

Synidotea poorei, a new isopod from the fouling community in Singapore waters (Valvifera, Idoteidae)

YIXIONG CAI^{1,2} AND SERENA L. M. TEO³

¹ Tropical Marine Science Institute, National University of Singapore, 14 Kent Ridge Road, Singapore 119223, Republic of Singapore. (caiyixiong@yahoo.com)

² Current address: National Biodiversity Centre, National Parks Board, 1 Cluny Road, Singapore 259569

³ Tropical Marine Science Institute, National University of Singapore, 14 Kent Ridge Road, Singapore 119223, Republic of Singapore. (tmsteolm@nus.edu.sg)

Abstract

Cai, Y. and Teo, S.L.M. 2012. *Synidotea poorei*, a new isopod from the fouling community of Singapore (Valvifera, Idoteidae). *Memoirs of Museum Victoria* 69: 237–243.

Synidotea poorei new species (Idoteidae) is described from fouling community on navigational buoys and jetties in Singapore waters. It belongs to the *S. hirtipes* species group. The new species is characterized by a smooth uropodal peduncle, sub-parallel pleotelson lateral margins and a moderately excavate pleotelson posterior margin. It represents a new record for the genus in Southeast Asia.

Keywords

Fouling, *Synidotea*, new species, marine isopod, Singapore

Introduction

Knowledge of the marine isopod fauna from Southeast Asia is relatively poor, and that of Singapore is even less so. Ten species, represent ten genera in eight families have been reported from Singapore waters. Most of these consist of records within larger works (e.g. Schioedte and Meinert, 1879; Barnard, 1925; Monod, 1926; Menzies and Barnard, 1951; Stock, 1960; Bruce 1986a). A new species of wood-borer, *Limnoria cristata* Cookson and Cragg, 1991, was described from intertidal driftwood in a mangrove forest, and two new species of branchial parasitic isopods have been described from hermit crabs collected in Singapore (Williams and Schuelein, 2005). In 2002, during a survey of the fouling community on the navigational buoys and jetties in Singapore coastal waters, four species of marine isopods, belonging to three families were found in the epifauna and epiflora on the surface of the navigational buoys. *Sphaeroma walkeri* Stebbing, 1905 (Sphaeromatidae) and *Cirolana willeyi* Stebbing, 1904 (Cirolanidae) are reported here for the first time from Singapore. *Sphaeroma walkeri*, originally described from Sri Lanka, has been reported to be a widely distributed introduced species found in various fouling communities (Miller, 1968; Carlton and Iverson, 1981; Mak and Morton, 1985) but it may not necessarily have been introduced to Singapore. *Cirolana willeyi*, also described from Sri Lanka, has been subsequently reported from estuarine and mangrove habitats from East Africa to Australia (Bruce, 1981, 1986b). A third species, of the genus *Cilicaca* (Sphaeromatidae) was also found. The fourth is a new species of *Synidotea* (Idoteidae) described here. Specimens

examined have been deposited in Raffles Museum of Biodiversity Research, National University of Singapore, Singapore (ZRC) and Museum Victoria, Melbourne (NMV). Terminology follows that of Poore and Lew Ton (1993).

Idoteidae Samouelle, 1819

Synidotea Harger, 1878

Synidotea poorei sp. nov.

Figures 1–4

Material examined. Holotype: male, tl 11.4 mm, ZRC.2005.0118, North Pandan Buoy, 1°15'48.12" N, 103°45'10.81" E, Terumbu Pandan, Singapore, coll. Y. Cai, S. L. M. Teo, K. S. Tan and T. M. Sin, 11 Apr. 2002. Paratypes: 25 males, tl 4.6–12.2 mm, 15 females, tl 5.6–8.1 mm, ZRC.2005.0119, data same as holotype; 2 females, 7.4, 10.2 mm; 4 ovigerous females, tl 6.9–8.6 mm; 4 males, tl 10.2–12.9 mm, NVM J62812, data same as holotype. Other specimens: 4 males, tl 6.0–9.1 mm, 2 females, tl 7.0–7.4 mm, ZRC.2005.0120, North West Sudong Buoy, 1°13'07.22" N, 103°42'59.10" E, near Pulau Sudong, Singapore, 19 Jul. 2002; 1 female, tl 8.4 mm, ZRC.2005.0121, Perimbi Buoy, 1°25'45.11" N, 103°53'14.75" E, East Johor Strait, Singapore, coll. Y. Cai, 21 May 2002; 1 male, tl 12.0 mm, ZRC.2005.0122, Retan-D Buoy, 1°17'35.63" N, 103°45'25.48" E, off Sungei Pandan, West Coast, Singapore, coll. Y. Cai, K. S. Tan & S. C. Lim, 17 Oct. 2003; 1 female, tl 5.9 mm, ZRC.2005.0123, Sirdhana Buoy, 1°14'43.00" N, 103°52'55.02" E, off Marina Bay, Singapore, coll. Y. Cai, K. S. Tan, T. M. Sin & S. L. M Teo, 5 Jun. 2002; 6 males, tl 6.2–10.8 mm, 1 female, tl 7.0 mm, ZRC.2005.0124, Mooring Buoys at Marina Bay, Singapore, 1°17'06.26" N, 103°51'20.09" E, coll.

