

The giant deep-sea scavenger genus *Bathynomus* (Crustacea, Isopoda, Cirolanidae) in the Indo-West Pacific

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ABSTRACT

Based on new material from the western Pacific and Indian Oceans, the deep-sea scavenging genus *Bathynomus* is revised. Six species are redescribed: *Bathynomus affinis* Richardson, 1910 (range extended to the Arafura and Timor Seas), *B. decemspinus* Shih, 1972, *B. doederleini* Ortman, 1894 (range extended to San Bernardino Strait, Philippine Islands), *B. immanis* Bruce, 1986 (range extended to Astrolabe Bay, Bismarck Sea), *B. kapala* Griffin, 1975 (range extended to off the Great Barrier Reef, Coral Sea) and *B. pelor* Bruce, 1986. *Bathynomus propinquus* Richardson, 1910 is considered to be a *nomen dubium*. Six new species are described: *B. brucei* n. sp. from off the Great Barrier Reef, Coral Sea; *B. bruscai* n. sp. from off the Great Barrier Reef, Coral Sea and Astrolabe Bay, Bismarck Sea; *B. crosnieri* n. sp. from off Madagascar, western Indian Ocean; *B. keablei* n. sp. from off the Malabar Coast, Arabian Sea; *B. kensleyi* n. sp. from the South China Sea, the Sulu Sea and the Coral Sea; *B. richeri* n. sp. from off New Caledonia, plus *Bathynomus* sp. from the Gulf of Aden. *Bathynomus giganteus* A. Milne Edwards, 1879 is reported for the first time from the east coast of the United States. Two distinct groups occur in *Bathynomus*, a lineage of giant species which mature at about 150 mm length and a lineage of supergiant species which can grow to 500 mm in length. The greatest diversity of *Bathynomus* occurs between latitudes 20°N and 20°S on the Indian-Australian plate. Outlying species occur on plates in the western North Pacific and the western Atlantic.

RÉSUMÉ

Le genre de nécrophage géant de profondeur *Bathynomus* (Crustacea: Isopoda: Cirolanidae) de l'Indo-Pacifique occidental.

Le genre d'isopode nécrophage *Bathynomus* est révisé à partir de matériel nouveau du Pacifique occidental et de l'Océan Indien. Six espèces sont redécrites: *Bathynomus affinis* Richardson, 1910 (répartition étendue jusqu'aux mers d'Arafura et de Timor), *B. decemspinus* Shih, 1972, *B. doederleini* Ortman, 1894 (répartition étendue jusqu'au détroit de San Bernardino, aux Îles Philippines), *B. immanis* Bruce, 1986 (répartition étendue jusqu'à la Baie de l'Astrolabe, en mer de Bismarck), *B. kapala* Griffin, 1975 (répartition étendue jusqu'au large de la Great Barrier Reef, en mer du Corail) et *B. pelor* Bruce, 1986. *Bathynomus propinquus* Richardson, 1910 est considéré comme un *nomen dubium*. Six espèces nouvelles sont décrites: *B. brucei* n. sp. au large de la Great Barrier Reef, mer du Corail; *B. bruscai* n. sp. au large de la Great Barrier Reef, en mer du Corail et dans la Baie de l'Astrolabe, en mer de Bismarck; *B. crosnieri* n. sp. au large de Madagascar, Océan

Indien occidental ; *B. keablei* n. sp. au large des côtes Malabar, en mer d'Arabie ; *B. kensleyi* n. sp. de la mer de Chine méridionale, de la mer de Sulu et de la mer du Corail ; *B. richeri* n. sp. au large de la Nouvelle-Calédonie. Il s'y ajoute *Bathynomus* sp. du Golfe d'Aden. *Bathynomus giganteus* est signalé pour la première fois de la côte est des États-Unis. Le genre *Bathynomus* présente deux groupes distincts, une lignée d'espèces géantes qui sont matures à une taille d'environ 150 mm et une lignée d'espèces super-géantes qui peuvent atteindre une taille de 500 mm. La plus grande diversité d'espèces de *Bathynomus* se rencontre entre les latitudes 20°N et 20°S sur la plaque australo-indienne. Les espèces non traitées ici se rencontrent dans le Pacifique Nord ouest et l'Atlantique ouest.

INTRODUCTION

Bathynomus is the dominant scavenging isopod genus in the deep sea, well known because of its gigantism. Even so the first species, *B. giganteus* A. Milne Edwards, was not described until 1879. Holthuis and Mikulka (1972) gave a thorough history of the taxonomy, which at that time contained only four species. Since then a further six species have been described (see Bruce 1986; Magalhães & Young 2003; Bruce & Bussarawit 2004). Wetzer (1986) gives an excellent popular account of the group.

Bathynomus is essentially a deep sea genus with a restricted distribution from about 35° north to 35° south in the Indo-West Pacific and western Atlantic Ocean. In this paper the genus is divided into two groups: giants, which mature at around 150 mm length and supergiants which mature above 150 mm and can grow to 500 mm in length.

Based on extensive new collections in the Museu Nacional, Rio de Janeiro, made during the Revizee Program off the coast of Brazil, Magalhães & Young (2003) redescribed the supergiants *B. giganteus* A. Milne Edwards, 1879 and *B. miyarei* Lemos de Castro, 1978 and described *B. obtusus*, the first record of giants from the western Atlantic Ocean.

Recent collections, particularly from the Australian Museum, Sydney, the Muséum national d'Histoire naturelle, Paris, the Museum and Art Galleries of the Northern Territory, Darwin and the Zoological Museum, University of Copenhagen, indicate that *Bathynomus* is a more diverse genus than was previously thought, with a mainly Indo-West Pacific distribution. Because of large collections made in 1993-1994 during the SEAS (Scavengers of Eastern Australian Seas) Project and the discovery of three new species off the Great Barrier Reef, we were asked by Alain Crosnier (Muséum national d'Histoire naturelle) and Niel Bruce (then at the Zoological Museum, University of Copenhagen) to revise this genus based on world collections. In this paper we redescribe the six known Indo-West Pacific species of *Bathynomus* and describe six new species (see species list below).

One species, *Bathynomus propinquus* Richardson, 1910, is problematical. The original description is based on an immature specimen (holotype, USNM 40909) 55 mm in length from off Santiago, western Luzon, Philippine Islands in 722 m depth. Because it is immature and small it is not possible to predict the adult size - whether it will be a giant or a supergiant. One of us (JKL) examined the type in October 2003 at the Los Angeles County Museum of Natural History. The pleotelsonic spines are very short and straight. The spines show no signs of curving up as adults of some species from the area do, but that character may develop with increasing size and maturity. There are five prominent spines on each side of the pleotelson and one broken spine in the center. On the left side there is a small lateral spine, but not on the right, so there are 12 spines in all. Species with this number of spines are *B. giganteus*, *B. kensleyi* n. sp., *Bathynomus* sp. from the Gulf of Aden (another juvenile) and occasionally *B. pelor*. The setal fringe is continuous along the lateral margin of the exopod and this characteristic eliminates all species but *B. pelor* and specimens of *B. kensleyi* from off Hong Kong. These two species have upwardly curved pleotelsonic spines. The robust setae on the anterodistal margin of pereopod 2 are broken and indeterminable. Based on this information we conclude that *B. propinquus* does not show critical adult species characters. *Bathynomus kensleyi* is the only species known from this area, but we know nothing about the juvenile characteristics of this species. It is concluded that *B. propinquus* is both unidentifiable and unlikely ever to have its identity resolved and is therefore here treated as a *nomen dubium*.

Historical collections of *Bathynomus* from the Indian Ocean, made by A. Alcock on the *Investigator*, were summarised by Lloyd (1908). The majority (7 specimens) came from the Arabian Sea, mainly off the south-western coast of India between 1000 and 1500 m depth. Of the other specimens one male came from north-east of Sri Lanka in the Bay of Bengal

and one large mature ovigerous female came from off Pegu, Burma. All of this material was referred to as *B. giganteus*. The female was illustrated in his paper. Based on the uropods and pleotelson this specimen appears to be *B. keablei* n. sp., but a lot of other characters are not known. Our specimen of *B. keablei* is about 198 mm long and Lloyd's female was 202 mm. The only other specimen Lloyd discussed in detail is a mature male (270 mm long) from north-east of Sri Lanka. It is probably not the same species as the Burma specimen. Based on the literature, it is impossible to know what the other specimens are, but the material from off Goa is probably *B. keablei*. The remaining material from the Gulf of Aden is probably a new species, but the only specimens are immature and therefore not described.

Bruce & Bussarawit (2004) described *B. lowryi* from the Andaman Sea. This species was collected by Charatsee Aungtonya (Phuket Marine Biological Centre) during the five-year BIOSHELF Project which studied the biodiversity of the Andaman Sea. *Bathynomus lowryi* cannot be confused with any of the material studied by Lloyd (1908) because of the pleotelsonic spines which are upwardly curved instead of being straight.

Recent Indo-West Pacific collections used in this study have come from a number of sources. Alain Crosnier, collected *B. crosnieri* during ORSTOM cruises in the western Indian Ocean near Madagascar during 1969 and *Bathynomus* sp. in the Gulf of Aden during 1972. Niel Bruce (then at the Queensland Museum) received an interesting collection in 1985 from near Marion Reef in the Coral Sea which contained three species (*B. immanis*, *B. kapala* and *B. kensleyi* n. sp.) from this rather small area. The famous MUSORSTOM 2 expedition (November, 1980), searching for *Neoglyphea* in the Philippine Islands, also collected specimens of *B. kensleyi* n. sp. During the summer of 1991 Jim Lowry and Stephen Keable, working at the Christensen Research Institute, Madang, collected *B. bruscai* and *B. immanis* in Astrolabe Bay, northern Papua New Guinea. Using commercial fishing boats more than 200 collections were made mainly by the authors and other Australian Museum staff during the SEAS Project off the east coast of Australia in 1993 and 1994 (Lowry & Smith 2003). Transects across the continental shelf and slope were set at six locations between Cairns in the north and Hobart in the south. Baited traps were set at depths of 50, 100, 200, 300, 400, 600 and 1000 m. More than 2000 specimens of five species (*B. brucei*, *B. bruscai*, *B. immanis*, *B. kapala* and *B. kensleyi*) were collected. ORSTOM collections made by Bertrand Richer de Forges in 1993 on the *NO Alis* indicated a supergiant species from New Caledonia. In 1995 Richer de Forges and Lowry trapped a large collection of these animals off the east coast of New Caledonia in 530 m depth. Between 1996 and 1999, several biologists, Peter Ng (National University of Singapore), Shane Ahyong and John Paxton (Australian Museum) collected *B. doederleini* during cruises with the commercial fishing fleet off north-eastern Taiwan. These collections, taken together, form the basis of this study.

CHARACTERS

Most of the collections on which our study is based do not contain large numbers of specimens so that new species are often based on only a few specimens. Morphological diversity in *Bathynomus* is not great and so it has been difficult to determine character variation within species although this is undoubtedly important.

Numbers of robust setae along the carpus and propodus of pereopods 1 and 2 and along the margins of the uropodal endopods and exopods vary between species. These counts are included in the species descriptions, but because of the size range within species and the usually small sample size they have not been used as diagnostic characters.

Body size splits *Bathynomus* into two groups, the giants and the supergiants. The giants mature in a size range from about 80 to 140 mm and the supergiants mature in a size range between about 170 mm to 500 mm.

Pleotelsonic spines extend around the distal margin of the pleotelson. There is always a number of prominent spines with a small lateral spine on each side. They range in number from 7, 9, 11 to 13 and in some species there appears to be some overlap. Pleotelsonic spines occur in two shapes: straight and upwardly curved. All giant species have straight spines. Among the supergiants there are species with straight pleotelsonic spines (*B. keablei*, *B. crosnieri*, *B. giganteus*, *B. miyareii*, *B. richeri*) and species with upwardly curved pleotelsonic spines (*B. kensleyi* and *B. lowryi*).

The setal fringe on the outer margin of the exopod is also an important character for dividing *Bathynomus* into groups of species. In this study the fringe is divided into three states: continuous along the lateral margin (more than 80%); of

medium length (extending along 65 to 77% of the margin) or short (extending along 50 to 64% of the margin). In species where the fringe is short there is an obvious change in the direction of the margin.

The central pleotelsonic spine is usually simple, but in four species (*B. bruscai*, *B. decemspinus*, *B. kapala* and *B. pelor*) the spine is bifid.

A set of characters which appears to distinguish species of *Bathynomus* is the shape of the lateral, medial and distal margins of the uropodal endopods and exopods and the distal corners. These characters, taken together determine the shape of the rami, an obvious difference between species of *Bathynomus*.

There are several apparent autapomorphies or restricted synapomorphies among species of *Bathynomus*. Perhaps the most unusual is the ridge that runs across the front of the head in all species. Normally it is discontinuous, dipping down between the eyes, but in *B. bruscai* it forms a continuous ridge across the front of the head. The pleotelsonic spines are straight in nearly all species, but in two supergiant species, *B. kensleyi* and *B. lowryi*, the spines upwardly curved.

DISTRIBUTION

If we look at a cross section of the sea floor off the Great Barrier Reef there are at least four species of *Bathynomus* separated by depth. Between about 180 and 400 m depth the common giant species *B. immanis* occurs. At 400 to 600 m depth a second giant species, *B. bruscai* occurs. Between about 600 m and 1000 m a third giant species, *B. brucei* occurs and from the base of the continental slope at about 1000 m and beyond the supergiant *B. kensleyi* occurs.

Bathynomus immanis is usually rare around 200 m depth, but very common between 300 and 400 m depth. In this depth range it dominates the scavenging guild to the exclusion of other potential scavengers. However in about 180 m depth off the Swain Reefs a large population of *B. immanis* occurs on the trawling grounds of a fishery for the eastern king prawn *Melicertus plebejus* (Hess). This apparently isolated population may be a consequence of the extremely large amount of bycatch generated by this fishery (up to 900 kg for every 1000 kg landed).

Off New Caledonia and in Astrolabe Bay, northern Papua New Guinea our data is not good, but species stratification by depth may also occur. Off New Caledonia only the supergiant *Bathynomus richeri* occurs in 530 to 660 m depth. In Astrolabe Bay *Bathynomus immanis* and *B. bruscai* occur in depths of 450 to 500 m. We have not been able to sample deeper, but we suspect that *B. kensleyi* occurs there in depths below 1000 m.

Further north we have even less data. In the South China Sea the obscure giant *B. decemspinus* is known from off south-western Taiwan in 70 to 80 m, and the supergiant *B. kensleyi* is recorded from 300 to 1000 m depth. In the Sulu Sea the giant *B. affinis* is known from 560 m depth and the supergiant *B. kensleyi* is recorded from 2500 m depth, the deepest record for any species of *Bathynomus*. Off Japan, south-western, north-eastern and eastern Taiwan and in the eastern Philippines the giant *B. doederleini* occurs at depths of 100 to 700 m.

No giants are known from the Indian Ocean. The supergiant *B. lowryi* occurs in the eastern Andaman Sea, the supergiant *B. keablei* occurs off the coasts of India (400 to 1330 m) and off Madagascar the supergiant *B. crosnieri* occurs at depths of 150 to 705 m.

In the Gulf of Mexico only the supergiant *B. giganteus* occurs from 200 m to 1800 m depth and no giant species is found. To the north *B. giganteus* occurs off the coast of Georgia, USA (31°N) in 775 m depth. This is the first record of *B. giganteus* from the east coast of the United States. One specimen, 450 mm, GMBL 85-90, off Georgia, USA (31°07.4'N 78°32.1'W), trap on coarse sand and coral debris, about 710 m, J. Wise aboard R.V. *Oregon*, 16 October, 1985.

However off the coast of Brazil two supergiants occur, *B. giganteus* and *B. miyarei*, and a smaller giant species, *B. obtusus*, occurs in 230 to 840 m depth. Along this coast the supergiant, *B. miyarei* is known from near the equator to about 29° south and occurs in 20 to 800 m depth. *Bathynomus obtusus* has a narrower latitudinal range, about 14° to 20° south and a narrower depth range, from about 230 to 850 m depth. *Bathynomus giganteus* occurs off this coast to about 21° south, but is apparently confined to depths below 800 m. A recent collection from off Rio Ceará, Brazil, published on the web by Veronica Ruiz, contained the largest specimen (500 mm in length) known.

