		Seminar Room, ITBC
MC : Kevin Fernandez		
Repertoire : Nivaarani Arumugam & Mohd Afif Zakaria		
Chairperson: Prof. Simon Robson		
Time	Schedule	Venue
0800-0900	ANeT Committee Meeting	Meeting Room, ITBC
0900-0930	Plenary 03: Life Patterns Of High Altitude Ant Genera Of Himalayan Region: Novelities And Adaptations by Himender Bharti	Seminar Room, ITBC

0930-0950	Speaker 01: The evolution and loss of complex behaviours in social insects: silk weaving and arboreal nesting in <i>Polyrhachis</i> ants by Simon K. A. Robson, Rudy J. Kohout, Andy Beckenbach and Corrie Moreau	Seminar Room, ITBC
0950-1010	Speaker 02: SEM study of Male External genitalia of the Carpenter ant, <i>Componotus compressus</i> (Hymenoptera: Formicidae) by Kadu Seema	Seminar Room, ITBC
1010-1030	Speaker 03: Taxonomic mysteries in the Mystery ant genus <i>Mystrium</i> by Masashi Yoshimura	Seminar Room, ITBC
1030-1050	- Tea Break and Poster session	Pantry, ITBC
1050-1110	Speaker 04: SEM structure of genitalia and sensilla present on them in <i>Componotus compressus</i> and <i>Oecophylla smaragdina</i> (Hymenoptera: Formicidae) by Barsagade Deepak Dewaji	Seminar Room, ITBC
1110-1130	Speaker 05: Taxonomy of Leptogenys (Formicidae: Ponerinae) ants of Sabah by Mohd Afifi Ahmad Hamdan	Seminar Room, ITBC
1130-1150	Speaker 06: Diversity of ants in Plant Genetic Protection Area of RSPG at Ratchaprapa Dam, Surat Thani, Thailand by Nawee Noon-anant, Sasithorn Hasin and Suparoek Watanasit	Seminar Room, ITBC
1150-1210	Speaker 07: Taxonomy Of <i>Pachycondyla</i> Ants, Group <i>Bothroponera</i> (Hymenoptera; Formicidae; Ponerinae) Of Sabah by Anati, S. & Bakhtiar, E. Y.	Seminar Room, ITBC
1210-1230	Speaker 08: The exocrine glands of <i>Protanilla wallacei</i> Johan Billen, Eline Bauweleers, Rosli Hashim and Fuminori Ito	Seminar Room, ITBC
1230-1250	Speaker 09: Morphometrics Of The Hyperdiverse Ant Genus: <i>Pheidole</i> by Beatrice Lecroq*	Seminar Room, ITBC
1250-1310	Speaker 10: Vision and navigation in nocturnal ants by Ajay Narendra*	Seminar Room, ITBC

1310-1400	- Lunch and Poster session	Seminar Room, ITBC
1310-1340	Meeting with undergraduate and postgraduate students of ITBC (Dr. Carsten Brühl)	Pantry, ITBC

SESSION 4

Theme : Mutualism, Predation And Competition: Ant Interaction Networks MC : Kevin Fernandez Repertoire : Andrew Lim & Mohd Faizul Chairperson: Prof. Rosli Hashim		Seminar Room, ITBC
Time	Schedule	Venue
1400-1430	Plenary 04: How do ant-plant interactions change along gradients of altitude and habitat modification? by Fayle, T. M., Edwards, D. P., PetrKlimes., Plowman, N., Turner, E. C., Foster, W. A. & Novotny, V.	Seminar Room, ITBC
1430-1450	Speaker 01: Eat or be eaten. Trophic ecology of rainforest ants by Martin Pfeiffer & Dirk Mezger	Seminar Room, ITBC
1450-1510	Speaker 02: Detection of species-to-species association for ant-mimicking spiders and their ant models by Y. Hashimoto, T. Endo, T. Itioka, F. Hyodo, T. Yamasaki & H. Sakamoto	Seminar Room, ITBC
1510-1530	Speaker 03: Studies on the predatory activities of <i>Oecophylla smaragdina</i> (Hymenoptera: Formicidae) on <i>Pteroma pendula</i> (Lepidoptera: Psychidae) in oil palm plantations in Teluk Intan, Perak (Malaysia) by Exelis MoisePierre and Azarae Hj Idris	Seminar Room, ITBC
1530-1550	- Tea Break and Poster session	Pantry, ITBC
1550-1610	Speaker 04: The tramp ant <i>Technomyrmex brunneus</i> has dominated native ants? by Shigeo Fukumoto and Seiki Yamane	Seminar Room, ITBC
1610-1630	Speaker 05: Is there an ant mosaic in the	Seminar

	canopy of tropical rainforests? by Jonathan D Majer, Sérgio P. Ribeiro and Nadia Espírito Santo	Room, ITBC
1630-1650	Speaker 06: Diversity of Ants in Lowland Semi-Evergreen Forest at A Reserve Area of Prince of Songkla University, Songkhla, Thailand by Nicharee Jannual, Nittaya Ruadreo and Nawee Noon-anant	Seminar Room, ITBC
1650-1710	Speaker 07: The utilization of weaver ant (<i>Oecophylla smaragdina</i>) to make ant farming for food and income in Thailand: Changes in nest size numbers on developing the strong weaver ant colony by Decha Wiwatwitaya	Seminar Room, ITBC
1710-1730	Speaker 08: Ants associated with decaying woody materials of Muaya Rainforest Education and Research Centre, Sipitang, Sabah by Mahadimenakbar bin Mohamed Dawood and Bakhtiar Effendi bin Yahya	Seminar Room, ITBC
1730-1750	Speaker 09: Controlling antagonist ants in establishing on the biocontrol of cocoa pod borer by using black ant in North Sumatra cocoa plantations by Abu Hassan Ahmad, Ahmad Saleh and Che Salmah Md Rawi*	Seminar Room, ITBC

Day 4 (Thursday 31 October 2013)

Option 1: Excursion

Time	Activities	Venue
0730	Pick up from accommodation	Respective accommodation
0800	Ant collection	UMS Hill
1215	Lunch	Pantry, ITBC
	Option to continue ant collection or ant identification	Entomology Lab, School of Science and Technology

		(SST), UMS
1530	Tea break	Pantry, ITBC
1600	Return to respective accommodation	

Option 2: Ant Curation And Identification (Parallel Sessions)

Time	Activities	Venue
0730	Pick up from accommodation	Respective accommodation
0800 (parallel session)	Ant Curation and Identification	Entomology Lab, School of Science and Technology (SST), UMS
1215	Lunch	Pantry, ITBC
1530	Tea break	Pantry, ITBC

Option 3: Paper Writing & Data Analysis (Parallel Sessions)

Time	Activities	Venue
0800 (parallel session)	Paper writing & data analysis Dr. Carsten Brühl	Seminar room, ITBC
1215	Lunch	ITBC, UMS
1530	Tea break	ITBC, UMS

Day 5 (Friday 1 November 2013)

Time	Activities	Venue
Whole day	Departure to home countries	Respective accommodations by public transportation (taxis)

~END~

LIST OF POSTERS

No.	Title and Authors
1.	The Ant Community Associated With Pitcher Plants In The Kebun Cina Forest Reserve, Sandakan, Sabah by Arthur Y. C. Chung
2.	Predatory activities of <i>Oecophylla smaragdina</i> (Formicidae: Formicinae) against the bagworm <i>Pteroma pendula</i> (Lepidoptera: Psychidae) in oil palm plantations by Exélis Moïse Pierre and Azarae Hj. Idris, Azidah Abdul Aziz, Norman Kamarudin, Tsuji Kazuki
3.	Group Size Effects On Ant Decision Making by Adam L Cronin
4.	A first step towards DNA barcoding of Asian ants: A case of <i>Crematogaster</i> in Cambodia by Shingo Hosoishi and Kazuo Ogata
5.	Efficacy of biopesticides (plant extract) on Carpenter ant <i>Camponotus compressus</i> (Fabricus) : The household pest by V. G. Meshram, D.D. Barsagade and Seema. G. Kadu
6.	Diversity of Ants in Leaf Litter at Forest Floor and Arboreal in Ulu Gombak Forest by Nur Farahin bt Mustafa
7.	Foraging Activity Of <i>Odontoponera</i> sp. At The Nesting Site by Nur Sakinah Bt Mohd Yassin
8.	Distribution and Diversity of Ant Species (Hymenoptera: Formicidae) in Pineapple Plantation Area of Peninsular Malaysia by Suhana Y., Bakhtiar Effendi Yahya, Norsiah M.J. and Siti Fatimah J.
9.	The Participation Of Ants In Detrital Food Webs In A Monsoon Tropical Forest BY V.A. Zryanin, A.V. Tiunov
10.	Preliminary Study on Effects of Forest Disturbance on Ant Communities at Wungnamkheiw Forestry Training Station, Nakhonratchasima Province by Ratanawadee Chareewan and Decha Wiwatwitaya
11.	Ants diversity in selected lowland forest of Peninsular Malaysia by Noor Izwan Anas
12.	Ant diversity in different land-use in Jambi by Winda Alamsari
13.	Diversity of ants in three habitat types, Kalabakan, Sabah by Muhammad Afif Zakaria, Bakhtiar Effendi Yahya & Mahadimenakbar Mohd Dawood

14.	Ants of Sabah update by Bakhtiar, E. Y., Mohd, A. A. H. & Anati, S.*
15.	A preliminary checklist of ants (Hymenoptera: Formicidae) of Terengganu, Malaysia by Johari Mohd Nor *
16.	Observation of ant-mimicking spiders (Myrmarachne, Salticidae) and ants in Thailand by Prasit Wongprom*