K. S. Tan & S. C. Lim, 14 Jul. 2003; 84 males, tl 6.8-13.2 mm, 54 females, tl 7.3-10.0 mm, ZRC.2005.0125, CAAS2 Buoy, 1°23'38.65" N, 103°59'37.13" E, off Changi Beach, Singapore, coll. Y. Cai, S. L. M. Teo & T. M. Sin, 23 Apr. 2002; 3 males, tl 4.8-10.3 mm, 1 female, tl 8.0 mm, ZRC.2005.0126, Jetty of St John's Island, 1°13'20.95" N, 103°50'56.33" E, Singapore, coll. Y. Cai, 22 Mar. 2004.

Description of male. Maximum size: 11.4 x 4.0 mm (holotype). Body 2.9-3.1 times as long as wide; depressed and smooth, without tubercles or carina, lateral margin smooth. Colour brownish with darker spots. Cephalon frontal margin almost straight, with indistinct median excavation, dorsal surface with anterior and posterior transverse grooves and longitudinal lateral grooves. Eyes bulge outward, forming part of contour of lateral margin of head. Ratio of post-orbital head width to width of pereonite 3 (widest pereonite) 0.56.

Antenna 1 flagellum uniaarticulate, with 10 pairs of jointed aesthetascs. Antenna 2 0.6 body length; article 4 2.4 times as long as wide; article 5 3.6 times as long as wide; flagellum with 16-22 articles, 1.2 length of peduncle.

Dorsum of each pereonite smooth, margin slightly arched; dorsomarginal areas of pereonites 2-7 slightly enlarged, distinctly depressed, lateral margins slightly upturned, marginal areas becoming progressively less depressed, and sloping gently on posterior pereonites; lunettes on pereonites 2-4 with posterior margin subtriangular or rounded; distolateral angle of pereonites 1-4 rounded, those of pereonites 5-7 subrectangular.

Pleotelson about 1.4 times as long as wide, dorsum smooth, evenly convex, lateral margin sub-parallel over anterior two-thirds, then tapering beyond curved margin to rounded posterior margin, with a shallow medial excavation.

Mandible incisor with 4 strong, unequal cusps. Lacinia mobilis stout, 4-cusped, with additional large serrate spine-like process. Molar process large, truncate, surrounded by short spines, bearing laterally 3 stiff setulose setae and many denticles along distal end.

Mesial lobe of maxilla 1 with 2 stout distally serrated robust apical setae with mesial setules; outer lobe with 9 robust tooth-like serrated setae.

Maxilla 2 3-lobed, with plumose, simple and comb setae on endopod as figured; mesial lobe of exopod lined with comb setae, Outer lobe enlarged, recurved laterally, fringed with extremely long plumose setae.

Endite of maxilliped with 1 recurved coupling hook, lined with 7-10 apical moderately slender plumose setae. Palp 3-articulate, last article expanded and fringed with 6-10 long setae. Epipod laminar, distal margin rounded, outer and distal margin fringed with fine setae.

Pereopod 1 carpus triangular, flexor margin densely lined with simple setae and denticles; propodus 1.9 times as long as greatest depth, tapering and curving distally, flexor margin with long simple setae; dactylus elongated, with simple setae.

Pereopods 2-7 similar in form and size, slightly longer than pereopod 1; carpus subrectangular; flexor margins of ischium to propodus densely fringed with simple setae and pubescence; extensor margins of carpus and merus armed with 1 or 2 simple setae; dactylus more elongate and straighter than that of pereopod 1. Pereopod 2 propodus as long as merus and carpus

together, 2.8 times as long as wide. Pereopod 4 propodus 2.4 times as long as wide. Pereopod 7 propodus 3.5 times as long as wide.

Penes fused along entire length, 1.6 times as long as wide, swollen distally, with notched lateral and distal margins.

Pleopods 1 and 2 with plumose marginal setae on endopods and exopods, both rami without sutures. Pleopods 1-3 with about 11, 5 and 3 coupling hooks on inner margin of peduncles respectively. Pleopod 2 with appendix masculina elongated, reaching beyond distal margin of endopod by one-sixth of its length, mostly straight, distal quarter slightly curving medially, with numerous spinules distally. Pleopods 3-5 with few and short simple marginal setae, incomplete transverse suture present from near middle of the outer margin of exopod.

