

Spider Crabs
(Crustacea: Brachyura: Majidae)
from the International
Indian Ocean Expedition, 1963-1964

D. J. G. GRIFFIN

SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY • NUMBER 182

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ABSTRACT

Griffin, D. J. G. Spider Crabs (Crustacea: Brachyura: Majidae) from the International Indian Ocean Expedition, 1963-1964. *Smithsonian Contributions to Zoology*, number 182, 35 pages, 8 figures, 6 tables, 1974.—Spider crabs were collected by the RV *Anton Bruun* from 52 stations in the Andaman Sea, Bay of Bengal, Arabian Sea, and western Indian Ocean from Natal to the Gulf of Aden. Specimens from seven stations worked by the *Te Vega* in the Andaman Sea, Indonesia, and western Pacific, and shore collections made at Madagascar and the islands to the north and at Cocos (Keeling) Island in the eastern Indian Ocean are also dealt with.

A total of 56 species belonging to 30 genera are reported on. Fifty-two of the species were collected by the *Anton Bruun* and the 32 species collected at 28 stations in the western Indian Ocean represent just over one-third of the total number of majid spider crabs from that area. The collections were taken mainly on the upper part of the continental shelf, but six species were collected at depths exceeding 200 meters. Basic references, descriptive notes, and a summary of the geographic distribution are given for each species.

Achaeus curvirostris (A. Milne Edwards), new combination, and *Hyastenus ovatus* (Dana) are shown to be senior synonyms of *A. fissifrons* (Haswell) and *Hyastenus tenuicornis* Pocock, respectively, and *Naxia mamillata* Ortmann, a junior synonym of *Naxioides robillardi* Miers. In addition, *Doclea tetraptera* Walker is confirmed as a junior synonym of *D. calcitrata* White, *Eurynome longimana* Stimpson of *E. aspera* (Pennant) and *Pseudocollodes complectens* Rathbun of *Inachus dorsettensis* (Pennant). Barnard's "*Macropodia formosa* var" is identified as *M. intermedia* Bouvier. These last three species, previously known from the east Atlantic and South Africa, are recorded from east Africa for the first time. *Chlorinoides tosaensis* Sakai and *Majella brevipes* Ortmann, previously known from Japan, and *Oncinopus neptunus* Adams & White (= *O. aranea* auct. in part) and *Simocarcinus obtusirostris* Miers from the western Pacific are recorded from the Indian Ocean for the first time. The majority of the species collected are widely distributed Indo-West Pacific ones.

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Spider Crabs (Crustacea: Brachyura: Majidae) from the International Indian Ocean Expedition, 1963-1964

D. J. G. Griffin

Introduction

During the International Indian Ocean Expedition the RV *Anton Bruun* undertook nine cruises in the northern and western Indian Ocean. Five of these cruises were devoted, at least in part, to an investigation of the benthic fauna. Cruise 1 traversed the Andaman Sea and northern and western Bay of Bengal. Cruise 4B zigzagged along the west coast of India, West Pakistan and northern Arabian Sea to the Gulf of Oman. Cruises 7, 8, and 9 ranged from South Africa in the region of Durban through the Mozambique Channel, to the island groups north of Madagascar and, after traversing the Gulf of Aden, ended at Hurghada in the Red Sea.

During the five cruises spider crabs were collected at 52 stations, 14 in the Andaman Sea and Bay of Bengal, 11 in the Arabian Sea, and 27 in the western Indian Ocean. These areas have been previously investigated by the British HMS *Alert*, the German *Valdivia*, the Indian RIMSS *Investigator* and J. Stanley Gardener's Expedition on HMS *Sealark*.

Guinot (1966) has listed the Brachyura from the western Indian Ocean and outlined their zoo-

geography. She listed 771 species including 93 majid spider crabs.

The present report deals with almost 800 specimens collected by the *Anton Bruun*. Some of the specimens collected by *Te Vega* at seven stations in the Andaman Sea, Indonesia, and western Pacific are also dealt with. Finally, a few specimens collected at shore stations in the Madagascar region and at Cocos (Keeling) Island in the eastern Indian Ocean are included. The collection, 850 specimens in all, was distributed by the Smithsonian Oceanographic Sorting Center, Washington, D.C.

The systematic account of the species is arranged alphabetically by genus. The list of references for each species includes that to the original description and any later one which gives detailed descriptive notes and/or illustrations. The material on which this report is based is housed mainly in the collections of the Division of Crustacea, National Museum of Natural History, Smithsonian Institution (USNM) with some duplicates in the Australian Museum, Sydney (AM); the catalog or registration number is given for each lot. Terminology follows that used previously (Griffin 1966b). The given dimensions of the specimens are the carapace lengths (including the rostrum), unless otherwise stated. Details of the *Anton Bruun* and *Te Vega* stations are given in Tables 1 and 2, respectively.

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TABLE 1.—*List of Anton Bruun stations from which spider crabs were collected during the International Indian Ocean Expedition*

Cruise	Station	Locality	Lat.	Long.	Depth (m)	Gear*	Date
1	17	SE Andaman Sea	07°40'N	97°09'E	512-503	GMT	21.III.1963
"	18A	"	07°34'N	98°00'E	77	DR	21-22.III.1963
"	20	"	09°13'N	97°51'E	60-58	GMT	23.III.1963
"	21	"	09°54'N	97°42'E	70	"	24.III.1963
"	22A	Andaman Sea	10°39'N	97°06'E	275	DR	"
"	22B	"	"	"	290	GMT	"
"	38	N Andaman Sea	14°07'N	97°05'E	69-73	"	30.III.1963
"	41	"	15°04'N	95°51'E	44-46	"	31.III.1963
"	41A	"	"	"	29-33	"	"
"	42	"	15°08'N	94°54'E	35	"	1.IV.1963
"	46	NE Bay of Bengal	21°00'N	91°59'E	23-25	"	5.IV.1963
"	47	"	20°27'N	92°20'E	19-20	"	"
"	47A	"	20°16'N	92°32'E	13-15	"	"
"	47B	"	19°50'N	92°55'E	30-22	"	"
4B	202B	W of Bombay	17°41'N	71°33'E	90	"	14.XI.1963
"	202C	"	18°27'N	71°13'E	84-97	"	"
"	203A	"	18°28' -71°09'				
"	203A	"	19°07'N	71°41'E	69-68	"	"
"	206A	NE Arabian Sea	19°08' -71°42'				
"	206A	"	20°23'N	70°00'E	71-79	"	15.XI.1963
"	216A	"	20°20' -69°55'				
"	216A	"	21°49'N	68°55'E	52-50	"	17.XI.1963
"	216A	"	21°52' -68°55'				
4B	221A	"	22°32'N	68°07'E	57	GMT	18.XI.1963
"	245A	Gulf of Oman	22°31' -68°05'				
"	245A	"	24°55'N	61°10'E	170-192	"	28.XI.1963
"	246A	"	24°52' -61°13'				
"	246A	"	25°00'N	60°57'E	298-311	"	"
"	264A	"	24°57' -60°59'				
"	264A	"	25°02'N	56°52'E	291-272	"	2.XII.1963
"	269C	"	25°08' -56°52'				
"	269C	"	23°35'N	58°49'E	124-121	DR	3.XII.1963
"	270A	"	22°05'N	59°47'E	55	GMT	4.XII.1963
"	270A	"	22°08' -59°48'				
7	357B	E of Durban	29°11'S	32°02'E	69	DR	30.VII.1964
"	370G	E of Lourenço Marques	24°40'S	35°28'E	347	AT	18.VIII.1964
"	371D	"	24°46'S	35°20'E	165	"	"
"	371G	"	24°49'S	35°13'E	73	DR	"
"	372C	"	24°46'S	34°50'E	22	"	19.VIII.1964
"	372L	"	25°07'S	34°34'E	112	AT	"
"	391J	E of Durban	29°21'S	31°35'E	57	"	9.IX.1964
"	392K	"	29°19'S	31°26'E	38	"	10.IX.1964
8	394B	"	29°27'S	31°31'E	68-70	GMT	25.IX.1964
"	396B	"	25°32'S	33°24'E	450-455	"	28.IX.1964
"	397A	E of Lourenço Marques	25°12'S	34°04'E	230-295	"	29.IX.1964
"	397C	"	26°07'S	34°11'E	600-665	"	"
"	398B	"	22°25'S	35°54'E	740	"	1.X.1964
"	399B	Mozambique Channel	22°30'S	36°07'E	850-960	"	"
"	400C	"	20°30'S	35°43'E	62	"	3.X.1964
8	401C	"	19°51'S	36°21'E	62	"	4.X.1964
4B	401F	"	20°30'S	35°49'E	32	"	"

TABLE 1.—Continued

<i>Cruise</i>	<i>Station</i>	<i>Locality</i>	<i>Lat.</i>	<i>Long.</i>	<i>Depth (m)</i>	<i>Gear*</i>	<i>Date</i>
"	403A	"	19°09'S	36°20'E	27-30	"	9.X.1964
"	408D	"	16°42'S	43°19'E	150-300	DR	15.X.1964
"	420A	E of Mombasa	02°42'S	40°53'E	140	GMT	6.XI.1964
"	421G	"	02°56'S	40°28'E	240	"	8.XI.1964
"	421H	"	02°50'S	40°31'E	290	"	"
9	442	Off Cape Guardafui	09°35'N	50°59'E	70-80	"	16.XII.1964
"	444	"	09°36'N	51°01'E	78-82	"	"
"	445	"	09°41'N	51°03'E	60-70	"	"
"	447	"	10°00'N	51°15'E	59-61	"	"
"	453	"	11°11'N	51°14'E	47-49	"	17.XII.1964
"	463	Mouth of Gulf of Aden	11°24'N	51°35'E	75-175	"	"

* Abbreviations: AT = Agassiz Trawl; DR = Rock Dredge; GMT = Gulf of Mexico Shrimp Trawl.

TABLE 2.—List of Te Vega stations referred to in this report

<i>Station</i>	<i>Locality</i>	<i>Lat.</i>	<i>Long.</i>	<i>Depth (m)</i>	<i>Gear</i>	<i>Date</i>
16	Penguin Bank off Molokai, Hawaiian Is.	21°02'N	157°41'W	—	—	3.VIII.1963
54	Teluk Kau, Halmahera, Moluccas	01°08.6'N	128°01'E	46-55	BT*	25.XI.1963
60	South China Sea, ca. 60 miles off coast of Sarawak, Borneo	4°44'N	113°23'E	100	"	6.X.1963
73	Strait of Malakka	4°07'N	100°00'E	72-74	"	30.X.1963
80	SE Andaman Sea, NE of Similan Is, Thailand	8°46'N	97°46'E	90-84	"	4.XI.1963
97LH	Pulo Penju, NE of Simalur, Indonesia	02°51'N	95°56'E	intertidal	—	22.XI.1963
305	Pacific Ocean, near Fiji	18°40.5'S	173°59.3'W	—	—	25.XI.1963

* BT = 6' beam trawl.

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Finally, I wish to express my appreciation to the authorities of the Smithsonian Institution's Oceanographic Sorting Center for allowing me to examine this collection.

Achaeus barnardi Griffin

Achaeus barnardi Griffin, 1968:81-86, figs. 3, 4c-g.

MATERIAL EXAMINED.—1 ♂, 10.1 mm, 1 ♀ (ovig.), 11.1 mm (USNM 135100-01).

Anton Bruun Cruises: Mozambique Channel. Sta. 400C, 62 m, 1 spec. Mouth of Gulf of Aden, Sta. 463, 75-175 m, 1 spec.

REMARKS.—These two specimens agree with the type-material in all main features. However, there are no spinules on the supraorbital eave, some minute spinules are present behind the eave, there are the two or three spinules on the branchial margin and three or four strong spinules along the center of the basal antennal article (only tubercles in the type-series), the cheliped is slightly more spinulose and, in the male, the fingers of the chelae gape more widely, and the two teeth filling the gape proximally are much stronger. The posterior margins of the antennular fossae bear a spinule (not noted in the type-series); there are minute denticles along the proximal part of the fourth ambulatory dactyl of the female.

DISTRIBUTION.—East Africa off Cape Morgan, Mozambique Channel, and mouth of Gulf of Aden.

Achaeus curvirostris (A. Milne Edwards),
new combination

Stenorhynchus curvirostris A. Milne Edwards, 1873:253.—Haswell, 1882:2.

Stenorhynchus fissifrons Haswell, 1879:409.

Achaeus tenuicollis Miers, 1886:9, pl. 1: figs. 3a-c.

Achaeus elongatus Sakai, 1938:223, fig. 13.

Achaeus fissifrons.—Griffin and Yaldwyn, 1965:38-43, figs. 1-8.—Griffin, 1970:101-102, fig. 13b,c.

MATERIAL EXAMINED.—1 ♂, 3.9 mm (USNM 135102).

Anton Bruun Cruises: E of Lourenço Marques, Sta. 371D, 165 m, 1 spec.

REMARKS.—The original description of this species was extremely short and hardly allowed positive identification. Through the kindness of Dr. G. Hartman, Zoologisches Institut, University of Hamburg, I have been able to examine what is surely the holotype of Milne Edwards's species. The specimen is a male, cl. 7.3 mm, labeled "*Stenorhynchus brevirostris*, Bass Strafe"; it bears

Museum Godeffroy number 3405 and is currently registered as K30. (A. Milne Edwards stated that his specimen had the Museum Godeffroy number 3710; it is possible that the numbers were altered when the Hamburg Museum took over the Godeffroy collections.) Only one ambulatory leg is attached to the body and there are two loose legs in the same container—no chelae or other ambulatories are present. The specimen agrees with Milne Edwards's description and also with what is known of *Achaeus fissifrons* in all important features; it possesses one supraorbital spine, one postorbital spinule, and one cardiac spine. The first pleopod is exactly as has been described for *A. fissifrons*.