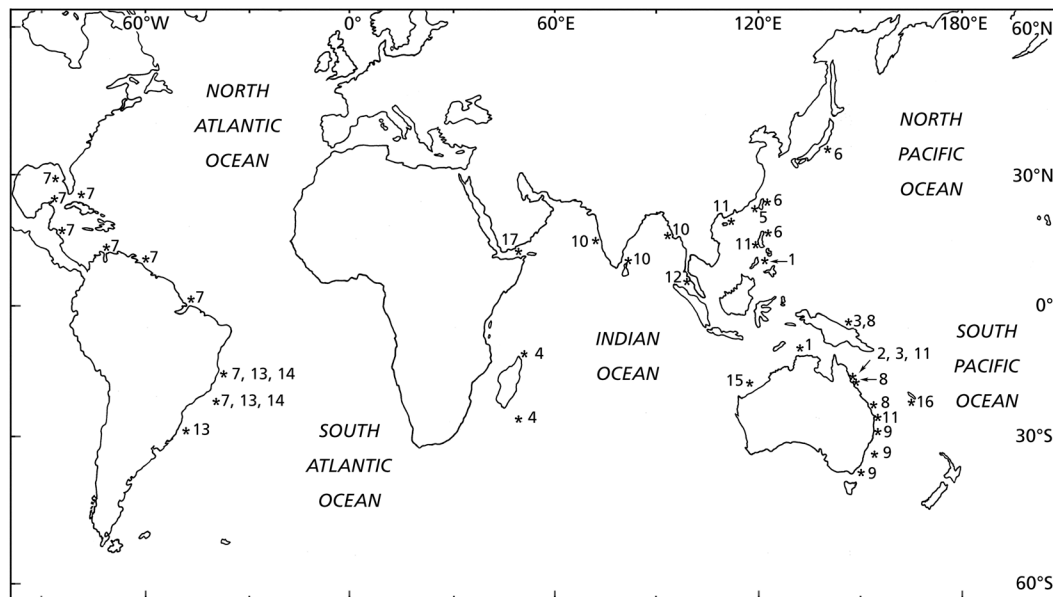


FIG. 1. World distribution of *Bathynomus*: 1, *Bathynomus affinis* Richardson, 1910; 2, *Bathynomus brucei* n. sp.; 3, *Bathynomus bruscai* n. sp.; 4, *Bathynomus crosnieri* n. sp.; 5, *Bathynomus decemspinus* Shih, 1972; 6, *Bathynomus doederleini* Ortman, 1894; 7, *Bathynomus giganteus* Milne Edwards, 1879; 8, *Bathynomus immanis* Bruce, 1986; 9, *Bathynomus kapala* Griffin, 1975; 10, *Bathynomus keablei* n. sp.; 11, *Bathynomus kensleyi* n. sp.; 12, *Bathynomus lowryi* Bruce & Bussarawit, 2003; 13, *Bathynomus miyarei* Lemos de Castro, 1978; 14, *Bathynomus obtusus* Magalhães & Young, 2003; 15, *Bathynomus pelor* Bruce, 1986; 16, *Bathynomus richeri* n. sp.; 17, *Bathynomus* sp.

FIG. 1. Répartition mondiale des *Bathynomus* : 1, *Bathynomus affinis* Richardson, 1910 ; 2, *Bathynomus brucei* n. sp. ; 3, *Bathynomus bruscai* n. sp. ; 4, *Bathynomus crosnieri* n. sp. ; 5, *Bathynomus decemspinus* Shih, 1972 ; 6, *Bathynomus doederleini* Ortman, 1894 ; 7, *Bathynomus giganteus* Milne Edwards, 1879 ; 8, *Bathynomus immanis* Bruce, 1986 ; 9, *Bathynomus kapala* Griffin, 1975 ; 10, *Bathynomus keablei* n. sp. ; 11, *Bathynomus kensleyi* n. sp. ; 12, *Bathynomus lowryi* Bruce & Bussarawit, 2003 ; 13, *Bathynomus miyarei* Lemos de Castro, 1978 ; 14, *Bathynomus obtusus* Magalhães & Young, 2003 ; 15, *Bathynomus pelor* Bruce, 1986 ; 16, *Bathynomus richeri* n. sp. ; 17, *Bathynomus* sp.

All species currently known from the Indian Ocean, the Andaman Sea, the South China Sea and the Philippines have been taken in trawls, but trapping gives more precise information. There is a need for trapping on the continental shelves and slopes in all of these areas to look for more species and for evidence of vertical displacement. At the moment it appears that giants only occur from Japan to Australia in the Indo-West Pacific and along the Brazilian coast in the western Atlantic. Where giants occur they appear to displace supergiant species, with the possible exception of the *B. miyarei* and *B. obtusus* situation in Brazilian waters. It appears that in areas where giants and supergiants occur together then the giants dominate the continental slopes and the supergiants are confined to the bathyal plane. But in areas where giants appear to be absent, like the Gulf of Mexico, then supergiants come up onto the slope and shelf.

Bathynomus is as yet unrecorded from the eastern Pacific and the eastern Atlantic Oceans. Longitudinally, the genus extends from 37°S (Gabo Island, south-eastern Australia) to 35°N (Sagami Bay, Japan) in the western Pacific and from 29°S (off Rio Grande do Sul, Brazil) to 31°N (off Georgia, USA) in the western Atlantic. The greatest diversity of *Bathynomus* occurs between 20°N and 20°S latitude on the Indian-Australian plate (fig. 1). Outlying species occur on plates in the western North Pacific and the western Atlantic. At the moment the most concentrated diversity occurs on the continental slopes off eastern Australia (5 species) and off Brazil (3 species). But systematic trapping programs at different depths in the Indian and the western Pacific Oceans would undoubtedly change our current perception.

METHODS

Diagnostic descriptions have been generated from a DELTA (Dallwitz *et al.* 1993, 1998) database to the world species of *Bathynomus*. Terminology for setae and spines follows Watling (1989). Material used in this study is lodged in the: Australian Museum, Sydney (AM), Institute of Zoology, Academia Sinica, Nankang, Taiwan (IZAS), Grice Marine Biological Laboratory, Charleston, South Carolina, USA (GMBL), Musée Zoologique de l'Université et de la Ville de Strasbourg, Strasbourg, France (MZS), Muséum national d'Histoire naturelle, Paris (MNHN), Museum and Art Galleries of the Northern Territory, Darwin (NTM), National Museum of Marine Biology, Checheng, Taiwan (NMMB), National Museum of Natural History, Washington, DC (USNM), Raffles Museum of Biodiversity Research, National University of Singapore (ZRC); Western Australian Museum, Perth (WAM) and Zoological Museum of the University of Copenhagen, Copenhagen (ZMUC).

LIST OF EXTANT SPECIES

Giants (up to 150 mm length)

<i>Bathynomus affinis</i> Richardson, 1910	Philippines, Arafura Sea
<i>Bathynomus brucei</i> n. sp.	north-eastern Australia
<i>Bathynomus bruscai</i> n. sp.	north-eastern Australia, northern Papua New Guinea
<i>Bathynomus decemspinus</i> Shih, 1972	south-western Taiwan
<i>Bathynomus doederleini</i> Ortmann, 1894	eastern Japan, north-eastern Taiwan, Philippines
<i>Bathynomus immanis</i> Bruce, 1986	north-eastern Australia, northern Papua New Guinea
<i>Bathynomus kapala</i> Griffin, 1975	eastern Australia
<i>Bathynomus obtusus</i> Magalhães & Young, 2003	Brazil
<i>Bathynomus pelor</i> Bruce, 1986	north-western Australia

Supergiants (up to 500 mm length)

<i>Bathynomus crosnieri</i> n. sp.	Madagascar
<i>Bathynomus giganteus</i> Milne Edwards, 1879	south-eastern USA to Brazil
<i>Bathynomus keablei</i> n. sp.	India
<i>Bathynomus kensleyi</i> n. sp.	South China Sea, Sulu Sea, Coral Sea
<i>Bathynomus lowryi</i> Bruce & Bussarawit, 2004	eastern Andaman Sea
<i>Bathynomus miyarei</i> Lemos de Castro, 1978	Brazil
<i>Bathynomus propinquus</i> Richardson, 1910 (<i>nomen dubium</i>)	
<i>Bathynomus richeri</i> n. sp.	New Caledonia
<i>Bathynomus</i> sp.	Gulf of Aden

TAXONOMY

Genus **BATHYNOMUS** A. Milne Edwards 1879

Bathynomus A. Milne Edwards, 1879: 21.

Bathynomus – Milne Edwards & Bouvier 1902: 171. — Gurjanova 1936: 68. — Hessler 1969: R374. — Holthuis & Mikulka 1972: 575. — Bruce 1986: 126. — Magalhães & Young 2003: 222.

Bathynomous – Boone 1927: 130. — Menzies 1962: 194.

Paleaga – Wieder & Feldman 1989: 75 (part — Not *Paleaga* Woodward, 1870).

DIAGNOSIS. — See Bruce (1986).

REMARKS. — According to Bruce (1986) *Bathynomus* is most similar to *Parabathynomus* K.H. Barnard, 1924, from South Africa. *Parabathynomus* differs from *Bathynomus* in having respiratory branchiae on the peduncles of the pleopods, a basally inserted appendix masculina and no pleotelsonic spines.

Bathynomus affinis Richardson, 1910

Figs 2, 3

Bathynomus affinis Richardson, 1910: 4, fig. 1.

Bathynomus affinis – Nierstrasz 1931: 162. — Holthuis & Mikulka 1972: 587. — Bruce 1986: 128, fig. 87a-e. — Shih 1972: 36 & figs 7, 8, 11.

Not *Bathynomus affinis* – Hale 1940: 292, pl. 18 (= *B. kapala*).

TYPE MATERIAL. — Philippine Islands. Near Caluya Island, Sulu Sea (11°57.3'N 121°42.15'E), 560 m: holotype, 91.5 mm (USNM 40908).

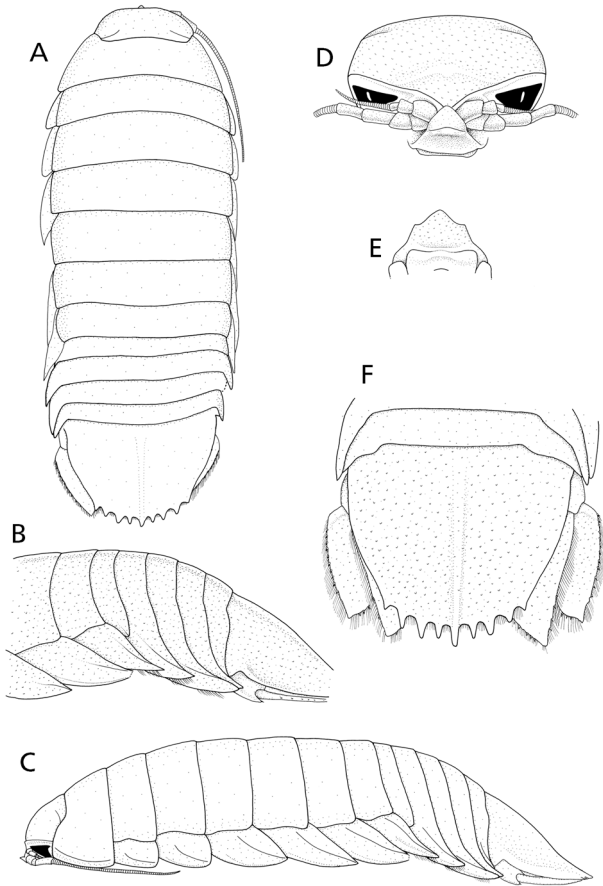


FIG. 2. *Bathynomus affinis* Richardson, 1910. Female, 142 mm, NTM Cr 007024, Arafura Sea, 295 m: A, corps, vue dorsale; B, péréion, vue latérale; C, corps, vue latérale; D, tête, vue antérieure; E, région clypéale, vue ventrale; F, pléotelson, vue dorsale.

FIG. 2. *Bathynomus affinis* Richardson, 1910. Femelle, 142 mm, NTM Cr 007024, Mer d'Arafura, 295 m: A, corps, vue dorsale; B, péréion, vue latérale; C, corps, vue latérale; D, tête, vue antérieure; E, région clypéale, vue ventrale; F, pléotelson, vue dorsale.

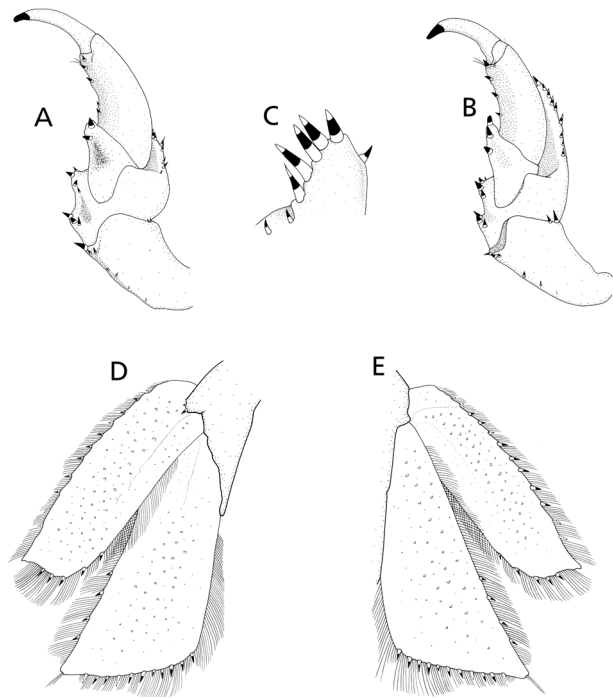


FIG. 3. *Bathynomus affinis* Richardson, 1910. Female, 142 mm, NTM Cr 007024, Arafura Sea, 295 m: A, péréiopode 1, vue médiane; B, péréiopode 2, vue médiane; C, péréiopode 2 mérus, bord postérolatéral; D, uropode, vue ventrale; E, uropode, vue dorsale.

FIG. 3. *Bathynomus affinis* Richardson, 1910. Femelle, 142 mm, NTM Cr 007024, Mer d'Arafura, 295 m: A, péréiopode 1, vue médiane; B, péréiopode 2, vue médiane; C, péréiopode 2 mérus, bord postérolatéral; D, uropode, vue ventrale; E, uropode, vue dorsale.

OTHER MATERIAL EXAMINED. — Arafura Sea, 9°14'S 131°14'E, 295 m, B. Clements, 9-16.07.1988: 2 ♀, "N", 125 mm and 135 mm (NTM Cr 007024).

TYPE LOCALITY. — Near Caluya Island, 11°57.30'N 121°42.15'E, Sulu Sea, Philippine Islands, western North Pacific Ocean, 560 m.

DESCRIPTION. — Body 142 mm long, length 3 × width. Head ridge above eyes discontinuous; clypeal area with distal margins straight, apex narrowly rounded. Antenna 2 flagellum extending to within pereonite 3.

Pereopod 1 ischium with 3 posteroproximal robust setae, 3 robust setae on posterodistal margin (3-4); merus with 9 (7-9), short robust setae on anterodistal angle, posterior margin with 3 robust setae in proximal row, and 4 robust setae in distal row; propodus length 2 × width, with 5 (4-5) robust setae on posterior margin. Pereopod 2 ischium with 2 (2-3) robust setae on posterior margin, and 3 (3-4) robust setae on posterodistal margin; merus with 13 (12-13), short robust setae on anterodistal angle, posteromedial margin with 3 robust setae in proximal row, and 4 robust setae in distal row; propodus with 4 (3-4) robust setae on posterior margin. Pereopod 7 coxa distally attenuated and curved posteriorly.

Pleonite 3 extending up to pleonite 5. Uropod extending slightly beyond pleotelson; peduncle with 2 robust setae; exopod and endopod with minutely scalloped lateral and distal margins; exopod lateral margin convex proximally, sinuate distally, with 12 robust setae along margin (12-13), setal fringe continuous (90-94%); medial margin straight; distomedial corner broadly rounded; distal margin sinuate, with 5 robust setae (4-5); distolateral corner slightly produced, distolateral corner subacute; endopod, lateral margin slightly sinuate, with 4 robust setae (4-5); medial margin straight; distomedial corner rounded; distal margin straight, with 11 robust setae (8-11); distolateral corner not produced, bifid. Pleotelson about as long as broad, length 1 × width, smooth (minute pores), longitudinal carina on dorsal surface conspicuous, with 7 distal and 2 lateral (5-7), short, straight prominent spines along distal margin, with setae between spines, central distal spine simple.

HABITAT. — Continental shelf and slope (120-300 m).

REMARKS. — *Bathynomus affinis* belongs to the group of giants with a continuous setal fringe along the lateral margin of the exopod and 9 pleotelsonic spines. Others in the group are *B. bruscai*, *B. doederleini*, *B. kapala*, *B. obtusus* and *B. pelor*. *Bathynomus affinis* is distinguished from *B. bruscai* by a discontinuous ridge along the front of the head and from *B. kapala* and *B. pelor* by the simple central pleotelsonic spine (distally bifid in the latter two species).

The differences between *B. affinis*, *B. doederleini* and *B. obtusus* are more subtle. For instance the clypeus of *B. obtusus* has broadly rounded lateral and apical margins, whereas *B. affinis* and *B. doederleini* both have interrupted lateral margins with the apex of *B. doederleini* narrowly rounded and that of *B. affinis* nearly subacute. The fringing setae, particularly along the lateral margin of the uropodal exopod appears to be significantly longer in *B. obtusus* than in either *B. affinis* or *B. doederleini*. *Bathynomus affinis* and *B. doederleini* are obviously very similar taxa. *Bathynomus doederleini* has more robust setae on the posterior margin of the propodus of pereopod 1, no setae defining the distolateral corner of the uropodal endopod and the pleotelsonic spines alternate between long and short.