Uropod 2.9 times as long as distal peduncle width, with short, simple setae, no oblique ridges on peduncle, distolateral angle with 3 plumose setae; endopod 0.3 length of peduncle, mesial length 0.7 proximal suture length, suture at 75° to long axis, distal margin truncate, at 75° to long axis, lateral margin gently convex between lateral and distal margins

Female. Maximum size, 7.6 x 3.1 mm (one of paratypes). Body stouter than male, 2.3-2.6 times as long as wide; pleotelson 1.2 times as long as wide; pereonal margins more evenly curved than in male. Antenna 2 with 13-15 articulated flagellum. Maxilla 2 3-lobed, with plumose, simple and comb setae on endopod as figured; both inner and outer lobes of exopod lined with comb setae; no dense pubescence on pereopods 2-7. Oostegites lamellar on pereonites 1-4.

Etymology. The new species is named after Gary C. B. Poore, who has contributed significantly to our understanding of marine isopods in the Indo-Pacific region.

Habitats. The new species was most commonly found in association with macroalgae and hydroids in the fouling community of Singapore waters.

Remarks. Currently, 14 species of the genus *Synidotea* belong to the '*S. hirtipes* group', which was defined as a group of similar species characterized by a smooth body, entire or slightly excavate front of the head, and excavated pleotelson apex (Monod, 1931; Menzies and Miller, 1972; Poore, 1996). The group contains: *S. hirtipes* (Milne Edwards, 1840), *S. laevidorsalis* (Miers, 1881), *S. laticauda* Benedict, 1879, *S. harfordi* Benedict, 1879, *S. variegata*, Collinge, 1917, *S. marplatensis* Giambiagi, 1922, *S. fluviatilis* Pillai, 1954, *S. worlinensis* Joshi and Bal, 1959, *S. brunnea* Pires and Moreira, 1975, *S. hunumantharoei* Kumari and Shyamasundari, 1984, *S. keablei* Poore and Lew Ton, 1993, *S. grisea* Poore and Lew Ton, 1993, *S. oahu* Moore, 2004, and *S. fosteri* Schotte and Heard, 2004. Two more species, *S. innatans* and *S. karumba* from Australia, were just described and added into the group (Poore, 2012).

Synidotea poorei sp. nov. can be separated from *S. hirtipes* easily by its smooth uropodal peduncle (vs. two ridges in *S. hirtipes*). The new species is superficially similar to *S. laevidorsalis*, *S. laticauda*, *S. grisea* and *S. keablei*, but it can be separated from these species by the sub-parallel lateral margin of the pleotelson. It also differs from *S. laevidorsalis*