The single specimen from *Anton Bruun* Sta. 371D differs from what must now be known as *A. curvirostris* only in lacking a tubercle on the anterior surface of the eyestalk. There are no traces of ridges behind the rostral spines and the specimen is clearly not identifiable as *A. cadelli* Alcock.

DISTRIBUTION.—Indo-West Pacific from eastern Africa and the Iranian Gulf to Japan, western and eastern Australia, and New Zealand.

Achaeus erythraeus Balss

FIGURES 1a-d

Achaeus erythraeus Balss, 1929:5-6.

MATERIAL EXAMINED.—1 ♂, 8.7 mm (USNM 135103).

Anton Bruun Cruises: Off Cape Guardafui, Sta. 445, 60-70 m, 1 spec.

REMARKS.—This single specimen agrees in a large number of important features with Balss's species. Thus, the rostral spines are long, slender, and divergent from the base, the supraorbital eave bears a single long spine, the eyestalk bears a small tubercle on the anterior surface near the cornea, there are three slightly shorter spines on the lateral margin of the basal antennal article, the mesogastric spine is slender and acuminate, the cardiac spine is stout and blunt, there are three short spines on the branchial margin and a similar number above, and the first pleopod is apically rounded. The only differences from the type-material that I have seen (3 ♂, 7.2-10.1 mm, Zoologisches Sammlung, Munich and Naturhistorisches Museum, Vienna, *Pola* Stas. 91, 127 and 130) are that the palm of each chela is more inflated

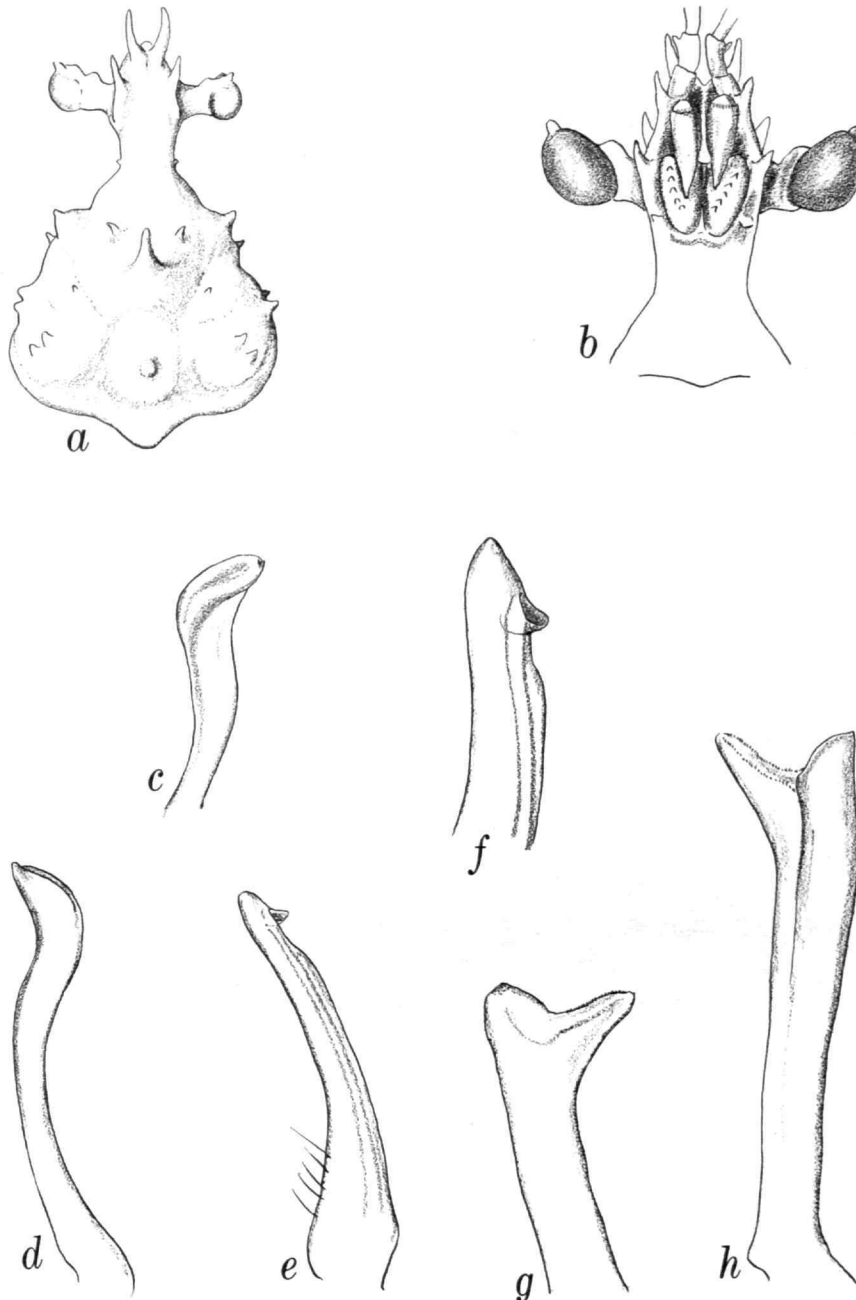


FIGURE 1.—*Achaeus erythraeus* Balss, male (USNM 135103), carapace length 8.7 mm, from off Cape Guardafui, Anton Bruun Sta. 445: *a*, carapace, dorsal aspect; *b*, front, ventral aspect; *c*, left pleopod 1, tip, sternal aspect; *d*, same, whole pleopod, abdominal aspect. *Gryphachaeus hyalinus* (Alcock and Anderson), male (AM P.17784), carapace length 13.2 mm, from E of Mombasa, Anton Bruun Sta. 420 A: *e*, left pleopod 1, abdominal aspect; *f*, same, tip. *Encephaloides armstrongi* Wood-Mason, male (AM P.17781), carapace length 24.8 mm, from Gulf of Oman, Anton Bruun Sta. 245A: *g*, left pleopod 1, tip, sternal aspect; *h*, same, whole pleopod, abdominal aspect.

and the dorsal and ventral spines are shorter, the terminal segment of the abdomen bears tubercles instead of spines, and there is only one short spine behind the orbit. *A. erythraeus* differs most notably from *A. spinosissimus* Griffin in the form of the rostrum, in having fewer spines on the basal antennal article, and in the armature of the fingers of the chela.

DISTRIBUTION.—Red Sea and off Cape Guardafui.

Achaeus lacertosus Stimpson

Achaeus lacertosus Stimpson, 1858:218.—Griffin, 1970:105–108, figs. 1b, 5, 14a,d.

MATERIAL EXAMINED.—1 ♂, 4.6 mm (USNM 135105).

Anton Bruun Cruises: E of Lourenço Marques, Sta. 371G, 73 m, 1 spec.

REMARKS.—This small specimen possesses all the characteristic features of this species, including the smooth carapace and unarmed eyestalk. It differs from previously described material only in having low spinules in a row on the ischium and merus of the third maxilliped and on the surface of the basal antennal article.

DISTRIBUTION.—Indo-West Pacific from South Africa to Japan and northern Australia.

Achaeus laeviculis Miers

Achaeus laeviculis Miers, 1884:520, pl. 46: figs. A, a. *Achaeus cf. laeviculis*.—Barnard, 1950:20–21, fig. 3c.

MATERIAL EXAMINED.—1 ♂, 4.5 mm (USNM 135104).

Anton Bruun Cruises: W of Bombay, Sta. 202C, 84–97 m, 1 spec.

REMARKS.—This small specimen is similar to *A. lacertosus* and to *A. varians* Takeda and Miyake in general shape of the carapace and shortness of the rostrum. However, the eyestalk has a small lobe on the anterior surface, the ischium and merus of the third maxilliped bear spinules in a row, the basal antennal article bears spinules laterally, and there is a low tubercle on the mesogastric region, another on the cardiac, and several on the anterolateral margins; in addition, there is a broad band of minute spinules close to the posterolateral margins of the carapace. There are

fewer differences from *A. laeviculis* than from any other *Achaeus* species and this specimen is therefore referred to that species.

DISTRIBUTION.—Western Indian Ocean: Seychelles; South Africa off Port Shepstone, Natal.

Achaeus spinosissimus Griffin

Achaeus spinosissimus Griffin, 1968:76–81, figs. 1, 2, 4a, 5.

MATERIAL EXAMINED.—1 ♀, 10.5 mm (USNM 135187).

Anton Bruun Cruises: Mozambique Channel, Sta. 400C, 62 m, 1 spec.

REMARKS.—The present specimen lacks all ambulatory legs and only the right cheliped is present. I am not able to confidently assign it to any known species. Of all the known species of *Achaeus*, *Macropodia*, and *Achaeopsis*, the present specimen most closely resembles *A. spinosissimus*. It differs from that species, known only from one adult male, as follows: there is a supraorbital tubercle instead of a spine, there is only a single postorbital spinule, the basal antennal article reaches to the tip of the short rostrum and bears three (not four) spines, the hepatic margin is outstanding and subacute and bears only two or three tubercles, the branchial region lacks marginal spines, there are only two subdorsal branchial tubercles, there are many tubercles on the dorsal surface posteriorly, and the third maxilliped ischium and merus each bear only two spines. It agrees with *A. spinosissimus* in having extremely short rostral spines, large antennular fossae, a spinule on the anterior surface of the eyestalk, and in the arrangement of the main tubercles on the gastric and cardiac regions.

DISTRIBUTION.—*Achaeus spinosissimus* was originally described from East London, South Africa.

Aepinus indicus (Alcock)

Apocremmus indicus Alcock, 1895:188–189, pl. 4: figs. 2, 2a. *Aepinus indicus*.—Griffin, 1972:53–54, fig. 3.

MATERIAL EXAMINED.—6 ♂♂, 7 ♀♀ (3 ovig.), 4.7–15.7 mm, smaller ovig. ♀, 7.4 mm (8, USNM 135106, 135108–11; 5, AM P.17777).

Anton Bruun Cruises: E of Lourenço Marques, Sta. 371D, 165 m, 1 spec. Mozambique Channel,

Sta. 408D, 150–300 m, 5 specs. Off Cape Guardafui, Sta. 444, 78–82 m, 2 specs.; Sta. 445, 60–70, 1 spec.; Sta. 453, 47–49 m, 1 spec. Mouth of Gulf of Aden, Sta. 463, 75–175 m, 3 specs.

REMARKS.—These specimens show no important differences from previously recorded material, particularly that recently reported from eastern and western Australia and the Philippines (Griffin, 1972). The rostral spines are sometimes straight and sometimes outwardly curved. A mesogastric spine is found in the *Anton Bruun* material and in Australian and Philippine specimens. This is not mentioned by Alcock but is figured by him.

Aepinus indicus differs in some important features from *A. septemspinosus* (A. Milne Edwards, 1879). The specimens recorded by Rathbun (1925:92–94) have been reexamined and these differences are as follows. In *A. septemspinosus* the rostrum is extremely short and rounded, the basal antennal article is truncate (not produced anterolaterally), there is no trace of any suborbital lobe or tubercle, the abdomen of the male is six-segmented and the first pleopod of the male is hardly expanded apically.

DISTRIBUTION.—Red Sea; Indian Ocean: eastern Africa from Lourenço Marques to Gulf of Aden, Amirantes, Seychelles, Ceylon, Andaman Islands; northern Australia; Philippine Islands.

Camposcia retusa Latreille

Camposcia retusa Latreille, 1829:60.—Sakai, 1965:69, pl. 30: fig. 1.

MATERIAL EXAMINED.—1 ♀ (ovig.), 30.9 mm (USNM 135112).

Madagascar: Nosi Tanga, Nosi Be, intertidal, J. R. Rudloe, 17 January 1964, 1 spec.

DISTRIBUTION.—Throughout Indo-West Pacific from South Africa to Australia and Japan.

Chlorinoides aculeatus (H. Milne Edwards)

Chorinus aculeatus H. Milne Edwards, 1834:316.

Acanthophris aculeatus.—Sakai, 1938:310–311, fig. 43.

Paramithrax (Chlorinoides) aculeatus.—Chhappgar, 1957:412–413, pl. 4: figs. a–e.

Chlorinoides aculeatus.—Griffin, 1966d:4, 11, 13.

MATERIAL EXAMINED.—1 damaged ♀, postrostral length 21.7 mm (USNM 135113).

Anton Bruun Cruises: NE Bay of Bengal, Sta. 47B, 30–22 m, 1 spec.

REMARKS.—Although this specimen is badly damaged, the rostrum being broken and the cardiac spines completely broken, it is assigned to this species because it possesses a single short pre-orbital spine, there are two intestinal spines, the anterior margin of the sternum is tuberculate, and the ambulatory propodi are trigonal with granules along the ridges. These are all features typical of *C. aculeatus* and not of *C. longispinus*. Like *C. longispinus* there are knobs on the carapace spines. The ambulatory meri possess only a single terminal spine instead of the two typical of the species.

The male first pleopod possesses a subterminal flap, not a spine as stated by Chhappgar (1957).

DISTRIBUTION.—Indo-West Pacific: Bay of Bengal to Japan and northern Australia.

Chlorinoides tosaensis Sakai

FIGURES 2, 3f

Chlorinoides tosaensis Sakai, 1969:254–255, figs. 4c, 5a, pl. 1: fig. 3.

MATERIAL EXAMINED.—1 ♂, 6 ♀ (1 ovig.), 19.5–27.0 mm, ovig. ♀ 23.7 mm (USNM 135114–18).

Anton Bruun Cruises: Mozambique Channel, Sta. 401C, 62 m, 1 spec. Off Cape Guardafui, Sta. 442, 70–80 m, 1 spec.; Sta. 444, 78–82 m, 2 specs.; Sta. 447, 59–61 m, 1 spec.; Sta. 453, 47–49 m, 2 specs.