DISTRIBUTION. — Timor Sea; Arafura Sea; South China Sea; Sulu Sea.

***Bathynomus brucei* n. sp.**

Figs 4-5

TYPE MATERIAL. — Australia. SEAS: Queensland. 16°39.92'S 145°20.71'E, east of Flynn Reef, Great Barrier Reef, 400 m, J.K. Lowry, P. Freewater & W. Vader on RV *Sunbird*, 7.06.1993, QLD-928, holotype "R", 154 mm (AM P68554); 16°39.00'S 146°20.79'E, 600 m, J.K. Lowry & K. Dempsey, 19.05.1994, paratypes, many specimens (AM P64035-P64036, P64080-P64083); 16°39.00'S 146°21.79'E, 600 m, 20.05.1994, paratypes, 32 specimens (AM P64084-P64085);

16°37.81'S 146°23.08'E, 1000 m, J.K. Lowry P. Freewater & W. Vader on RV *Sunbird*, 8.06.1993: paratypes, 12 specimens (AM P57901, P64031-P64032).

TYPE LOCALITY. — East of Flynn Reef, 16°39.92'S 145°20.71'E, Great Barrier Reef, Australia, 400 m.

DESCRIPTION. — Body length 154 mm long, length $2 \times$ width. Head ridge above eyes discontinuous; clypeal area with distal margins concave, apex broadly rounded. Antenna 2 flagellum extending to within pereonite 4.

Pereopod 1 ischium with 1 posteroproximal robust setae and 4 robust setae on posterodistal margin; merus with 6 short robust setae on anterodistal angle, posterior margin with 3 robust setae in proximal row and 4 robust setae in distal row; propodus length $2.1 \times$ width, with 6 robust setae on posterior margin. Pereopod 2 ischium with 3 robust setae on posterior margin and 5 robust setae on posterodistal margin; merus with 14 short robust setae on anterodistal angle, posteromedial margin with 3 robust setae in proximal row and 4 robust setae in distal row; propodus with 4 robust setae on posterior margin. Pereopod 7 coxa distally attenuated and curved posteriorly.

Pleonite 3 extending up to pleonite 5. Uropod not extending beyond pleotelson; peduncle with 2 robust setae; exopod and endopod with minutely scalloped lateral and distal margins; exopod lateral margin convex proximally, sinuate distally,

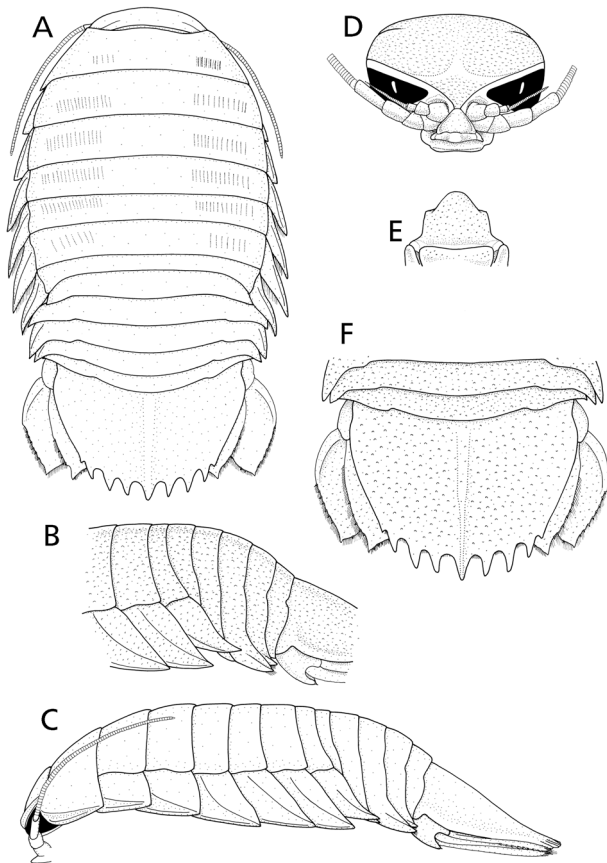


FIG. 4. *Bathynomus brucei* n. sp. Holotype "R", 154 mm, AM P68554, off Flynn Reef, Great Barrier Reef, Australia, 400 m: A, body, dorsal view; B, pereon, lateral view; C, body, lateral view; D, cephalon, anterior view; E, clypeal region, ventral view; F, pleotelson, dorsal view.

FIG. 4. *Bathynomus brucei* n. sp. Holotype "R", 154 mm, AM P68554, au large de Flynn Reef, Great Barrier Reef, Australie, 400 m : A, corps, vue dorsale ; B, péréion, vue latérale ; C, corps, vue latérale ; D, tête, vue antérieure ; E, région clypéale, vue ventrale ; F, pléotelson, vue dorsale.

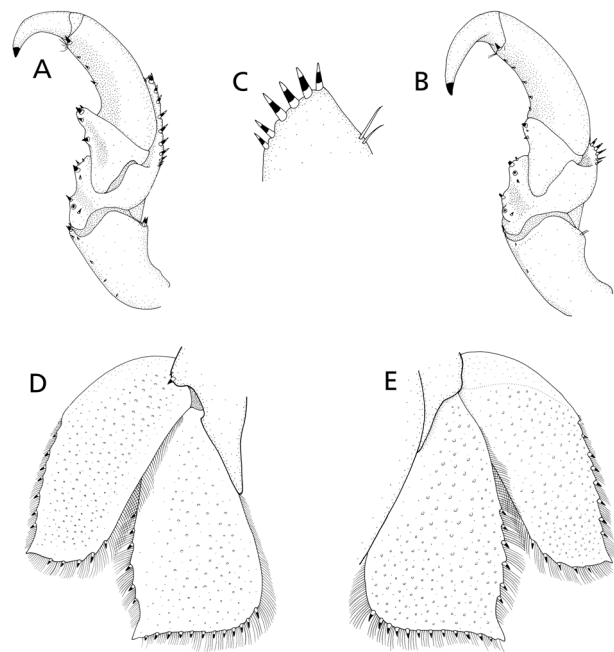


FIG. 5. *Bathynomus brucei* n. sp. Holotype "R", 154 mm, AM P68554, off Flynn Reef, Great Barrier Reef, Australia, 400 m: A, pereopod 1, medial view; B, pereopod 2, medial view; C, pereopod 2 merus, posterolateral margin; D, uropod, ventral view; E, uropod, dorsal view.

FIG. 5. *Bathynomus brucei* n. sp. Holotype "R", 154 mm, AM P68554, au large de Flynn Reef, Great Barrier Reef, Australie, 400 m : A, péréiopode 1, vue médiane ; B, péréiopode 2, vue médiane ; C, péréiopode 2 mérus, bord postérolatéral ; D, uropode, vue ventrale ; E, uropode, vue dorsale.

with 8 robust setae along lateral margin, setal fringe short (54-56%); medial margin concave; distomedial corner rounded; distal margin straight, with 5 robust setae; distolateral corner slightly produced, distolateral corner acute; endopod, lateral margin sinuate, with 6 robust setae; medial margin straight; distomedial corner broadly rounded; distal margin straight, with 12 robust setae; distolateral corner produced, subacute. Pleotelson broader than long or about as long as broad, length $0.8 \times$ width, granulated (minute denticles), longitudinal carina on dorsal surface conspicuous, with 7 distal and 2 lateral, straight prominent spines along distal margin, with setae between spines, central distal spine simple.

HABITAT. — Continental slope (400-1000 m depth).

REMARKS. — *Bathynomus brucei* is the largest of the giants. It is a distinctively wide species with a short setal fringe on the lateral margins of the exopods and 9 pleotelsonic spines. The only other species with such a short, marginal fringe is *B. immanis*. *Bathynomus immanis* is a more slender species with 7 pleotelsonic spines, which lives on the outer continental shelf and slope down to about 400 m depth.

DISTRIBUTION. — Continental slope off north-eastern, Australia, Coral Sea.

ETYMOLOGY. — Named for Niel Bruce in recognition of his important contributions to cirrolanid taxonomy and in particular to the genus *Bathynomus*.

***Bathynomus bruscai* n. sp.**

Figs 6-7

TYPE MATERIAL. — Papua New Guinea. 5°9.40'S 145°51.1'E, about 2 km east of Dam Awan (Rasch Pass), Madang Lagoon, Astrolabe Bay, fine silty clay, 500 m, J.K. Lowry, S. Keable & M. Jebb, 9.03.1991, holotype, 99 mm (AM P64188); Astrolabe Bay, M. King, 06.1987, 1 paratype (WAM 450-89).

OTHER MATERIAL EXAMINED. — Australia. SEAS: Queensland. 16°39.92'S 146°20.71'E, 400 m, J.K. Lowry, & K. Dempsey on RV *Sunbird*, 20.05.1994, many specimens (AM P64186-P64187); 12.2°C, 400 m, J.K. Lowry, P. Freewater & W. Vader on RV *Sunbird*, 7-8.06.1993, 12 specimens (AM P64177-P64183); 16°6.8'S 146°20.71'E, 600 m, 19.05.1994, 9 specimens (AM P64184-P64185).

TYPE LOCALITY. — About 2 km east of Dam Awan (Rasch Pass), 5°9.40'S 145°51.1'E, Madang Lagoon, Astrolabe Bay, Papua New Guinea, fine silty clay, 500 m depth.

DESCRIPTION. — Body length 88-99 mm, length $2.1-2.9 \times$ width. Head ridge above eyes continuous; clypeal region, distal margins straight, apex narrowly rounded apically. Antenna 2, flagellum extending to within pereonite 3.

Pereopod 1 ischium with 2 posteroproximal robust setae, 3-5 robust setae on posterodistal margin; merus with 6-7, long robust setae on anterodistal angle, posterior margin with 3 robust setae in proximal row, and 4 robust setae in distal row; propodus length $2 \times$ width, with 4 robust setae on posterior margin. Pereopod 2 ischium with 2 robust setae on posterior margin, and 4-7 robust setae on posterodistal margin; merus with 9-11, long robust setae on anterodistal angle, posteromedial margin with 3 robust setae in proximal row, and 4 robust setae in distal row; propodus with 3 robust setae on posterior margin. Pereopod 7 coxa distally attenuated and curved posteriorly.

Pleonite 3 extending up to pleonite 5. Uropod extending beyond pleotelson; peduncle with 1-2 robust setae; exopod and endopod with minutely scalloped lateral and distal margins; exopod lateral margin sinuate or convex proximally,

straight distally, with 9 robust setae along margin, setal fringe continuous (93%); medial margin concave; distomedial corner broadly rounded; distal margin convex, with 3-5 robust setae; distolateral corner not produced, distolateral corner bifid with setal tuft; endopod, lateral margin straight or sinuate, with 5-6 robust setae; endopod, medial margin straight; distomedial corner rounded; distal margin straight, with 8-9 robust setae; distolateral corner produced, distolateral corner acute or subacute. Pleotelson length $0.8-0.9 \times$ width; smooth (minute pores); longitudinal carina on dorsal surface conspicuous; with distal spines, with 7, short, straight prominent spines along distal margin, and 2 small lateral spines, with setae between spines, central distal spine bifid.

HABITAT. — Continental slope (400-600 m).

REMARKS. — Among the giants *Bathynomus bruscai* is most similar to species such as *B. decemspinus*, *B. kapala* and *B. pelor*, all of which have a bifid central pleotelsonic spine, however *B. bruscai* is unique in having a continuous ridge above the eyes. One small male, 85 mm, from the continental slope (400 m) off the Great Barrier Reef differs from the other specimens in having a dip in the brow and in having 11 pleotelsonic spines.

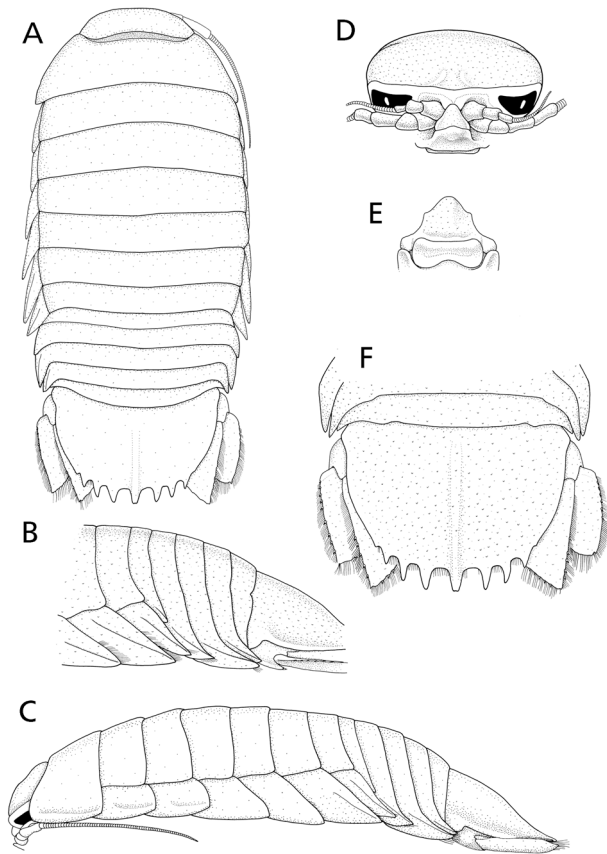


FIG. 6. *Bathynomus bruscai* n. sp. Holotype, 99 mm, AM P64188, about 2 km east of Dam Awan (Rasch Pass), Madang Lagoon, Astrolabe Bay, Papua New Guinea, 500 m: A, body, dorsal view; B, pereopod, lateral view; C, body, lateral view; D, cephalon, anterior view; E, clypeal region, ventral view; F, pleotelson, dorsal view.

FIG. 6. *Bathynomus bruscai* n. sp. Holotype, 99 mm, AM P64188, environ 2 km à l'est de Dam Awan (Rasch Pass), lagon de Madang, Baie de l'Astrolabe, Papouasie Nouvelle-Guinée, 500 m : A, corps, vue dorsale ; B, péréopode, vue latérale ; C, corps, vue latérale ; D, tête, vue antérieure ; E, région clypéale, vue ventrale ; F, pléotelson, vue dorsale.

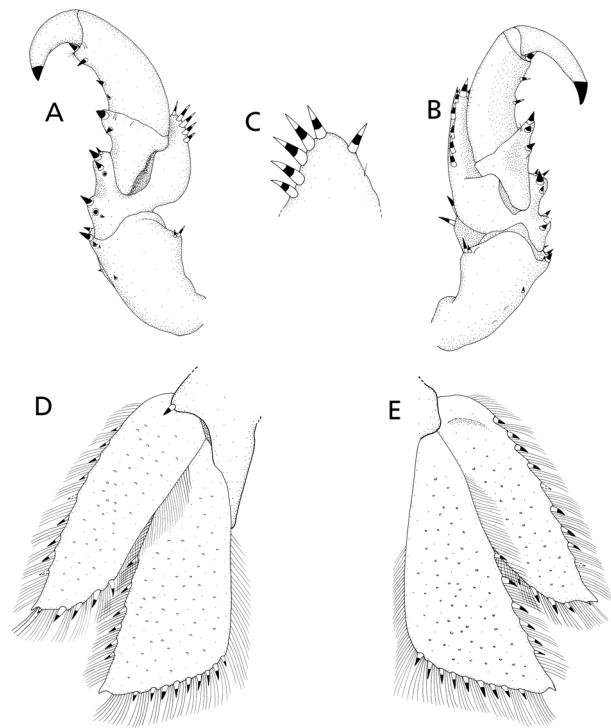


FIG. 7. *Bathynomus bruscai* n. sp. Holotype, 99 mm, AM P64188, about 2 km east of Dam Awan (Rasch Pass), Madang Lagoon, Astrolabe Bay, Papua New Guinea, 500 m: A, pereopod 1, medial view; B, pereopod 2, medial view; C, pereopod 2 merus, posterolateral margin; D, uropod, ventral view; E, uropod, dorsal view.

FIG. 7. *Bathynomus bruscai* n. sp. Holotype, 99 mm, AM P64188, environ 2 km à l'est de Dam Awan (Rasch Pass), lagon de Madang, Baie de l'Astrolabe, Papouasie Nouvelle-Guinée, 500 m : A, péréopode 1, vue médiane ; B, péréopode 2, vue médiane ; C, péréopode 2 mérus, bord postérolatéral ; D, uropode, vue ventrale ; E, uropode, vue dorsale.

DISTRIBUTION. — Astrolabe Bay, Papua New Guinea; continental slope of north-eastern Australia.

ETYMOLOGY. — Named for Rick Brusca, in recognition of his contribution to carcinology in general and cirrolanid taxonomy in particular.

***Bathynomus crosnieri* n. sp.**

Figs 8-9

TYPE MATERIAL. — Madagascar. 12°42.12'S 48°22.13'E, western Indian Ocean, 437-444 m deep, A. Crosnier, 5.03.1971, holotype "V", 285 mm [pleotelson damaged distally] (MNHN IS.2286); off Madagascar, 24°00'S 43°39'E, western Indian Ocean, 300 m, 1969; paratype, (MNHN IS.2287).