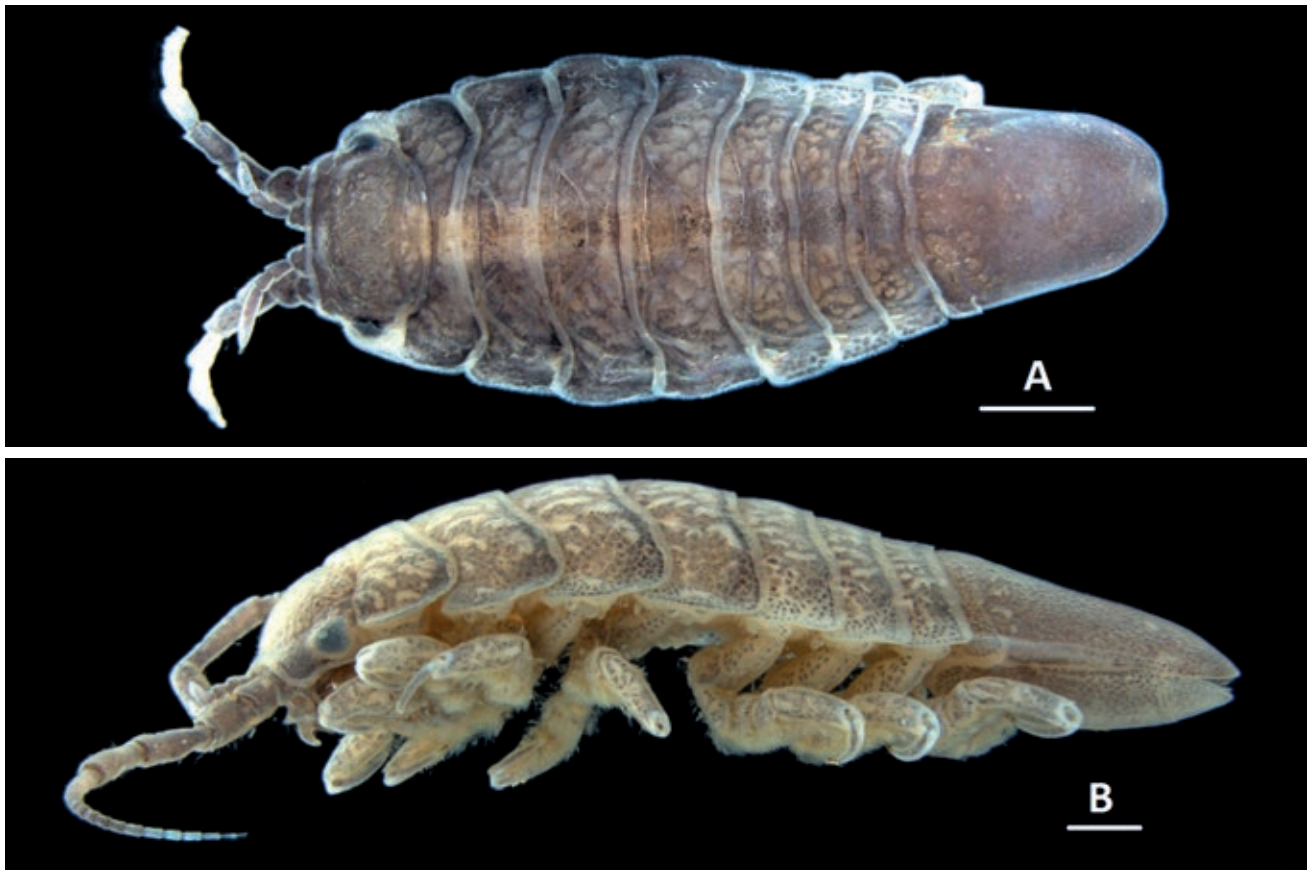


Figure 1. Photographs of *Synidotea poorei*, sp. nov. A. female, tl 7.4 mm, B. male, tl 12.9 mm, NMV. Scale bar = 1 mm.

by the shape of uropodal endopod (fig. 3G vs. fig. 1f in Poore, 1996) and the fused penial plates (fig. 3H vs. fig. 1k in Poore, 1996); from *S. laticauda* by the less excavated posterior end of the pleotelson; and from *S. keablei* by sexual dimorphism of the maxilla 2, and the elongated pleotelson. *Synidotea poorei* sp. nov. can be distinguished from *S. harfordi* by the shape of the lunette on the pereonites 2-4 (rounded vs. triangular) and the overall body form, which is more slender in the latter. *Synidotea poorei* is also similar to *S. brunnea* from which it can be separated by the more elongated antennae 1 and 2, and the shape of uropodal endopod (fig 3G vs. fig. 38 in Pires & Moreira, 1975). *Synidotea poorei*, also resembles *S. variegata* (cf. Collinge, 1917; Pillai, 1963) from which it differs by the more stout peduncle of antenna 2 (fig 3 in Collinge, 1917 vs. fig. 2C), stouter pleotelson (1.3 times as long as wide in female and 1.5 times in male of *S. poorei* vs. 1.7 times in *S. variegata*); and the shallower pleonal suture. With respect to the body form, the cephalon and the pleotelson, *S. poorei* is very similar to the Argentinean species *S. marplatensis*. It can be separated by the much longer appendix masculina (Fig. 3C, D vs. Fig. 4

in Giambiagi, 1922); and the smooth uropodal peduncle (vs. with an oblique ridge). *Synidotea poorei* can also be easily separated from the two recently described species, *S. fosteri* and *S. oahu* by its much longer antenna 2, and the smooth uropodal endopod.

Acknowledgements

The authors would like to thank Tan Koh Siang, Sin Tsai Min and Lim Swee Cheng (TMSI), for assisting in field collections, to Gary Poore (NMV) for helping with photographs and critically reading the manuscript, Niel Bruce (Museum of Tropical Queensland, Queensland Museum, Townsville, Australia), who has confirmed identity for some of fouling isopod species from Singapore. Thanks are also due to MPA (Maritime and Port Authority of Singapore), for granting the permission and providing logistic support for the filed samplings. The present study was financially supported by a research grant from ASTAR (Agency for Science, Technology and Research, Singapore).