REMARKS.—These seven specimens differ from the type-series (holotype ♂ USNM 125882) in two features. First, the hepatic margin bears a short, flattened lobe, which may be either bifid or single, whereas in the type-series there is a single spine. Second, there are two intestinal spines instead of one (as described, the holotype has a damaged intestinal region). It is extremely doubtful if this series could be considered even sub-specifically distinct from the Japanese specimens. While the nature of the hepatic lobe and the number of intestinal spines might normally be considered important distinctions, it is clear from examination of the very similar *C. longispinus* (De Haan) that there is considerable variation in both these features (compare Sakai's [1965, pl. 40: fig. 1] and Serene's [1969, pl. 3A] illustrations of *C. longispinus*). In view of the very close similarity, in a wide range of features including details of the male

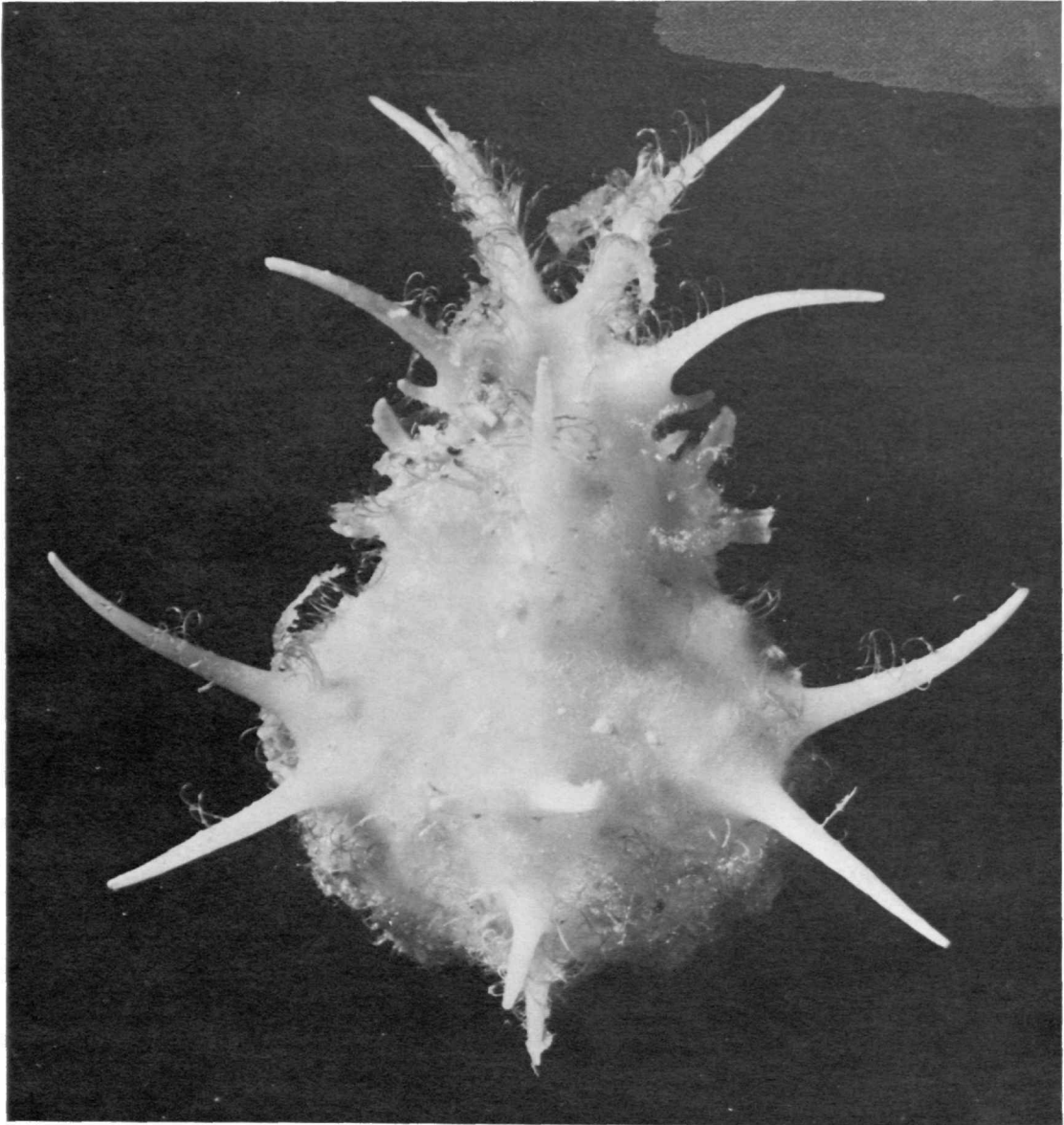


FIGURE 2.—*Chlorinoides tosaensis* Sakai, female (USNM 135118), carapace length 27.0 mm, from off Cape Guardafui, Anton Bruun, Sta. 453: carapace, dorsal aspect.

first pleopod, of these *Anton Bruun* specimens and the type-series, the considerable variation in spinulation of various lobes and spines, and the very few specimens as yet available, the present material is assigned to Sakai's species. It is possible that these specimens are conspecific with one of the three "varieties" of *C. longispinus* reported from the Indian Ocean (see Griffin 1966d for list and discussion); however, none of these have been described as possessing the long preorbital spines typical of *C. tosaensis*.

Sakai has already mentioned that this species is very similar to *C. acanthonotus* (Adams and White) from Borneo. Examination of the holotype of the latter in the British Museum (Natural History), London (♀, 27.1 mm, reg. no. 47.21), confirms this view. The main difference is that *C. acanthonotus* possesses an accessory spine on the preorbital spine so as to give the latter a bifid appearance. Availability of further material may indeed show the two to be one species.

Chlorinoides tosaensis and *C. acanthonotus* plus *C. longispinus* and *C. aculeatus* form a very tightly knit group of species within the genus *Chlorinoides*, the main difference between the two pairs of species being the elongation of the preorbital lobe in *C. tosaensis* and *C. acanthonotus*.

DISTRIBUTION.—East Africa, Japan.

Collodes malabaricus Alcock

Collodes malabaricus Alcock, 1895:189–190, pl. 5: fig. 3.—Stephensen, 1945:97.

MATERIAL EXAMINED.—1 ♀, 4.6 mm (USNM 135120).

Anton Bruun Cruises: W of Bombay, Sta. 202C, 84–97 m, 1 spec.

REMARKS.—This extremely small specimen differs from Alcock's (1895) description and figure only in that the carapace is slightly more tuberculate, the rostrum is composed of two lobes separated by a very narrow fissure, the branchial spines are slightly shorter, and the anterior and posterior angles of the supraorbital cave are more outstanding.

DISTRIBUTION.—Iranian Gulf and Arabian Sea off the coast of India.

Cyrtomaia suhmi Miers

Cyrtomaia suhmi Miers, 1886:16–17, pl. 3: fig. 2.—Ihle and Ihle-Landenberg, 1931:157.

Cyrtomaia suhmi typica Doflein, 1904:54–55, pl. 19: figs. 1, 2.

MATERIAL EXAMINED.—1 ♂, 3 ♀♀ (damaged), ♂ 80.9 mm (USNM 135119).

Anton Bruun Cruises: SE Andaman Sea, Sta. 17, 512–502 m, 4 specs.

REMARKS.—These specimens differ from the type-material in the British Museum (Natural History), London (cat. no. 84.31), only in that each basal antennal article possesses three small lateral spines (only one in the holotype), and there is only one obvious spine toward the posterolateral part of the branchial region (two in the holotype); the long protogastric spines are forwardly directed and subparallel, whereas Miers's illustration shows them as divergent.

Doflein (1904) described two subspecies; thus the existence, in nomenclature, of the nominate subspecies *Cyrtomaia suhmi suhmi* was automatically established. Doflein gave the subspecific name *typica* to the form from the Celebes-Moluccas area originally described by Miers, the form dealt with by Alcock (1895) from the Laccadive Sea off the Travancore coast, and the *Valdivia* material from the Nicobars and west of Sumatra. Therefore, although *C. suhmi typica* has independent nomenclatural status the two names are objective synonyms, *C. suhmi suhmi* having precedence according to the *International Code of Zoological Nomenclature* (Article 47a). Doflein's material of this subspecies (in the Zoologisches Museum, Humboldt University, Berlin) differs in no significant way from Miers's. Most particularly, the carapace is generally smooth and bears few tubercles. But the protogastric spines are subparallel and not divergent as in Miers's figure. The second subspecies described by Doflein, *C. suhmi platyceros*, was considered a synonym of *C. goodridgei* McArdle by Ihle and Ihle-Landenberg; it is generally more tuberculate dorsally than *C. suhmi suhmi*, the lateral margin of the cave is tuberculate and bears a small spine, the ridge from the base of each protogastric spine to the orbit is tuberculate, the mesogastric region in front of the medial spine is granular, the intestinal region bears only one small tubercle, the lateral branchial margin bears close-set tubercles and several spines, the posterolateral

branchial spine is small, the branchial region is generally granular, and the lateral spines of the basal antennal article are long and slender, not short and stout. (The syntypes from Stas. 258 and 264 are in the Berlin Museum.) A third subspecies, *C. suhmi curviceros*, from Japan was described by Bouvier (1915). It is generally similar to *C. suhmi suhmi* but differs in having most of the spines smaller and the rostral spines outwardly curved. Material of this subspecies collected by Parisi at Enoshima, Japan (2 ♂, 1 ♀ (ovig.), 47.9–90.0 mm) is in the Museo Civico di Storia Naturale, Milan (cat. no. 1576–8).

Cyrtomaia suhmi is most similar to *C. maccullochi* Rathbun from southern Australia but differs as follows: the spines are generally longer, especially on the branchial region, the spines on the first two ambulatory legs are longer, the chela of the male is much more slender, the eyestalk is slightly longer, and the first pleopod of the male is less expanded apically.

DISTRIBUTION.—The subspecies *C. suhmi suhmi* has been recorded from off the southwest coast of India, the Andaman Sea, eastern Indian Ocean west of Sumatra, and the Philippines.

Doclea calcitrata White

Doclea calcitrata White, 1847a:61; 1847b:56.—Adams and White, 1848:7, pl. 1: figs. 2, 2a–c.

Doclea tetraoptera Walker, 1887:114–115.—Alcock, 1895:231–233.—Chopra, 1935:471, fig. 1d.

MATERIAL EXAMINED.—5 ♂♂, 3 ♀♀, 31.1–40.5 mm (6, USNM 135121; 2, AM P.17778).

Anton Bruun Cruises: N Andaman Sea, Sta. 41A, 29–33 m, 8 specs.

REMARKS.—Although Alcock (1895), and Chopra (1935) have remarked that *D. calcitrata* and *D. tetraoptera* are very similar, no thorough comparisons have been made. The type-material of both species is in the British Museum (Natural History), London (*Doclea calcitrata* White, 1 ♂, holotype, cl. 47.8 mm, Zebu [= Cebu], Philippine Is, Cunningham coll., cat. no. 43.6; *Doclea tetraoptera* Walker, 1 ♂, 1 ♀, 26.0, 34.4 mm, ?cotypes, Singapore, coll. Sgt. Major Archer, 1908: 12:8.30–31). I consider this material and that taken by the *Anton Bruun*

to be conspecific. The first pleopod of the male is almost identical in all.

This species is characterized by the long, apically bifid rostrum, very long marginal branchial and intestinal spines, and the fringes of hairs along the ridges of the ambulatories. The first pleopod of the male has been figured by Chopra.

DISTRIBUTION.—Andaman Sea, Singapore, Gulf of Thailand, Philippine Islands.

Doclea canalifera Stimpson

Doclea canalifera Stimpson, 1858:216; 1907:7–8, pl. 1: fig. 4.—Alcock, 1895:228.—Chapra, 1935:469–470, fig. 1b.—Sakai 1938:292–293, pl. 37: fig. 3.

MATERIAL EXAMINED.—14 ♂♂, 17 ♀♀, 13.9–38.0 mm (28, USNM 135122–26, 135251; 3, AM P.17779).

Anton Bruun Cruises: N Andaman Sea, Sta. 41, 44–46 m, 1 spec.; Sta. 41A, 29–33 m, 20 specs.; Sta. 42, 35 m, 1 spec. NE Bay of Bengal, Sta. 46, 23–25 m, 4 specs.; Sta. 47, 19–20 m, 4 specs.; Sta. 47A, 13–15 m, 1 spec.

REMARKS.—The present material agrees well with the description and figures given by Stimpson (1907) and the males possess a first pleopod agreeing with the figure given by Chopra (1935). The third branchial spine and the intestinal spine decrease markedly in length with growth; *Doclea japonica* Ortmann from Kochi, Japan, has been considered as a synonym of *D. canalifera* by Chopra and of *D. ovis* by Sakai. A series of 10 specimens in the Smithsonian Institution (6 ♂♂, 4 ♀♀ [2 ovig.], 43.7–64.0 mm, Foochow, China, C. R. Kellogg, 1924 [reg. no. 58743]; Yenting, China, 1923 [49168]; Amoy, S.F. Light, 1924 [62027–29]; Wakanowra, Japan, Jordan and Snyder, 1900 [26271]) from China and Japan identified by Rathbun as *D. canalifera* are probably *D. japonica*. They differ from the *Anton Bruun* series of *D. canalifera* in having much shorter marginal branchial and intestinal spines, shorter ambulatory legs, the males having a small spine on the second sternite close to the abdominal fossa, and the first pleopod being distally bifid. *Doclea japonica* is thus almost certainly a distinct species.

DISTRIBUTION.—Northern Indo-West Pacific from the Bay of Bengal through Singapore to Japan.

***Doclea muricata* (Herbst)**

Cancer muricata Herbst, 1790:211–212, pl. 14: fig. 84.