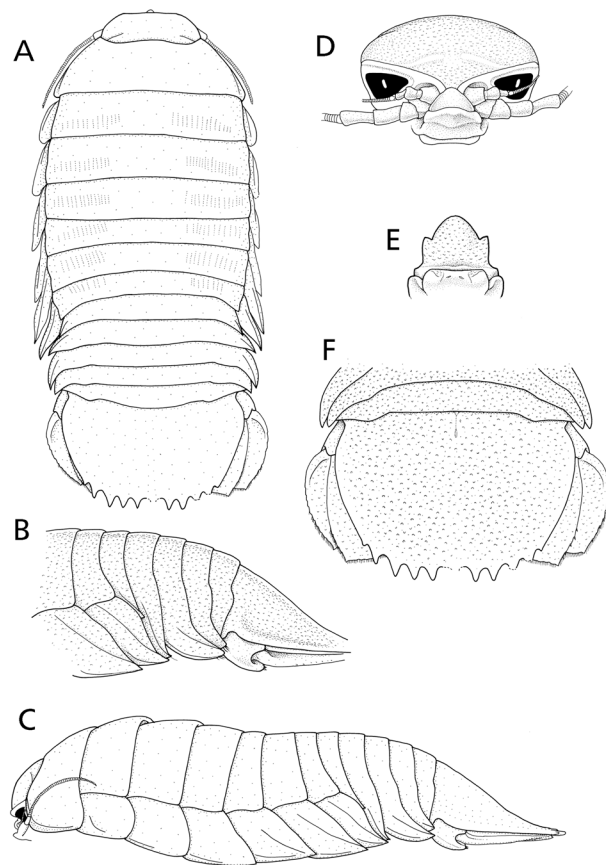


FIG. 8. *Bathynomus crosnieri* n. sp. Holotype, 285 mm, MNHN IS.2286 off Madagascar, western Indian Ocean, 437-444 m: A, body, dorsal view; B, pereon, lateral view; C, body, lateral view; D, cephalon, anterior view; E, clypeal region, ventral view; F, pleotelson, dorsal view.

FIG. 8. *Bathynomus crosnieri* n. sp. Holotype, 285 mm, MNHN IS.2286 au large de Madagascar, Océan Indien occidental, 437-444 m : A, corps, vue dorsale ; B, péréion, vue latérale ; C, corps, vue latérale ; D, tête, vue antérieure ; E, région clypéale, vue ventrale ; F, pléotelson, vue dorsale.

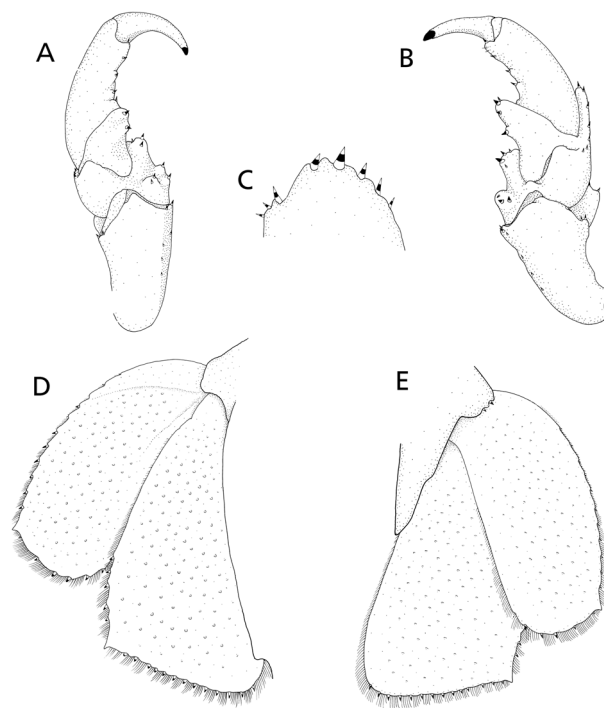


FIG. 9. *Bathynomus crosnieri* n. sp. Holotype, 285 mm, MNHN IS.2286 off Madagascar, western Indian Ocean, 437-444 m: A, pereopod 1, medial view; B, pereopod 2, medial view; C, pereopod 2 merus, posterolateral margin; D, uropod, dorsal view; E, uropod, ventral view.

FIG. 9. *Bathynomus crosnieri* n. sp. Holotype, 285 mm, MNHN IS.2286 au large de Madagascar, Océan indien occidental, 437-444 m : A, péréiopode 1, vue médiane ; B, péréiopode 2, vue médiane ; C, péréiopode 2 mérus, bord postérolatéral ; D, uropode, vue dorsale ; E, uropode, vue ventrale.

OTHER MATERIAL EXAMINED. — Madagascar. 27°00'S (MNHN IS.2288); near l'Étoile Bank, between Tulear and La 48°08.5'E, western Indian Ocean, 695-705 m deep, A. Crosnier, Manombo, west coast of Madagascar, about 150 m depth, 13.09.1972 (possible juveniles of *B. crosnieri*, 4 specimens, 1.03.1969, 2 specimens (MNHN IS.2294).

TYPE LOCALITY. — Off Madagascar, 12°42.12'S 48°22.13'E, western Indian Ocean, 437-444 m depth.

DESCRIPTION. — Supergiant. Body length 285 mm, length 2.2-2.3 × width. Head ridge above eyes discontinuous; clypeal region, distal margins convex, apex broadly rounded. Antenna 2, flagellum extending to within pereonite 2.

Pereopod 1 ischium with 4 posteroproximal robust setae, 2 robust setae on posterodistal margin; merus with 8 (check), short robust setae on anterodistal angle, posterior margin with 4 robust setae in proximal row, and 3 robust setae in distal row; propodus length 2 × width, with 5 robust setae on posterior margin. Pereopod 2 ischium with 4 robust setae on posterior margin, and 4 robust setae on posterodistal margin; merus with 8, short robust setae on anterodistal angle, posteromedial margin with 3 robust setae in proximal row, and 4 robust setae in distal row; propodus with 4 robust setae on posterior margin. Pereopod 7 coxa distally attenuated and curved posteriorly.

Pleonite 3 extending up to pleonite 5. Uropod not extending beyond pleotelson; peduncle with 2-3 robust setae; exopod and endopod with minutely scalloped lateral and distal margins; exopod lateral margin convex, with 9-11 robust setae along margin (check), setal fringe of medium length (77%); medial margin straight; distomedial corner rounded; distal margin convex, with 4-6 robust setae; distolateral corner slightly produced, distolateral corner acute; with 4-5 robust setae; endopod, medial margin straight; distomedial corner broadly rounded; distal margin straight, with 13-14 robust setae; distolateral corner produced, distolateral corner subacute. Pleotelson shorter than broad, length 0.7 × width; granulated (minute denticles); longitudinal carina on dorsal surface inconspicuous; with 9 short, straight prominent spines along distal margin, and 2 small lateral spines, without setae between spines, central distal spine simple.

HABITAT. — Continental shelf and slope (150-700 m).

REMARKS. — *Bathynomus crosnieri* is the southernmost Indian Ocean species and one of the largest species in the genus. It is very similar to *B. giganteus* from the Gulf of Mexico, but it differs from *B. giganteus* in the clypeus which has a convex distal margin, in the pereopods which are more robust (fig. 23 G, H), in the coxa of pereopod 7 which is distally attenuated, not broad.

It is most similar to *B. keablei*, *B. giganteus* and *B. richeri*, all of which have a medium length lateral setal fringe on the exopod and 11 straight pleotelsonic spines. *Bathynomus keablei* is more similar in size to *B. richeri*, but it has a shorter second antenna.

DISTRIBUTION. — Madagascar (south-western Indian Ocean).

ETYMOLOGY. — Named for Alain Crosnier in recognition of his immense contribution to carcinology in the Indo-West Pacific.

Bathynomus decemspinus Shih, 1972

Bathynomus decemspinus Shih, 1972: 32, figs 1-6, 10, pl. 4.

Bathynomus decemspinus – Bruce 1986: 130, fig. 88g-i.

TYPE MATERIAL. — West of Tungkang, Taiwan, Strait of Taiwan, 70–80 m depth, holotype ♀, 123 mm (IZAS 5335).

TYPE LOCALITY. — West of Tungkang, Taiwan, Strait of Taiwan, 70-80 m depth.

DESCRIPTION. — Based on description of Shih (1972) and figures of Bruce (1986). Body 123 mm long, length 2.8 × width. Head, ridge above eyes discontinuous.

Uropod not extending beyond pleotelson; peduncle with 2 robust setae; exopod and endopod with minutely scalloped lateral and distal margins; exopod, lateral margin convex proximally, straight distally, with 11 robust setae along margin; setal fringe of medium length (72-76%); medial margin straight; distomedial corner broadly rounded; distal margin straight, with 3 robust setae; distolateral corner produced, distolateral corner acute; endopod, lateral margin straight; medial margin straight; distomedial corner rounded; distal margin concave, with 10-11 robust setae; distolateral corner produced, acute. Pleotelson broader than long, length 0.6 × width, longitudinal carina on dorsal surface conspicuous, with 5 distal and 2 lateral, short, straight prominent spines along distal margin, with setae between spines, central distal spine bifid.

HABITAT. — Continental Shelf (70-80 m).

REMARKS. — *Bathynomus decemspinosus* belongs to the group of giants which have 7 pleotelsonic spines. This includes *B. doederleini*, *B. immanis*, and *B. kapala*. Of these species only *B. decemspinosus* and *B. kapala* have a bifid central pleotelsonic spine. From what we know of these two species, they are very similar. Their only differences are in the uropods. The setal fringe of the exopod extends further along the margin in *B. kapala* and the distal margin is less angled.

DISTRIBUTION. — Strait of Taiwan, South China Sea.

Bathynomus doederleini Ortmann, 1894

Figs 10-11

Bathynomus doederleini Ortmann, 1894: 191.

Bathynomus doederleini – Richardson 1910: 4. — Nierstrasz 1931: 162.

Bathynomus Doederleini – Bouvier 1901a: 643; 1901b: 376; 1901c: 122. — Milne Edwards & Bouvier 1902: 159, pls 7, 8.

Bathynomus Doederleini – Dolfein 1906: 265, 266 — Thielemann 1911: 18.

Bathynomus doederleini – Richardson 1909: 78. — Hale 1940: 292.

Bathynomus doederleini – Gurjanova 1936: 68. — Günther & Deckert 1950: 90. — Idyll 1964: 258. — Shiino 1965: 542, fig. 718. — Holthuis & Mikulka 1972: 587. — Bruce 1986: 128, fig. 87f-k. — Tso & Mok 1991: 141. — Soong & Mok 1994: 72. — Saito *et al.* 2000: 61.

Palaega doederleini – Karasawa *et al.* 1992: 5, fig. 3.

TYPE MATERIAL. — Japan. Near Enoshima: syntypes, 123-103 mm (MZS).

OTHER MATERIAL EXAMINED. — Japan. Sagami Bay, Japan, Masuhide Numata, 1975, 1 specimen (AM P64190); 34°53.9'N 138°43.1'E, west of Toi, Suruga Bay, 382-425 m, S. Ohta, 20.11.1978, 1 specimen (AM P42713); 35°6.90'N 139°13.11'E, Kanagawa Reef, off Manazuru, 680 m: many specimens (AM P64189).

Taiwan. 22°48'N 121°11'E, Fu-gun, 1992, 6 specimens (AM P64099); 25°N 122°E, off Tai-chi, I-lan county, 100-400 m, P.K.L. Ng, 4.08.1996, 23 specimens, 1 ♂, 133 mm illustrated (AM

P64088, P64100, P68555; ZRC); 25°N 122°E, 250-400 m, J. Paxton, 03.1999, 4 specimens (AM P64089); 25°N 122°E, 200-400 m, S. Ahyong, 25.05.1998, 4 specimens (AM P64087); 25°10'N 121°43'E, off Tai-chi, 600 m, 05.1993. 3 specimens (AM P64086, P64090).

Philippine Islands. 12°57.50'N 124°21.45'E, San Bernardino Strait, 376-382 m, J. Paxton, 23.09.1995, 4 specimens, AM P64191.

TYPE LOCALITY. — Near Enoshima, Japan.

DESCRIPTION. — Male AM P68555. Body length 133 mm, length 3 × width. Head ridge above eyes discontinuous. Antenna 2, flagellum extending to within pereonite 3.

Pereopod 1 ischium with 1-3 posteroproximal robust setae (1), and 3-4 robust setae on posterodistal margin (4); merus with 5, long robust setae on anterodistal angle, posterior margin with 3-5 robust setae in proximal row (3), and 3-4 robust setae in distal row (4); propodus length $2 \times$ width, with 5-6 robust setae on posterior margin (5). Pereopod 2 ischium with 1-3 robust setae on posterior margin (1), and 3-4 robust setae on posterodistal margin (4); merus with 9-13 (13), long robust setae on anterodistal angle, posteromedial margin with 3-5 robust setae in proximal row (3), and 3-4 robust setae in distal row (4); propodus with 4 robust setae on posterior margin. Pereopod 7 coxa distally attenuated and curved posteriorly.

Pleonite 3 not extending beyond pleonite 5. Uropod not extending beyond pleotelson; peduncle with 2 robust setae; exopod and endopod with minutely scalloped lateral and distal margins; exopod lateral margin sinuate, with 9-12 robust setae along margin (12), setal fringe medium to continuous in length (75-84%); medial margin straight; distomedial corner broadly rounded; distal margin convex, with 4-6 robust setae; distolateral corner slightly produced, acute; endopod, lateral margin slightly sinuate, with 7-9 robust setae; endopod, medial margin straight; distomedial corner rounded; distal margin straight, with 10-13 robust setae (10); distolateral corner produced, subacute. Pleotelson length $0.9 \times$ width; granulated

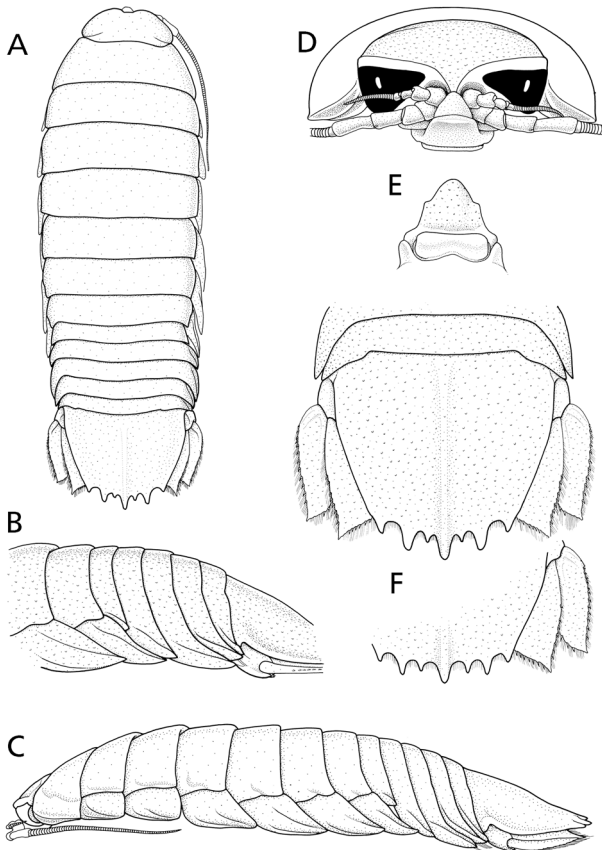


FIG. 10. *Bathynomus doederleini* Ortmann, 1894. 1 male, AM P68555, off Tai-chi, north-eastern Taiwan, 100-400 m: A, body, dorsal view; B, pereopod, lateral view; C, body, lateral view; D, cephalon, anterior view; E, clypeal region, ventral view; F, pleotelson, dorsal view.

FIG. 10. *Bathynomus doederleini* Ortmann, 1894. 1 mâle, AM P68555, au large de Tai-chi, nord-est de Taiwan, 100-400 m : A, corps, vue dorsale ; B, péréopode, vue latérale ; C, corps, vue latérale ; D, tête, vue antérieure ; E, région clypéale, vue ventrale ; F, pléotelson, vue dorsale.

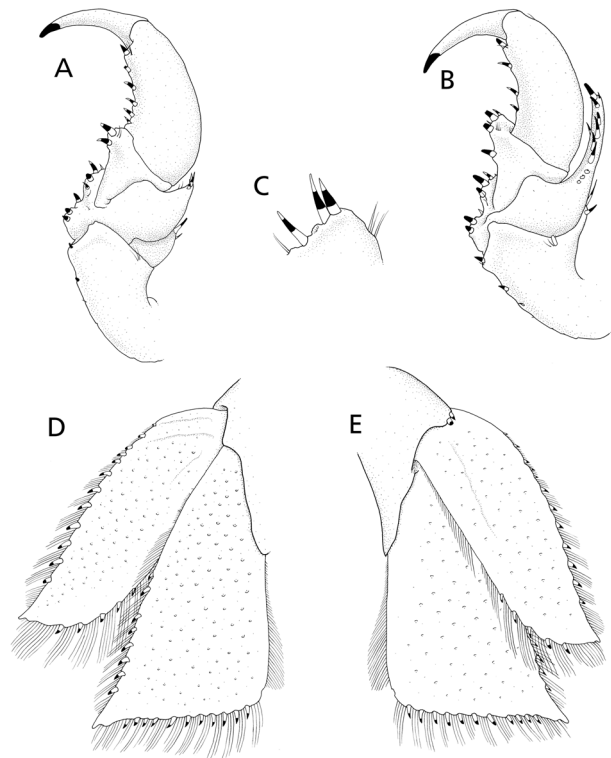


FIG. 11. *Bathynomus doederleini* Ortmann, 1894. 1 male, AM P68555, off Tai-chi, north-eastern Taiwan, 100-400 m: A, pereopod 1, medial view; B, pereopod 2, medial view; C, pereopod 2 merus, posterolateral margin; D, uropod, dorsal view; E, uropod, ventral view.