** No abstract provided by authors*

PLENARY SPEAKERS PROFILE

1. Prof. Jonathan Majer, of Curtin University, Australia, is an expert in the functional role of ants in human-modified ecosystems, including agricultural plantations and ex-mining sites. He was also a pioneer of the use of invertebrates as “bioindicators”, that is, a group of animals or plants, changes in which reflect the health of an ecosystem. He has published over 100 papers in peer reviewed journals, and a similar number of articles in other publications. http://environmentagriculture.curtin.edu.au/people/people_oasis.cfm/J.Majer



1. Professor Dr. Datin Maryati Mohamed, currently of Universiti Tun Hussein Onn Malaysia, has had a long and distinguished career, publishing on ant ecology, taxonomy and diversity. Furthermore she has been instrumental in forming collaborations between Malaysian scientists and colleagues in the international scientific community. <https://community.uthm.edu.my/maryati>



3. Dr. Himender Bharti, of Punjabi University, Patiala, is the foremost ant ecologist, systematist and conservation biologist in India. One major barrier to further work in diverse insect communities in the tropics is a lack of taxonomic knowledge, and Dr Bharti has worked tirelessly to overcome this barrier by describing new species, and writing identifications keys. In the last three years alone he has published 24 peer-reviewed papers, mainly relating to ant taxonomy. <http://www.antdiversityindia.com/about>



4. Dr. Tom Fayle, of University of South Bohemia, Czech Republic and Imperial College London, UK, is an ant community ecologist with a particular interest in Bornean ants. He is interested in how human-induced habitat change affects ant communities, the functions that they perform, such as nutrient cycling, and the relationships between these ants and other animal and plant groups. He is also a prolific writer in the field of ant ecology. <http://www.tomfayle.com/>

PLENARY SESSION ABSTRACTS**01. Planning for long-term ant studies - a personal perspective****Professor Jonathan Majer***Curtin University, Australia*

Many of the conference delegates are commencing their careers in science, most likely in the area of myrmecology. They may be university lecturers or may work in research institutions. Either way, if their careers develop as planned they may continue this line of research for many years. This plenary contribution will outline the benefits of long-term research and will highlight certain precautions that need to be taken to ensure that maximum benefits are gained from the data that accumulates. Aspects that will be considered include storage of raw data, standardisation of sampling protocols, maintenance of ant reference collections, correct recording of study plot locations and more. The talk will be furnished with real-life examples that have accumulated from 40 years of research involving ants.

** Please find full paper online at*

https://docs.google.com/document/d/1B8J0iR-uBSSvadrovpnK4aHpM-DXsUh_Soj9dG8GvJI/edit?pli=1

02. What is the worth of an ant?**Prof. Datin Dr. Maryati Mohamed**

*Faculty of Science, Technology and Human Development
Universiti Tun Hussein Onn Malaysia
86400, Pt. Raja, Batu Pahat, Johor*

An ant is an ant. Everybody knows ant when they see one. But as to the worth of an ant, it is everyone's guess. This paper reviews some research where ants have been seen as useful in Malaysia. This includes the species *Dolichoderus thoracicus* that had been used as a biological control agent in reducing impact of damage by main pests of the cocoa, both in Peninsula Malaysia and Sabah. Another research studied the roles of ants as symbionts to four species of *Macaranga*, and related the study to Malaysian tropical rainforest regeneration. Perhaps the latest was a chemical (dolichodial) extracted from again *Dolichoderus thoracicus* that was shown to be effective in repelling pest such termites and other species of ants. The paper then goes into exploring how insects, in particular ants could be useful in the tourism industry. Based on three studies on the potentials of entotourism, ants had been shown to be the most commonly encountered insects in the forests of Sabah and Peninsula Malaysia. Species such as *Camponotus gigas* and the trio (*Odontoponera transversa*, *Odontomachus rixosus* and *Diacamma rugosum*) could be promoted to be the leading stars. The later part of the paper presents the idea of using ant's behavior in the mathematical performance modeling. Finally, just to think out of the box suggestions are made on how ants could be useful as models in mechanical and civil engineering.

Keywords: biological control, symbionts, ants' chemicals, entotourism, performance modelling

**03. Life Patterns of High Altitude Ant Genera of Himalayan
Region:
Novelities and Adaptations**

Dr. Himender Bharti

Department of Zoology, Punjabi University, India

The high altitude ant genera of Himalaya during their journey through time have evolved different survival strategies to cope with hostile environmental conditions. The dominant ant genera of high altitude ecosystem are *Myrmica*, *Formica*, *Lasius*, *Temnothorax* and *Aphaenogaster*. The short summers, sub-zero temperatures in winter, paucity of resources and almost negligible nesting sites pose a great deal of threat to their mere existence in high altitude ecosystems. During the course of investigations, it has been found that these ants have developed new ways and means to adapt, exploit and sustain in the hostile environmental conditions. Their life patterns include various forms and phases of parasitic interactions ranging from temporary parasitism to inquilism; topographic specialization; polygyny; polydomy and endogenously heterodynamous life cycles. The evolution of social parasitism in high altitude ant genera seems to be an outcome of surviving in sub-zero temperatures and poor nesting site availability. It has also been observed that to avoid competition in the already meagre resources certain genera and species have pocketed themselves at different elevations in Himalaya. The paucity of nesting space has further led to polygynous condition i.e. multiple queens in one nest, in case of many high altitude ant genera. These ants on finding suitable nesting sites build huge nests with thousands of workers to maintain it. Thus, to maintain the queen to worker ratio the polygynous condition has become the need of the hour at higher altitudes. Furthermore, to maintain the population, each species spreads by budding and builds nest adjacent to the site of the mother nest. The polydomous condition thus helps in spreading, proliferating and maintaining the different ant communities in higher altitudes. To top it all, the endogenously heterodynamous life cycles, in which the compulsory diapause of queen, workers and immatures, help the evolutionary novel ants to overcome the bad weather conditions. The research work presented here thus provides first ever comprehensive data from the higher altitudes of Himalaya regarding the adaptations, endurances and life patterns of the high altitude ants.

04. How do ant-plant interactions change along gradients of altitude and habitat modification?

Tom M. Fayle^{1,2}, David P. Edwards³, Petr Klimes¹, Nichola Plowman¹, Edgar C. Turner⁴, William A. Foster⁴, and Vojtech Novotny¹

¹ Univ. of South Bohemia, Czech Republic and ² Imperial College London, UK, ³ University of Sheffield, Sheffield, UK ⁴ University of Cambridge, UK

Mutualistic interactions between ants and plants are widespread, particularly in the tropics. While the costs and benefits for the partners in these interactions have been well quantified for a range of systems, the way that these balance of these factors are impacted by gradients in anthropogenic habitat modification and changing altitude are very poorly understood. Investigating communities along these gradients is of interest, since these patterns will shed light on the way that two main global threats to ecosystems (habitat destruction and climate change) are expected to impact mutualistic interaction networks. Here we investigate the way that the two-way by-product mutualism between epiphytic bird's nest ferns (*Asplenium* spp.) and their ant inhabitants changes in response to logging of primary forest and conversion to oil palm plantation in Sabah, Malaysia. We show that although there are some minor impacts of habitat conversion on the mutualism, it is remarkably robust, with non-native species playing important roles in oil palm plantation. We also present some preliminary results from a study in Papua New Guinea investigating the effects of altitude on the interactions between terrestrial ant-plants and their ant inhabitants. Lowland communities involve rather non-specific interactions between multiple ant and plant species, while in the highlands, only a single species of ant inhabiting a single species of plant remains. We are currently conducting assays for herbivory and degree of ant protection, and experimental ant exclusions, to further explore the drivers of these patterns.

ORAL PRESENTATION ABSTRACTS**1(1) Global ant biogeography and the importance of Asia in its modern and past diversity history.****Guénard Benoit¹, Vincent Perrichot² and Evan Economo¹.**

¹*Okinawa Institute of Science and Technology Graduate University,
Okinawa, 904-0495, Japan.*

²*Paleontology department, Université de Rennes 1, France.*

Understanding global patterns of insect diversity represents one of the main challenges for the coming years. Ants represent an ideal first group for realizing such endeavor. Here I will present several databases developed on ant biogeography and their importance for the study of Asian ants. First, I will briefly introduce the Global Ant Bioinformatics project which as of today aggregates over 600,000 records on ant species distribution. In a second time, I will present how global ant databases can be used to explore the historical biogeographic patterns of ants. Using three newly created databases on current and past distributions of ant genera and on current ant community composition we compared the fossil and modern ant fauna across several regions of the world. Results indicate that extinction processes are common in ants, strongly altering both composition and structure of communities. I will also underline the important role played by the Indomalayan and Australasian regions as a potential refuge for many ant taxa. Finally, I will conclude how those new databases open many opportunities for studying a large range of ecological and evolutionary mechanisms shaping ant diversity.