Doclea muricata.—Alcock, 1895:230–231.

MATERIAL EXAMINED.—1 ♂, 37.0 mm (USNM 135127).

Anton Bruun Cruises: NE Bay of Bengal, Sta. 46, 23–25 m, 1 spec.

DISTRIBUTION.—Bay of Bengal.

***Doclea ovis* (Herbst)**

Cancer ovis Herbst, 1790:210–211, pl. 13: fig. 82.

Doclea ovis.—Alcock, 1895:227.—Chopra, 1935:467–469, fig. 1A.—Sakai, 1938:293–294, pl. 37: fig. 2.

MATERIAL EXAMINED.—11 ♂♂, 16 ♀♀, 42.0–48.5 mm (23, USNM 135128; 4, AM P.17780).

Anton Bruun Cruises: NE Bay of Bengal, Sta. 46, 23–25 m, 27 specs.

REMARKS.—These specimens agree with previous descriptions of this species and the male first pleopod is the same as figured by Chopra. The species is characterized by the globular form of the carapace, which is covered by an extremely dense tomentum concealing all dorsal tubercles and spines.

DISTRIBUTION.—Northern Indo-West Pacific from Bay of Bengal through Singapore to Japan.

***Encephaloides armstrongi* Wood-Mason**

Eucephaloides armstrongi Wood-Mason, in Wood-Mason and Alcock, 1891:259.—Alcock, 1895:187–188.—Alcock and Anderson, 1896:pl. 19: figs. 2, 2a.

MATERIAL EXAMINED.—47 ♂♂, 44 ♀♀ (1 ovig.), 9.0–31.7 mm, ovig. ♀ 24.9 mm (88, USNM 135130; 3, AM P.17781).

Anton Bruun Cruises: Gulf of Oman, Sta. 245A, 170–192 m, 3 specs.; Sta. 246A, 298–311 m, 88 specs.

REMARKS.—The branchial regions in this species are inflated and arched up to meet each other above the cardiac and anterior part of the intestinal regions. It is thus one of the most distinctive Indo-Pacific majids. In very small specimens (about 10 mm cl.) the branchial regions meet anteriorly only, and a small medial spine is visible behind on the cardiac and intestinal regions. There are several small spines on the other parts of the dorsal surface of the carapace also and the

preorbital, intercalated, and postorbital spines are well developed. In larger specimens (about 20 mm cl.) the cardiac spine is still visible, although small, and the spines of the carapace are smaller. In the largest specimens (more than 30 mm cl.) the cardiac region is completely covered, the carapace bears tubercles only, and the intercalated spine is reduced to a short, broadly triangular, flattened lobe.

The only other Indo-Pacific majid with the branchial regions so closely approximated is *Rochinia beauchampi* (Alcock and Anderson) (see Alcock and Anderson, 1896, pl. 20: fig. 2 as *Scyramathia beauchampi*).

DISTRIBUTION.—Gulf of Oman, Bay of Bengal.

***Entomonyx spinosus* Miers**

Entomonyx spinosus Miers, 1884:526, pl. 47: figs. b, b, b'.—Griffin, 1966d:10.—Takeda and Miyake, 1969:515–516, figs. 12d–f.

MATERIAL EXAMINED.—1 ♂, 2 ♀♀, 15.4–18.2 mm (USNM 135131–32).

Anton Bruun Cruises: Mozambique Channel, Sta. 400C, 62 m, 2 specs.; Sta. 408D, 150–300 m, 1 spec.

REMARKS.—Reasons for retaining this species in *Entomonyx* were given by Griffin (1966d). In addition to differences from species of *Chlorinoides* in the orbital structure, there are important differences in the ornamentation of the carapace and chelipeds. However, the male first pleopod, figured by Takeda and Miyake (1969), is very similar to that of species of *Chlorinoides*.

DISTRIBUTION.—Indo-West Pacific from Providence Island and the Seychelles to Japan and northwestern Australia.

***Eurynome aspera* (Pennant)**

Cancer asper Pennant, 1777:8, pl. 11A: fig. 20.

Eurynome longimana Stimpson, 1858:220; 1907:27, pl. 4: fig. 2.

Eurynome aspera.—Monod, 1956:480–482, figs. 646–648.—Hartnoll, 1961:173–177, figs. 1, 2, 3a, 4a, 6, 5a, 7.—Forest and Guinot, 1966:95.—Crosnier, 1970:1217–1218, pl. 1: figs. 1–4.

MATERIAL EXAMINED.—4 ♂♂, 1 ♀, 7.5–12.4 mm (4, USNM 135133, 135135; 1, AM P.17782).

Anton Bruun Cruises: E of Durban, Sta. 357B,

69 m, 1 spec.; Sta. 391J, 57 m, 1 spec.; Sta. 392K, 38 m, 3 spcs.

REMARKS.—The *Anton Bruun* specimens agree very closely with the figures given by Barnard (1950). Together these appear at first to differ from eastern Atlantic specimens (see Monod, 1956; Hartnoll, 1961) in three main characters: (1) the tubercles of the carapace (particularly on the gastric, cardiac, and intestinal regions) are distinct rather than fused; (2) the elevation on the dorsum of each branchial region anteriorly is spinous rather than flattened or scutellate; and (3) the medial border of the male first pleopod is setose distally only, rather than weakly setose or naked distally and strongly setose proximally.

Comparison of the *Anton Bruun* specimens with a large series from the northeastern Atlantic off northwestern Spain and the Mediterranean Sea that are in the Smithsonian Institution (14 ♂♂, 12 ♀♀ [3 ovig.], 8.9–17.3 mm, smallest ovig. ♀ 11.8 mm: near mouth of Ria de Arosa, Spain, 10–70 m, dredge, 18 July–11 August, 1964 [23 specs., USNM 121877–121886]; Cape Licie, Mediterranean Sea, 44 fms, 6 July 1881, "Travailleur", exch. Paris Museum [3 specs., USNM 22966]), shows quite clearly that these two species are conspecific, contrary to the view of Capart (1951) and Monod (1956), who considered that Barnard's specimens from South Africa were referable to a distinct species, *E. longimana* Stimpson. Most important, in the *Anton Bruun* specimens the pleopod is exactly as figured by Monod (fig. 647) for a male taken off Senegal and does not agree with Barnard's illustration, which shows the lateral subterminal projection as blunt and setose distally only. Second, just less than half the series from northwestern Spain have the tubercles of the mesogastric, cardiac, and intestinal regions distinct, although adjacent. The position of the major tubercles here, and on the rest of the dorsal surface of the carapace, on the ventral surface, and on the sternum, is exactly as described and figured by Hartnoll. The South African specimens in fact differ no more from the typical *E. aspera* than do the spinous, multituberculate specimens from northwestern Spain. Hartnoll showed that a distinct species, *E. spinosa* Hailstone, occurred in British waters and that this, while closely similar to *E. aspera*, differed in having the tubercles generally more separate. But there are also distinct

differences in the position of some of the tubercles, in the shape of the apex of the male pleopods, and in the relative growth of the male chelae. There are no such differences between the North Atlantic and South African specimens considered here. A male syntype of *E. longimana*, c.l. 9.3 mm, from "Cape Town, South Africa, North Pacific Exploring Expedition" is in the collections of the Museum of Comparative Zoology, Cambridge (Mass.), U.S.A. The specimen is in spirit and bears the registration number R50. The plates on the carapace are distinct and the first pleopod is as figured by Monod. I therefore consider *E. longimana* Stimpson as a synonym of *E. aspera*.

DISTRIBUTION.—Eastern Atlantic from the coast of Norway to Angola, western Indian Ocean from False Bay, South Africa, to Durban.

Eurynome elegans Stebbing

FIGURES 3c–e

Eurynome elegans Stebbing, 1921:454–455, pl. 13.—Barnard, 1950:57–58, figs. 12d, e.

MATERIAL EXAMINED.—4 ♂♂, 3 ♀♀, 10.0–14.6 mm (5, USNM 135136–37; 2, AM P.17783).

Anton Bruun Cruises: Gulf of Oman, Sta. 269C, 124–121 m, 6 specs.; Sta. 270A, 55 m, 1 spec.

REMARKS.—These specimens are clearly referable to this species in having a densely tuberculate carapace and carinate ambulatory meri. They are, however, much larger than the type-specimens and the series includes the first known males of the species. *Eurynome elegans* agrees with *E. aspera* and the other species of the genus which have boletate tubercles more or less fused into larger plates, in general form of the carapace, orbit, rostrum, basal antennal article, and third maxillipeds. The abdomen of the male is also similar in shape and possesses seven segments and the chelipeds are extremely long, slender, and parthenopid-like as is typical of the genus. However, as in the southern Australian *E. granulosa* Baker, the tubercles of the carapace are not flat-topped. Moreover, the first pleopod is more or less truncate apically and quite unlike that of *E. aspera*, *E. spinosa*, *E. orientalis* Sakai, and *E. bituberculata* Griffin.

The present specimens represent a considerable extension of geographic range for the species.

DISTRIBUTION.—Western Indian Ocean, known only from off Zululand and from the Gulf of Oman.

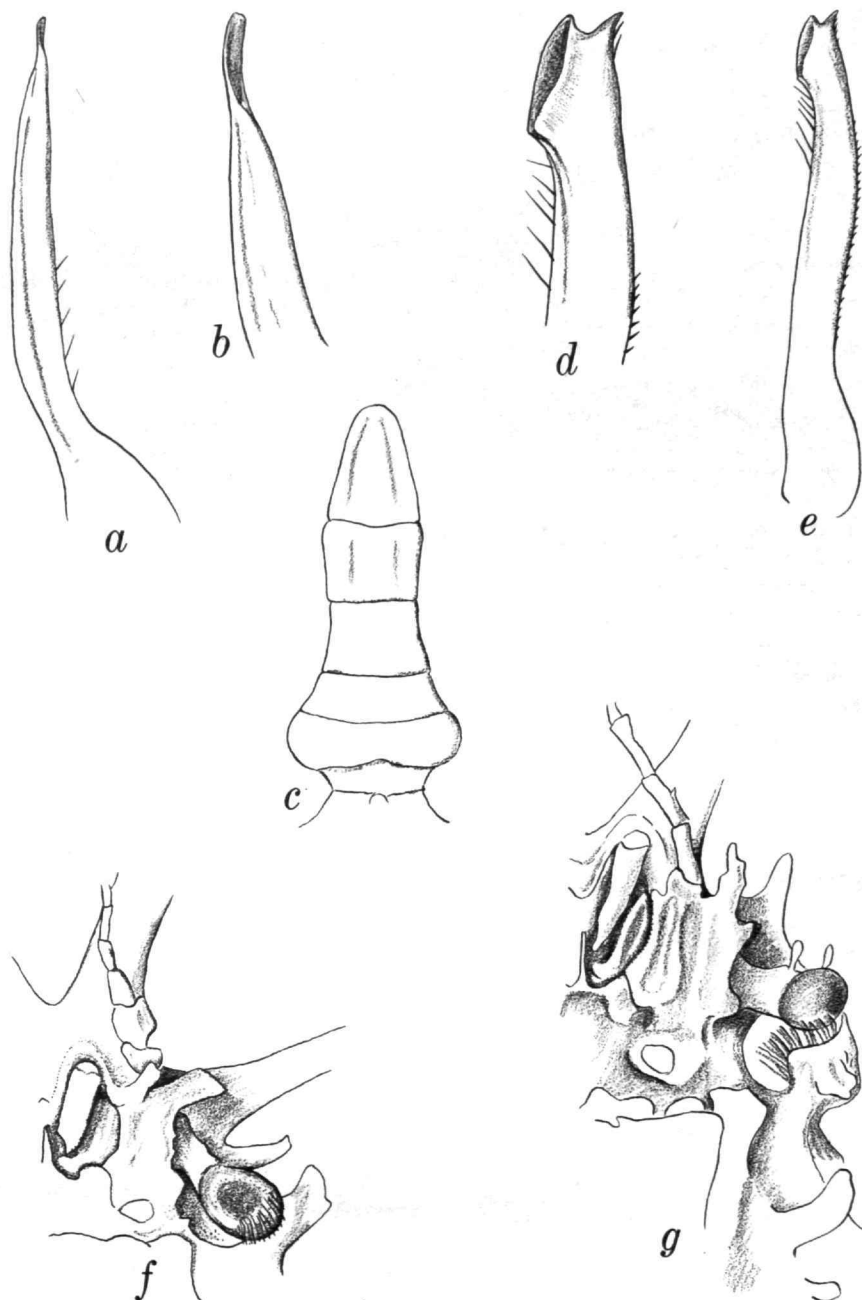


FIGURE 3.—*Hyastenus ovatus* (Dana), male (AM P.17786), carapace length 25.0 mm, from west of Bombay, *Anton Bruun* Sta. 203A: *a*, left pleopod 1, abdominal aspect; *b*, same, tip; *g*, orbit, left side, ventral aspect. *Eurynome elegans* Stebbing, male (AM P.17783), carapace length 10.4 mm, from mouth of Gulf of Oman, *Anton Bruun* Sta. 269C: *c*, abdomen; *d*, left pleopod 1, tip, abdominal aspect; *e*, same, whole pleopod, abdominal aspect. *Chlorinoides tosaensis* Sakai, female (USNM 135118), carapace length 27.0 mm, from off Cape Guardafui, *Anton Bruun* Sta. 453: *f*, orbit, left side, ventral aspect.

***Gryphachaeus hyalinus* (Alcock and Anderson)**

FIGURES 1e,f

Achaeus hyalinus Alcock and Anderson, 1894:205.*Gryphachaeus hyalinus*.—Alcock, 1895:177–178, pl. 3: figs. 4, 4a.