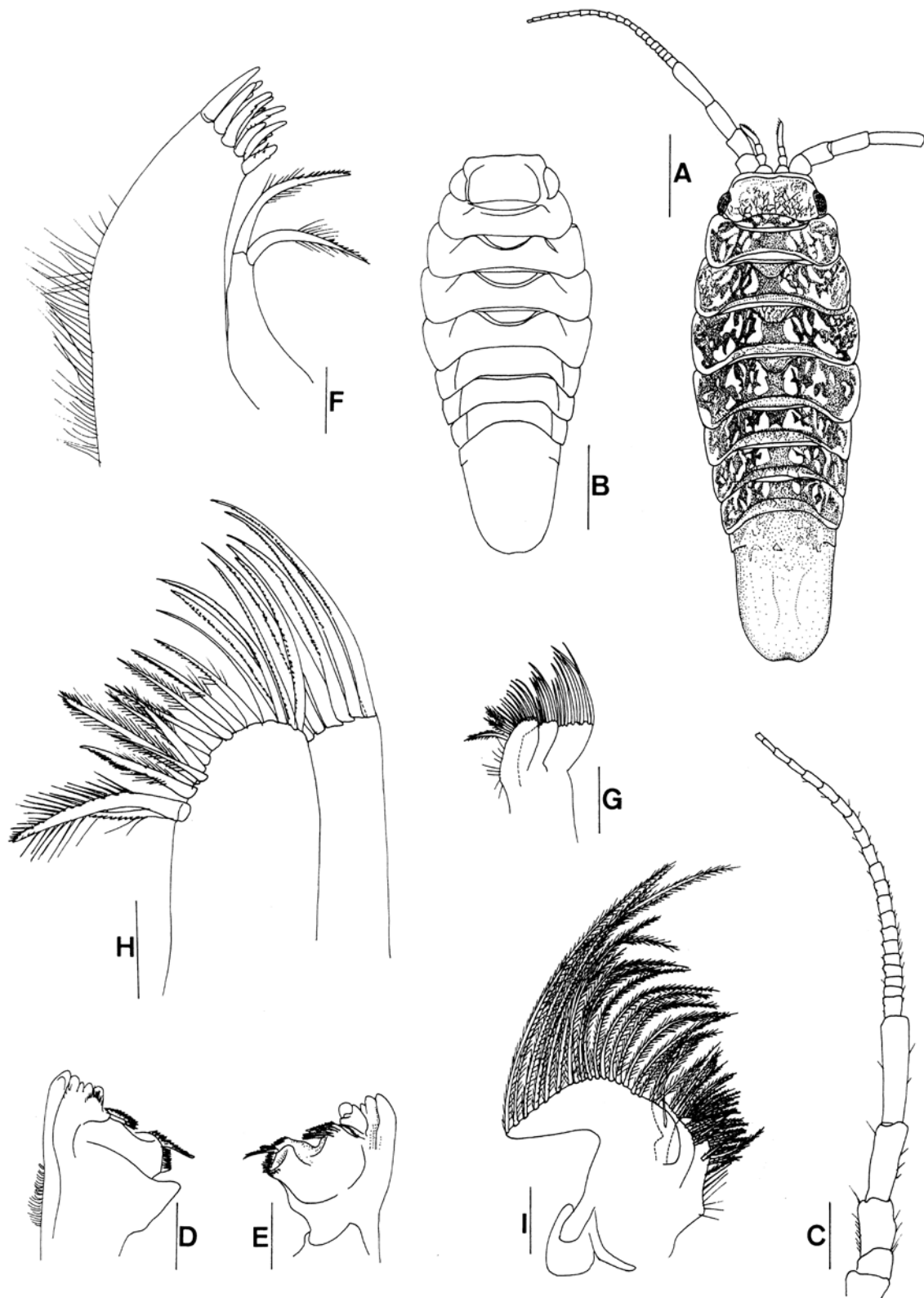


Figure 2. *Synidotea poorei*, sp. nov. A. dorsal view of male specimen, B. dorsal view of female specimen, C. antenna 2, D. right mandible, E. left mandible, F. right maxilla, G, I. maxilla 2, male, H. inner and median lobes of left maxilla 2, male, close up. Scales: A, B=1.5 mm, C=0.5 mm, D, E=0.2 mm, F, H=0.1 mm, G=2 mm.