1(2) What happened in 12 years of ant museum in Thailand?**Decha Wiwatwitaya***Department of Forest Biology, Faculty of Forestry, Kasetsart University,
Bangkok, Thailand. 10900*

Ant museum was formally established by Assoc. Prof. Dr. Decha Wiwatwitaya at Faculty of Forestry, Kasetsart University in May 2004. It was divided into 2 sub-museum, including ant museum for research and ant museum for ordinary people in June 2007. The objectives of ant museum for research were to collect Thai ants and other countries, holotypes and paratypes, and support researchers for studying ants. Two types of specimens would be preserved following as (1) wet specimens were kept in vials with 95 % alcohol (~ 200,000 specimens) (2) dry specimens would be arranged in taxonomic order in wooden cases (~ 50,000 specimens and 400 wooden cases). In addition, I have more than 1,000 exotic specimens as well. The objectives of ant museum for ant museum for ordinary people were to display information of ants, importance and value of ants, and outputs of researches forward ordinary people. The exhibition was divided into 4 types, being (1) the miracle of ants (2) relationships of ants (3) infinite value of ants and (4) the fascinating life of ants. The activities of ant museum for 12 years were following as (1) solving problems of ants in factories and companies more than 100 ones (2) more than 150 researches/thesis/senior projects (3) more than 300 interviews (4) more than 30,000 visitors (Thai people and foreigners), and (5) more than 200 school and university. At present, ant museum develop to edutainment using interactive media for explaining ant stories, and using multimedia animation for explaining main ethics of ants.

Keywords: Ant museum, Faculty of Forestry, Kasetsart University, Thailand

1(3) Factors controlling CO₂ efflux rates from subterranean nest of ants in a seasonal tropical forest, Northeast, Thailand

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CO₂ efflux from subterranean ant nest is a reason for soil CO₂ hot spots in tropical rainforest, however, our knowledge of factors controlling nest CO₂ efflux in this ecosystem is still poor. In order to clarify the major factors that control CO₂ efflux from subterranean ant nests, an experiment was conducted in dry evergreen forest at Sakaerat Environmental Research Station from October, 2010 to September, 2011. Here, we examined environmental factors and indexes of nest structure (i.e. diameter and number of nest entrance holes) that influence the variation in CO₂ efflux rates from subterranean ant nests. CO₂ efflux was measured using commercial respiration chamber and infrared gas analyzer (PP-systems, Hitchin, UK). Soil temperature were measured at 10 cm depth with a Drip-Proof Type Digital Thermometer (MODEL PC-9215, SATO, Japan), and moisture content at 6 cm depth with moisture sensor (ThetaProbe type ML2x, Delta-T Devices Ltd., UK). We found a positive relationship between soil CO₂ efflux and temperatures, but no relationship in nest CO₂ efflux. We found a positive relationship between nest CO₂ efflux and soil moisture content of < 18%, while a negative relationship when moisture content is > 18%. Number of ant nest hole had no significant effects on nest CO₂ efflux. On the other hand, we found a significant positive relationship between nest CO₂ efflux and hole diameter. Our present results indicated that soil moisture content and some nest structure of ant is important

factors causing variation in CO₂ efflux from subterranean ant nest in a seasonal tropical forest.

Keywords: subterranean ant nest, CO₂efflux, environmental factor, nest structure, tropical forest

1(4) Habitats, occurrence and nest density of *Aneuretus simoni* Emery (Sri Lankan Relict Ant) in Sri Lanka : 2001-2013

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The sole representative of subfamily Aneuretinae, *Aneuretus simoni* Emery, is of interest as a Critically Endangered species in the world. Surveys were conducted on endemic *A. simoni* in selected forests and other lands in several Districts, Ratnapura, Anuradhapura, Polonnaruwa, Puttalam, Kurunegala, Kalutara, Galle and Matara, from 2001 to 2012. In 2001, the species was recovered in "Pompekelle" in Ratnapura. Density of workers (7 m⁻²) in a selected region was estimated by the quadrat method in 2002. Occurrence and relative abundance of *A. simoni* in "Pompekelle" and Gilimale Forest Reserve were recorded by conducting several sampling methods on six visits to each forest in 2004. In 2005, this species was discovered from Sinharaja Forest. Occurrence and relative abundance of workers in Sinharaja Forest Reserve were estimated by several simultaneous sampling methods conducted along ten, 100 m transects. Ant surveys conducted by several simultaneous sampling methods in 54 lands in three dry zone Districts, Anuradhapura, Polonnaruwa and Puttalam, and intermediate zone, Kurunegala District, from 2006 to 2008 did not record this species. This species was discovered from southern Sri Lanka, Kirikanda Forest in Kalutara District, in 2009 and nest density (0.13 m⁻²) and the frequency of occurrence of nests (8/ 240) in this forest were recorded in 2010. Also, after the discovery of the species from three other forests in southern Sri Lanka in 2011 and 2012, nest density and nest occurrence of *A. simoni* in a selected site of each forest, Kalugala Proposed Forest Reserve (0.3 m⁻² & 3/ 40), Kulunakanda Proposed Forest Reserve (0.93 m⁻² & 7/ 30) and Wilpita "Aranya Kele" (0.27 m⁻² & 2/ 30) were estimated by the quadrat method. Environmental conditions during the survey at the habitats of *A. simoni* have also been recorded. Surveys on the species should be extended to other wet zone forests in Sri Lanka.

**1(5) Ant distribution patterns in Borneo – an approach using
species envelope modeling****Carsten A. Brühl**

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The interior mountain ranges of Central Borneo represent the only remaining large, contiguous and undisturbed tropical rainforest of Southeast Asia outside of western New Guinea. The destruction of rainforest by logging and conversion to agricultural landscapes is well advanced everywhere else in the region where forest fragments persist in the form of national parks or other reserves. Destruction is also proceeding in Borneo, especially in its Indonesian part, by the recent expansion of large scale oilpalm plantations. The World Wildlife Fund (WWF) led a conservation initiative for this remaining large forest block under the title Heart of Borneo to protect this unique ecosystem before it is lost forever. In 2007 a declaration was signed by the governments of Malaysia, Indonesia and Brunei which recognizes the *Heart of Borneo* initiative as a trans-boundary conservation project including national parks, production forest and other sustainable land-use. Since ants play a major role in nutrient fluxes in tropical forests and are recognized as important predators we studied the ant distribution in Borneo using a species envelope approach. We established a database for 604 ant species and almost 4000 sample locations using published and unpublished records of ants and modeled distribution areas using Maxent models. Five regions in Borneo revealed a high species density. Only a few of the species rich areas for ants lie within the current Heart of Borneo boundaries. Records were especially low from Central Kalimantan and future collecting should concentrate in these regions.

1(6) Samsum Ant, *Pachycondyla sennaarensis* (Hymenoptera: Formicidae: Ponerinae): Distribution in Saudi Arabia

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Pachycondyla sennaarensis is the most abundant ponerinae species found in the human settlements zone, housing areas, parks, irrigated garden and roadside plantations of the Jazan, Najran, eastern and central provinces. However in the eastern zone samples were collected in moderate size; whilst their occurrence in the northern and western zones was not recorded. Their localized distribution in the different areas attained serious attention after a report on the anaphylactic shock caused by the sting of the medically important ant, *P. sennaarensis* in the year 2006 . During the consequent three years study from January 2010 to January 2013, regular surveys were performed that reveal their heavy infestations in the spring and summer seasons by making nests in the moist areas and cracks of the cemented structures whereas, their infestations is reduced to standstill or very low in the winter seasons. In the heavily infested ecologically preferred localities , quarantine measures are suggested for their control due to their serious medical significance.

Keywords: Samsum ant, Ponerinae, *Pachycondyla sennaarensis*, Prevalence, Saudi Arabia

1(7) Paleontological history and taxonomical divergence of Dolichoderinae of Eurasia

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Paleontological data a useful instrument for reconstruction of life history of taxa and climate change during geological time. Ranges of application and aims of using paleontological data in ants taxonomy are discussion. Paleontological history and taxonomical divergence of main taxa of the odor-ants (Dolichoderinae) on Eurasia are elucidate in the light of new original data. Probable time for origin of tribe Iridomyrmecini and "heyday" of the Dolichoderinae in Nothern Hemisphere are suggesting.

2(1) Effect of habitat transformation on shaping ant community structure in jambi

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Land-use change cause undesirable effect on biodiversity decline as well as reduce ecosystem services. An indicator of decreasing ecosystem services is the change of species composition and unbalance trophic interaction between pests and its natural enemies. This research was conducted to study the effect of habitat transformation on shaping ant community structure. Ecological research was in four types of land use (i.e. forest, jungle rubber, rubber plantations and oil palm plantations) around Harapan Forest and Bukit Duabelas National Park in Jambi, Indonesia. On each type of land use, four plots (size 50 m x 50m) were selected for ant sampling. Ants were collected using hand-collecting method in combination with baiting on three strata i.e. leaf litter, soil and tree. We found 137 ant species from both areas of Harapan Forest and

Bukit Duabelas National Park. Based on ant diversity, there were no significant difference between Harapan and Bukit Duabelas. Nevertheless, ant species composition showed significantly different among land-use types. It concludes that habitat transformation play important role on shaping ant community structure.

Keywords: ant, community structure, Jambi

2(2) Beta diversity of ants in an oil palm landscape (Sabah, Malaysia) – heterogeneity in a monoculture

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Oil palm (*Elaeis guineensis*) plantations are a major feature of the overall landscape of Sabah (Malaysia), which comprises a fragmented mosaic of mostly oil palm and forest. The detrimental effects of natural forest conversion to oil palm on native ant diversity are widely acknowledged, but little is known of actual ant diversity and its underlying processes within the oil palm landscape itself. Since it is impossible to completely inventory the species pool of a landscape, it is essential to quantify compositional variation between point samples - beta diversity - to better estimate total diversity. Beta diversity varies with the size of the smallest sampled unit of comparison – sampling grain. In this study, we investigated the implications of sampling grain on the beta diversities of ground-dwelling ant assemblages across oil palm plantations and forests in Sabah, using multi-assemblage generalizations of pairwise similarity indices (C_{qN}), which give different weights to species relative abundances. Our results mainly show that: 1) average pairwise overlap between an oil palm and a forest community increases with grain; 2) oil palm communities are generally more different at larger grains, unlike forest communities which tend to become more similar at larger grains, 3) beta diversities of species identities in oil palm and forest are not significantly different, whereas beta diversities of common and dominant species are higher in oil palm relative to forest, across all grains. These results suggest that we might exaggerate the impact of oil palm conversion on native biodiversity by failing to account for beta diversity in landscapes.

