RAFFLES BULLETIN OF ZOOLOGY 2009 Supplement No. **22**: 1–3
Date of Publication: 30 Dec.2009

FOURTEENTH INTERNATIONAL MARINE BIOLOGY WORKSHOP 2006: THE MARINE FLORA AND FAUNA OF SINGAPORE

K. S. Tan
Tropical Marine Science Institute, National University of Singapore, 18 Kent Ridge Road, Singapore 119227, Republic of Singapore
Email: tmstanks@nus.edu.sg

Lena Chan
National Biodiversity Centre, National Parks Board, 1 Cluny Road, Singapore 259569, Republic of Singapore
Email: lena_chan@nparks.gov.sg

L. M. Chou
Department of Biological Sciences, National University of Singapore, 14 Science Drive 4, Singapore 117543, Republic of Singapore
Email: dbsclm@nus.edu.sg

Peter K. L. Ng
Raffles Museum of Biodiversity Research, National University of Singapore, 6 Science Drive 2, Singapore 117546, Republic of Singapore
Email: dbsngkl@nus.edu.sg

INTRODUCTION

The 14th International Marine Biological Workshop was held at the Tropical Marine Science Institute on St John's Island in the Singapore Straits from 26th March to 15th April 2006. This workshop was undertaken as part of an international series encompassing wide-ranging research done in Hong Kong and Australia over the last 30 years (e.g. see Morton, 2003; Wells et al., 2005; Davie & Phillips, 2008). Six international participants from Australia, Denmark, The Netherlands and USA together with six local participants attended the workshop proper in Singapore. Possibly due to Singapore's rapid economic growth, sustained coastal development and a fair history of scientific work carried out previously, the response to invitations to participate in the workshop was initially somewhat equivocal and muted. Many marine habitats in Singapore have either entirely disappeared or changed significantly. After all, coastal reclamation had increased the land area of Singapore from some 525 km^2 to the current 720 km^2 in the last 50 years. Singapore's marine flora and fauna, in relative terms, are arguably better known to science than many other tropical countries. Was there anything left in Singapore that is worth studying this millennium? Were we overly optimistic (and naïve) to organize a workshop as part of a distinguished series, which had for a number of recent venues near-pristine marine ecosystems at the scientists' disposal to satisfy their search for new discoveries?

We were mistaken. Participants who came to the workshop were enthusiastic despite the small turnout. St John's Island and other islets in the vicinity were probably never subjected to such scientific scrutiny, and it was not long before the scientists were working hard against time to complete the fieldwork. It was even more heartening to receive manuscripts from non-participants many months after the workshop. This resulted in several more contributions to make up this supplement. Taken together, this volume comprises peer-reviewed, original taxonomic and ecological papers on marine algae, sponges, scleractinian corals, zoanthids, sea anemones, nereidid polychaetes, marine mites, bopyrid isopods, false limpets, sap-sucking slugs, and fish. In addition, a view on how marine habitats in Singapore could be managed sustainably in spite of various inherent limitations, is also included.

The results revealed our surprising ignorance for Singapore's marine biodiversity. A total of 38 new records of marine macroalgae are documented from artificial and natural habitats by Lee et al. (2009), of which nearly a third have their previously known geographical distributions now extended; Lim et al. (2009) documented 64 species of sponges from subtidal communities on navigation buoys, of which eight are new records for Singapore or the region; 33 of the 161 species of scleractinian (hard) coral reported upon by Huang (2009) are new records for Singapore, including a new species of an attached fungiid coral (*Podabacia kunzmanni*) described by Hoeksema (2009). Despite these new findings, the precarious and uncertain position of Singapore's coral reefs is nevertheless real, as revealed by the distribution of sponges in the Southern Islands (de Voogd & Cleary, 2009) as well as via an assessment of historical records of a charismatic coral family, the Fungiidae (Hoeksema & Koh, 2009). Amongst the other cnidarian groups, five

putative species of Zoanthidae are reported for the first time from Singapore (Reimer & Todd, 2009) as well as ten new records of sea anemones (Fautin et al., 2009). The ecological relationship between gorgonian sea fans and a gobioid fish is described in detail by Sih & Chouw (2009). With the higher invertebrates, Chan (2009) provides six new records of nereidid polychaetes from Singapore mangroves. Three new species of marine mites (Bartsch, 2009) and a new species of water mite (Smit, 2009) are also described. A further 40 species of marine mites and one other species of water mite are reported upon for the first time from Singapore. Some 11 species of parasitic isopods living inside various decapod crustaceans, and a similar number of shell-less sacoglossan gastropods living on algae, are described by Markham (2009) and Jensen (2009), respectively. Stone revetments and seawalls are now a predominant intertidal habitat in Singapore. A descriptive ecology and analysis of distribution of species on such revetments is provided by Lee et al. (2009) and Lee & Sin (2009). An account of the reproductive ecology and seasonality of *Siphonaria* on a seawall is given by Chim & Tan (2009). Goh (2009) discusses the challenges of a science-based approach adopted in Singapore to manage and sustain marine habitats amidst various constraints.