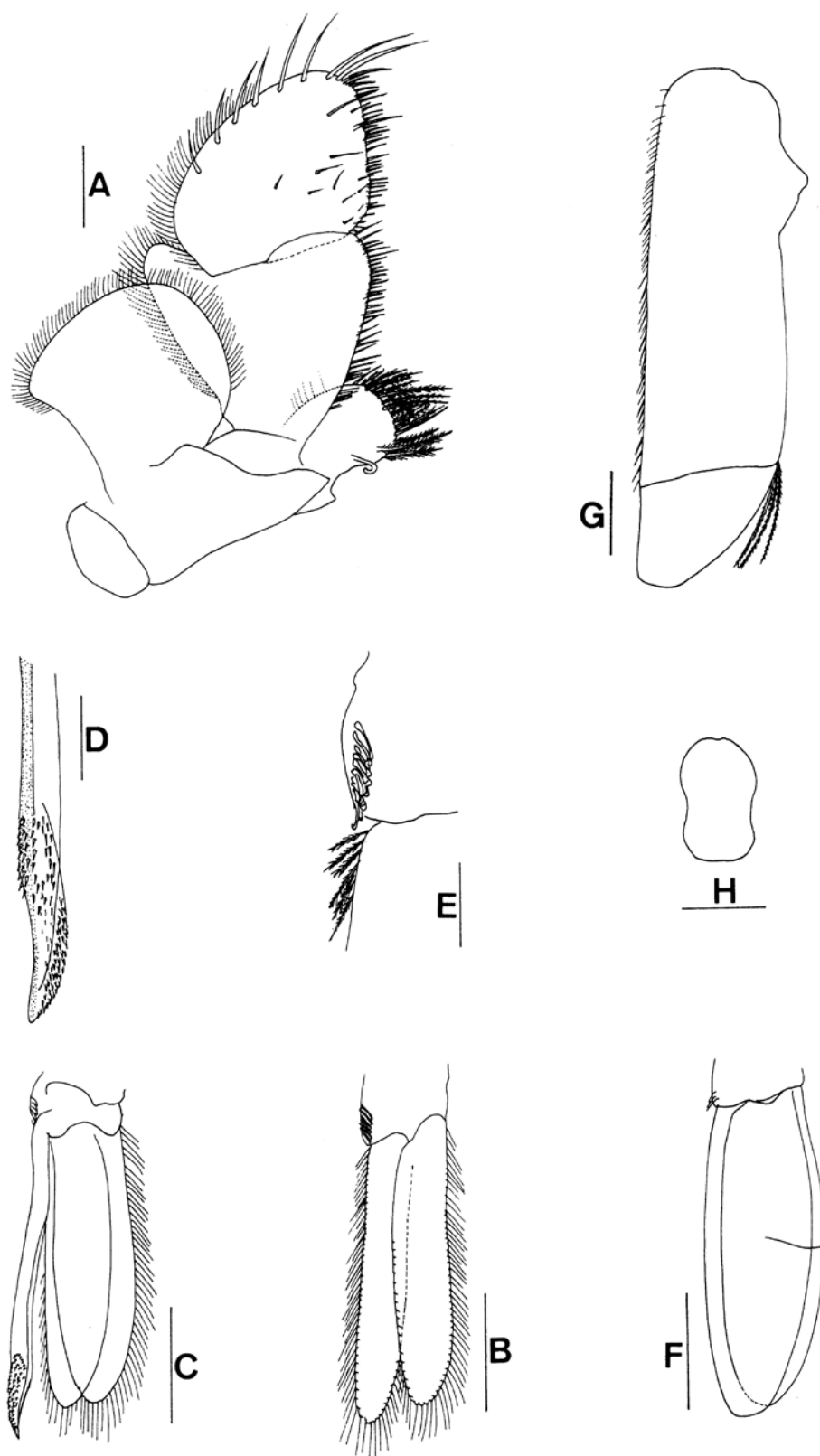


Figure 3. *Synidotea poorei*, sp. nov. A. left maxilliped, B. pleopod 1, male, C. pleopod 2, male, D. appendix masculina of pleopod 2, E. base of pleopod 1, F. pleopod 3, G. right uropod, H. penial papilla. Scales: A, D, E, G, H=0.2 mm, B, C, F=0.6 mm.