Keywords: ground-dwelling ants, Sabah, beta diversity, sampling grain.

2(3) Ecological impact of ants on soil modification in a tropical rainforest floor in Borneo, Malaysia

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Ants are important ground arthropod in term of species richness and biomass in tropical rainforests. They are called ecosystem engineers because their foraging and nesting activities could alter soil physical and chemical environments. However, field investigation on the relationship between ants and soil environmental and functional factors is seldom. In this study, we aimed to clarify the ants distribute in a tropical forest soil and how the variability relates to soil physical and environmental factors. The study was conducted in lowland tropical rainforest in Lambir Hills National Park in Sarawak, Malaysia. We collected 165 cylindrical soil samples from 0-10 cm and 10-30cm depths of the forest floor randomly, with the measurements of soil respiration, temperature and moisture content. All ants from the soil samples were separated and their number and their fresh biomass were measured. We also measured soil mass and bulk density of each sample. Correlation analysis showed that both of ant number and biomass have positive relationships with soil respiration. Soil moisture content and soil bulk density has negative relationships with ants, suggesting ant inhabitation increases soil porosity, which allow rapid infiltration of soil water. These results suggest contribution of ants on soil structure and function in tropical rainforest ecosystems.

Keywords: Ecosystem engineer, moisture content, soil respiration, bulk density, correlation analysis.

2(4) Community patterns of ants by using the Self-Organizing Map

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Self-organizing map (SOM) is a type of artificial neural network analysis, showing the similarity between input data on a map. The SOM is used for clustering, visualization and abstraction of complex data. To understand relationship between ant species and their habitats, we examined data that were collected in Fukuoka City, Japan, during the years from 1998 to 2012, using SOM. The sampled data includes a total of 54 species from 14 sites of different land use types. The result showed that the sampling sites were classified into three clusters according to ant species composition. Each cluster had similar habitat characteristics. In addition, the scope of species distribution was illustrated through visualization of the SOM. Some species appeared to be occurred locally while others were distributed in wide range of habitat. To compare the result of SOM, we analyzed the same data set by using other multivariate statistical method, detrended correspondence analysis (DCA). The result of DCA showed the same grouping as in SOM. Interestingly, removing singleton and doubleton species, the clusters by DCA was changed while SOM's result was consistent. These facts suggest that SOM could give more robust cluster than DCA and effective to see species adaptability in response to habitat changes.

Keywords: Community patterns, habitat characteristics, visualization, cluster, SOM, DCA

2(5) *Oecophylla smaragdina* queen nest location and external characteristics

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Relocating naturally established *O. smaragdina* colonies to designated sites such as mango, cashew, and citrus plantations for the biological control of pests, benefits from including the gravid queen. When it is intended to also use *O. smaragdina* as human food – large larvae and pupae developing into virgin queens are favoured in Thailand and the Lao PDR, the inclusion of the gravid queen is a necessity. A thorough understanding of the location and external characteristics of the queen nest in the polydomous *O. smaragdina* colony facilitates the relocation. In the Lao PDR, where *O. smaragdina* is one of the most consumed edible insects, mature colonies are monogynous. The tree housing the queen can be most easily identified by taking into account both tree height and number of nests in the tree: any non-queen tree taller than or equally tall as the queen tree in a given colony houses fewer nests than the queen tree, and any non-queen tree housing more nests than the queen tree in a given colony is shorter than the queen tree. The queen nest is located near the top of the queen tree, and very small. It can be further distinguished from non-queen nests of similar size by the higher number of major worker ants present on its exterior and its larger nest opening. Eliciting queen evacuation, which is rapid when disturbing the queen nest, is recommended to verify the presence of the queen and facilitates her capture.

Keywords: *Oecophylla smaragdina*, queen, edible insects, biological control

2(6) Ants of ports – monitoring of alien ant species**Kana Nishimuta, Taiga Yamaguchi and Yutaka Harada***Ikeda Senior High School, Nishibeppu 1680, Kagoshima, 890-0033 Japan*

Ants of ports were investigated in the ports of mainland Kagoshima prefecture and its neighboring islands, using honey baits and manual collecting. In this study, 35 ant species belonging to 20 genera in 4 subfamilies were collected. This corresponds to around 30 % of the 110 ant species confirmed on the mainland of Kagoshima prefecture. Eight (22.8%) of the 35 ant species collected were alien ants. Ant species collected from all of the eight ports surveyed were *Monomorium chinense* and *Nylanderia amia*. In this survey, the alien ant species *Cardiocondyla obscurior* was collected on mainland Japan (in Makurazaki Port) for the first time. In Miyanoura Port, 28 species were collected. On the other hand, only 7 species were collected on the South Quay of Kagoshima Port. Twenty species were collected using honey baits and 35 using manual collecting. Fifteen ant species were not collected using honey baits. The dominant ant species estimated by the frequency of their appearance at honey baits was *Tetramorium tsushimae* in the South Quay and New Port of Kagoshima Port, Taniyama Port and Kushikino Port, *Pheidole indica* in Yamagawa Port, *Monomorium chinense* in Makurazaki Port and Nishinoomote Port, *Pheidole noda* in Miyanoura Port. The similarity of species composition calculated by Nomura-Simpson's Coefficients (NSC) was greatest between Yamagawa Port and Miyanoura Port, and was least between South Quay of Kagoshima Port and Taniyama Port.

Keywords: alien ant species, honey baits, dominant ant species, species composition

2(7) Agent Based Models Of Ant Reproductive Strategies**Adam L Cronin¹ & Thibaud Monnin²**

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Ants employ two markedly different reproductive strategies. The vast majority of species use Independent Colony Foundation (ICF), in which colonies invest in huge numbers of propagules (new queens), which disperse alone on the wing and typically have a very low rate of success (<1%). In contrast, very few new propagules are produced under Dependent Colony Foundation, queen(s) are assisted by potentially large numbers of workers, and dispersal is necessarily on foot. Thus, whereas ICF colonies produce huge numbers of tiny propagules with high dispersal and low success, DCF colonies produce very few large propagules, with low dispersal and high success. These two markedly different strategies are thought to provide advantages in different types of environments. Developing an understanding of which ecological conditions favour either strategy is thus desirable to help anticipate the influence of phenomena such as habitat and climate change and the behaviour of invasive species. However, obtaining reliable empirical data on dispersal patterns and colony investment in social insects is laborious at best and impossible at worst. To address this problem, we have developed an agent-based model of ant reproductive strategies using the software NetLogo. Our initial results support some predictions in the literature, but also raise additional questions. Further development of this model should allow us to generate testable hypotheses regarding the ecological conditions favouring a range of ant reproductive strategies.

Keywords: Dependent Colony Foundation, Independent Colony Foundation, Habitat aggregation, fission, competition.

2(8) Spatial Pattern of Invasive Ant, *Anoplolepis gracilipes* in Bogor Botanical Garden, Indonesia

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The occurrence of invasive ant *Anoplolepis gracilipes* in Bogor Botanical Garden (BBG) and its surrounding area had been intensively studied (e.g. Ito *et al.* 2001, Rizali *et al.* 2008). In urban area especially in Bogor, *A. gracilipes* is not only interfering the human but also negatively affect to another organism including ants. The aim of this research was to observe the spatial pattern of *A. gracilipes* in BBG. Information about spatial pattern of this species will be valuable to understand the behavior in landscape context as one of important aspect in developing control strategy. Ant observation was conducted using baiting method along 50 m transect with 50 m distance between transects. In total 285 points were observed within 87 ha of BBG area. The result showed that *A. gracilipes* was occurred in 32.28% from the total area of BBG. *A. gracilipes* was mostly found in "mixed vegetation" habitat (61.95%) compare with other habitat such as bamboo habitat (14.13%), riverside (9.79%) and building (14.13%). Micro-climate condition in "mixed vegetation" habitat seems suitable for *A. gracilipes* especially for nesting. To understand about behavior of *A. gracilipes*, research will be continued by studying colony boundaries, number of colony and the population structure.

Keywords: invasive, spatial pattern, *Anoplolepis gracilipes*

3(1) The evolution and loss of complex behaviours in social insects: silk weaving and arboreal nesting in *Polyrhachis* ants

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To investigate the evolution of complex behaviours we derived phylogenetic hypotheses for the ant genus *Polyrhachis* (based on 3 nuclear and 3 mitochondrial gene sequences from 37 *Polyrhachis* species representing all 13 subgenera and 5 outgroup species) and inferred the evolutionary history of nesting behavior and nest location using ancestral state reconstruction and correlation. The monophyly of the genus and all thirteen subgenera are supported, but one subgenus (*Cyrtomyrma*) appears nested within the *Myrmhopla* and sister to the *mucronata* group. In contrast to previous hypotheses nest-weaving via the use of larval silk is ancestral within the genus and strongly correlated with arboreal nesting habits. Transitions away from the ancestral state have occurred frequently, with ground nesting (which is strongly correlated with the lack of larval silk in the nest) evolving on at least 5 separate occasions. Larval cocoons (the ancestral state) have also been lost on at least two occasions, and most surprisingly, transitions back to arboreal nesting have also occurred, including the revolution of silk nests (albeit from spider rather than larval sources). Together, these patterns show a remarkable flexibility in the evolution, loss and regaining of complex behaviours.