FIG. 11. *Bathynomus doederleini* Ortmann, 1894. 1 mâle, AM P68555, au large de Tai-chi, nord-est Taiwan, 100-400 m : A, péréopode 1, vue médiane ; B, péréopode 2, vue médiane ; C, péréopode 2 mérus, bord postérolatéral ; D, uropode, vue dorsale ; E, uropode, vue ventrale.

(minute pores); longitudinal carina on dorsal surface conspicuous; with 5 (occasionally 7), short, straight prominent spines along distal margin, and 2 small lateral spines, with setae between spines; central distal spine simple.

HABITAT. — Continental shelf and slope (100-680 m).

REMARKS. — *Bathynomus doederleini* belongs in the group of giants in which the uropodal exopod has a continuous setal fringe along the lateral margin. This includes *B. affinis*, *B. bruscai*, *B. kapala*, *B. obtusus* and *B. pelor*. Among this group only *B. doederleini* and *B. kapala* have 7 pleotelsonic spines. *Bathynomus doederleini* is distinguished from *B. kapala* by the central pleotelsonic spine which is simple.

Bathynomus doederleini is a distinctive species in which the pleotelsonic spines are of noticeably uneven lengths. In relatively fresh material we have seen from off north-eastern Taiwan the pleotelson was blood red. This report of *B. doederleini* from the southern Philippines is a significant range extension.

DISTRIBUTION. — Sagami Bay, Suruga Bay, Japan; south-western, northern-eastern and eastern Taiwan; San Bernardino Strait, Philippines (all western Pacific Ocean).

Bathynomus immanis Bruce, 1986

Figs 12-13

Bathynomus immanis Bruce, 1986: 129, figs 89-90.

Bathynomus immanis – Bruce, Lew Ton & Poore 2002: 140.

TYPE MATERIAL. — Australia. Queensland. 18°03'S 147°10'E, east of Hinchinbrook Island: holotype, ♂ AM P32383, paratypes, AM P30478, QM W7976, QM W9298.

OTHER MATERIAL EXAMINED. — Australia. SEAS: Queensland. 16°40'49"S 146°18'49"E, east of Flynn Reef, J.K. Lowry, P. Freewater & W. Vader on RV *Sunbird*, 200 m, 7-8.06.1993, 22 specimens (AM P38835-38837, P46821, P46841, P46913); 16°40'49"S 146°18'49"E, 72% mud, 28% sand, 200 m, 18-19.05.1994, 14 specimens (AM P46830, P46885-P46887, P57904); 16°40'49"S 146°18'49"E, 300 m, 6-7.06.1993, 300 specimens (AM P38838, P38847, P38850, P46800-46801, P46807-46810); 16°40'49"S 146°18'49"E, 71.7% mud, 28.3% sand, 300 m, 18.05.1994, 163 specimens (AM P46831-P46834, P46836-46839); 16°39'55"S 146°20'43"E, 400 m, 7-8.06.1993, 360 specimens (AM P46802-P46806, P46812-P46814, P46816-P46818); 16°39'55"S 146°20'43"E, 81.3% mud, 18% sand, 0.7% gravel, 400 m, 18-19.05.1994, 101 specimens (AM P46835, P46840-46842, P46888-P46891); 23°26'10"S 152°28'28"E, east of Fitzroy Reef, Great Barrier Reef, Queensland, J.K. Lowry, P. Freewater & R. Springthorpe on MV *Reefknot*, 400 m, 16-17.06.1993, 67 specimens (AM P46811, P46820); 23°32.46'S 152°16.45'E, 200 m, 2.06.1994, 1 specimen (AM P46892); 23°30.46'S 152°2.32'E, 55.9% sand, 43.4% mud, 0.7% gravel, 300 m, 17.06.1994, 164 specimens (AM P38845, P46815,

P46819, P46893-46894, P46898-P46900); 23°32.46'S 152°16.45'E, 52% sand, 48% mud, 400 m, 2-3.06.1994, 180 specimens (AM P38848-P38849, P46895-46897, P46901-P46903, P46912). stn HL 86-1, east of Dunk Island, Great Barrier Reef, H. Larson on FRV *Soela*, 18°00'S 147°02'E, 220 m, trawl, 8.01.1986, 54 specimens (NTM Cr 007020); stn HL 86-2, 18°00.1'S 147°01.3'E, 224 m, trawl, 9.01.1986, 10 specimens (NTM Cr 007021); stn HL 86-8, 256-260 m, trawl, 10.01.1986, 1 ♂ (NTM Cr 003544); stn HL 86-9, 18°00.5'S 147°07.2'E, 300-304 m, trawl, 11.01.1986, 8 specimens (NTM Cr 007022); stn 11, south-east of Swain Reefs, Coral Sea, 22°59.15'S 152°58.55'E, 343-359 m, 18.11.1985, 2 specimens (1 illustrated, "A"); (NTM Cr 3423); stn 21, 22°27.8'S 153°28.3'E, 403-412 m, 21.11.1985, NTM Cr 003421.

Papua New Guinea: east of Dam Awan (Rasch Pass), Madang Lagoon, Astrolabe Bay (5°9.4'S 145°51.1'E), Papua New Guinea, fine silty clay, 500 m, J.K. Lowry, S. Keable & M. Jebb, 9.03.1991: 1 specimen, 117 mm, (AM 68556); off Madang Lagoon, Astrolabe Bay, from an eel stomach in a trap, 450 m, M. Jebb & N. Bruce: 1 specimen (H), (ZMUC).

TYPE LOCALITY. — East of Hinchinbrook Island, 18°03'S 147°10'E, Queensland, Australia.

DESCRIPTION. — Body length 112–139 mm, length 2.3–2.9 × width. Head ridge above eyes discontinuous; clypeal region, distal margins concave to straight, apex narrowly rounded apically or truncated apically. Antenna 2, flagellum extending to within pereonite 3, or extending to within pereonite 4.

Pereopod 1 ischium with 1–3 posteroproximal robust setae, 1–2 robust setae on posterodistal margin; merus with 4, short robust setae on anterodistal angle or long robust setae on anterodistal angle, posterior margin with 3 robust setae in proximal row, and 3–4 robust setae in distal row; propodus length 2–2.5 × width, with 4–5 robust setae on posterior margin. Pereopod 2 ischium with 1–3 robust setae on posterior margin, and 3 robust setae on posterodistal margin; merus with 8–12, short robust setae on anterodistal angle or long robust setae on anterodistal angle, posteromedial margin with 3 robust setae in proximal row, and 3 robust setae in distal row; propodus with 3–4 robust setae on posterior margin. Pereopod 7 coxa distally attenuated and curved posteriorly.

Pleonite 3 not extending beyond pleonite 5, or extending up to pleonite 5. Uropod not extending beyond pleotelson; peduncle with 2 robust setae; exopod and endopod with minutely scalloped lateral and distal margins; exopod lateral margin convex proximally, straight distally, with 5–7 robust setae along margin, setal fringe short (62–65%); medial margin

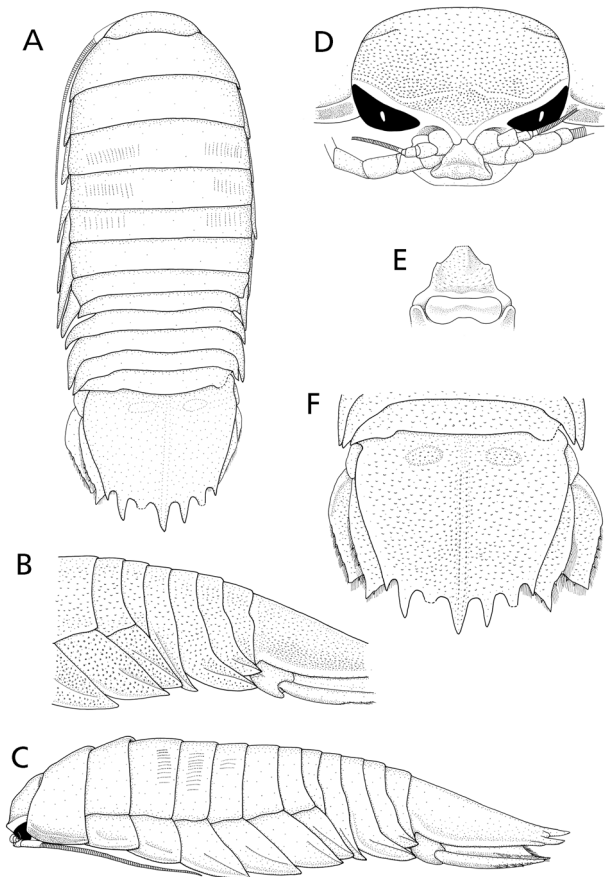


FIG. 12. *Bathynomus immanis* Bruce, 1986. Specimen "A", 139 mm, NTM Cr 000623, south-east of Swain Reefs, Coral Sea, 343–399 m: A, body, dorsal view; B, pereon, lateral view; C, body, lateral view; D, cephalon, anterior view; E, clypeal region, ventral view; F, pleotelson, dorsal view.

FIG. 12. *Bathynomus immanis* Bruce, 1986. Spécimen "A", 139 mm, NTM Cr 000623, sud-est de Swain Reefs, Mer du Corail, 343–399 m : A, corps, vue dorsale ; B, péréion, vue latérale ; C, corps, vue latérale ; D, tête, vue antérieure ; E, région clypéale, vue ventrale ; F, pléotelson, vue dorsale.

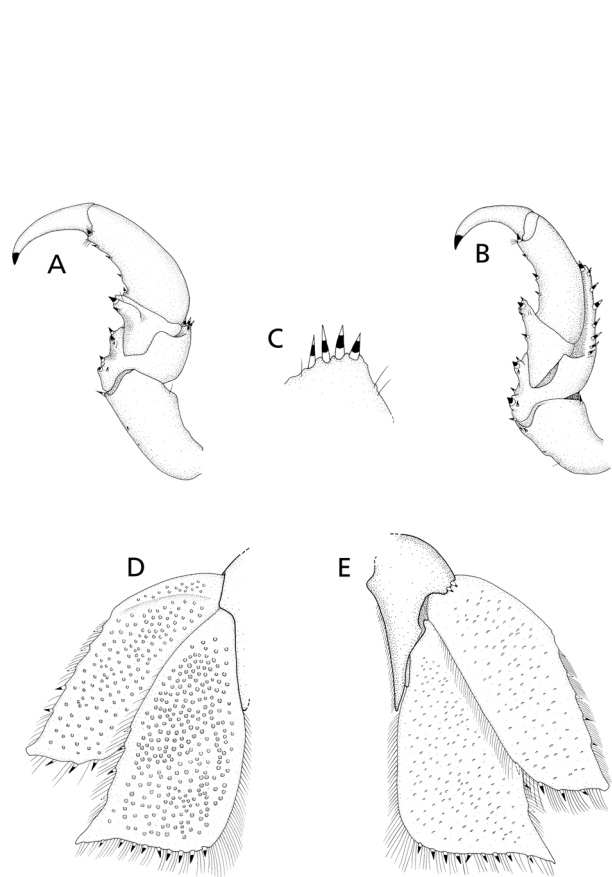


FIG. 13. *Bathynomus immanis* Bruce, 1986. Specimen "A", 139 mm, NTM Cr 000623, south-east of Swain Reefs, Coral Sea, 343–399 m: A, pereopod 1, medial view; B, pereopod 2, medial view; C, pereopod 2 merus, posterolateral margin; D, uropod, dorsal view; E, uropod, ventral view.

FIG. 13. *Bathynomus immanis* Bruce, 1986. Spécimen "A", 139 mm, NTM Cr 000623, sud-est de Swain Reefs, Mer du Corail, 343–399 m : A, péréiopode 1, vue médiane ; B, péréiopode 2, vue médiane ; C, péréiopode 2 mérus, bord postérolatéral ; D, uropode, vue dorsale ; E, uropode, vue ventrale.

straight; distomedial corner broadly rounded; distal margin sinuate or convex, with 3-5 robust setae; distolateral corner produced, distolateral corner acute; endopod, lateral margin sinuate, with 3-6 robust setae; medial margin straight, or convex; distomedial corner rounded, or broadly rounded; distal margin sinuate, with 8-11 robust setae; distolateral corner produced, acute. Pleotelson length 0.8-0.9 × width; smooth (minute pores), or granulated (minute pores); longitudinal carina on dorsal surface conspicuous; with distal spines, with 5 short, straight prominent spines along distal margin and 2 small lateral spines, without setae between spines, central distal spine simple.

HABITAT. — Continental shelf and slope (180-400+ m).

REMARKS. — *Bathynomus immanis* is most similar to *B. brucei* as discussed under that species. The specimen illustrated here is from a population living around Marion Reef in the Coral Sea. The pleotelsonic spines are slightly more robust and slightly longer than those of the population living on the outer continental shelf and slope off the Great Barrier Reef.

We have also identified a population of *B. immanis* living in Astrolabe Bay in northern Papua New Guinea with slight differences from the Great Barrier Reef population. For instance the distal margins of the clypeus are straight, not concave, and the apex is narrowly rounded apically, not truncated and there appears to be setae between the pleotelsonic spines. This discovery significantly extends the distribution of this common scavenger.

DISTRIBUTION. — Astrolabe Bay, Papua New Guinea. Off the Great Barrier Reef from Cairns to Mooloolaba; south-east of the Swains, Australia, Coral Sea.

Bathynomus kapala Griffin, 1975

Figs 14-15

Bathynomus kapala Griffin, 1975: 104, figs 1-8, pl. 15.

Bathynomus affinis – Hale 1940: 292, pl. 18.

Bathynomus kapala – Coleman 1981: 106, fig. 36. — Bruce 1986: 129, fig. 88a-f. — Bruce, Lew Ton & Poore 2002: 141.

TYPE MATERIAL. — Australia. New South Wales State Fisheries: New South Wales. stn K71-11-01, 34°24'S 151°20'E, east of Wollongong, New South Wales, 366 m, FRV *Kapala*, 6.07.1971, holotype (AM P17947); stn K71-09-01, 32°46'S 152°46'E, east of Port Stephens, sandy mud, 595 m, FRV *Kapala*, 7.05.1971, 1 paratype (AM P17949); stn K71-07-02, 33°34'S 152°03'E, east of Broken Bay, 567 m, FRV *Kapala*, 21.04.1971, 1 paratype (AM P18086); stn K71-05-04, 33°39'S 152°55'E, north-east of Port Jackson, 366 m, FRV *Kapala*, 6 April 1971, 1 paratype (AM P18010); stn K72-02-04, 33°40'S 151°53'E, east of Long Reef, 412 m, FRV *Kapala*, 1.08.1972, 3 paratypes (AM P19389); stn K71-12-02, 33°40'S 151°55'E, east of Broken Bay, 549 m, FRV *Kapala*, 14.07.1971, 1 paratype (AM P17954); stn K71-07-01, 33°41'S 151°55'E, east of Long Reef, 549 m, FRV *Kapala*, 20.04.1971, 2 paratypes (AM P17948); stn K71-05-04, 33°39'S 152°55'E, north-east of Port Jackson, 366 m, FRV *Kapala*, 6.04.1971, 2 paratypes (AM P17952); stn K72-07-01, 34°00'S 151°43'E, east of Botany Bay, 732 m, FRV *Kapala*, 6.11.1972, 1 paratype (AM P19390); stn K71-10-03, 34°19'S 151°24'E, south-east of Port Hacking, 366 m, FRV *Kapala*, 28.06.1971, 1 paratype (AM P17951); stn K71-11-07, 34°56'S 151°10'E, north-east of Jervis Bay, 549 m, FRV *Kapala*, 7.07.1971, 3 paratypes (AM P17946); stn K71-11-10, 35°31'S 150°45'E, south-east of Ulladulla, 421 m, FRV *Kapala*, 8.07.1971, 2 paratypes (AM P17953).

