

SUPPLEMENTS PUBLISHED

(continued from inside cover)

9. Kurahashi H & Magpayo FR (2000). Blow flies (Insecta: Diptera: Calliphoridae) of the Philippines. Raffles Bulletin of Zoology, Supplement 9: 1–78.
10. Jefferson TA & Smith BD (eds.) (2002) Facultative freshwater cetaceans of Asia: Their ecology and conservation. Raffles Bulletin of Zoology, Supplement 10: 1–187.
11. Ng PKL, Wowor D & Yeo DCJ (eds.) (2002) Scientific results of the Anambas Expedition 2002. Raffles Bulletin of Zoology, Supplement 11: 1–130.
12. Yeo DCJ, Ng PKL & Pethiyagoda R (eds.) (2005) Contributions to biodiversity exploration and research in Sri Lanka. Raffles Bulletin of Zoology, Supplement 12: 1–434.
13. Kottelat M & Yeo DCJ (eds.) (2005) Southeast Asian freshwater fish diversity. Raffles Bulletin of Zoology, Supplement 13: 1–208.
14. Tan H & Jan R-Q (eds.) (2007) Proceedings of the 7th Indo-Pacific Fish Conference. Raffles Bulletin of Zoology, Supplement 14: 1–434.
15. Wang LK & Hails CJ (2007) An annotated checklist of birds of Singapore. Raffles Bulletin of Zoology, Supplement 15: 1–179.
16. Tan SH & PKL Ng (eds.) (2007) Crustacean Supplement I. Raffles Bulletin of Zoology, Supplement 16: 1–357.
17. Ng PKL, Guinot D & Davie PJF (2008) Systema Brachyurorum: Part 1. An annotated checklist of extant brachyuran crabs of the world. Raffles Bulletin of Zoology, Supplement 17: 1–286.
18. Bieler R, Chalermwat K, Mikkelsen PM, Tan KS & Wells E (eds.) (2008) Molluscs of Eastern Thailand: Proceedings of the International Marine Bivalve Workshop, Chantaburi, Thailand, August–September 2005, with contributions on other molluscan groups. Raffles Bulletin of Zoology, Supplement 18: 1–264.
19. Tan SH & Chen I-S (eds.) (2008) Aquatic biodiversity of the South China Sea. Raffles Bulletin of Zoology, Supplement 19: 1–292.
20. Tan SH & MEY Low (eds.) (2009) Crustacean Supplement II. Raffles Bulletin of Zoology, Supplement 20: 1–307.
21. De Grave S, Pentcheff ND, Ahyong ST, Chan T-Y, Crandall KA, Dworschak PC, Felder DL, Feldmann RM, Fransen CHJM, Goulding LYD, Lemaitre R, Low MEY, Martin JW, Ng PKL, Schweitzer CE, Tan SH, Tshudy D & Wetzer R, 2009. A classification of living and fossil genera of decapod crustaceans. Raffles Bulletin of Zoology, Supplement 21: 1–109.
22. Tan KS (ed.) (2009) Fourteenth International Marine Biology Workshop 2006: The marine flora and fauna of Singapore. Raffles Bulletin of Zoology, Supplement 22: 1–294.
23. Low MEY & SH Tan (eds.) (2010) Checklists of anomuran decapod crustaceans of the world (exclusive of the Kiwaoidea and families Chirostylidae and Galatheidae of the Galatheaidea) and marine lobsters of the world. Raffles Bulletin of Zoology, Supplement 23: 1–181.
24. Davison GWH & Chia CSW (eds.) (2011) Proceedings of the fifth International Hornbill Conference, Singapore, 22–25 March 2009. Raffles Bulletin of Zoology, Supplement 24: 1–176.
25. Koh LP, Lee TM & Lim MLM (eds.) (2012) Special Memorial Issue: Navjot S. Sodhi (1962–2011). Raffles Bulletin of Zoology, Supplement 25: 1–289.
26. Kottelat M (2013) Conspectus cobitidum: An inventory of the loaches of the world (Teleostei: Cypriniformes: Cobitoidei). Raffles Bulletin of Zoology, Supplement 26: 1–199.
27. Kottelat M (2013) The fishes of the inland waters of Southeast Asia: A catalogue and core bibliography of the fishes known to occur in freshwaters, mangroves and estuaries. Raffles Bulletin of Zoology, Supplement 27: 1–663
28. Belant JL & Wilting A (eds.) (2013) Methods for detecting and surveying tropical carnivores. Raffles Bulletin of Zoology, Supplement 28: 1–113
29. Davison GWH, Wells DR & Yong HS (2013) Special volume in honour of the 80th birthday: Gathorne Garthorne-Hardy, 5th Earl of Cranbrook. Raffles Bulletin of Zoology, Supplement 29: 1–279
30. Tan HH, Orchard M, Davie PF & Ng PKL (2014) Christmas Island and Cocos (Keeling) Islands: Biodiversity and management challenges. Raffles Bulletin of Zoology, Supplement 30: 1–468



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1. Wee DPC & Ng PKL (1995) Swimming crabs of the genera *Charybdis* De Haan, 1883 and *Thalamita* Latreille, 1829 (Crustacea: Decapoda: Brachyura: Portunidae) from Peninsular Malaysia and Singapore. *Raffles Bulletin of Zoology*, Supplement 1: 1–128.
2. Deeleman-Reinhold CL (1995) The Ochyroceratidae of the Indo-Pacific region (Araneae). *Raffles Bulletin of Zoology*, Supplement 2: 1–103.
3. Ng PKL & Chuang CTN (1996) The Hymenosomatidae (Brachyura) of Southern Asia, with notes on other species. *Raffles Bulletin of Zoology*, Supplement 3: 1–82.
4. Morioka H & Yang CM (1996) A catalogue of the bird specimens in the Singapore Zoological Reference Collection Part I. Struthioniformes–Charadriiformes. *Raffles Bulletin of Zoology*, Supplement 4: 1–141.
5. Kurahashi H, Benjaphong N & Omar B (1997) Blow flies (Insecta: Diptera: Calliphoridae) of Malaysia and Singapore. *Raffles Bulletin of Zoology*, Supplement 5: 1–88.
6. Sodhi NS, Yong HS & Ng PKL (eds.) (1999) The biodiversity of Pulau Tioman, Peninsular Malaysia. *Raffles Bulletin of Zoology*, Supplement 6: 1–288.
7. Allwood AJ, Chinajariyawong A, Drew RAI, Hamacek EL, Hancock DL, Hengsawad C, Jipanin JC, Jirasurat M, Kong Krong C, Kritsaneepaiboon S, Leong CTS & Vijaysegaran S (1999) Host plant records for fruit flies (Diptera: Tephritidae) in Southeast Asia. *Raffles Bulletin of Zoology*, Supplement 7: 1–92.
8. Ng PKL & Tan KS (eds.) (2000) The biodiversity of South China Sea. *Raffles Bulletin of Zoology*, Supplement 8: 1–673.

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