Keywords: complex systems, behavior, *Polyrhachis*, phylogeny

3(2) SEM study of Male External genitalia of the Carpenter ant, *Componotus compressus* (Hymenoptera: Formicidae)

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The male external genitalia of *Componotus compressus* comprises a well developed phallic structure apically attached to ninth sternum. The external genitalia extended in the form of long appendicular structure to form a distal aedeagus surrounded by three pairs of valves as the basal plate Basimere, distal Telomere and Volsellae. An elongated aedeagus projected outside in the form of bilobed Phallostreme. Based on the outer cuticular structure of the external genitalia the sensilla have been classified into six types: sensilla trichoidea ST-I and ST-II a sensilla trichoidea curvata (STC) and sensilla basiconica SB-I and SB-II.

Keywords: *Componotus compressus*, SEM, Basimere, Volsellae, Phallostreme

3(3) Taxonomic mysteries in the Mystery ant genus *Mystrium*

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The species in the genus *Mystrium* are very mysterious ants. Their unique snapping mandibles and reproductive system have received strong attention from ecological researchers. In the genus *Mystrium*, Menozzi published a taxonomic revision in 1929, and Bihn & Verhaagh published the revision for the Indo-Australian region in 2007. In spite of the presence of these revisions, the identification of *Mystrium* is still severely hampered because the current taxonomic system is built on comparatively few specimens from each species, which has misled previous determination efforts and identification of actual species boundaries. According to our morphological comparative study based on thousands of specimens accumulated in the collection of the California Academy of Sciences, each species of *Mystrium* shows high intra-specific variation, which explains why previous revision failed to distinguish between species. In this presentation, I introduce (1) an overview of the current taxonomic

problems and confusions existing in the genus *Mystrium*, (2) new taxonomic solutions for these problems, including revised species boundaries, and (3) questions regarding *Mystrium* species which still remain in the Indo-Australian region.

3(4) SEM structure of genitalia and sensilla present on them in *Componotus compressus* and *Oecophylla smaragdina* (Hymenoptera: Formicidae)

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The male genitalia of *Componotus compressus* and *Oecophylla smaragdina* appear to be phallic structures. The phallus is usually a large, highly complex arising from the wall of the genital chamber above the ninth sternum. The male external genitalia consist of a pair of gonocoxite and inner penis (adeagus). The gonocoxite divided into two parts, basal basimere and distal telomere. The penis (adeagus) are paired, long tubular structure in *O. smaragdina* and flat in *C. compressus*. Terminally it modified into smooth rounded structure. It bifurcated in to two and formed an opening, phallotreme. The scanning electron microscopic (SEM) studies revealed the presence of sensilla trichoidea ST-I, ST-II and ST-III and sensilla basiconica (SB) on male genitalia of both species while, sensilla trichoidea curvata (STC) are found only on *O. smaragdina*. The female genitalia is reduced type, partially exposed in the terminal fossa of the pygidium, and the contain two layers of sheath externally. The external opening is surrounded by two layers, inner and outer in both species. On the dorsal side of inner layer of opening, four sharp bristals and ventrally on outer layer six bristals were present on the either side of lancet. A pair of lancets originate in between inner and outer margin towards the ventral side of opening. The lancets are concave on inner side and fused together forming a tube- like structure pointed at distal end in the female, while lancets are reduced in worker *C. componotus*. ST-I, ST-II are noticed surrounding the external opening. In female *O. smaragdina* dorsal side of outer layer contain many bristals. Each ventro-lateral side of opening contain a group of 5 long and 4 short, 4 long and 2 short bristals in female and worker respectively. The ST-I and ST-II are scattered surrounding to the opening.

3(5) Taxonomy of *Leptogenys* (Formicidae: Ponerinae) ants of Sabah

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The ant genus *Leptogenys* was first described by Roger in the year 1861 based on worker of *Leptogenysfalcigera* from Sri Lanka. Currently, there are 258 species, 25 subspecies and 1 fossil species of *Leptogenys* in the world (Bolton, 2012) and the species richness of the genus is centred in tropical region and Australian region. *Leptogenys* ants are grouped under the subfamily Ponerinae. There are 31 species and 10 subspecies described from the Indo-Australian region (Bolton, 2012). They are characterized by having pretarsal claws of middle and hind legs pectinate, mandible are arm with only 1-3 teeth, Ocelli absent pretarsal claw usually pectinate, ventral surface of mandible close to base without a triangular falange and clypeus with sharp median longitudinal carina (Bolton 1994).

The genus has been revised by Bingham (1903), Wilson (1955 & 1958), Taylor (1969 & 1988), Mann (1921 and Bolton (1975). There has been no recent revision work for Indo-Australian region. This study aims at 1. to study on taxonomy of genus *Leptogenys* ant (formicidae) in Sabah, Malaysia. 2. determining the species distribution of *Leptogenys* ants of Sabah; 3. to study nesting behaviour of *Leptogenys* ants; 3. All of the collection will be conduct in borneo Sabah. There would be three main method when conducting the specimen collection which is pitfall trap, winkler's sampling method and as well as manual sampling of ants. This constructions of dichotomous key and the development of the database about ant genus *Leptogenys* will improve data collection of this ant taxonomy information.

Keywords : Formicidae, *Leptogenys*, Borneo, Sabah, Malaysia

3(6) Diversity of ants in Plant Genetic Protection Area of RSPG at Ratchaprapa Dam, Surat Thani, Thailand

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Studies on diversity of ants in Plant Genetic Protection Area of RSPG at Ratchaprapa Dam, Surat Thani Province were conducted by three methods: direct sampling, colony sampling and leaf litter sifting in January, April, June and August 2010. A total of 117 ant species belonging to 49 genera and 11 subfamilies were identified based on the morphological characteristics of the workers. The Myrmicinae was dominant at the proportion of genera and species (19 genera, 45 species), followed by Formicinae (10 genera, 36 species) and Ponerinae (9 genera, 20 species), respectively. The genus *Polyrhachis* had the highest number of species (20), followed by *Pheidole* (12), while *Leptogenys* and *Tetraponera* were represented by six species each. Moreover, the species composition and occurrence of ant species in each time, including microhabitats and nest types were difference.

Keywords: diversity, ants, Ratchaprapa Dam, Surat Thani Province

3(7) Taxonomy Of *Pachycondyla* Ants, Group *Bothroponera* (Hymenoptera; Formicidae; Ponerinae) Of Sabah**Anati Sawang and Bakhtiar Effendi Yahya***Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah*

This study is aimed at: 1. revising the taxonomic status of the *Pachycondyla* ants of the group *Bothroponera* in Sabah; 2. studying the distribution of *Pachycondyla* ants (*Bothroponera* group) of the in Sabah 3. studying the nesting behavior of *Pachycondyla* (*Bothroponera* group) ants in Sabah. Redescription and identification keys (based on workers) to *P. tridentata*, *P. debilior*, *P. breviour* and *P. sandakana* were presented. *P. tridentata* is the most distributed *Pachycondyla* species throughout Sabah compared to other members of *Bothroponera* group species. *Bothroponera* ant's species recorded the highest species richness at Danum Valley, Poring, Imbak Canyon, Maliau Basin and Gunung Tambuyukon. Nesting site of *tridentate* can be found in dead wood and soil, *debilior* was found nesting in dead wood, while *breviour* was found nesting in the soil and soil under dead wood. However, no data of nesting site of *P. sandakana* recorded. Further study on the nesting behavior of *P. sandakana* and additional of samples collection should be done and more sampling needed to be conducted especially at areas with higher species richness such as Maliau Basin, Danum Valley, Imbak Canyon, Poring and Gunung Tambuyukon to add more data specimens and contribute to new species discovered.

Keywords: Hymenoptera, Formicidae, Ponerinae, *Pachycondyla*, *Bothroponera*, Sabah, Malaysia.

3(8) The exocrine glands of *Protanilla wallacei***Johan Billen¹, Eline Bauweleers¹, Rosli Hashim² & Fuminori Ito³**

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We studied the exocrine system of both workers and ergatoid queens of *Protanilla wallacei* using light, scanning and transmission electron microscopy. Our survey revealed the presence of 26 glands, of which 6 had never been found before in ants. Five of these represent novel discoveries for social insects in general. The overall novel discoveries comprise an epithelial stipes gland, a pharyngeal wall gland, a central petiole gland, a lateral postpetiole gland and a footsole gland in the hindleg pretarsi. The intramandibular epithelial gland was already reported in some bees previously, but is now for the first time also reported in ants. The exocrine system of workers and ergatoid queens is very similar, with only the spermathecal gland showing an obvious difference. This is in line with the limited anatomical as well as behavioural difference between both castes in *Protanilla* compared to the situation in *Leptanilla*.