OTHER MATERIAL EXAMINED. — Australia. Queensland. Off Marion Reef, Coral Sea, 590-606 m: juvenile ♂ (NTM Cr 003422); off Marion Reef, Coral Sea, 678-695 m, 1 specimen (NTM Cr 003424). New South Wales State Fisheries: New South Wales. 28°06'S 153°58'E, north-east of Tweed Heads, 412 m, FRV *Kapala*, 1.06.1978, 1 specimen (AM P46504); 29°52'S 153°42'E, east of

Wooli, 495 m, FRV *Kapala*, 23.08.1977, 1 specimen (AM P27025); 33°25'S 152°07'E, east of Terrigal, 640 m, FRV *Kapala*, 19.08.1975, 3 specimens (AM P21010); 33°02'S 152°31'E, east of Newcastle, 457 m, FRV *Kapala*, 18.08.1975, many specimens (AM P21002); 33°02'S 152°31'E, east of Newcastle, 457 m, FRV *Kapala*, 18.08.1975, 1 specimen (AM P21067); 33°27'S 152°05'E, east of

Terrigal, m, FRV *Kapala*, 17 November 1976, 3 specimens (AM P25131); east of Broken Bay, NSW, 33°36'S 151°57'E, 823 m, FRV *Kapala*, 21.12.1976, 3 specimens (AM P25130); south-east of Bermagui, NSW, 36°43'S 150°21'E, 567 m, K. Graham on FV *Shelley H*, 15.02.2000, 1 specimen (AM P64393). SEAS: off Wollongong, NSW, 34°32.06'S 151°17.40'E, 92.2% sand, 7.8% mud,

400 m, J.K. Lowry & K. Dempsey on MV *Robin E*, 28.03.1994, 31 specimens (AM P43495, P44334, P44338-P44340, P44343, P44347). Fisheries Investigation Survey: Victoria. 37°34'S 149°55'E, south of Gabo Island, Victoria, 365 m, FIS *Endeavour*, 1909-1914, 1 specimen (AM E6215).

TYPE LOCALITY. — Off Wollongong, 34°24'S 151°20'E, New South Wales, Australia.

DESCRIPTION. — Body length 90-103 mm, length 2.2-2.8 × width. Head ridge above eyes discontinuous; clypeal region, distal margins convex, apex broadly rounded apically. Antenna 2 flagellum extending to within pereonite 3.

Pereopod 1 ischium with 3-4 posteroproximal robust setae, 2-6 robust setae on posterodistal margin; merus with 7-8, long robust setae on anterodistal angle, posterior margin with 3 robust setae in proximal row, and 4 robust setae in distal row; propodus length 2-2.5 × width, with 4 robust setae on posterior margin. Pereopod 2 ischium with 3-4 robust setae on posterior margin, and 3-5 robust setae on posterodistal margin; merus with 9-12, long robust setae on anterodistal

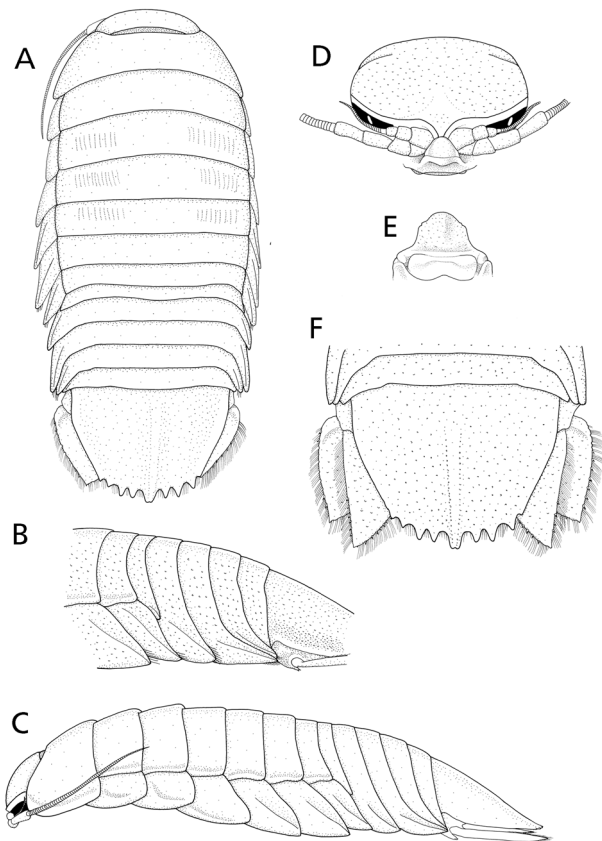


FIG. 14. *Bathynomus kapala* Griffin, 1975. Male "G", 90 mm, NTM Cr 003422, south-east of Swain Reefs, Coral Sea, 590-606 m: A, body, dorsal view; B, pereon, lateral view; C, body, lateral view; D, cephalon, anterior view; E, clypeal region, ventral view; F, pleotelson, dorsal view.

FIG. 14. *Bathynomus kapala* Griffin, 1975. Mâle "G", 90 mm, NTM Cr 003422, sud-est de Swain Reefs, Mer du Corail, 590-606 m : A, corps, vue dorsale ; B, péréon, vue latérale ; C, corps, vue latérale ; D, tête, vue antérieure ; E, région clypéale, vue ventrale ; F, pléotelson, vue dorsale.

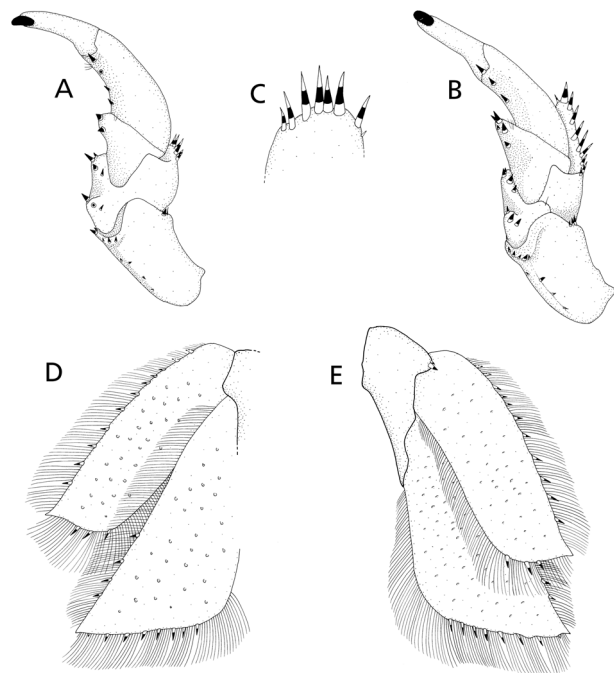


FIG. 15. *Bathynomus kapala* Griffin, 1975. Male "G", 90 mm, NTM Cr 003422, south-east of Swain Reefs, Coral Sea, 590-606 m: A, pereopod 1, medial view; B, pereopod 2, medial view; C, pereopod 2 merus, postrolateral margin; D, uropod, dorsal view; E, uropod, ventral view.

FIG. 15. *Bathynomus kapala* Griffin, 1975. Mâle "G", 90 mm, NTM Cr 003422, sud-est de Swain Reefs, Mer du Corail, 590-606 m : A, péréiopode 1, vue médiane ; B, péréiopode 2, vue médiane ; C, péréiopode 2 mérus, bord postérolatéral ; D, uropode, vue dorsale ; E, uropode, vue ventrale.

angle, posteromedial margin with 3 robust setae in proximal row, and 4 robust setae in distal row; propodus with 3 robust setae on posterior margin. Pereopod 7 coxa distally broad and slightly curved posteriorly.

Pleonite 3 extending up to pleonite 5. Uropod extending beyond pleotelson; peduncle with 1-2 robust setae; exopod and endopod with minutely scalloped lateral and distal margins; exopod lateral margin sinuate or convex proximally, sinuate distally, with 8-11 robust setae along margin, setal fringe continuous (85-94%); medial margin straight, or concave; distomedial corner rounded, or broadly rounded; distal margin straight or sinuate, with 2-3 robust setae; distolateral corner slightly produced, acute; endopod lateral margin slightly sinuate, with 3-5 robust setae; endopod, medial margin straight; distomedial corner rounded; distal margin straight, with 7-10 robust setae; distolateral corner produced or not produced, distolateral corner acute or bifid. Pleotelson length 0.9-1 × width; smooth (minute pores); longitudinal carina on dorsal surface conspicuous; with distal spines, with 5-7, short or long, straight prominent spines along distal margin, and 2 small lateral spines, with setae between spines, central distal spine bifid.

HABITAT. — Continental slope (366-823 m).

REMARKS. — The specimen illustrated here comes from Marion Reef in the Coral Sea, the most northerly record for *B. kapala*. *Bathynomus immanis* also lives here, and in deeper water away from the reef *B. kensleyi* occurs. This is the only area where *B. immanis* and *B. kapala* co-occur.

Bathynomus kapala is most similar to those giants with a bifid central pleotelsonic spine, such as *B. bruscai*, *B. decemspinus* and *B. pelor*. *Bathynomus kapala* differs from *B. bruscai* in having a discontinuous ridge above the eyes and from *B. decemspinus* in having a continuous setal fringe along the lateral margin of the exopod. *Bathynomus kapala* and *B. pelor* are most similar. Mainly *B. kapala* has 7 pleotelsonic spines and *B. pelor* has 11, but occasionally spine numbers overlap at 9.

DISTRIBUTION. — *Queensland*: off the Swains, Coral Sea. *New South Wales*: off Port Stephens; off Broken Bay; off Sydney; off Botany Bay; off Port Hacking; off Wollongong; south of Ulladulla. *Victoria*: off Gabo Island.

***Bathynomus keablei* n. sp.**

Figs 16-17

Bathynomus giganteus – Lloyd 1908: 81, figs 2-8, pls 9-12.

TYPE MATERIAL. — India. Off Goa, Malabar Coast, 1353 m, collected by A. Alcock (Indian Museum, Calcutta), 1898: holotype, ♀, 198 mm (ZMUC).

OTHER MATERIAL EXAMINED. — Burma. stn 373. 15°59.17'N 93°39.75'E, off Pegu, coast of Burma, Bay of Bengal, about 400 m, RIMSS *Investigator*, ♀, ovigerous, 202 mm [illustrated by Lloyd, 1908].

India. Laccadive Sea, stn 105, 15°2'N 72°34'E, 1332 m, RIMSS *Investigator*, 3 immature ♀, 160 mm, 195 mm, 200 mm, [referred

by Wood Mason & Alcock, 1891]; stn 371, 12°18.77'N 74°5.48'E, off western coast of Madras, Laccadive Sea, RIMSS *Investigator*, immature ♀, 193 mm.

Sri Lanka. 9°32'N 80°59.5'E, off north-eastern coast of Sri Lanka, 405-1070: mature ♂, 270 mm.

TYPE LOCALITY. — Off Goa, Malabar Coast, India, 1353 m depth.

DESCRIPTION. — Body length 198 mm, length 2.4 × width. Head ridge above eyes discontinuous; clypeal region, distal margins concave, apex broadly rounded apically. Antenna 2 flagellum extending to within pereonite 3.

Pereopod 1 ischium with 1 posteroproximal robust setae, 2 robust setae on posterodistal margin; merus with 5, short robust setae on anterodistal angle, posterior margin with 5 robust setae in proximal row, and 3 robust setae in distal row;

propodus length $2.3 \times$ width, with 5 robust setae on posterior margin. Pereopod 2 ischium with 4 robust setae on posterior margin, and 3 robust setae on posterodistal margin; merus with 7, short robust setae on anterodistal angle, posteromedial margin with 3 robust setae in proximal row, and 3 robust setae in distal row; propodus with 5 robust setae on posterior margin. Pereopod 7 coxa distally broad and slightly curved posteriorly.

Pleonite 3 extending up to pleonite 5. Uropod not extending beyond pleotelson; peduncle with 2 robust setae; exopod and endopod with smooth lateral and distal margins; exopod lateral margin convex, with 9 robust setae along margin, setal fringe of medium length (65%); medial margin straight; distomedial corner rounded; distal margin convex, with 4 robust setae; distolateral corner not produced, subacute; endopod, lateral margin convex, with 6 robust setae; endopod, medial margin straight; distomedial corner rounded; with 12 robust setae; distolateral corner not produced, distolateral corner subacute. Pleotelson length $1.3 \times$ width; smooth (minute pores); longitudinal carina on dorsal surface conspicuous; with 9, short, straight prominent spines along distal margin, and 2 small lateral spines, with setae between spines, central distal spine simple.

HABITAT. — Bathyal, 1353 m depth.

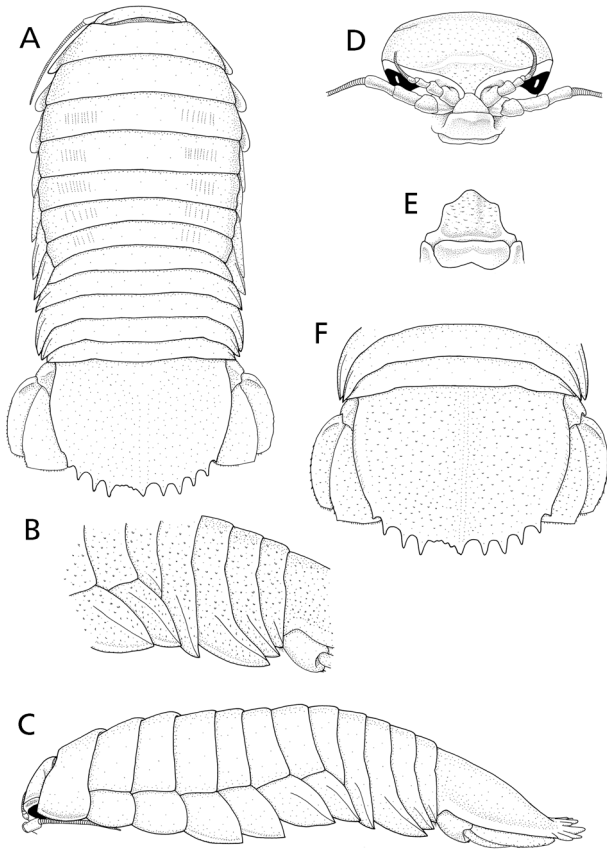


FIG. 16. *Bathynomus keablei* n. sp. Holotype female, 198 mm, ZMUC, off Goa, Malabar Coast, India, 1353 m: A, body, dorsal view; B, pereopod, lateral view; C, body, lateral view; D, cephalon, anterior view; E, clypeal region, ventral view; F, pleotelson, dorsal view.

FIG. 16. *Bathynomus keablei* n. sp. Holotype femelle, 198 mm, ZMUC, au large de Goa, côte Malabar, Inde, 1353 m : A, corps, vue dorsale ; B, péréopode, vue latérale ; C, corps, vue latérale ; D, tête, vue antérieure ; E, région clypéale, vue ventrale ; F, pléotelson, vue dorsale.

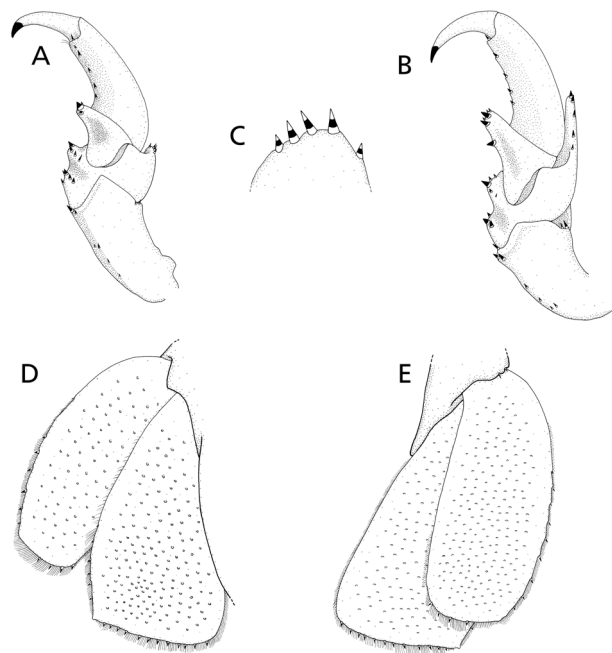


FIG. 17. *Bathynomus keablei* n. sp. Holotype female, 198 mm, ZMUC, off Goa, Malabar Coast, India, 1353 m: A, pereopod 1, medial view; B, pereopod 2, medial view; C, pereopod 2 merus, posterolateral margin; D, uropod, dorsal view; E, uropod, ventral view.

FIG. 17. *Bathynomus keablei* n. sp. Holotype femelle, 198 mm, ZMUC, au large de Goa, côte Malabar, Inde, 1353 m : A, péréopode 1, vue médiane ; B, péréopode 2, vue médiane ; C, péréopode 2 mérus, bord postérolatéral ; D, uropode, vue dorsale ; E, uropode, vue ventrale.

REMARKS. — Lloyd (1908) made an extensive study of the internal anatomy of this species under the name of *B. giganteus*. He also made an accurate whole animal illustration of a mature female which has allowed us to identify his material as *B. keablei*. Lloyd (1908) referred to other material of this species in the Indian Museum. We also refer this material to *B. keablei*, except for the material from the Arabian coast where we know another species occurs.

Bathynomus keablei is a supergiant. It is most similar to *B. crosnieri*, *B. giganteus* and *B. richeri*, all of which have a medium length lateral setal fringe on the exopod and 11 straight pleotelsonic spines. *Bathynomus keablei* is more similar in size to *B. richeri*, but it has a shorter second antenna. It differs from all of these species in the shape of the clypeus which has concave distal margins and in the non-produced distolateral corners of the uropod exopod.