The wide range of taxonomic groups covered in this volume reflects the diversity and resilience of marine organisms residing in Singapore despite continued coastal transformation. It is hoped that this collection of articles will provide a necessary baseline for more studies on Singapore biodiversity, their ecology and conservation, so that a better balance can be achieved between development, conservation and rehabilitation of the marine environment, in Singapore and the region.

List of Participants and Contributors (in alphabetical order)

Dr Ilse Bartsch, Forschungsinstitut Senckenberg, Hamburg, Germany

Mr Chan Mun Fei, National Parks Board, Singapore

Mr Chim Chee Kong, National University of Singapore

Dr Daniel Cleary, Universidade de Aveiro, Portugal

Professor Chou Loke Ming, National University of Singapore

Mr Jeff Chouw Fong Wei, National University of Singapore

Professor Daphne Fautin, University of Kansas, USA

Dr Nigel Goh, National Parks Board, Singapore

Dr Bert W. Hoeksema, National Museum of Natural History, Leiden, The Netherlands

Mr Huang Danwei, National University of Singapore

Dr Kathe Jensen, Zoologisk Museum, Copenhagen, Denmark

Dr Esther Koh, Singapore Immunology Network, Agency for Science, Technology and Research, Singapore

Ms Michelle Lee Ai Chin, National University of Singapore

Dr Lawrence Liao, University of Prince Edward Island, Canada

Mr Lim Swee Cheng, National University of Singapore

Dr John C. Markham, Arch Cape Marine Laboratory, Oregon, USA

Dr John D. Reimer, University of the Ryukyus, Japan

Mr Justin Sih Sia Yong, National University of Singapore

Dr Sin Tsai Min, National University of Singapore

Dr Harry Smit, University of Amsterdam, The Netherlands

Ms Ria Tan, www.wildsingapore.com, Singapore

Dr Tan Koh Siang, National University of Singapore

Dr Tan Swee Hee, National University of Singapore

Dr Peter Todd, National University of Singapore

Ms Karenne Tun, National University of Singapore

Dr Nicole de Voogd, National Museum of Natural History, Leiden, The Netherlands

Dr Richard C. Willan, Museum and Art Gallery of the Northern Territories, Darwin, Australia

ACKNOWLEDGEMENTS

The 14th International Marine Biology Workshop held in Singapore was organized by Tan Koh Siang (Tropical Marine Science Institute, National University of Singapore), Lena Chan (National Biodiversity Centre, National Parks Board, Singapore), Chou Loke Ming (Department of Biological Sciences, National University of Singapore) and Peter Ng (Raffles Museum of Biodiversity Research, National University of Singapore). Publication of the workshop proceedings was made possible with funds provided by the National University of Singapore and National Parks Board. The workshop and associated activities leading to this publication could not have been achieved without the hard work and kind help of many people. The participants would like to express their sincere appreciation to the staff of the Tropical Marine Science Institute on St John's Island, Department of Biological Sciences, NUS and National

Biodiversity Centre, National Parks Board for all their help in and around the laboratories, the aquaria, the Zoological Reference Collection and in the field to ensure the smooth running of the workshop: Serene Ang, Jeff Chouw, Michelle Lee, Kelvin Lim, Lim Swee Cheng, Razali bin Duriat, Angie Seow, Justin Sih, Sin Tsai Min, Serena Teo and Yeo Keng Loo (deceased). Special thanks are due to the skippers and crew of the research vessels "Mudskipper" and "Hammerhead" for their kindness and patience during the numerous dive trips out to the Southern Islands. Tan Swee Hee and Martyn Low, as Managing Editor and Assistant Editor of this journal respectively, provided much needed help and expertise during manuscript compilation and proofing of this supplement.

LITERATURE CITED

Bartsch, I., 2009 Psammobiont halacarid mites (Acari: Halacaridae) from St. John's Island, Singapore and remarks on the halacarid fauna of the Malay Peninsula. *Raffles Bulletin of Zoology*, Supplement No. **22**: 173–201.

Chan, W. M. F., 2009. New nereidid records (Annelida: Polychaeta) from mangroves and sediment flats of Singapore. *Raffles Bulletin of Zoology*, Supplement No. **22**: 159–172.