Keywords: exocrine glands, morphology, *Protanilla*, Leptanillinae

4(1) Eat or be eaten. Trophic ecology of rainforest ants**Martin Pfeiffer¹ & Dirk Mezger²**

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The forest floor of Bornean alluvial forests is inhabited by a large number of ant species, which exhibit a great variety of lifestyles. We measured $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ values of ants, arthropods, plants and soil in Gunung Mulu National Park, in Sarawak, Malaysia and inferred the trophic positions of 151 ground ant species from four types of rain forests (alluvial, dipterocarp, limestone forest and Kerangas). Base-line corrected mean $\delta^{15}\text{N}$ values for different ant species ranged from -0.67‰ to 10.56‰ thus confirming that forest ants occupy a variety of trophic levels. Three major trophic groups could be distinguished: predominant herbivore species; omnivores and truly predacious species. Ant subfamilies differed significantly in their trophic positions, as did many ant genera within subfamilies and ant species within ant genera. Several ant species exhibited dietary flexibility and differed significantly in trophic positions between forest types. Trophic positions of ant species in two forest types were compared with null model analysis to check niche structure. Using $\delta^{13}\text{C}$ values of plants and trophobiotic hemiptera, we also studied the trophobiotic interactions of ants.

Keywords: food web, ground ants, stable isotope study, primary rainforest types, Borneo

4(2) Detection of species-to-species association for ant-mimicking spiders and their ant models

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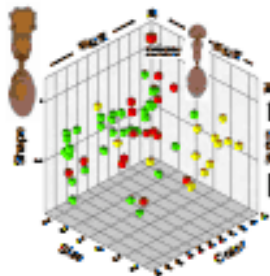
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Ant-mimicry has evolved in non-web-weaving spiders, such as Salticidae and Corinnidae. Ant-mimic spiders mainly occur in the tropical regions, and few species are found in temperate regions. Since ant diversity is especially high in the *tropics* compared to *temperate zone*, it seems that the remarkable *diversity* of ant-mimic spiders in tropics is associated with the diversity of ants. To assess this assumption, the present study examined how ant biodiversity reflects on biodiversity of ant-mimic spiders in tropical forests. Using the morphometric tools, we analyzed objectively visual resemblance (i.e. body size, shape and coloration) between ants and ant-mimic spiders, and assessed species-to-species relationships between the mimics and their models. In this study, we examined combination pattern of ant-mimic spiders and ant-models to detect whether association was found between ants and ant-mimic spiders in same communities, nor not.



4(3) Studies on the predatory activities of *Oecophylla smaragdina* (Hymenoptera: Formicidae) on *Pteroma pendula* (Lepidoptera: Psychidae) in oil palm plantations in Teluk Intan, Perak (Malaysia)

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A field study was conducted to elucidate the predatory activities of the ant *Oecophylla smaragdina* on the bagworm *Pteroma pendula* in oil palm plantations at Teluk Intan, Perak, Peninsular Malaysia, from November 2010 to August 2011. The ant was found to be prevalent in taller (> 4m) palm stands but absent in shorter ones subject to a comparable regime of chemical pesticides or biological control. Among the taller palms the number of nests per tree ranged from 0 to 13. The abundance level of *P. pendula* was significantly lower in trees occupied by *O. smaragdina* than in unoccupied palms. Similarly, the degree of foliar injury was significantly lower in occupied palms. There was a strong positive correlation between pest density and degree of foliar injury. The number of fruiting bunches, indicative of the palm-oil productivity, was significantly higher in occupied palms. The predatory behaviour of *O. smaragdina* towards *P. pendula* was confirmed by observations in a distinctive chronological sequence. Field experiments showed that *O. smaragdina* preferred to consume pupae over larvae (of all instars), until the extermination of the former. The study confirmed that *O. smaragdina* does not attack or disturb the oil palm pollinator weevil, *Elaeidobius kamerunicus*. The ant species thus shows great promise for biological control in oil palm.

Keywords: *Elaeis guineensis*, Asian weaver ants, Bagworms, foliar injury, entomophagy, weevil pollinator

4(4) The tramp ant *Technomyrmex brunneus* has dominated native ants?**Shigeko Fukumoto and Seiki Yamane***The Kagoshima University Museum, Japan*

Technomyrmex brunneus is a famous tramp ant occurring mainly in continental Southeast Asia and extending to warm temperate Japan. Northern limit of its range in Kagoshima, South Kyushu, had been the southern part of Kagoshima-shi, but the range has recently been expanding. In the Kagoshima University Botanical Garden, it had not been found until 2000, but supposedly invaded there in 2002, and is now the most dominant ant. Fortunately the arboreal ant fauna in the botanical garden was quantitatively surveyed in 2000 before the invasion by *T. brunneus*. We made ant faunal survey in 2011 and 2013 with the same method as that employed in 2000. We also studied the ant community of the forest floor at the same place. The 2011 and 2013 surveys showed that on trees *T. brunneus* was a super-dominant with a frequency occurrence of ca. 70%, followed by *Nylanderia flavipes* (ca. 10%). Among the species with high frequencies in 2000, *N. flavipes* remained dominant but three species, i.e., *Tetramorium bicarinatum*, *Lasius japonicus* and *Crematogaster matsumurai*, disappeared. On the other hand, the number of forest floor species did not decrease and several species retained high frequencies together with *T. brunneus*. The result suggests that this species more strongly affects the ant community on the tree than on the forest floor.

Keywords: tramp ant, arboreal ants, species composition

4(5) Is there an ant mosaic in the canopy of tropical rainforests?**Jonathan D Majer¹, Sérgio P. Ribeiro² and Nadia Espírito Santo²**

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Although the existence of an ant mosaic has been documented in many tropical tree crops, there have been questions regarding its existence in the corresponding tropical or subtropical rainforests in the area. However, most of the relevant work in tropical forests has involved accessing the canopy from below by means of tree climbing techniques. This has precluded access to the more delicate branches of the outer canopy surface. In our study a canopy crane was used to access canopy from above. We assessed ant defensive behaviour and recruitment at baits in the Parque Natural Metropolitano, Panama. Sardine-honey baits were set in a grid of 25 paired upper and lower canopy points, for which coordinates and height were recorded. We tested the hypothesis that interactions in the ant mosaic become stronger as one moves from the lower to the upper canopy. We sampled 23 species of ants, with various species of *Azteca* recruiting to 63% of baits and excluding all other ant genera. One species of *Camponotus* also excluded other ant species over 95% of its area of occurrence. Exclusion between dominant and sub-dominant species was more frequent in the upper than lower canopy. Permeable borders and territory-free spaces are important for ant species diversity, and were more frequent in the lower canopy. Here, a combination of more costly patrolling conditions and less profitable resources, such as extra-floral nectaries and trophobionts, may be the most likely cause of this pattern. The findings we present could account for the viewpoint of some researchers that ant mosaics exist in plantations but not necessarily in the corresponding forests of the area.

4(6) Diversity of Ants in Lowland Semi-Evergreen Forest at A Reserve Area of Prince of Songkla University, Songkhla, Thailand**Nicharee Jannual, Nittaya Ruadreo and Nawee Noon-anant**

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The diversity of ants in two study sites, plant communities along the valley slopes and near water and plant communities along the ridges with shallow soils and rock outcrops in lowland semi-evergreen forest at a reserve area of Prince of Songkla University, Songkhla Province were conducted by five methods: hand collecting, leaf litter sifting, Winkler extraction, honey baits traps and pitfall traps in March and May, 2013. A total of 72 ant species belonging to 38 genera and 8 subfamilies were identified based on the morphological characteristics of the workers. The Myrmicinae was dominant at the proportion of genera and species (13 genera, 32 species), followed by Formicinae (8 genera, 17 species), Ponerinae (7 genera, 11 species) and Dolichoderinae (5 genera, 5 species), respectively. The genus *Pheidole* had the highest number of species (10), followed by *Polyrhachis* (6) and *Crematogaster* (5), respectively. Species composition and occurrence of ant species in each plant community and method were difference.

Keywords: diversity, ants, lowland semi-evergreen forest, a Reserve area of Prince of Songkla University, Songkhla Province

4(7) The utilization of weaver ant (*Oecophylla smaragdina*) to make ant farming for food and income in Thailand: Changes in nest size numbers on developing the strong weaver ant colony

Decha Wiwatwitaya

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The weaver ant (*Oecophylla smaragdina*) is one of the most abundant and widespread ants in tropical Asia. This study was carried out at mango plantation, Wangnamkhiew district, Nakonratchasima province during December 2008–April 2010. I collected 5 strong colonies (103 trees) which occupied 25(6a), 19(7a), 19(11a), 15(14a), and 25(16a) mango trees. Numbers of nests, nest sizes, nest positions, environmental factors (rainfall, wind, and mango tree health) were investigated in monthly interval. The weaver ants were gotten food (small fresh fish: 30 gram/tree) two times/month. The resulted showed that the colonies were variable in tree numbers over the study period. The tree numbers showed no clear seasonal changes between the brood (Dec.-Apr.) and no brood (May-Nov.) seasons. Few weaver ants were found in mango trees without nests in the colonies which they used to find food. The mean total number of nests, mean small- and the large- sized nests were 15, 9, and 2 /mango tree, respectively. The small- and the large- sized nests were inversed in numbers over the study period. Most small-sized nests increased in numbers in June to August while most large-sized nests occurred in September to April. The large-sized nests decreased in numbers. So, weaver ants nested the small-sized nests by 1-4 leave below canopy. Most nest positions were found in South. East, West, and Center of canopies as the least in North. The most large-sized nests were found in South of canopies whereas the small-sized ones in Center of canopies. There was no significant difference between the environmental factors and number of nests. However, the strong wind and heavy rainfall affected be negative in numbers of large-sized nests, and be positive in one of small-sized nests. As the mango health affected on both nest sizes.