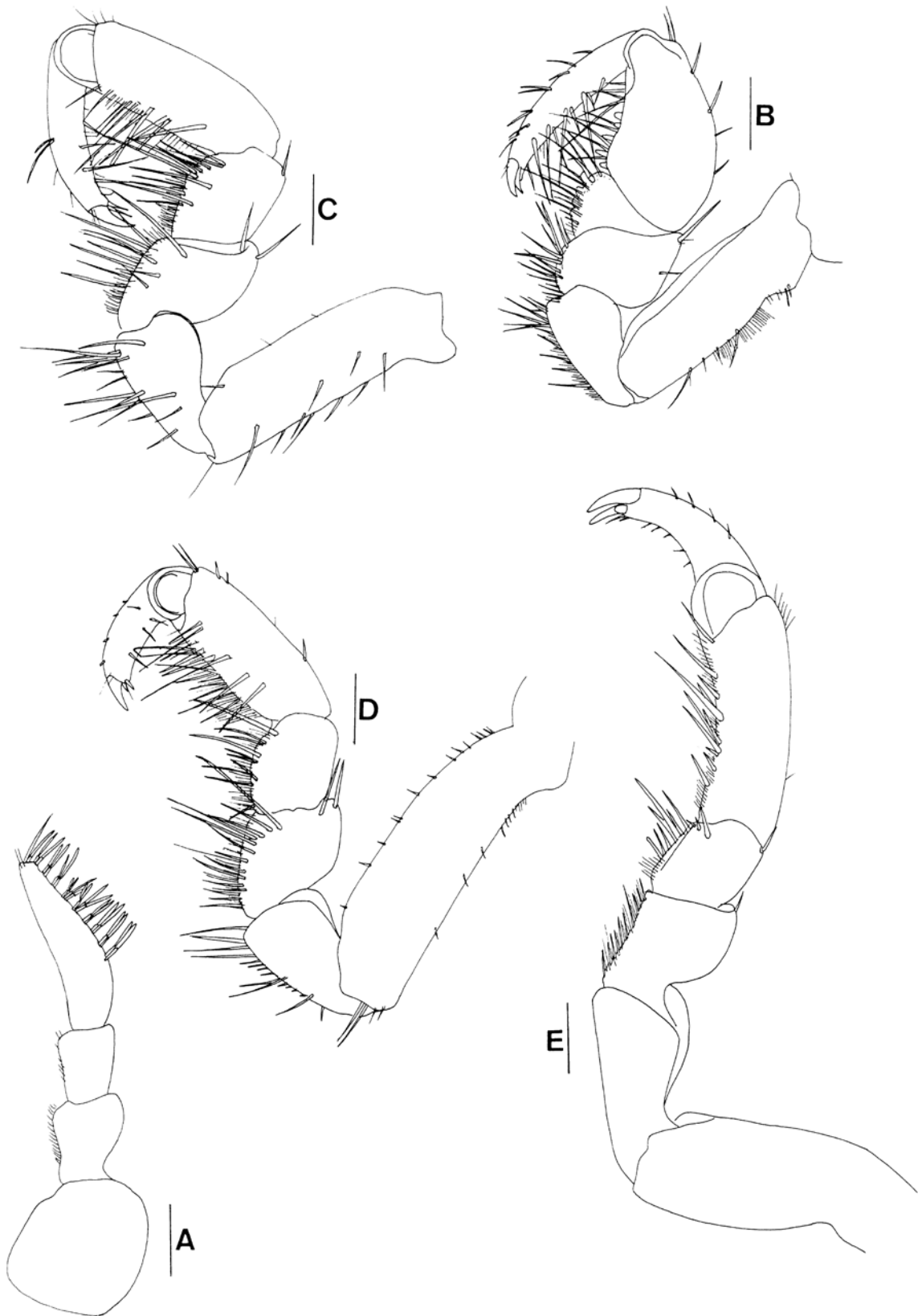


Figure 4. *Synidotea poorei*, sp. nov. A, left antenna 1, B, left pereopod 1, C, left pereopod 2, D, left pereopod 4, E, left pereopod 7. Scales: A-E=0.2 mm.