MATERIAL EXAMINED.—2 ♂♂, 6 ♀♀ (5 ovig.), 10.0–16.8 mm, smallest ovig. ♀ 12.2 mm (6, USNM 135139–41, 135252; 2, AM P.17784–85).

Anton Bruun Cruises: E of Mombasa, Sta. 420A, 140 m, 1 spec. Off Cape Guardafui, Sta. 444, 78–82 m, 3 specs.; Sta. 445, 60–70 m, 1 spec.; Sta. 447, 59–61 m, 2 specs. Mouth of Gulf of Aden, Sta. 463, 75–175 m, 1 spec.

REMARKS.—These extremely spiny and very hairy specimens, with their free basal antennal articles, long interantennular spine, and subchelate fourth ambulatory legs, clearly belong to this very distinctive species of which the present series comprises the first known males. The abdomen of the male is six-segmented, the last two segments being fused but the abdomen of the female is five-segmented, the last three being fused.

DISTRIBUTION.—Western Indian Ocean: off east Africa from north of Mombasa to mouth of Gulf of Aden; off Ceylon.

Huenia proteus* De HaanMaja (Huenia) proteus* De Haan, 1839:95–96, pl. 23: figs. 4, 5.*Huenia proteus*.—Sakai, 1965:75, pl. 34: figs. 1, 2.

MATERIAL EXAMINED.—2 ♂♂, 11.1, 15.5 mm (USNM 135170).

Anton Bruun Cruises: Andromache Reef, just S of entrance to Port Kilindini of Mombasa Harbor, Kenya, 4°05'12"S, 39°40'45"E, 0–3.5 m, sand, coral rock, eel grass, H. A. Fehlman and party, 16 November 1964, Sta. HA 2, 2 specs.

REMARKS.—The very considerable variation in this species, only part of which is due to sexual dimorphism, has been dealt with by numerous previous authors. The ambulatory propodi in these two specimens are less expanded than appears to be usual in Japanese specimens.

DISTRIBUTION.—Widespread Indo-West Pacific from South and east Africa to Japan, Australia, and the Pacific to Hawaii.

Hyastenus convexus* MiersHyastenus (Chorilia) convexus* Miers, 1884:196, pl. 18: figs. b, b.*Hyastenus convexus*.—De Man, 1902:664–666, pl. 22: fig. 32.—Balss, 1935:124.—Griffin, 1966a:282.

MATERIAL EXAMINED.—1 ♂, 5 ♀♀, 7.8–22.3 mm (USNM 135142–43, 135165–67).

Anton Bruun Cruises: SE Andaman Sea, Sta. 18A, 77 m, 1 spec. NE Bay of Bengal, Sta. 47B, 30–22 m, 1 spec. E of Durban, Sta. 391J, 57 m, 1 spec.; Sta. 394B, 68–70 m, 1 spec. Off Cape Guardafui, Sta. 442, 70–80 m, 2 specs.

REMARKS.—The large male and female from Stas. 391J and 394B agree completely in all details with the holotype of Miers's species in the British Museum (Natural History), London (♂, 17.8 mm, cat. no. 81.31). The remaining four specimens differ slightly in lacking any trace of mesogastric tubercles, and in having a small epibranchial spine and a low intestinal tubercle. In addition the gastric regions are not so convex and the anterolateral spine of the basal antennal article is larger and more slender. In these and other features there is agreement with the material described by Laurie (1906:377) as "variety *hendersoni*" (syntypes in the British Museum: 2 ♂♂, 4 ♀♀, 8.9–19.5 mm, cat. no. 1907.5.22.116–120). The four specimens differ from *H. calvarius* Alcock mainly in lacking a prominent intestinal spine. Laurie considered that his form was closely similar to *H. subinermis* Zehnter (listed as a synonym of *H. convexus* by Balss, 1935) and *H. espinosus* Borradaile. *Hyastenus elongatus* Ortmann from Japan, which lacks an epibranchial spine and *H. trispinosus* Rathbun from the Philippine Islands, which possesses one, are also similar species. Barnard (1950:54) notes that small specimens which he assigns to *H. spinosus* lack the two mesogastric spines typical of adults of this species; possibly some of his series are conspecific with those taken by the *Anton Bruun* off Durban.

DISTRIBUTION.—Indo-West Pacific from eastern Africa through Malay Archipelago to northern Australia and the Philippine Islands.

Hyastenus diacanthus* (De Haan)Pisa (Naxia) diacantha* De Haan, 1839:96–97, pl. c, pl. 24: fig. 1.

Hyastenus diacanthus.—Sakai, 1938:279–281, fig. 36, pl. 29: fig. 2; 1965:81, pl. 36: fig. 1.—Buitendijk, 1939:241–242, figs. 5–8.—Takeda and Miyake, 1969:508–509.

MATERIAL EXAMINED.—2 ♀♀, 15.4, 21.5 mm (USNM 135144).

Anton Bruun Cruises: Mozambique Channel, Sta. 401F, 32 m, 2 specs.

DISTRIBUTION.—Widespread Indo-West Pacific from Ceylon to Japan and Australia.

Hyastenus hilgendorfi De Man

Hyastenus hilgendorfi De Man, 1887:14–18, pl. i: figs. 3, 4.—Griffin, 1968:103–105, fig. 1, pl. 1.—Tirmizi and Serene, 1971:25–27 [remarks], pl. 2: fig. B.

Halimus hilgendorfi.—Rathbun, 1910:317.

MATERIAL EXAMINED.—1 ♂, 1 ♀, 16.9, 20.0 mm (USNM 135164, 135169).

Anton Bruun Cruises: Andaman Sea, Sta. 22A, 275 m, 1 spec.

Te Vega Cruises: Moluccas, Sta. 54, 46–55 m, 1 spec.

REMARKS.—The 16.9 mm ♀ from the Moluccas clearly agrees with previously described material of this species. The 20 mm ♂ from deep water in the Andaman Sea, however, differs in having no gastric or branchial spines or tubercles except a prominent epibranchial spine and in having the first pleopod slightly more slender. Since this specimen agrees in most other features with *H. hilgendorfi*, it is therefore tentatively assigned to this species. It differs from *H. spinosus* in lacking gastric spines and in the shape of the first pleopod, which is extremely slender in that species.

DISTRIBUTION.—Mediterranean Sea and Suez Canal; widespread Indo-West Pacific from eastern Africa, Red Sea, and Iranian Gulf to Gulf of Thailand, Malay Archipelago, northern Australia, and Hawaii.

Hyastenus inermis (Rathbun)

Halimus inermis Rathbun, 1911:250–251, pl. 20: fig. 6.

MATERIAL EXAMINED.—1 ♂, 1 ♀, 13.0, 15.0 mm (USNM 135145–46).

Anton Bruun Cruises: E of Mombasa, Sta. 420A, 140 m, 1 spec. Off Cape Guardafui, Sta. 447, 59–61 m, 1 spec.

REMARKS.—These two specimens show no important differences from the type-material (USNM 41402–05, 128935). The female has a bopyrid isopod in the left branchial cavity.

DISTRIBUTION.—Known only from the western Indian Ocean off eastern Africa.

Hyastenus ovatus (Dana)

FIGURES 3a,b,g

Lahaina ovata Dana, 1851:269; 1852:93–94; 1885:pl. 2: figs. 1a–f.

Hyastenus (Chorilia) ovatus.—Miers, 1884:522–523.

Hyastenus (Chorilia) ovatus var. *tenuirostris* Miers, 1884:523.

Hyastenus (Chorilia) tenuicornis Pocock, 1890:76–77 [new synonymy].

Hyastenus tenuicornis.—Alcock, 1895:215–216.—Alcock and Anderson, 1898:pl. 33: figs. 4, 4a.—Nobili, 1906:175.

Halimus tenuicornis.—Rathbun, 1902:133; 1906:881; 1911:252–253.—Borradaile 1903:687.

Halimus ovatus.—Rathbun, 1906:881.—Balss, 1935:123.

Hyastenus ovatus.—Buitendijk, 1939:244–245.

MATERIAL EXAMINED.—6 ♂♂, 4 ♀♀, 9.0–25.5 mm (8 USNM 135155–56, 135158–59, 135162; 2, AM P.17786).

Anton Bruun Cruises: SE Andaman Sea, Sta. 18A, 77 m, 1 spec. W of Bombay, Sta. 202C, 84–97 m, 5 specs.; Sta. 203A, 69–68 m, 2 specs. NE Arabian Sea, Sta. 206A, 71–79 m, 1 spec.; Sta. 221A, 57 m, 1 spec.

Te Vega Cruises: Hawaiian Is., Sta. 16, 1 spec.

REMARKS.—Examination of a very large series of specimens (25 ♂, 29 ♀ [14 ovig.], 6.6–20.8 mm, smallest ovig ♀ 7.6 mm) from Hawaii (reported on by Rathbun [1906], USNM 29748–63), Maldive Is. (Rathbun [1902], USNM 28778 and Buitendijk [1939], Rijksmuseum, Leiden cat. no. 4315) and from the western Indian Ocean (Rathbun [1911], USNM 41409–13), with which the *Anton Bruun* series is clearly conspecific, leaves no doubt that Pocock's *Hyastenus tenuicornis* is the same as Dana's *Lahaina ovata*. The entire series of 64 specimens possess the very long, outwardly curved rostral spines, prominent preorbital spine, very broad hiatus between the supraorbital eave and laterally flattened postorbital lobe and stout lobes on the lateral edge of the pterygostomian region characteristic of the animals described by Dana and by Pocock. Dana's figures are somewhat confusing because the carapace is shown covered

by hairs and none of the spines of the carapace are indicated. However, he illustrates peculiar hairs occurring on the cardiac region. These are right-angled, with the apex somewhat expanded and very long, and often appear to radiate out from the central cardiac spine or tubercle. These hairs are present on all the specimens examined by Rathbun. Rathbun (1906) remarked that some of the Hawaiian specimens possess a small spine in the hiatus between the eave and postorbital lobe. Such a spine is present also in most of the material from the western Indian Ocean (Rathbun, 1911) and the *Anton Bruun* series. This spine is generally concealed by the surrounding pubescence and was presumably missed by Dana. The carapace possesses a single intestinal spine (referred to as a second cardiac by Pocock) and a group of small spines subdorsally on the anterior part of the branchial region. Sometimes there are several tubercles on the protogastric region anterior to the four in a line just in front of the first mesogastric. The surface of the basal antennal article possesses a characteristic central longitudinal groove, the anterolateral spine has one or two supplementary spines almost dorsally, and the lateral margin of the article bears a small lobe near the base. The chela of the adult male is subcristate along the dorsal and ventral edge.

Buitendijk (1939) has suggested that *Pseudomippa incerta* from the Marshall Islands (Balss, 1938) may be identifiable with this species. However, Balss's species is almost certainly *Hyastenus agassizii* (Rathbun, 1902) described from the Maldiv Islands. Both possess a few spines on the dorsal edge of the ambulatory meri, a most unusual feature in this group. There are slight differences between the two in the details of the orbit.

DISTRIBUTION.—Widespread Indo-West Pacific from the Red Sea and Seychelles area to the western Pacific and Hawaii.

Hyastenus spinosus A. Milne Edwards

Hyastenus spinosus A. Milne Edwards, 1872:250.—Barnard, 1950:53–54, fig. 11f.

MATERIAL EXAMINED.—25 ♂♂, 34 ♀♀ (1 ovig.), 10.4–62.2 mm, ovig. ♀, 37.1 mm (USNM 135147–54.)

Anton Bruun Cruises: NE Bay of Bengal, Sta.

46, 23–25 m, 1 spec. NE Arabian Sea, Sta. 206A, 71–79 m, 5 specs.; Sta. 216A, 52–50 m, 3 specs.; Sta. 221A, 57 m, 17 specs. E of Lourenço Marques, Sta. 372C, 22 m, 1 spec. E of Durban, Sta. 394B, 68–70 m, 6 specs. Mozambique Channel, Sta. 403A, 27–30 m, 22 specs. Off Cape Guardafui, Sta. 453, 47–49 m, 1 spec.

Te Vega Cruises: Strait of Malakka, Sta. 73, 72–74 m, 3 specs.

REMARKS.—The present series shows some variation in the relative size of the two spines on the mesogastric region and the epibranchial spine. Such variation has previously been noted by Alcock (1895) and by Barnard (1950).

DISTRIBUTION.—Indo-West Pacific: Gulf of Aden, eastern Africa from Durban to Cape Guardafui, Ceylon, coasts of India, Singapore, Gulf of Siam, northern Australia, Fiji.

Hyastenus uncifer Calman

Hyastenus uncifer Calman, 1909:712, pl. 72: figs. 8, 9.—Guinot, 1962:242, fig. 16a,b.

Halimus uncifer.—Rathbun, 1911:252, pl. 20: fig. 7.

MATERIAL EXAMINED.—1 ♀ (carapace and some legs only), postrostral length 9.6 mm (USNM 135163).

Anton Bruun Cruises: Mozambique Channel, Sta. 408D, 150–300 m, 1 spec.

REMARKS.—This specimen differs from the material available to Rathbun and Calman in three features in particular: (1) the lateral margin of the basal antennal article has a slightly longer anterolateral spine and the lateral margin is basally more convex; (2) the dorsal spine on the distal edge of the ambulatory merus is larger; and (3) the spines on the ventral edge of the ambulatory dactyli are shorter. It agrees with *H. uncifer* in major features and has the same arrangement of tubercles on the carapace. It agrees with *H. uncifer* rather than *H. ovalis* in the details of the orbit. The early record of this species from Natal by Stebbing has now been assigned to *H. spinosus* (see Barnard, 1950:53).

DISTRIBUTION.—Indian Ocean: Mozambique Channel, Deigo Garcia, Mauritius, Maldiv Islands, Christmas Island. Pacific Ocean: Palau Islands.