Keywords: Weaver ant, *Oecophylla smaragdina*, ant farming, food

4(8) Ants associated with decaying woody materials of Muaya Rainforest Education and Research Centre, Sipitang, Sabah**Mahadimenakbar bin Mohamed Dawood and Bakhtiar Effendi bin Yahya***Institute for Tropical Biology and Conservation,
Universiti Malaysia Sabah*

A dead stump and two pieces of fallen deadwood were examined during two short visits in Muaya Rainforest Education and Research Centre, Sipitang Sabah. Due to limitation of time, only about 30% of the dead stump was inspected while for the other deadwood pieces, about 90% were inspected. Representatives of ants encountered foraging or inhabiting in the deadwood were collected manually by hand and preserved in ethanol. Altogether 19 morphospecies of ants from 14 genera in 5 sub-families were recorded from these deadwood habitats.

POSTER PRESENTATION ABSTRACTS**POSTER 1: The Ant Community Associated With Pitcher Plants In The Kebun Cina Forest Reserve, Sandakan, Sabah****ARTHUR, Y. C. Chung***Forest Research Centre, Forestry Department, P. O. Box 1407, 90715
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A total of seven ant species were recorded foraging on the pitchers at the Sandakan Rainforest Park. An experiment was carried out to investigate whether the ants could escape when fallen into the digestive pitcher fluid. From the selected ant species, only *Polyrhachis pruinosa* was able to escape, suggesting that this species could either tolerate the digestive pitcher fluid or has a better grip on the smooth inner surface of the pitcher. Hence, it is not surprising that this species is often seen foraging on the pitcher peristome and lid. The study has also shown that the effectiveness of the fluid in trapping ants was the same in both freshly opened and old pitchers.

POSTER 2: Predatory activities of *Oecophylla smaragdina* (Formicidae: Formicinae) against the bagworm *Pteroma pendula* (Lepidoptera: Psychidae) in oil palm plantations

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Oecophylla smaragdina a generalist predator of insect pests in the tropics is commonly found in oil palm fields exhibiting polydomous nesting occupancy of massive individual forager's abundance. Monitoring *Oecophylla smaragdina* from September 2010 to May 2013 in oil palm plantations was conducted to elucidate foraging activities in relation to air temperature and relative humidity. That aspect of the investigation was a prerequisite for recent study on the weaver ants' predatory ability as a biological control agent. A strong sense of territorial behavior is highly significant with major workers occupancy forming a large dense society in oil palm trees and immediate surroundings secondary territories, used for hunting purposes, in natural conditions located on the ground; and intermittent territories in the forest zone (strictly diurnal), used for hunting and the tending of homopterans. By permanent surveillance of the territories and efficient recruitment, the societies rapidly adapt to fluctuations in the quantity of prey. There is a close correlation between aggressive territoriality and predation. The Asian weaver ants exhibited a bimodal diurnal foraging circadian rhythm with two peaks: midday (12:00 h -15:00 h) and around dusk (17:30 h- 18:30 h), irrespectively during both dry and rainy seasons. Lowest nocturnal peak occurred at 01:00 h – 05:00 h. All intensively surveyed oil palm blocks gave similar results. This behavior was prevalent in peninsular and East Malaysia (Sabah/Sarawak) regardless of the seasons. Activity is regular and continuous during whole days with more diurnal intensity and lesser, much slower nocturnal movements. Similarity of the Malaysian *O. smaragdina* species with her African counterpart *O. longinoda*, unpredictably contrast stalwartly with same species from Australia. There is a close correlation between aggressive territoriality and predation. *O. smaragdina* showed a moderate

positive correlation of foraging activity with increase in air temperature. However it is negatively correlated to relative humidity. The implementation of *O.smaragdina* is suggested to alleviate small holders' management cost and environmentally friendlier for large commercial plantations. A more ecologically sustainable industry by adoption of natural enemies for pest management, resulting in an attenuation of loss in biodiversity, caused by forest diminution, may improve product quality and international negative perception. This report is pioneering, answering the scarcity of data on the subject in oil palm, will help a larger public awareness by diminishing skeptical interpretations of industry players to better understand the benefits gain from its gradual implementation by decision makers.

Keywords: Asian weaver ants, circadian cycle, *Elaeis guineensis*, Tropical micro-climate parameters- Integrated pest management

POSTER 3: Group Size Effects on Ant Decision Making**Adam L Cronin***United Graduate Schools of Agricultural Sciences, Iwate University,
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Decision accuracy is known to increase with group size, a phenomenon known colloquially as the 'wisdom of the crowds'. Ant colonies vary markedly in colony size, raising the question of what effect this has on decision making capacity. Consensus decisions arise in social insect colonies in a decentralised manner, in which a collective response emerges as the product of numerous semi-independent individual decisions. Decisions are often quorum-based, such that the propensity for an individual to perform an action is a sharply non-linear function of the number of individuals already performing that action. Colonies regularly make consensus decisions over collective actions in which maintaining group integrity is critical, including the selection of a new nest. I used the nest-site selection process of the ant *Myrmecina nipponica* to examine the relationship between decision accuracy and colony size under different circumstances. Results indicate that quorum size increases linearly with colony size. Larger colonies tended to find new sites quicker, but had no advantage in assessing or moving to the new site. Under stressed conditions, colonies lowered their quorum threshold, and this led to more rapid relocations in small colonies but not larger ones. These findings suggest quorum thresholds are core components of the decision-making process and are both linked to colony size and adaptively tuned to the environment. The response to stress may differ with colony size.

Keywords: Consensus decision, group size, quorum, stress.

POSTER 4: A first step towards DNA barcoding of Asian ants: A case of *Crematogaster* in Cambodia

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DNA barcoding is used as an additional and powerful method in integrative taxonomy, and can provide a useful reference for the identification. Here we report a first step toward to DNA barcoding of Asian *Crematogaster* ants. In the course of our recent examination of *Crematogaster* specimens collected from Cambodia, one unique species related to *C. fraxatrix* Forel was found. The Cambodian specimens were very similar to *C. fraxatrix*, but can be distinguished by the dorsoventrally flattened propodeal spiracles and developed subpetiolar process. DNA sequences have been generated for *C. fraxatrix* and the one undescribed species using a mitochondrial COI region with a total of 1134bp. The mean interspecific divergence was 9.4% between the two species. During our field surveys in 2010-2013, seventeen morphospecies of *Crematogaster* were collected from several localities of Cambodia. Seven species were named, but the others not yet. We sequence the workers, then the DNA sequence data can contribute to the correct identification in the future.

Keywords: Asia, *Crematogaster*, DNA barcoding, taxonomy

POSTER 5: Efficacy of biopesticides (plant extract) on Carpenter ant *Camponotus compressus* (Fabricius): The household pest**V. G. Meshram¹, D.D. Barsagade² and Seema G. Kadu²**¹*Dept. of Biochemistry, RTM Nagpur University, Nagpur , (MS), India
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The Carpenter ant *Camponotus compressus* are social insect forming a large colony and habits of excavating a nest in the wood, timber, wide variety of household wood and furniture and consumed store-grains and sweet food. They form a clear ground level trail to their more persisting foraging sites and become nuisance pest during searching of food in houses. To control these household pest the role of plant extract in the integrated pest management system were studied. The ethanolic leaf extract of *Argemone mexicana* , *Annona squamosa* , *Dathura stramonium* , *Ipomoea comea* and *Solanum xanthocarpum* were evaluated for bioefficacy in comparison to synthetic insecticide, Lindan. The Lindan increased *C. compressus* mortality as compared to the leaf extract although the plant extract performed significantly superior over the untreated control. Among the used leaf extract, less infestation and higher mortality were recorded in spraying treatment with the bet of *Ipomea comea* followed by *Dathura stramonium* *Solanum xanthocarpum*, *Argemone mexicana* and *Annona squamosa*. The qualitative phytochemical study reveals the presence higher concentration of alkaloids, glycosides, tannins and phenolic compounds, flavonoids , steroids, triterpenoids and saponines in *Ipomoea comea* than the other plant extract used.

Keywords: Carpenter ant, Biopesticides ,Phytochemicals

**POSTER 6: Diversity of Ants In Leaf Litter At Forest Floor And
Arboreal In Ulu Gombak Forest****Nur Farahin Bt Mustafa***Kajang, Selangor, Malaysia*

This project is about diversity of ants that found in leaf litter at ground and arboreal in Ulu Gombak forest, Gombak, Selangor. The main goals for this project are to compare the diversity of ants in the arboreal and ground leaf litter and also to study the effect of leaf litter size (weight) to the diversity of ants. There are three methods that have been carried out through this project, which are collecting, sorting and identifying. The result shows that the diversity of ants are higher at arboreal than ground leaf litter based on the Simpson's Index of Diversity. Two statistical analyses have been carried out that are T-Test and General Linear Model (GLM) using SPSS in order to see whether there is significant value between the diversity of ants and the leaf litter's size. The p values for T-Test and GLM for ground leaf litter is 1.00, which is higher than 0.05, therefore, there is no significant difference between the diversity of ants and the leaf litter's size. While for arboreal, the p values for T-Test and GLM are 0.128 and 0.126, respectively, which are higher than 0.05. Thus, from the statistic, we can conclude that in this study, there is no significant difference between the diversity of ants in the small and big sample size of leaf litter at both ground and arboreal.