DISTRIBUTION. — Off the Malabar Coast, India; off Sri Lanka; off the Burma Coast, Bay of Bengal.

ETYMOLOGY. — This species is named for Stephen Keable in recognition of his contribution to cirrolanid systematics in the Indo-West Pacific.

***Bathynomus kensleyi* n. sp.**

Figs 18-19

Bathynomus giganteus – Soong 1992: 293, figs 1, 2.

TYPE MATERIAL. — South-east of Swain Reefs, Coral Sea (22°55.1'S 154°21.25'E), 590-606 m depth, 17.11.1985: holotype, 277 mm, NTM Cr 003425.

OTHER MATERIAL EXAMINED. — Australia. SEAS: Queensland. 16°37.81'S 146°23.08'E, east of Flynn Reef, Queensland, Great Barrier Reef, 1000 m, J.K. Lowry, P. Freewater & W. Vader on RV *Sunbird*, 8.06.1993, 1 ♀ "U", 1 ♂ (AM P68557, P68558); stn 78, 16°55'S 151°34'E, 880 m, P. Davie on RV *Soela*, 6.10.1985, 1 juvenile, about 125 mm, (QMW 28011); 22°55.1'S 154°21.25'E, south-east of Swain Reefs, Coral Sea, 590-606 m, 17.11.1985, 1 specimen "W" (NTM Cr 000625).

Philippine Islands. MUSORSTOM 2: stn CP75, 13°51'N

120°30'E, off Manila, Luzon Island 300-330 m, specimen "T" (MNHN IS.2290); stn 49, 13°49.1'N 119°59.8'E, off Manila, Luzon Island 750-925 m depth, 25.03.1976, 1 juvenile, 75 mm (MNHN Is.2298); Sulu Sea, 2500 m depth, A.A. Yayanos: specimen "L" (AM P42711, AM P42712);

South China Sea. 20°20'N-20°50'N 115°30'E-116°15'E, South of Hong Kong, 500 m depth, 2 ovigerous ♀ "X", about 300 mm (NMMB).

TYPE LOCALITY. — South-east of Swain Reefs, 22°55.1'S 154°21.25'E, Coral Sea, 590-606 m depth.

DESCRIPTION. — Body length 213-350 mm, length 1.6-2.2 × width. Head ridge above eyes discontinuous; clypeal region, distal margins concave, apex narrowly rounded apically or broadly rounded apically. Antenna 2, flagellum extending to within pereonite 2.

Pereopod 1 ischium with 1-4 posteroproximal robust setae, 2-4 robust setae on posterodistal margin; merus with 2-4, short robust setae on anterodistal angle, posterior margin with 4 robust setae in proximal row, and 3-4 robust setae in distal row; propodus length 1.9-2.1 × width, with 4-5 robust setae on posterior margin. Pereopod 2 ischium with 3-4 robust setae on posterior margin, and 2-3 robust setae on posterodistal margin; merus with 5-7, short robust setae on anterodistal angle, posteromedial margin with 3-4 robust setae in proximal row, and 3 robust setae in distal row; propodus with 4 robust setae on posterior margin. Pereopod 7 coxa distally broad and slightly curved posteriorly.

Pleonite 3 extending up to pleonite 5. Uropod not extending beyond pleotelson; peduncle with 2-3 robust setae; exopod and endopod with smooth lateral and distal margins, or with minutely scalloped lateral and distal margins; exopod lateral margin convex, with 9 robust setae along margin (13), setal fringe continuous or of medium length (check); medial margin straight; distomedial corner rounded; distal margin convex, with 4-5 robust setae; distolateral corner subacute or acute; endopod, lateral margin straight or convex, with 3-6 robust setae; endopod, medial margin straight; distomedial corner

rounded; distal margin straight or sinuate, with 10-13 robust setae; distolateral corner produced or not produced, distolateral corner acute or subacute. Pleotelson longer than broad; smooth (minute pores) or granulated (minute pores); longitudinal carina on dorsal surface inconspicuous; with 9 long, upwardly curved prominent spines along distal margin, and 1-2 small lateral spines, with setae between spines or without setae between spines, central distal spine simple.

HABITAT. — Continental slope, bathyal to upper abyss (300-2500 m).

REMARKS. — *Bathynomus kensleyi* and *B. lowryi* are the only known species with upwardly curved pleotelsonic spines. They differ in the clypeus which has a rounded apex in *B. kensleyi*, truncated in *B. lowryi*; in the distal margin of the exopod which is convex in *B. kensleyi*, straight in *B. lowryi*; in the pleotelson which is longer than broad in *B. kensleyi* and broader than long in *B. lowryi*; in the dorsal carina of the pleotelson which is more conspicuous in *B. lowryi* and in the pleotelsonic spines which number 11 in *B. kensleyi* and 9 in *B. lowryi*.

DISTRIBUTION. — South China Sea; Sulu Sea; Coral Sea.

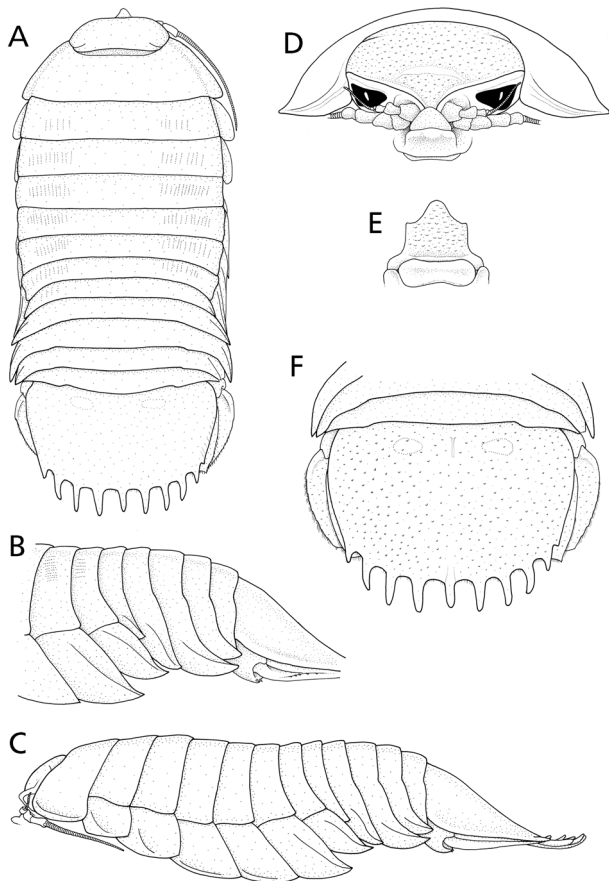


FIG. 18. *Bathynomus kensleyi* n. sp. Holotype, 277 mm, NTM Cr 000625, south-east of Swain Reefs, Coral Sea, 590-606 m: A, body, dorsal view; B, pereopod, lateral view; C, body, lateral view; D, cephalon, anterior view; E, clypeal region, ventral view; F, pleotelson, dorsal view.

FIG. 18. *Bathynomus kensleyi* n. sp. Holotype, 277 mm, NTM Cr 000625, sud-est de Swain Reefs, Mer du Corail, 590-606 m : A, corps, vue dorsale ; B, péréopode, vue latérale ; C, corps, vue latérale ; D, tête, vue antérieure ; E, région clypéale, vue ventrale ; F, pléotelson, vue dorsale.

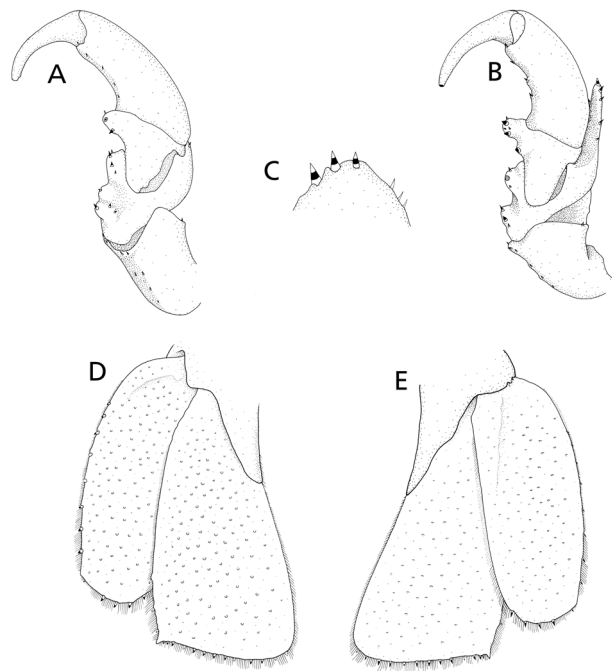


FIG. 19. *Bathynomus kensleyi* n. sp. Holotype, 277 mm, NTM Cr 000625, south-east of Swain Reefs, Coral Sea, 590-606 m: A, pereopod 1, medial view; B, pereopod 2, medial view; C, pereopod 2 merus, posterolateral margin; D, uropod, dorsal view; E, uropod, ventral view.

FIG. 19. *Bathynomus kensleyi* n. sp. Holotype, 277 mm, NTM Cr 000625, sud-est de Swain Reefs, Mer du Corail, 590-606 m : A, péréopode 1, vue médiane ; B, péréopode 2, vue médiane ; C, péréopode 2 mérius, bord postérolatéral ; D, uropode, vue dorsale ; E, uropode, vue ventrale.

ETYMOLOGY. — Named for the late Brian Kensley, in recognition of his many accomplishments in Isopod taxonomy and in particular the Cirolanidae.

Bathynomus pelor Bruce, 1986.

Bathynomus pelor Bruce, 1986: 133, figs 91-92.

Bathynomus pelor – Jones & Morgan 2002: 55 (colour photograph). — Bruce, Lew Ton & Poore 2002: 141.

TYPE MATERIAL. — Australia. CSIRO North-West Shelf project: Western Australia. 18°40'S 116°30'E, 250 km north-west of Port Hedland, Western Australia, 700 m, J. Paxton & M. McGrouther on FRV *Soela*, 5.04.1982, holotype, (AM P32587); 18°40'S 116°42'E, 250 km north-west of Port Hedland, Western Australia, 600 m, 4.04.1982, 1 paratype, (AM P32588); 18°29'S 116°36'E, 250 km north-west of Port Hedland, Western Australia, mud, 700 m, 6.04.1982, 1 paratype (AM P32589); 18°40'S 116°30'E, 250 km north-west of Port Hedland, Western Australia, 700 m, 5.04.1982, 1 paratype (AM P33560).

OTHER MATERIAL EXAMINED. — Australia. Western Australia. 1 specimen (WAM 30-95); North West Shelf, specimen "F" plus 10 specimens (NTM CR 003431); 13°S 123°E, North West Shelf, 700-750 m, B. Wallner, early 1988, 1 specimen (NTM CR 007033); 16°55.4'S 119°52.3'E to 16°52.4'S 119°46.1'E, east of Lacedpede Islands, 1 specimen (WAM 38-95); 17°22S 118°38'E, North West Shelf, 430 m, 2.11.1985, 9 specimens (NTM CR 003432); Shark Bay, R.W. Kemp, 1 specimen (WAM 40-95); stn 13, 16°49'S 119°59'E, 439-468 m, RV *Courageous*, 19.08.1983:

TYPE LOCALITY. — 250 km north-west of Port Hedland, 18°40'S 116°30'E Western Australia, 700 m.

DESCRIPTION. — Body length 105-118 mm, length 2.3-2.4 × width. Head ridge above eyes discontinuous. Antenna 2, flagellum extending to within pereonite 3.

Pereopod 1 ischium with 3-4 posteroproximal robust setae, 2-5 robust setae on posterodistal margin; merus with 5-9, long robust setae on anterodistal angle, posterior margin with 3 robust setae in proximal row, and 3-4 robust setae in distal row; propodus length 2 × width, with 4-5 robust setae on posterior margin. Pereopod 2 ischium with 2-3 robust setae on posterior margin, and 3-5 robust setae on posterodistal margin; merus with 11-14, long robust setae on anterodistal angle, posteromedial margin with 3-4 robust setae in proximal row, and 3-4 robust setae in distal row; propodus with 3 robust setae on posterior margin. Pereopod 7 coxa distally attenuated and curved posteriorly.

Pleonite 3 not extending beyond pleonite 5 to extending up to pleonite 5. Uropod extending beyond pleotelson; peduncle with 1-3 robust setae; exopod and endopod with smooth lateral and distal margins; exopod lateral margin sinuate or convex proximally, sinuate distally, with 8-12 robust setae along margin, setal fringe continuous (90-94%); medial margin straight; distomedial corner rounded, or broadly rounded; distal margin straight, with 3-4 robust setae; distolateral corner slightly produced, distolateral corner subacute or acute; endopod, lateral margin straight, with 3-7 robust setae; endopod, medial margin straight; distomedial corner rounded; distal margin straight, with 8-11 robust setae; distolateral corner produced or not produced, distolateral corner acute or bifid. Pleotelson length 1 × width; smooth (minute pores); longitudinal carina on dorsal surface conspicuous; with distal spines, with 7-11, short, straight prominent spines along distal margin, and 2 small lateral spines, with setae between spines, central distal spine bifid.

HABITAT. — Continental slope (298-750 m).

REMARKS. — *Bathynomus pelor* is most similar to those species with a bifid central pleotelsonic spine, such as *B. bruscai*, *B. decemspinus* and *B. kapala*. *Bathynomus pelor* differs from *B. bruscai* in having a discontinuous ridge above the eyes and from *B. decemspinus* in having a continuous setal fringe along the lateral margin of the exopod. *Bathynomus pelor* and *B. kapala* are most similar. Mainly *B. pelor* has 9 or 11 pleotelsonic spines and *B. kapala* has 7 spines.

DISTRIBUTION. — Shark Bay to the North-west Shelf, Western Australia (eastern Indian Ocean).

***Bathynomus richeri* n. sp.**

Figs 20-21

TYPE MATERIAL. — New Caledonia. Bathus 1. CP 702. 20°55.97'S 165°34.67'E, 591-660 m depth, B. Richer de Forges on NO *Alis*, 18.03.1993, holotype, 178 mm (MNHN IS.5832); Bathus 2, CP 744, 22°31.89'S 166°25.56'E, 586 m depth, B. Richer de Forges, NO *Alis*, 14.05.1993, 1 paratype (MNHN IS.5833); Bathus 2, CP 743, 22°35.56'S 166°26.23'E, 713-950 m depth, B. Richer de Forges, NO *Alis*, 14.05.1993, 1 paratype, 130 mm (MNHN IS.5834); fish trap, 5 paratypes (MNHN IS.2292); Nakety Pass, east coast, about 21°22'S 166°10'E, 530 m, trap also with *Chaceon bicolor*, *Heterocarpus* spp., B. Richer de Forges & J.K. Lowry, FV *Thalassa*, 2.12.1995, 8 paratypes (AM P68561), 5 paratype (AM P68562), 35 paratypes (AM P68563).

TYPE LOCALITY. — off New Caledonia, 22°55.97'S 165°34.67'E, 591-660 m depth.

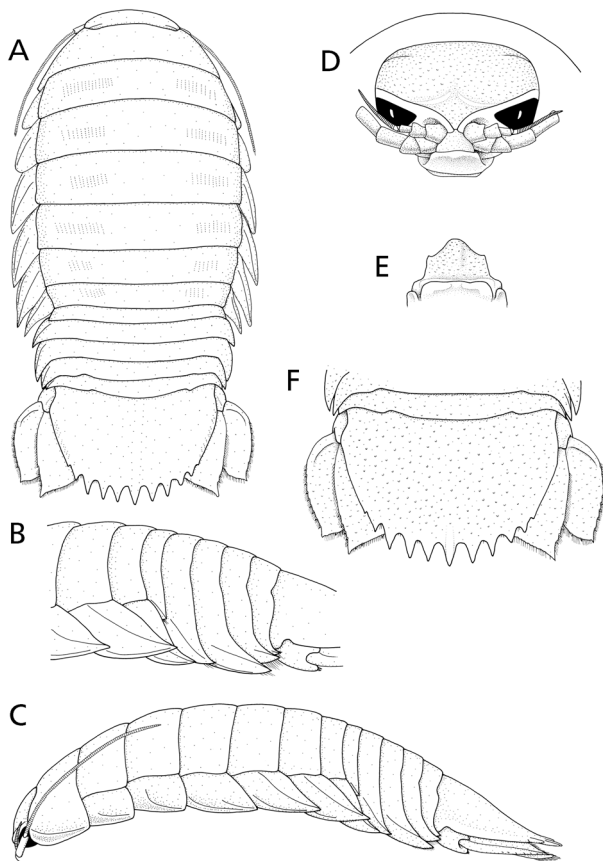


FIG. 20. *Bathynomus richeri* n. sp. Holotype, 178 mm, MNHN, off New Caledonia, 591-660 m: A, body, dorsal view; B, pereopod, lateral view; C, body, lateral view; D, cephalon, anterior view; E, clypeal region, ventral view; F, pleotelson, dorsal view.