References

- Barnard, K.H. 1925. A revision of the family Anthuridae (Crustacea Isopoda) with remarks on certain morphological peculiarities. *Journal of the Linnean Society (Zoology)* 36: 109-160.
- Benedict, J.E. 1879. A revision of the genus *Synidotea*. *Proceedings of the Academy of Sciences of Philadelphia* 1897: 387-404.
- Bruce, N.L. 1981. Cirolanidae (Crustacea: Isopoda) of Australia: diagnoses of *Cirolana* Leach, *Metacirolana* Nierstrasz, *Neocirolana* Hale, *Anopsilana* Paulian and Deboutteville, and three new genera-*Natatolana*, *Politolana* and *Cartetolana*. *Australian Journal of Marine and Freshwater Research* 32: 945-966.
- Bruce, N.L. 1986a. Revision of the isopod crustacean genus *Mothocya* Costa, in Hope, 1851 (Cymothoidae: Flabellifera), parasitic on marine fishes. *Journal of Natural History* 20: 1089-1192.
- Bruce, N.L. 1986b. Cirolanidae (Crustacea: Isopoda) of Australia. *Records of the Australian Museum, Supplement* 6: 1-239.
- Carlton, J.T., and Iverson, E.W. 1981. Biogeography and natural history of *Sphaeroma walkeri* Stebbing (Crustacea: Isopoda) and its introduction to San Diego Bay, California. *Journal of Natural History* 15: 31-48.
- Collinge, W.E. 1917. Description of a new species of Isopoda of the genus *Synidotea* Harger, from the Gulf of Mannar. *Records of the Indian Museum* 13:1-3, pl. 1.
- Cookson, L.J., and Cragg, S.M. 1991. *Limnoria cristata* (Isopoda: Limnoriidae), a new species of marine wood-borer from Singapore. *Raffles Bulletin of Zoology* 39: 87-97.
- Giambiagi, D. 1922. Cuatro nuevos isopodos de la Argentina. *Physis (Revista de la Sociedad Argentina de Ciencias Naturales)* 5: 230-244, pls 1-4.
- Harger, O. 1878. Descriptions of new genera and species of Isopoda, from New England and adjacent regions. *American Journal of Sciences and Arts* 15: 373-379.
- Joshi, U.N., and Bal, D.V. 1959. Some of the littoral species of Bombay isopods with detailed description of two new species. *Journal of the University of Bombay (new series)* 27: 57-69.
- Kumari, C.J., and Shyamasundari, K. 1984. A new species of the genus *Synidotea* Harger from the Waltair coast, India (Crustacea: Isopoda: Valvifera). *Journal of the Bombay Natural History Society* 80: 389-393.
- Mak, P.M.S., and Morton, B.S. 1985. *Sphaeroma walkeri* Stebbing (Isopoda, Sphaeromatidae) introduced into and established in Hong Kong. *Crustaceana* 49: 75-82.
- Menzies, R.J. and Barnard, J.L. 1951. The isopodan genus *Iais* (Crustacea). *Bulletin of the Southern California Academy of Sciences* 50: 136-151.
- Menzies, R.J., and Miller, M.A. 1972. Systematics and zoogeography of the genus *Synidotea* (Crustacea: Isopoda) with an account of Californian species. *Smithsonian Contributions to Zoology* 102: 1-33, figs 1-12.
- Miers, E.J. 1881. Revision of the Idoteidae, a family of sessile-eyed Crustacea. *Journal of the Linnean Society of London*, 16: 1-88.
- Miller, M.A. 1968. Isopoda and Tanaidacea from buoys in coastal water of the continental United States, Hawaii, and the Bahamas (Crustacea). *Proceedings of the United States National Museum* 125: 1-53.
- Milne Edwards, H. 1840. *Histoire naturelle des Crustacés, comprenant l'anatomie, la physiologie et la classification de ces animaux*. Vol. 3. Librairie Encyclopédique de Roret: Paris. 638 pp.
- Monod, T. 1926. Les Gnathiidae. Essai monographique (morphologie, biologie, systématique). *Mémoires de la Société des Sciences Naturelles du Maroc* 12: 1-667.
- Monod, T. 1931. Sur quelques Crustacés aquatiques d'Afrique (Cameroun et Congo). *Revue de Zoologie et de Botanique Africaine* 21: 1-36.
- Moore, W. 2004. Description of a new *Synidotea* species (Crustacea: Isopoda: Valvifera: Idoteidae) from Hawaii. *Proceedings of the Biological Society of Washington* 117: 76-87.
- Pillai, N.K. 1954. A preliminary note on the Tanaidacea and Isopoda of Travancore. *Bulletin of the Central Research Institute, University of Travancore* (C) 3: 1-21.
- Pires, A.S. and Moreira, P.S. 1975. Two new species of *Synidotea* (Crustacea, Isopoda, Valvifera) from Brazil. *Boletim do Instituto Oceanográfico, São Paulo* 24: 46-67.
- Poore, G.C.B. 1996. Species differentiation in *Synidotea* (Isopoda: Idoteidae) and recognition of introduced marine species: a reply to Chapman and Carlton. *Journal of Crustacean Biology* 16: 384-394.
- Poore, G.C.B. 2012. Four new valviferan isopods from diverse tropical Australian habitats (Crustacea: Isopoda: Holognathidae and Idoteidae). *Memoirs of Museum Victoria* 69: 00-00.
- Poore, G.C.B., and Lew Ton, H.M. 1993. Idoteidae of Australia and New Zealand (Crustacea: Isopoda: Valvifera). *Invertebrate Taxonomy* 7: 197-278.
- Schioedte, J.C., and Meinert, F.W. 1879. Symbolae ad Monographiam Cymothoarum Crustaceorum Isopodum Familiae 1. Aegidae. *Naturhistorisk Tidsskrift* 12: 321-414.
- Schotte, M., and Heard, R. 2004. A new species of *Synidotea* (Crustacea: Isopoda: Valvifera) from the northern Gulf of Mexico. *Proceedings of the Biological Society of Washington*, 117: 88-94.
- Stebbing, T.R.R. 1904. Marine crustaceans. XII, Isopoda, with description of a new genus. In Gardiner, J. S., *The fauna and geography of the Maldives and Laccadive Archipelagoes*, 2: 699-721.
- Stebbing, T.R.R. 1905. Report on the Isopoda collected by Professor Herdman, at Ceylon, in 1902. *Report to the Government of Ceylon on the Pearl Oyster Fisheries of the Gulf of Manaar (by W.A. Herdman)*. Part 4. *Supplementary Report* 23: 1-64, pls 1-12.
- Stock, J.H. 1960. Notes on Epicaridea. *Crustaceana* 1: 28-33.
- Samouelle, G. 1819. *The entomologists' useful compendium; or an introduction to the knowledge of British Insects, comprising the best means of obtaining and preserving them, and a description of the apparatus generally used; together with the genera of Linné, and modern methods of arranging the Classes Crustacea, Myriapoda, spiders, mites and insects, from their affinities and structure, according to the views of Dr. Leach. Also an explanation of the terms used in entomology; a calendar of the times of appearance and usual situations of near 3,000 species of British Insects; with instructions for collecting and fitting up objects for the microscope*. Thomas Boys: London. 496, 412 pls.
- Williams, J.D., and Schuerlein, L.M. 2005. Two new species of branchial parasitic isopods (Crustacea: Isopoda: Bopyridae: Pseudioninae) from hermit crabs collected in Singapore. *Proceedings of the Biological Society of Washington* 118: 96-107.