Chim C. K. & K. S. Tan, 2009. Vertical distribution, spawning and recruitment of *Siphonaria guamensis* (Gastropoda: Pulmonata) on a seawall in Singapore. *Raffles Bulletin of Zoology*, Supplement No. **22**: 269–278.

Davie, P. J. F. & J. A. Phillips, 2008. Introduction: The marine flora and fauna of Moreton Bay Workshop - a focus on species. *Memoirs of the Queensland Museum*, **54**: xi–xvii.

Fautin, D. G., S. H. Tan & R. Tan, 2009. Sea anemones (Cnidaria: Actiniaria) of Singapore: abundant and well-known shallow-water species. *Raffles Bulletin of Zoology*, Supplement No. **22**: 121–143.

Goh, N., 2009. Management for long-term sustainability of marine habitats in Singapore: a science-based approach. *Raffles Bulletin of Zoology*, Supplement No. **22**: 279–282.

Hoeksema, B. W., 2009. Attached mushroom corals (Scleractinia: Fungiidae) in sediment-stressed reef conditions at Singapore, including a new species and a new record. *Raffles Bulletin of Zoology*, Supplement No. **22**: 81–90.

Hoeksema, B. W. & E. G. L. Koh, 2009. Depauperation of the mushroom coral fauna (Fungiidae) of Singapore (1860s–2006) in changing reef conditions. *Raffles Bulletin of Zoology*, Supplement No. **22**: 91–101.

Huang D., K. P. P. Yun, L. M. Chou and P. A. Todd, 2009. An inventory of zooxanthellate scleractinian corals in Singapore, including 33 new records. *Raffles Bulletin of Zoology*, Supplement No. **22**: 69–80.

Jensen, K. R., 2009. Sacoglossa (Mollusca: Gastropoda: Opisthobranchia) from Singapore. *Raffles Bulletin of Zoology*, Supplement No. **22**: 207–223.

Lee A. C. & T. M. Sin, 2009. Intertidal assemblages on coastal defence structure in Singapore II. Contrasts between islands and the mainland. *Raffles Bulletin of Zoology*, Supplement No. **22**: 255–268.

Lee A. C., L. M. Liao & K. S. Tan, 2009. New records of marine algae on artificial structures and intertidal flats in coastal waters of Singapore. *Raffles Bulletin of Zoology*, Supplement No. **22**: 5–40.

Lee A. C., K. S. Tan & T. M. Sin, 2009. Intertidal assemblages on coastal defence structure in Singapore I: A faunal study. *Raffles Bulletin of Zoology*, Supplement No. **22**: 237–254.

Lim S.-C., N. J. de Voogd and Koh-Siang Tan, 2009. Fouling sponges (Porifera) on navigation buoys from Singapore waters. *Raffles Bulletin of Zoology*, Supplement No. **22**: 41–58.

Markham, J. C., 2009. A review of the Bopyridae (Crustacea: Isopoda) of Singapore, with the addition of four species to that fauna. *Raffles Bulletin of Zoology*, Supplement No. **22**: 225–236.

Morton, B., 2003. Hong Kong's international malacological, wetland and marine biological workshops (1977–1998): Changing local attitudes towards marine conservation. In: Morton, B. (ed.), *Proceedings of an International Workshop Reunion Conference, Hong Kong 21 -26 October 2001*. Hong Kong University Press, Hong Kong. Pp. 31–71.

Reimer, J. D. & P. A. Todd, 2009. Preliminary molecular examination of zooxanthellate zoanthids (Hexacorallia: Zoantharia) and associated zooxanthellae (Symbiodinium spp.) diversity in Singapore. *Raffles Bulletin of Zoology*, Supplement No. **22**: 103–120.

Sih, J. & J. Chouw, 2009. Fish and whips: use of gorgonians as a habitat by the large whipcoral goby, *Bryaninops amplus* (Larson). *Raffles Bulletin of Zoology*, Supplement No. **22**: 145–157.

Smit, H., 2009. Water mites of the family Pontarachnidae from Singapore, with a description of one new species (Acari: Hydrachnidia). *Raffles Bulletin of Zoology*, Supplement No. **22**: 203–205.

Wells, F. E., D. I. Walker & G. A. Kendrick (eds.), 2005. *Proceedings of the Twelfth International Marine Biological Workshop: The Marine Flora and Fauna of Esperance, Western Australia.* Western Australian Museum, Perth. Volume **1**: i–x, 1–323; Volume **2**: 325–727.

de Voogd, N. J. & D. F. R. Cleary, 2009. Variation in sponge composition among Singapore reefs. *Raffles Bulletin of Zoology*, Supplement No. **22**: 59–67.