FIG. 20. *Bathynomus richeri* n. sp. Holotype, 178 mm, MNHN, au large de la Nouvelle-Calédonie, 591-660 m : A, corps, vue dorsale ; B, péréopode, vue latérale ; C, corps, vue latérale ; D, tête, vue antérieure ; E, région clypéale, vue ventrale ; F, pléotelson, vue dorsale.

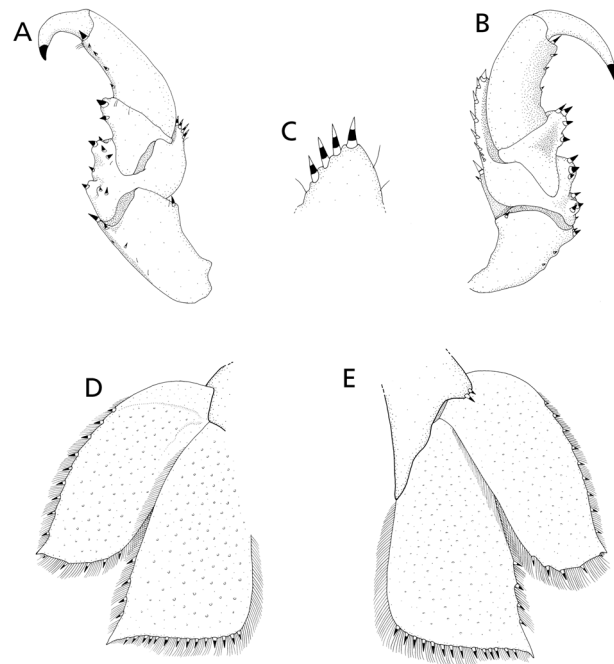


FIG. 21. *Bathynomus richeri* n. sp. Holotype, 178 mm, MNHN, off New Caledonia, 591-660 m depth: A, pereopod 1, medial view; B, pereopod 2, medial view; C, pereopod 2 merus, posterolateral margin; D, uropod, dorsal view; E, uropod, ventral view.

FIG. 21. *Bathynomus richeri* n. sp. Holotype, 178 mm, MNHN, au large de la Nouvelle-Calédonie, 591-660 m : A, péréopode 1, vue médiane ; B, péréopode 2, vue médiane ; C, péréopode 2 mérus, bord postérolatéral ; D, uropode, vue dorsale ; E, uropode, vue ventrale.

DESCRIPTION. — Body length 178 mm, length $2.2 \times$ width. Head ridge above eyes discontinuous; clypeal region, distal margins straight, apex broadly rounded apically. Antenna 2, flagellum extending to within pereonite 3.

Pereopod 1 ischium with 3 posteroproximal robust setae; merus with 4-5, short robust setae on anterodistal angle, posterior margin with 5 robust setae in proximal row; propodus length $2 \times$ width, with 4 robust setae on posterior margin. Pereopod 2 ischium with 4 robust setae on posterior margin; merus with 11, short robust setae on anterodistal angle, posteromedial margin with 6 robust setae in proximal row; propodus with 3 robust setae on posterior margin.

Pleonite 3 extending up to pleonite 5. Uropod not extending beyond pleotelson; peduncle with 2 robust setae; exopod and endopod with minutely scalloped lateral and distal margins; exopod lateral margin sinuate, with 9 robust setae along margin, setal fringe of medium length (74%); medial margin straight; distomedial corner rounded; distal margin convex, with 4 robust setae; distolateral corner slightly produced, distolateral corner acute; endopod, lateral margin sinuate, with 4 robust setae; endopod, medial margin straight; distomedial corner rounded; with 11 robust setae; distolateral corner produced, distolateral corner acute. Pleotelson broader than long, length $0.7 \times$ width; smooth (minute pores); longitudinal carina on dorsal surface inconspicuous; with distal spines, with 7-9, short, straight prominent spines along distal margin, and 2 small lateral spines, with setae between spines, central distal spine simple.

HABITAT. — Continental slope (530-950 m).

REMARKS. — *Bathynomus richeri* is a small wide-bodied species in the supergiant group. It is most similar to *B. crosnieri* and *B. giganteus*, both of which have a medium length setal fringe on the lateral margin of the exopod, a pleotelson which is broader than long and 11 straight, pleotelsonic spines. *Bathynomus richeri* is smaller than these two supergiants, its second antenna extends into pereonite 3 and its exopods and endopods are differently shaped.

DISTRIBUTION. — Off southern New Caledonia (Coral Sea, south-western Pacific Ocean).

ETYMOLOGY. — Named for Bertrand Richer de Forges, in recognition of his outstanding contribution to our knowledge of the deep sea fauna of the South Pacific and as thanks for his patience and support of this project.

***Bathynomus* sp.**

Fig. 22

MATERIAL EXAMINED. — Gulf of Aden, western Indian Ocean, January 1972; 11 specimens, largest 93 mm (MNHN Is 5837); 12°27.7'S 48°12.5'E, 600-605 m, A. Crosnier, 19.01.1972, 1 specimen, 100 mm (MNHN Is.5836); 12°27.7'S 48°12.5'E, Gulf of Aden, western Indian Ocean, 600-605 m depth, A. Crosnier, 19 January 1972; 11 specimens, largest 93 mm (MNHN Is 5837); 12°44.13'S 48°10.1'E, Gulf of Aden, western Indian Ocean, 563-570 m depth, A. Crosnier, 5.03.1971, 9 specimens, largest, 73 mm (MNHN IS.2283).

DESCRIPTION. — Body length 100 mm, length $2.5 \times$ width. Head ridge above eyes discontinuous. Antenna 2, flagellum extending to within pereonite 3.

Pereopod 1 ischium with 4 posteroproximal robust setae, 5 robust setae on posterodistal margin; merus with 9, short robust setae on anterodistal angle or long robust setae on anterodistal angle, posterior margin with 4 robust setae in proximal row, and 5 robust setae in distal row; propodus length $2 \times$ width, with 5 robust setae on posterior margin. Pereopod 2 ischium with 6 robust setae on posterior margin, and 5 robust setae on posterodistal margin; merus with 11, short robust setae on anterodistal angle, posteromedial margin with 3 robust setae in proximal row, and 4 robust setae in distal row; propodus with 4 robust setae on posterior margin. Pereopod 7 coxa distally broad and slightly curved posteriorly.

Pleonite 3 extending beyond pleonite 5. Uropod not extending beyond pleotelson; peduncle with 2 robust setae; exopod and endopod with smooth lateral and distal margins; exopod lateral margin convex proximally, sinuate

distally, with 7-8 robust setae along margin, setal fringe of medium length (65-77%); medial margin straight; disto-medial corner broadly rounded; distal margin sinuate, with 5 robust setae; distolateral corner produced, distolateral corner subacute; endopod, lateral margin sinuate, with 5 robust setae; endopod, medial margin straight; distomedial corner rounded; distal margin sinuate, with 12 robust setae; distolateral corner produced, distolateral corner acute. Pleotelson length 0.8 × width; granulated (minute pores); longitudinal carina on dorsal surface inconspicuous; with 11, short, straight prominent spines along distal margin, and 2 small lateral spines, without setae between spines.

HABITAT. — Continental slope (600-605 m).

REMARKS. — These specimens are juveniles. The largest is only 73 mm in length. They are included here to alert that an additional, probably new species, occurs in the Gulf of Aden.

DISTRIBUTION. — Gulf of Aden, north-western Indian Ocean.

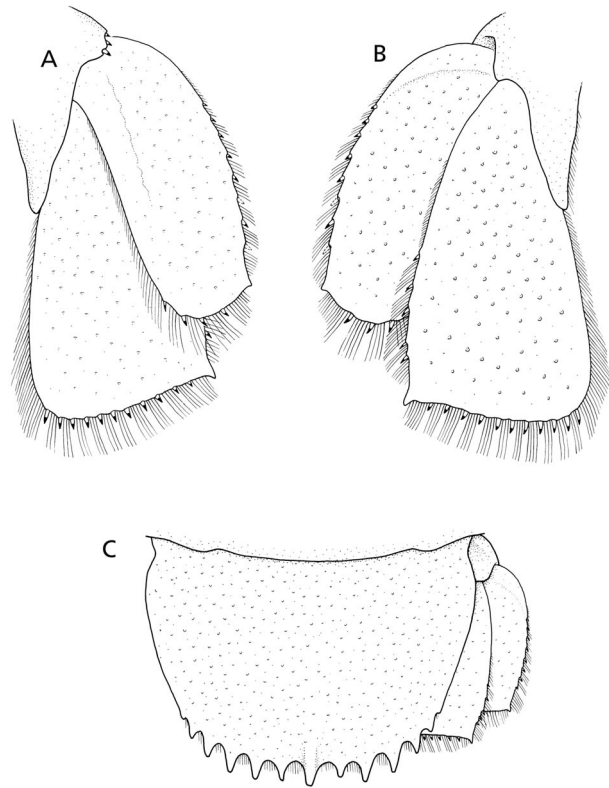


FIG. 22. *Bathynomus* sp. Specimen, 100 mm, MNHN IS 2231, Gulf of Aden, 600-605 m: A, uropod, dorsal view; B, uropod, dorsal view; C, pleotelson, ventral view.

FIG. 22. *Bathynomus* sp. Spécimen, 100 mm, MNHN IS 2231, Golfe d'Aden, 600-605 m : A, uropode, vue dorsale ; B, uropode, vue dorsale ; C, pléotelson, vue ventrale.

KEY TO SPECIES OF *BATHYNOMUS*

Where species have variable pleotelsonic spine counts, then the species occurs more than once in the key.

- 1. Pleotelsonic spines 7 2
- Pleotelsonic spines 9 5
- Pleotelsonic spines 11 or 13 13
- 2. Pleotelsonic central spine simple 3
- Pleotelsonic spine bifid 4
- 3. Uropod exopod setal fringe medium to continuous (75-84%) *B. doederleini*
- Uropod exopod setal fringe short (62-65%) *B. immanis*
- 4. Uropod exopod setal fringe medium length (77-78%) *B. decemspinus*
- Uropod exopod setal fringe continuous (85-94%) *B. kapala*
- 5. Pleotelsonic central spine bifid 6
- Pleotelsonic central spine simple 8
- 6. Ridge above eyes continuous *B. bruscai*
- Ridge above eyes discontinuous 7
- 7. Uropod endopod lateral margins slightly sinuate *B. kapala*
- Uropod endopod lateral margins straight *B. pelor*
- 8. Pleotelson broader than long 9
- Pleotelson as long as broad or slightly longer 12

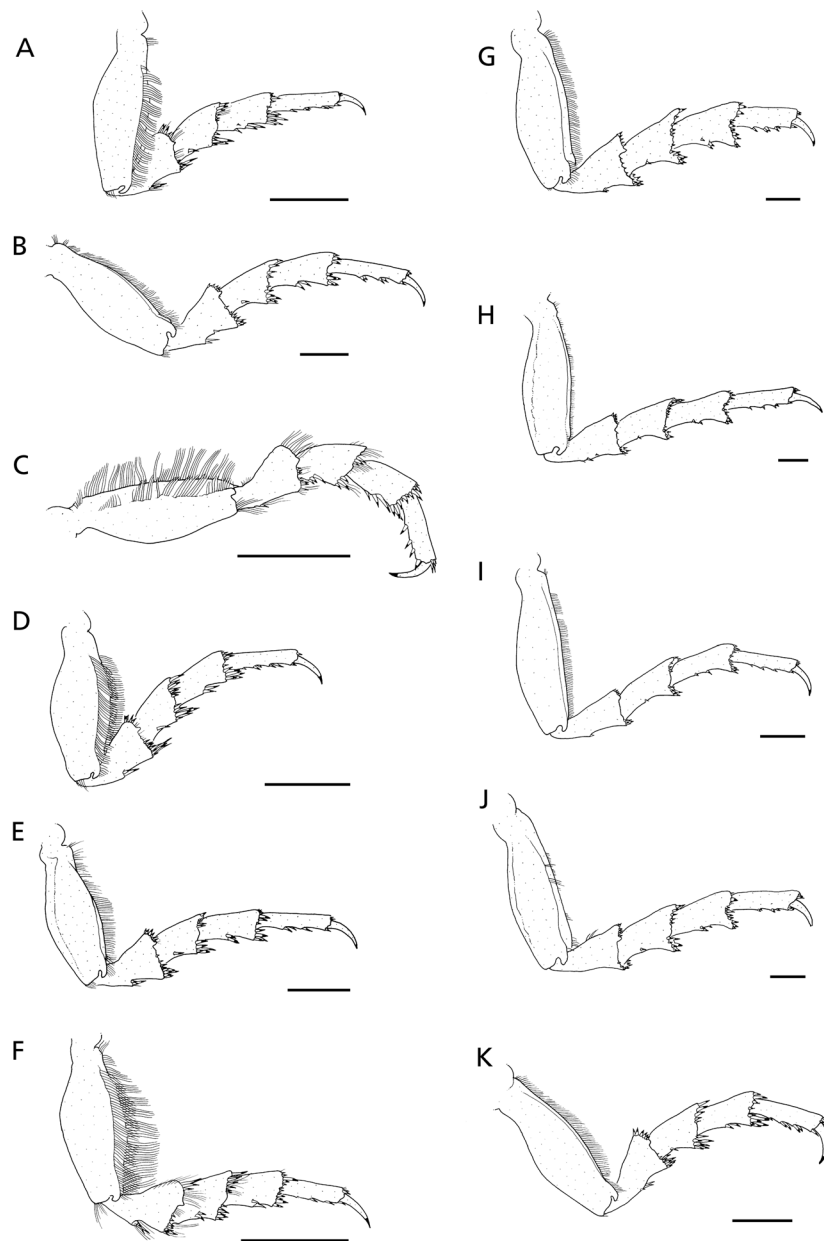


FIG. 23. Pereopod 7. Giants: A, *B. affinis* Richardson, 1910; B, *B. brucei* n. sp.; C, *B. bruscai* n. sp.; D, *B. doederleini* Ortmann, 1894; E, *B. immanis* Bruce, 1986; F, *B. kapala* Griffin, 1975. Supergiants: G, *B. crosnieri* n. sp.; H, *B. giganteus* Milne Edwards, 1879; I, *B. keablei* n. sp.; J, *B. kensleyi* n. sp.; K, *B. richeri* n. sp. Scales, 5 mm.

FIG. 23. Périopode 7 chez les Géants : A, *B. affinis* Richardson, 1910 ; B, *B. brucei* n. sp. ; C, *B. bruscai* n. sp. ; D, *B. doederleini* Ortmann, 1894 ; E, *B. immanis* Bruce, 1986 ; F, *B. kapala* Griffin, 1975. Périopode 7 chez les super-géants : G, *B. crosnieri* n. sp. ; H, *B. giganteus* Milne Edwards, 1879 ; I, *B. keablei* n. sp. ; J, *B. kensleyi* n.s.p. ; K, *B. richeri* n. sp. Échelles 5 mm.

9. Uropod exopod marginal medium to continuous (>65%) 10
 — Uropod exopod marginal setation short (54-56%) *B. brucei*
10. Pleotelsonic spines upwardly curved *B. lowryi*
 — Pleotelsonic spines straight 11
11. Clypeus lateral margins convex, broadly rounded apically *B. obtusus*
 — Clypeus lateral margins concave, narrowly rounded apically *B. miyarei*
12. Uropod extending beyond pleotelson; uropod endopod distolateral corner bifid *B. affinis*
 — Uropod not extending beyond pleotelson; uropod endopod distolateral corner subacute. *B. doederleini*
13. Pleotelsonic spines upwardly curved *B. kensleyi*
 — Pleotelsonic spines straight 14
14. Uropod endopod distolateral corner strongly produced *B. richeri*
 — Uropod endopod distolateral corner not strongly produced 15
15. Uropod exopod distolateral corner slightly produced 16
 — Uropod exopod distolateral corner not produced 17
16. Clypeus lateral margins concave *B. keablei*
 — Clypeus lateral margins straight *B. giganteus*
17. Pleotelsonic spines 13 *Bathynomus* sp.
 — Pleotelsonic spines 11 *B. crosnieri*

ACKNOWLEDGEMENTS

We thank Alain Crosnier, Niel Bruce and Bertrand Richer de Forges for making collections available for study. We particularly thank Bertrand Richer de Forges for continued support during the project and Niel Bruce and Stephen Keable for discussions, advice and many useful suggestions on the manuscript. We thank George Davis for making it possible to examine the type of *B. propinquus* at the Los Angeles County Museum and Betty Wenner and Chip Biernbaum for bringing to our attention the occurrence of *B. giganteus* in the Western North Atlantic. We thank Penny Berents, Peter Freewater, Roger Springthorpe and Wim Vader for helping, often under trying conditions, to make the SEAS collections and Matthew Jebb, Stephen Keable and Alan Myers for helping to make the Papua New Guinea collections. We thank Roger Springthorpe for technical assistance. Kate Dempsey made most of the illustrations and plates, but we thank John Gittoes who stepped in near the end to skilfully finish the work.

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