Keywords: Ants, Diversity, Leaf litter-Ground, Arboreal

POSTER 7: Foraging Activity Of *Odontoponera sp.* at the nesting site**Nur Sakinah Bt Mohd Yassin***University Malaya, Malaysia*

This study is about foraging activity of *Odontoponera sp.* from 2 different holes at forested area of University Malaya Diversity Centre, Gombak, Selangor which rich in diversity and species richness. A simple observation method was conducted within 72 hours. 25 of individuals from each hole were captured before being marked using paint markers and released it back to their respective holes. Their activity was recorded by using SONY video cam recorder which has been placed at the hole. The data was analyzed using General Linear Model (GLM) analysis for foraging frequency of each hole within 72 hours which give negative result that is P value, $0.331 > 0.05$. Thus, there was no significant difference between the holes and the successful trips of the ants. In contrast, when GLM analysis was performed to test the significant difference between day and night with 12 interval period, there was significant difference as P, $0.044 < 0.05$. It proved that the ants mostly active during night compared during day and the preferable food for them are Hemipteran which they can get only at night. There were also other behaviors at the nesting site such as bring stone out from the nest, bring stone in, close the nest hole and defense territory.

Keywords: *Odontoponera sp.*, foraging activity, successful trips

**POSTER 8: Distribution and diversity of ant species
(Hymenoptera: Formicidae) in pineapple plantation area of
Peninsular Malaysia**

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Pineapples are the Malaysian leading agricultural commodity. However, Pineapple Mealybug Wilt associated Viruses (PMWaV) is one of the most serious diseases of pineapple and occurs worldwide in all the major pineapple production areas. Mealybugs and ants are known to be involved in the epidemiology. Several species of ants are associated with mealybugs (pink pineapple mealybug, *Dysmicoccus brevipes* (Cockerell), and the grey pineapple mealybug, *D. neobrevipes* Beardsley). The ants assist in the establishment of mealybug colonies, consuming the honeydew produced by the mealybugs, and can have a suppressive effect on the mealybugs' natural enemies. Efforts to control the spread of PMWaV are often directed at control of the ants. The objectives of this study are to determine and identify the diversity species of ants and mealybugs (vector) species in pineapple cultivation. The diversity and abundance of ant species was surveyed in selected pineapple plantations area in Peninsular Malaysia which divided into four regions namely northern region, central region, east-coast region and southern region. Five sampling methods: handling capture over constant time, sugar-protein bait trap, pitfall trap, leaf litter sifting and soil sifting, were conducted each month from January to Ogos 2013, inclusive. A total of 16 morphospecies of Formicidae were collected and there was no significantly different in ants species diversity among the selected pineapple growth area. Therefore, the information from this preliminary study suggests that, subject to confirmation and further clarification, ant species diversity may be used to assist the pest management strategies to control ant species and pineapple mealybugs, vector of PMWaV in minimizing incidences of virus spread and mealybug wilt of pineapple.

Keywords: Ants, PMWaV, mealybugs, species diversity, pineapple

POSTER 9: The participation of ants in detrital food webs in a monsoon tropical forest**Zryanin, V.A.¹, Tiunov, A.V.²**

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The ant fauna of Cat Tien National Park (southern Vietnam) includes about 300 species, and some of them play a crucial role in integrating belowground and aboveground food webs. However seasonal patterns of ant participation in detrital food webs remain poorly studied. We addressed this question in a field experiment using either native tree litter (C3 plants, $\delta^{13}\text{C}$ around -30‰) or the litter of C4 plant *Saccharum spontaneum* (C4 plant, $\delta^{13}\text{C} \sim -12\text{‰}$). In December 2008, meshwork baskets were filled with litter and established either on the soil surface or 20–30 cm above ground. Soil fauna was extracted from the litter after 6 and 12 months, i.e. after dry and wet season, respectively. In total, 27 ant species were obtained, C4 signal ($-23.8\text{‰} < d^{13}\text{C} < -11.7\text{‰}$) was detected in 11 species. During the dry season, the belowground and aboveground carbon was used in nearly equal proportions mainly by ground-dwelling ants. During the wet season, a distinct C4 signal was detected in litter-dwelling ants only above ground. Similar seasonal pattern in the use of litter carbon was detected in collembolans, potential prey of litter-dwelling ants. This assumption is supported by a characteristic increase in $d^{15}\text{N}$ values in collembolans and ants.

Keywords: ants, detrital food webs, ^{13}C and ^{15}N isotopes, seasonal patterns, Vietnam

POSTER 10: Preliminary Study on Effects of Forest Disturbance on Ant Communities at Wungnamkheiw Forestry Training Station, Nakonratchasima Province

Rattanawadee Chareewarn and Decha Wiwatwitaya

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This study carried out at Wungnamkheiw Forestry Training Station, Nakonratchasima Province in June 2012. The objectives were to community structure and species composition in the disturbed areas. The tuna and honey baits were used to collect ants in dry evergreen forest (DEF), *Eucalyptus* plantation (EP), and open area (OA). 50 baits belonging to 25 in tuna and 25 in honey were used in each area. A total of 150 baits were laid. The resulted showed that the most species were occurred in OA (25species), followed by in DEF (23) and in EP (22) respectively. The ants were the highest density in DEF. This density increased 5 times in DEF (1,503 ind./m²) from OA (390) and 2 times from EP (788) whereas in EP increased 2 times from OA. The dominant species were different in each area. *Crematogaster* sp.9 of AMK was the highest density in DEF, *Monomorium destructor* in EP, and *Odontoponera denticulata* in OA. The highest diversity index appeared in OA (2.56), followed by DEF (2.21) and EP (2.00), respectively. The ants were different distribution of dominant species in each area, being *Pheidole dogosi* in DEF, *Diacamma vargans* in EP, and *O. denticulata* in OA. The most specific species were occurred in OA (11 species), followed by in EP (7) and in DEF (5), respectively. The most exotic species were found in EP (4 species), followed by in DEF (3) and in OA (1), respectively. The most invasive species appeared in EP (3 species), followed by in DEF (1) and in OA (1), respectively. The invasive species was one reason for decreasing ant diversity in EP. So, the forest disturbance affected community structure and species composition of ant communities in different level. This study can use the ants as an indicator for disturbed area. It will lead to manage the rehabilitation of forest disturbance.

Keywords: Forest disturbance, ant communities, community structure

**POSTER 11: Ants diversity in selected lowland forest of
Peninsular Malaysia****Noor Izwan, A. and Amirrudin, B. A.**

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Ecological studies of ants in Peninsular Malaysia are limited and many focusing on species inventory resulted in the establishment of local species checklist. This study aims to investigate the diversity and species composition of ants at two lowland forests in Peninsular Malaysia. Data were collected in May 2013 at Sekayu Recreational Forest (SRF), Terengganu and Krau Forest Reserve (KFR), Pahang, Malaysia, through trapping and hand picking. Overall, 794 and 697 individuals of ants belonging to 33 and 22 species were collected from KFR and SRF, respectively. The most abundant species at KFR was *Oecophylla smaragdina* (253 specimens) and at SRF, was *Lophomyrmex bedoti* (280 specimens). Shannon's diversity index shows that KFR was more diverse (2.26) than SRF (1.94). Rarefaction curve of KFR increased rapidly but does not reached an asymptote compare to SRF. The taxonomic distinctness value of KFR was 2.65 (low 2.58; high 2.75) and 2.77 for SRF (low 2.53; high 2.77). In general, KFR has more species than SRF – intact forest may harbour more species than that of partially disturbed one. Cosmopolitan species such as *Oecophylla smaragdina* is common at KFR but was not recorded at SRF because lack of fruit trees at the latter which the species preferred. Although KFR had more species, taxonomic differences between both sites almost differ significantly. Less similar species from none-related taxa made-up the ants assemblages of both community. The finding is still premature and more samplings were needed to examine species composition at both localities. The information of this study however, provides a baseline for further research on ants in Peninsular Malaysia particularly on localities with different environmental perturbations.

Keywords: ants, diversity, rarefaction, taxonomic distinctness

POSTER 12: ANT DIVERSITY AND ITS ROLE IN DIFFERENT LAND USE IN JAMBI

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Conversion of tropical forests, mainly to agricultural area is the most important driver of tropical biodiversity loss. As dominant species in lowland forests, ant species diversity is prone to decline sharply due to forest transformation. This research was conducted to investigate the diversity of ants and its role in different land use. Ecological research was conducted in four types of land-use i.e. forest, jungle rubber, rubber and oil palm plantation, located within two landscapes i.e. Harapan and Bukit Dua Belas in Jambi, Indonesia. Each type of land use, four plots were selected for ant sampling. Ants were collected using baiting methods, combination between tuna and sugar. In total, 64 species of ants belong to 4 subfamilies and 20 genera were recorded from both area of Harapan and Bukit Duabelas. Surprisingly, the highest number of ant species was found in oil palm plantation. In addition, the compositions of ants based on its role showed differ among land-use types. It indicates that land-use change drive ant species composition.

Keywords: ant diversity, land use, forest

**POSTER 13: Diversity of ants in three habitat types in Kalabakan,
Sabah**

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Conversion of natural habitat often leads to serious loss of biodiversity, for example it alters the structure of ant's communities; forest specialist are more abundant in undisturbed forest compared to disturbed forest. Other studies suggest that primary forest encompassed more ants species compared to logged forest as well as in converted habitat such as oil palm plantation. We study ant species composition in different habitat in the Stability of Altered Forest Ecosystem (SAFE) experimental sites and its surrounding areas (Maliau Basin) in Sabah. Ants were collected from old growth forest site, secondary forest site and oil palm plantation areas along 200m long line transects using the Ants of Leaf Litter (ALL) Protocol. Environmental variables such as forest quality, soil pH, soil moisture, and soil temperature were collected as additional information. The preliminary results indicate the actual number of species expected was much higher.

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