***Inachoides dolichorhynchus* Alcock and Anderson**

FIGURE 4a

Inachoides dolichorhynchus Alcock and Anderson, 1894:206.—
Alcock, 1895:186, pl. 4: figs. 1, 1a.

MATERIAL EXAMINED.—1 ♀, 8.4 mm (USNM 135171).

Anton Bruun Cruises: Mozambique Channel, Sta. 408D, 150–300 m, 1 spec.

REMARKS.—This single specimen is referred to this species, which has not been reported since it was originally discovered off the Madras coast of India, because of a number of very close similarities. Thus, the general shape of the carapace, relative length of the rostrum (Alcock incorrectly states that the rostrum is as long as the carapace; he could only have measured rostrum length from the posterior orbital margin—see his figure), form of the orbit, position of main spines, and general

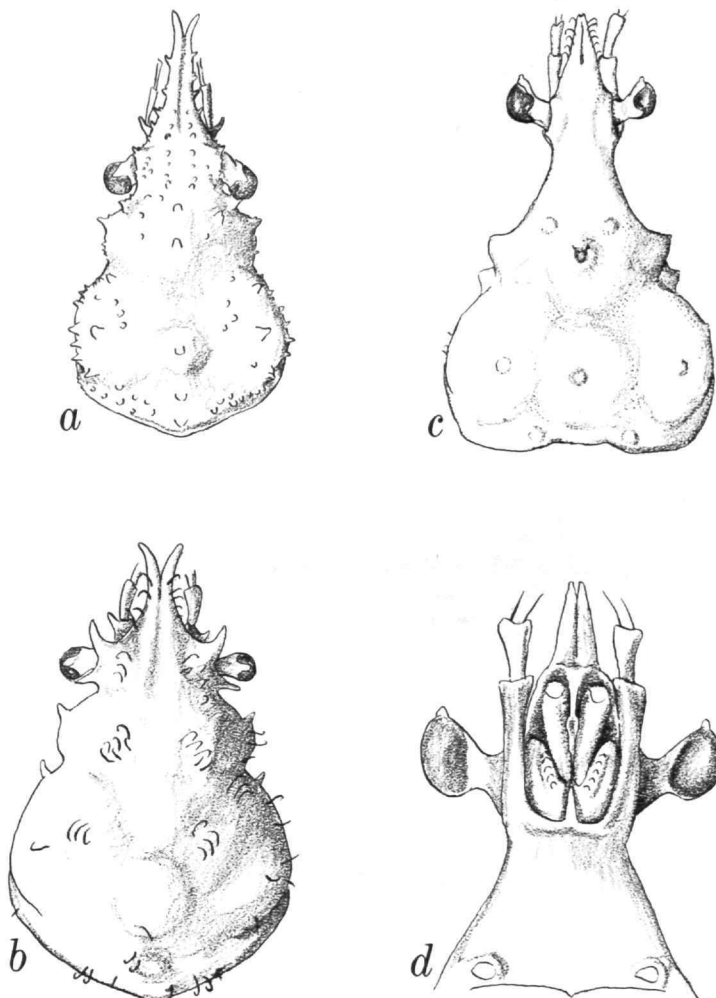


FIGURE 4.—*Inachoides dolichorhynchus* Alcock and Anderson, male (USNM 135171), carapace length 8.4 mm, from Mozambique Channel, *Anton Bruun* Sta. 408D: a, carapace, dorsal aspect. *Menaethiops delagoae* Barnard, female (USNM 135250), carapace length 9.0 mm, from E of Lourenço Marques, *Anton Bruun* Sta. 372C: b, carapace, dorsal aspect. *Macropodia formosa* Rathbun, male (AM P.17788), carapace length 15.4 mm, from SE of Durban, *Anton Bruun* Sta. 391J: c, carapace, dorsal aspect; d, front, ventral aspect.

spinulation, including arrangement of spines above the orbit and of spinules on the edges of the rostrum (asymmetrical), are all as found in the holotype (δ , 17.6 mm, "Madras coast, Marine Survey", Zoological Survey of India, Calcutta, cat. no. 4545/7) and accurately figured by Alcock. In addition the abdomen consists of five free segments as stated by Alcock.

However, there are a number of distinct differences. The rostral spines are incompletely fused and diverge slightly apically, the basal antennal article bears more spines laterally, the anterior border of the mouthfield is not deeply cleft medially, there is no prominent spine on the posterior margin of the carapace, only a tubercle, and there are two prominent mesogastric spines. The *Anton Bruun* specimen is thus only tentatively identified as *I. dolichorhynchus*.

DISTRIBUTION.—Mozambique Channel, Bay of Bengal.

Inachus dorsettensis (Pennant)

Cancer dorsettensis Pennant, 1777:8, pl. 9A: fig. 18.

Pseudocollodes complectens Rathbun, 1911:248, pl. 20: fig. 4 [new synonymy].

Inachus dorsettensis.—Barnard, 1950:29–30, fig. 5d–e.—Monod, 1956:526–529, figs. 715–722.

MATERIAL EXAMINED.—7 δ δ , 6 ϕ ϕ , (5 ovig.), 6.8–17.1 mm, smallest ovig. ϕ , 7.5 mm (12, USNM 135172–75; 1, AM P.17787).

Anton Bruun Cruises: E of Lourenço Marques, Sta. 370G or 372L, 112–347 m, 3 specs. Off Cape Guardafui, 70–82 m, Sta. 442, 70–80 m, 1 spec.; Sta. 444, 78–82 m, 2 specs. Mouth of Gulf of Aden, Sta. 463, 75–175 m, 7 specs.

REMARKS.—The *Anton Bruun* material agrees very closely with previous descriptions of *I. dorsettensis* (e.g., Barnard, 1950; Monod, 1956). Comparison was also made with five specimens of *I. dorsettensis* from near the type-locality of that species (2 δ δ , 3 ϕ ϕ , 11.2–24.7 mm, Channel Is. [USNM 6351], Cape Licie, Mediterranean Sea [USNM 22972]). The only differences are in spinulation of the rostrum and hepatic margin, presence of spines or spinules on the branchial margins anteriorly, spinulation of the posterior margin of the carapace, anterior margin of the sternum, cheliped merus, and fourth ambulatory dactyl, and the density of hairs on the carapace. All these fea-

tures are variable and the differences are very slight. The specimens from Sta. 370G (or 372L) have minute spinules on the supraorbital cave close to the edge of the cave, and the hepatic and branchial margins bear numerous spinules.

The type-material of *Pseudocollodes complectens* Rathbun, originally described from the Seychelles (holotype δ , 9.1 mm [USNM 41389], 1 δ , 2 ϕ , paratypes [USNM 128939]) differs from the *Anton Bruun* material as follows: (1) the cardiac spine is shorter; and (2) the first ambulatory meri bear spinules along the anterior surfaces. The length of the interantennular spine relative to the rostrum, cited by Rathbun as a major reason for setting up the genus *Pseudocollodes*, varies quite widely—the two are almost equal in several *Anton Bruun* specimens, just as in the type-series of Rathbun's species. All the specimens considered here possess the four small tubercles or groups of spinules on the protogastric regions in a straight line or weak curve forward of the mesogastric spine, and the males possess the tuberculated areas on the sternum of the chelipeds lateral to the abdominal fossa, both features characteristic of *Inachus dorsettensis*. Barnard (1950) has already suggested that Rathbun's species may be a synonym of *I. dorsettensis*. I agree fully with this. *Pseudocollodes complectens* is the type-species of *Pseudocollodes* Rathbun, 1911, by monotypy; *I. dorsettensis* is the type-species of *Inachus* Weber, 1795 (see Garth and Holthuis 1963:424). Synonymizing these two species thus makes Rathbun's genus a junior objective synonym of *Inachus*. However, *Pseudocollodes demani* Balss differs in a number of important features from Rathbun's species.

DISTRIBUTION.—Eastern Atlantic from the coast of Norway to South Africa, extending into the western Indian Ocean to Lourenço Marques, the Seychelles, and north to the mouth of the Gulf of Aden.

Inachus guentheri (Miers)

Achaeopsis guentheri Miers, 1879a:2, pl. 4: fig. 1.

Inachus guentheri.—Barnard, 1950:27–29, figs. 5a–c.—Monod, 1956:529–531, figs. 723–730.

MATERIAL EXAMINED.—2 δ δ , 2 ϕ ϕ , 8.0–11.1 mm (USNM 135176–77, 135179).

Anton Bruun Cruises: E of Lourenço Marques, Sta. 370G or 372L, 112–347 m, 1 spec.; Sta. 371D,

165 m, 1 spec. E of Durban, Sta. 394B, 68–70 m, 1 spec. E of Mombasa, Sta. 420A, 140 m, 1 spec.

REMARKS.—All four specimens possess the following characteristic features of this species as previously described and illustrated: (1) posterior rims of the antennular fossae with a small spinule; (2) strong mesogastric spine but low cardiac tubercles; (3) supraorbital eave with a small spine close to the edge; (4) body covered by close pubescence; and (5) protogastric regions smooth or with two very small spinules.

The male from Sta. 394B has the strong polished "boss" on the anterior rim of the abdominal fossa, but in the male from Sta. 370G (or 372L) this is absent and there are only the two small submedial spines. However, both have the strongly curved first pleopod shown for this species by Monod (1956, fig. 730) and rather different from that shown by Barnard (1950, fig. 5e). In all the specimens the rostrum terminates in two slender spines and the basal antennal articles possess spines along the edges. There are some minor differences between the specimens in spinulation of the cheliped merus and carpus and some other variable features. Also, the postorbital spine is sometimes spinulose and the mesogastric spine sometimes bears spinules subapically. Some of these variations have been mentioned by Barnard.

Barnard (1950:29) has already commented upon Doflein's (1904) description of *Inachus antarcticus* as a new species despite the adequate description and illustration given by Miers.

DISTRIBUTION.—Atlantic and Indian Ocean coasts of southern Africa from Senegal south to False Bay and north to Lourenço Marques.

Macropodia formosa Rathbun

FIGURES 4c,d

Macropodia formosa Rathbun, 1911:242–244, fig. 1.—Barnard, 1950:17–18, fig. 2g–i [part: not the 2 ♀♀ from Tugela R., Natal, S Afr. Mus. A. 1412].

MATERIAL EXAMINED.—4 ♂♂, 4 ♀♀ (2 ovig.), 8.7–15.7 mm, smaller ovig. ♀ 8.7 mm (6, USNM 135180–84; 2, AM P.17788).

Anton Bruun Cruises: E of Durban, Sta. 391J, 57 m, 3 specs.; Sta. 392K, 38 m, 2 specs.; E of Durban, Sta. 394B, 68–70 m, 1 spec. Off Cape Guard-

afui, Sta. 444, 78–82 m, 1 spec.; Sta. 445, 60–70 m, 1 spec.

REMARKS.—These eight specimens show no important differences from the single male (USNM 41375) collected by the *Sealark* (Rathbun, 1911). The spines of the carapace and sternum are variable in size and the merus of the third maxilliped sometimes bears spinules. Only one specimen bears minute denticles on the basal antennal article and on the postorbital region; in other specimens, those areas are smooth. In the largest male the fixed finger is excavate proximally, both it and the dactyl bear enlarged teeth, and short hairs arise in a dense fringe from both fingers on both outer and inner surfaces, extending the full length of the fingers on the inner surface and along the proximal half on the outer surface. The first three segments of the abdomen of both sexes each bear a medial tubercle. Rathbun's descriptions are detailed and accurate and most of the important features not mentioned by her are covered by Barnard. However, Barnard was dealing with two species and his figure 2j is not of *M. formosa* but *M. intermedia* (see below). The presence of the strong spinule on the posterior rim of each antennular fossa and the splayed lateral rims are characteristic of that species and not of *M. formosa*.

DISTRIBUTION.—Western Indian Ocean: Delagoa Bay, off East London, near Durban; just south of Gulf of Aden; and Cargados Carajos, between Mauritius and Seychelles.

Macropodia intermedia Bouvier

Macropodia longirostris var. *intermedia* Bouvier, 1940:366.—Capart, 1951:76–77.

Macropodia formosa [var.] Barnard, 1950:18, fig. 2j [called "var." in legend].

Achaeopsis gilsoni Capart, 1951:65–67, fig. 20, pl. 1: figs. 4, 10; pl. 2: fig. 3.

Macropodia gilsoni.—Monod, 1956:555–559, figs. 811–822.

Macropodia intermedia.—Guinot and Ribeiro, 1962:78.—Forest and Guinot, 1966:115–116.—Crosnier, 1970:1218.

MATERIAL EXAMINED.—1 ♂, 2 ♀, (1 ovig.), 12.5–17.2 mm, ovig. ♀ 14.5 mm (USNM 135185–86).

Anton Bruun Cruises: E of Durban, Sta. 392K, 38 m, 1 spec.; Sta. 394B, 68–70 m, 2 specs.

REMARKS.—These three specimens differ from the material reported on by Capart and by Monod

only in that the edges of the antennular fossae are not quite so obviously outwardly splayed. There are slight differences in the spinulation of the carapace, and in the male, the distal edge of the fourth ambulatory merus bears four spinules dorsally; there are three spinules in the females. In particular, there is agreement in the position of the main spines on the carapace and in the arrangement of hairs and spinules on the ambulatory propodi and dactyli. Each basal antennal article bears three to five prominent spines; it is this feature that immediately distinguishes *M. intermedia* from *M. formosa* as was noticed in the two females from Natal examined by Barnard (1950).

DISTRIBUTION.—Eastern Atlantic from Morocco to southern Angola; Western Indian Ocean: off Natal coast.

Majella brevipes Ortmann

Majella brevipes Ortmann, 1893:51–52, pl. 3: figs. 5, 5a, 5i.—Sakai, 1965:84–85, fig. 12, pl. 37: fig. 4.

MATERIAL EXAMINED.—3 ♂♂, 7.3–12.8 mm (USNM 135188–90).

Anton Bruun Cruises: Mozambique Channel, Sta. 408D, 150–300 m, 1 spec. Off Cape Guardafui, Sta. 444, 78–82 m, 1 spec.; Sta. 445, 60–70 m, 1 spec.

REMARKS.—These three specimens agree with previously described material in the densely tuberculate carapace, slender spinulose rostrum, and spinulose supraorbital cave; the hepatic and branchial margins are provided with long, slender spines and the chelae are long and slender as in species of *Eurynome*. But there is obvious variation in the relative size of the spines, in the spinulation, and in the shape and length of the rostrum. The rostrum is much longer in the largest male (more than one-half postrostral length) than in the other specimens (less than one-third postrostral length). There are several spinules on the dorsal and ventral edges of all the ambulatory meri and a few on the carpi, whereas Sakai states that only the fourth legs are tuberculate. In the largest specimen the spines on the gastric, cardiac, and dorsal surface of the branchial regions are very low, whereas in the other specimens there are prominent spines in these regions as described by Sakai.

The basal antennal article (not described by Ortmann or Sakai) is slender and weakly tapering,

armed with spines and spinules on the margins and surface, with spinules and a strong spine apically, and a prominent lateral lobe basally. The third maxilliped ischium and merus both bear a few tubercles and the lateral margin of the merus is spinulose. The sternum is smooth except for small tubercles around the anterior margin of the abdominal fossa. These specimens represent a considerable extension of geographic range for this species.

DISTRIBUTION.—Western Indian Ocean: off Cape Guardafui just south of mouth of Gulf of Aden; Mozambique Channel. Japan: Sagami Bay.

Menaethiops delagoae Barnard

FIGURE 4b

Menaethiops delagoae Barnard, 1955:13–15, fig. 3g–i.—Guinot, 1962:38, 42.

MATERIAL EXAMINED.—1 ♀ (ovig.), 9.0 mm (USNM 135250).

Anton Bruun Cruises: E of Lourenço Marques, Sta. 372C, 22 m, 1 spec.

REMARKS.—This specimen possesses moderately long rostral spines which, although contiguous basally, diverge gradually apically. It can therefore only be assigned to *M. delagoae* since in all other species of the genus, briefly reviewed by Guinot (1962), the rostral spines are straight and either contiguous throughout their length or divergent from the base. Barnard's description is very short. However, there is also agreement in the details of the orbit, which possesses strong, minutely denticulate preorbital and antorbital lobes, and in the basal antennal article, the anterolateral angle of which is obliquely extended laterally and also minutely denticulated. The carapace has the regions of the dorsal surface well defined but lacks prominent spines or tubercles except for two on the hepatic region, one above the other, and one anteriorly on the branchial margin. *M. acutifrons* (A. Milne Edwards) possesses several prominent spines on the carapace dorsum. The pterygostomian region possesses five small tubercles in an oblique row toward the outer margin. There are a similar number of small tubercles in a double longitudinal row toward the lateral margin of the ischium of the third maxilliped, and along the exognath there are also tubercles in a poorly defined double row.

DISTRIBUTION.—Known only from Lourenço Marques (Delagoa Bay).

***Menaethius monoceros* (Latreille)**

Pisa monoceros Latreille, 1825:139–140.

Huenia brevirostrata Dana, 1852:134–135; 1855, pl. 6: figs. 4a–c [new synonymy].

Menaethius monoceros.—Forest and Guinot, 1961:14, figs. 9a–b.—Sakai, 1965:74–75, pl. 33: fig. 4.

MATERIAL EXAMINED.—13 ♂♂, 11 ♀♀ (6 ovig.), 1 juv., 3.0–21.1 mm, smallest ovig. ♀ 5.5 mm (USNM 135191–97).

Anton Bruun Cruises: Tulear, Madagascar, from offshore reef, K. J. Boss, 9 August 1964, 2 specs. Amiranthe, Sta. HA 33, 27°16'N, 33°47'E, intertidal, H. A. Fehlman, 5 January 1965, 2 specs.

Ambatoloaka Beach, Nossi Be, Madagascar, 1.5 m, bottom of rock and coral, J. R. Rudloe, 11 January 1964, 4 specs.

Cocos (Keeling) Island: Lagoon 1.5 miles SE of Possession Point, Horsburgh I., Virginia Orr Sta. B16, 12–18 ft, sand, shell, and coral rubble, 21 January 1964, 4 specs.; Sta. B34, lagoon 2 miles E of northern end of West Island (Ujong Tanjong), 24 ft, hard, fine sand and weed, 11 February 1964, 11 specs.

Te Vega Cruises: NE of Simalur, Indonesia, Sta. 97LH, intertidal, 1 spec. Near Fiji, Sta. 305, 1 spec.

REMARKS.—All specimens clearly belong to this distinctive species. Dana's *Huenia brevirostrata* is very similar to what is known of female *Menaethius monoceros* and is definitely not the female of Dana's *Huenia simplex* (= *Simocarcinus simplex*), contrary to Miers's (1879b:649) statement.

DISTRIBUTION.—Throughout the Indo-West Pacific from South Africa and the Red Sea to Japan, Australia, and Tahiti.

***Micippa thalia* (Herbst)**

Cancer thalia Herbst, 1803:50–51, pl. 58: fig. 3.

Micippa thalia.—Alcock, 1895:251–252.—Sakai, 1965:90, pl. 42: fig. 3.

MATERIAL EXAMINED.—1 ♂, 9.4 mm, 1 ♀ (ovig.), 31.7 mm (USNM 135198–99).

Anton Bruun Cruises: Off Cape Guardafui, Sta. 453, 47–49 m, 1 spec.

Ambatoloaka Beach, Nosi Bay, Madagascar, 2 m, 29 December 1963, J. R. Rudloe, 1 spec.

REMARKS.—Both specimens have the distally rostrum typical of the species. The smaller specimen possesses two mesogastric spines but no other medial spines on the carapace. The spines are knobbed at their tips. In the larger specimen the only obvious spines are the third marginal branchial ones, all the others being represented by large tubercles.

DISTRIBUTION.—Indo-West Pacific from eastern Africa and the Red Sea to Japan and Australia.

***Naxioides robillardi* Miers**

Naxia (*Naxioides*) *robillardi* Miers, 1882:339–341, pl. 20: figs. 1, 1a–c.—Whitelegge, 1900:148.

Naxia mammillata Ortmann, 1893:56–57, pl. 3: figs. 7, 7a, 7i [new synonymy].

Naxioides mammillata.—Rathbun, 1911:253.—Sakai, 1938: 268–270, pl. 27: fig. 1; 1965:78, pl. 35: fig. 1.

Naxioides robillardi.—Buitendijk, 1950:65.

MATERIAL EXAMINED.—9 ♂♂, 8 ♀♀ (3 ovig.), 20.5–121.5 mm, smallest ovig. ♀, 82.0 mm (13, USNM 135200–03; 4, AM P.17789).

Anton Bruun Cruises: Gulf of Oman, Sta. 269C, 124–121 m, 1 spec.; Sta. 270A, 55 m, 2 specs. E of Mombasa, Sta. 420A, 140 m, 12 specs. Mouth of Gulf of Aden, Sta. 463, 75–175 m, 2 specs.

REMARKS.—This series agrees closely with that previously reported on by Miers and Whitelegge. There is, however, also very close agreement with *Naxioides mammillata* (Ortmann) (see Sakai, 1938). Both species agree in relative length of the rostral spines, position, and relative size of the spines on the carapace, ornamentation of the carpus of the cheliped, and form of the chela in the male. There are only very slight differences in the shape of the rostral spines and basal antennal articles, and the variation in the *Anton Bruun* series encompasses that shown by Japanese specimens illustrated by Sakai. Finally, Rathbun's specimen of *N. mammillata*, a male from Salomon Bank in the western Indian Ocean, agrees with the *Anton Bruun* series in ornamentation of the abdomen and shape of the first pleopod. The first pleopod of the largest male of the type-series of *Naxia mammillata* Ortmann (6 ♂♂, 4 ♀♀, 25.2–79.6 mm, "Japan, Kagoshima, coll. Doderlein," Strasbourg Museum, unreg.) agrees completely with the first pleopod of the *Anton Bruun* males. In the smaller specimens of both the present series and the syntypes

of *N. mammillata*, the smaller spines of the carapace are concealed by dense tomentum.

DISTRIBUTION.—East Africa, off Mombasa, mouth of Gulf of Oman, Mauritius, Singapore, south-eastern Australia, Norfolk Island, Japan.

Oncinopus neptunus Adams and White

Oncinopus neptunus Adams and White, 1848:1-3, pl. 2: fig. 1.—Takeda and Miyake, 1969:477, 478, figs. 3, 5a, 6.—Griffin, 1972:56.

MATERIAL EXAMINED.—3 ♂♂, 9 ♀♀ (1 ovig.), 6.4–12.0 mm, ovig. ♀ 9.8 mm (USNM 135204–07, 135211, 135215–6).

Anton Bruun Cruises: NE Arabian Sea, Sta. 206A, 71–79 m, 3 specs. Mozambique Channel, Sta. 400C, 62 m, 1 spec.; Sta. 408D, 150–300 m, 1 spec. Off Cape Guardafui, Sta. 444, 78–82 m, 2 specs.; Sta. 445, 60–70 m, 2 specs.; Sta. 447, 59–61 m, 2 specs.

Te Vega Cruises: Strait of Malakka, Sta. 73, 72–74 m, 1 spec.

REMARKS.—Takeda and Miyake (1969) have considered *O. neptunus*, of which *O. subpellucidus* Stimpson is a synonym, to be distinct from *O. aranea* De Haan. These rather small specimens are assigned to *O. neptunus* since the males possess a first pleopod differing from that of the holotype figured by Takeda and Miyake (1969) only in being a little more slender apically. The rostral lobes of the western Indian Ocean specimens are short and subtriangular; those of the female from *Te Vega* Sta. 73 (Strait of Malakka), however, are slender and rather longer.

DISTRIBUTION.—Indo-West Pacific from east Africa to the Philippine Islands and Australia.

Ophthalmias cervicornis (Herbst)

FIGURES 5, 7a–c

Cancer cervicornis Herbst, 1803:49–50, pl. 58: fig. 2.

Stenocinops [sic] *cervicornis*.—A. Milne Edwards, 1865:135–136.

Ophthalmias cervicornis.—Guinot, 1962:46, fig. 33.

MATERIAL EXAMINED.—4 ♂♂, 1 ♀, 21.1–43.4 mm (USNM 135208).

Anton Bruun Cruises: Mozambique Channel, Sta. 400C, 62 m, 5 specs.

REMARKS.—Differences between this species and *O. curvirostris* have been listed and discussed by Guinot. Examination of material in the British Museum (Natural History), London, and the Muséum National d'Histoire Naturelle, Paris (7 ♂, 3 ♀, 12–60 mm), referred to *O. cervicornis* by Latreille, A. Milne Edwards, Henderson, and Laurie (see Guinot, 1962), and the holotype in the Zoologisches Museum, Humboldt University, Berlin (♀, postrostral length 31 mm, "Indian Ocean"—cat. no. 2053), largely confirms Guinot's analysis except that the rostrum and relative length of the eyestalk and supraorbital spine are more variable than indicated by Guinot. The *Anton Bruun* series differs from the remainder of the series mainly in two features: the supraorbital spine is no longer than the eyestalk, whereas in most others (but not all) it is about the same length; the surface of the ischium of the third maxilliped is quite deeply grooved, whereas it is usually flat or at most weakly grooved. The surface of the merus is slightly more excavate than is usual. The lobe on the posterior margin of the carapace is blunt and the third maxilliped merus is strongly bilobed medially as is typical. The specimen identified by Rathbun (1911) as *O. cervicornis* is actually *Stilbognathus martensii* Miers.

DISTRIBUTION.—Eastern Africa, Ceylon, and southeast India, Indonesia, Japan, and Hawaii.

Ophthalmias curvirostris (A. Milne Edwards)

FIGURES 6, 7d

Stenocinops [sic] *curvirostris* A. Milne Edwards 1865:135, pl. 5: figs. 1, 1a–e.

Ophthalmias curvirostris.—Guinot, 1962:46–51, figs. 34, 37a,b.

MATERIAL EXAMINED.—1 ♂, 1 ♀ (ovig.), 47.0, 60.0 mm (USNM 135209–10).

Anton Bruun Cruises: Off Cape Guardafui, Sta. 447, 59–61 m, 1 spec. North of Gulf of Aden, Sta. 463, 75–175 m, 1 spec.

REMARKS.—I have reexamined the material (6 ♂, 5 ♀, 21.5–44.1 mm) in the British Museum (Natural History), London, and the Muséum National d'Histoire Naturelle, Paris, referred to this species by Nobili and Laurie (see Guinot, 1962) and the holotype (♀, 41 mm, "Mer Rouge, M. Maillard, 1864") in the Paris Museum. The *Anton Bruun* material differs most notably from these 12 speci-

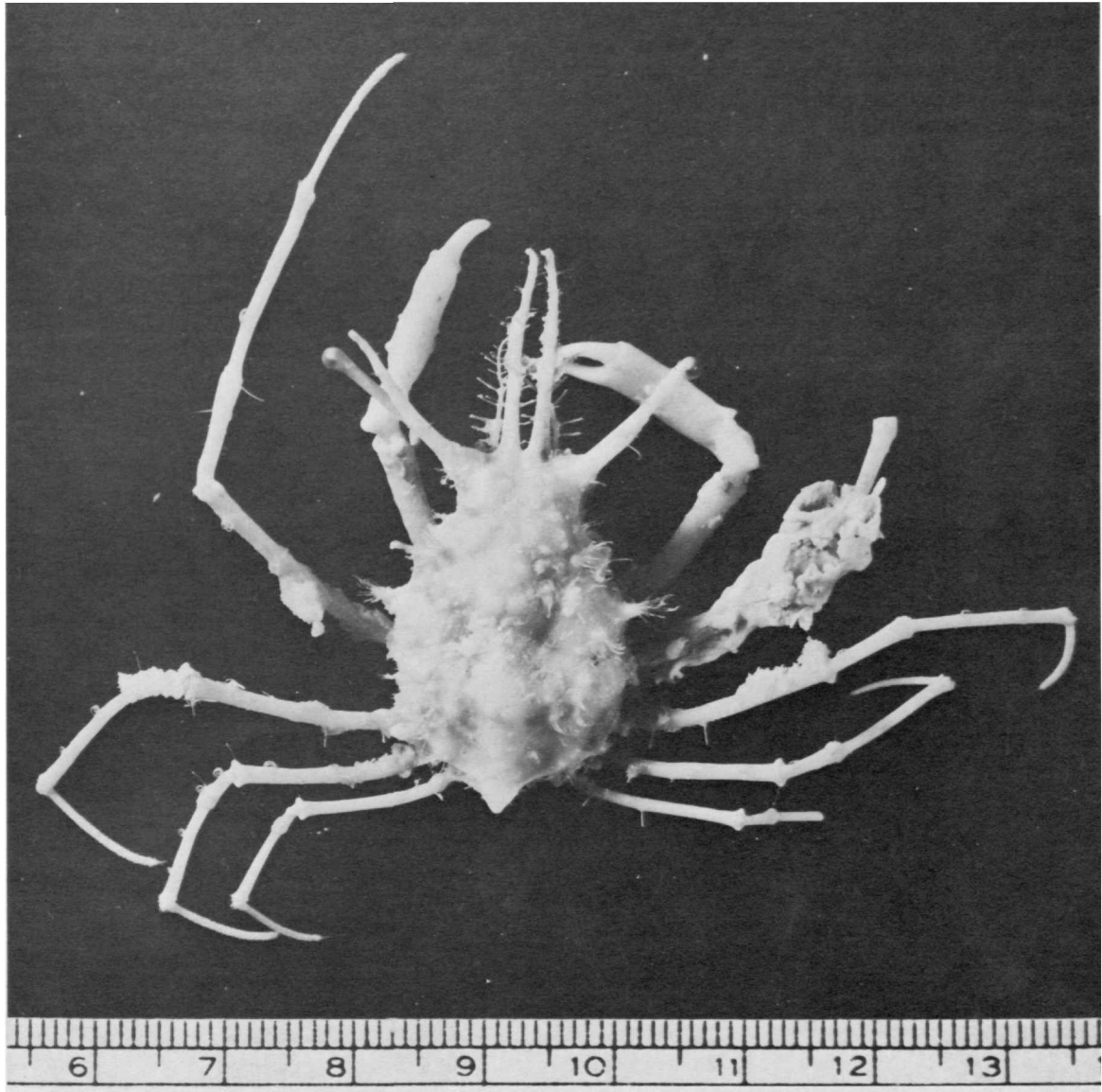


FIGURE 5.—*Ophthalmias cervicornis* (Herbst), male (USNM 135208), carapace length 43.4 mm, from Mozambique Channel, Anton Bruun Sta. 400C: whole animal in dorsal view.

mens in four features. The supraorbital spine considerably exceeds the eyestalk in length and is forwardly curved, whereas it is no longer than the eyestalk and straight in the others. The anterolateral corner of the mouth-field is not rounded, as is usual, but is provided with an anteriorly and posteriorly directed blunt lobe. The junction of the fused basis and ischium of the third maxilliped is much more strongly notched than is usual. The medial edge of the merus is more obviously bilobed than is usually the case. There is, however, considerable variation in the shape of the medial margin of the third maxilliped in the other specimens. Guinot (1962, fig. 34) shows the anterolat-

eral corner of the ischium as expanded and weakly grooved. This is hardly typical and is not found in the *Anton Bruun* specimens. The male taken by the *Anton Bruun* has slender chelae despite its large size (the smallest ovig. ♀ examined was 24 mm cl.). The two *Anton Bruun* specimens possess the closely approximated rostral spines and acuminate lobe on the posterior margin of the carapace that are typical of the species. The female possesses a triangular, flattened medial spine on the fourth abdominal segment as figured by A. Milne Edwards.

DISTRIBUTION.—Red Sea and Gulf of Aden; Iranian Gulf.

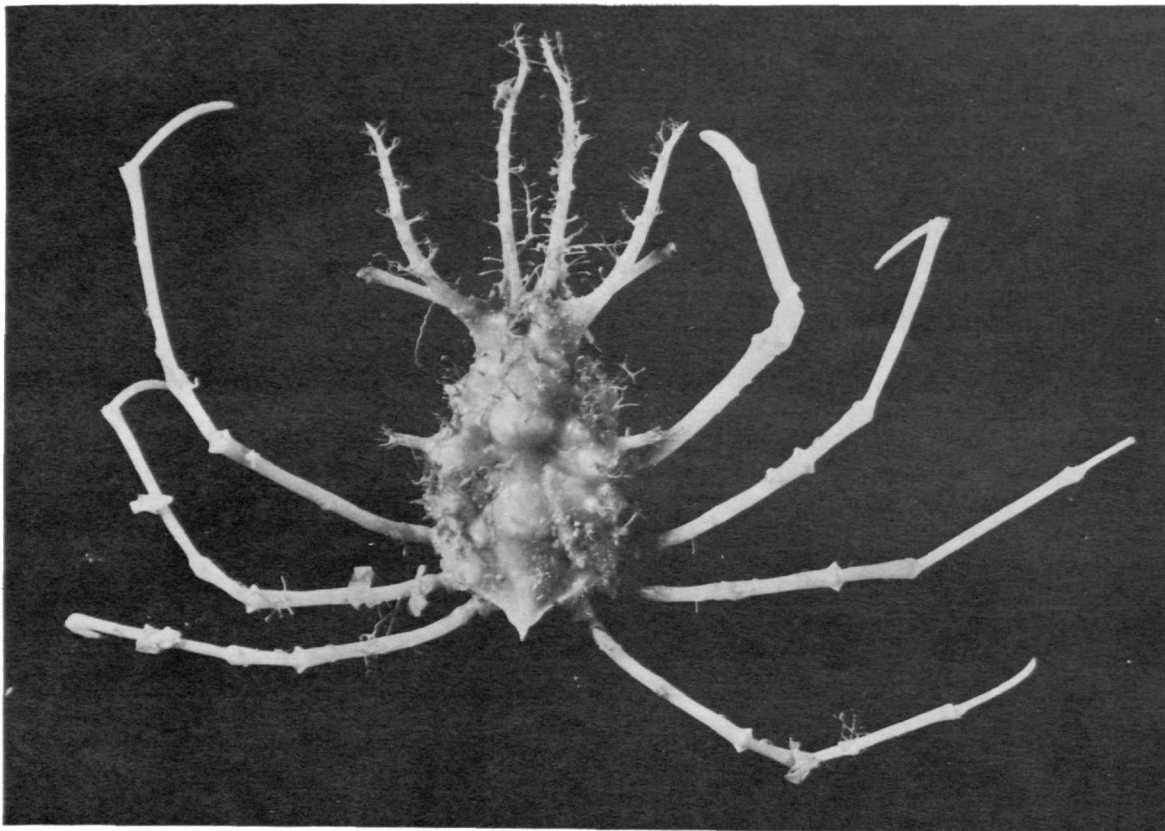


FIGURE 6.—*Ophthalmias curvirostris* (A. Milne Edwards), male (USNM 135209), carapace length 47.0 mm, from off Cape Guardafui, *Anton Bruun* Sta. 447: whole animal in dorsal view.

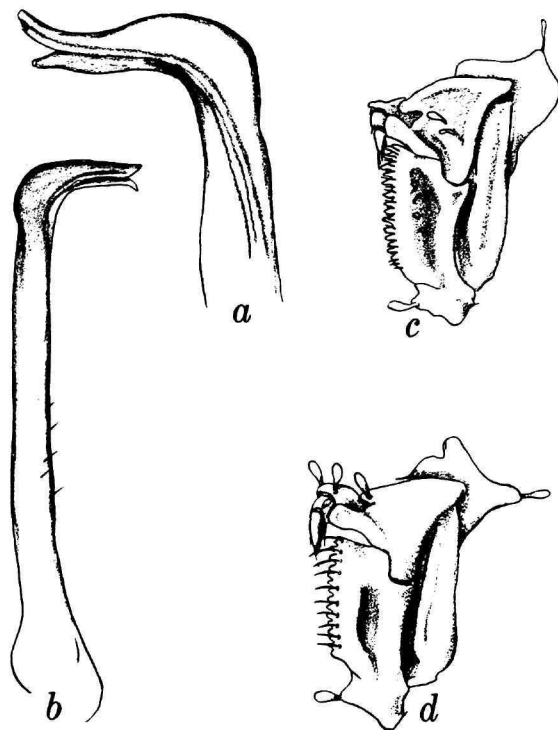


FIGURE 7.—*Ophthalmias cervicornis* (Herbst), male (USNM 135208), carapace length 43.4 mm, from Mozambique Channel, Anton Bruun Sta. 400C: a, left pleopod 1, tip, sternal aspect; b, left pleopod 1, abdominal aspect; c, left third maxilliped. *Ophthalmias curvirostris* (A. Milne Edwards), male (USNM 135209), carapace length 47.0 mm, from off Cape Guardafui, Anton Bruun Sta. 447: d, left third maxilliped.

Perinia tumida Dana

Perinia tumida Dana, 1852:114–115; 1855, pl. 4: fig. 1.

Perinea tumida.—Sakai, 1938:294–296, fig. 40.

MATERIAL EXAMINED.—1 ♂, 9.5 mm (USNM 135212).

Anton Bruun Cruises: Latham I., S of Zanzibar reef, 20 November 1964, 1 spec.

DISTRIBUTION.—Indo-West Pacific from eastern Africa and the Red Sea to Japan, Australia, and the central Pacific, including Hawaii.

Phalangipus filiformis Rathbun

Phalangipus filiformis Rathbun, 1916:551.—Griffin, 1973: 172–175, figs. 1b, 3e,f, 6b, 7b, 8g,h.

MATERIAL EXAMINED.—3 ♂, 4 ♀, 9.1–20.0 mm (USNM 135212–14).

Te Vega Cruises: Moluccas, Sta. 54, 46–55 m, 6 specs. Off coast of Sarawak, Borneo, Sta. 60, 100 m, 1 spec.

REMARKS.—This species is notable for its very short rostral spines and the sharp spines on the carapace.

DISTRIBUTION.—Maldiv Islands, South China Sea, Philippine Islands, northern Australia.

Phalangipus hystrix (Miers)

Naxia hystrix Miers, 1886:60–61, pl. 6: fig. 4.

Egeria investigatoris Alcock, 1895:225.

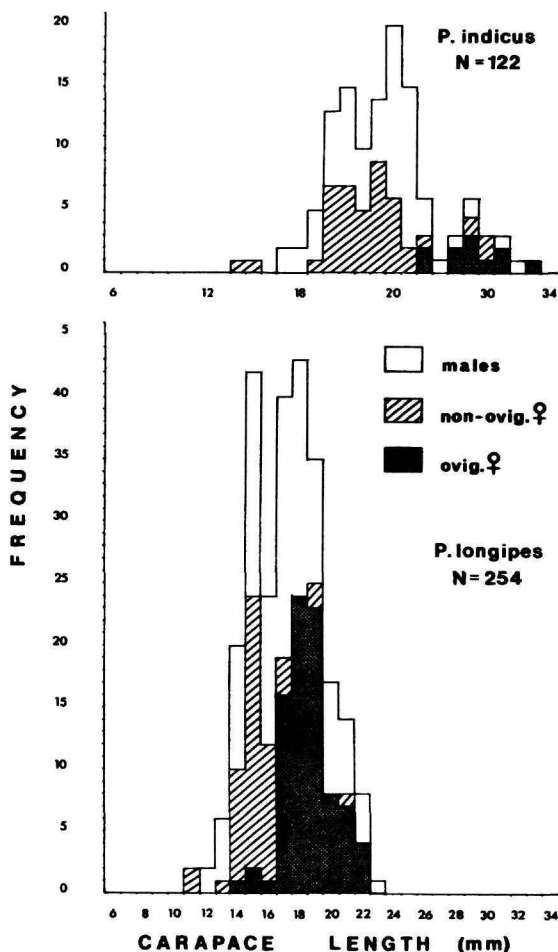


FIGURE 8.—Length frequency histogram for two species of *Phalangipus* from Anton Bruun Sta. 41A.

Naxioides hystrix.—Takeda and Miyake, 1969:570–511, fig. 9g, h.

Phalangipus hystrix.—Griffin, 1973:175–179, figs. 5a–e, 6i, 7i.

MATERIAL EXAMINED.—6 ♂♂, 9 ♀♀ (1 ovig.), 10.3–30.4 mm, ovig. ♀, 29.6 mm (10, USNM 135219–24; 5, AM P.17791).

Anton Bruun Cruises: SE Andaman Sea, Sta. 20, 60–58 m, 1 spec.; Sta. 21, 70 m, 1 spec. N Andaman Sea, Sta. 38, 69–73 m, 2 specs. W of Bombay, Sta. 202B, 90 m, 1 spec.; Sta. 202C, 84–97 m, 2 specs.

Te Vega Cruises: Off coast of Sarawak, Borneo, Sta. 60, 100 m, 3 specs. SE Andaman Sea, Sta. 80, 90–84 m, 5 specs.

REMARKS.—The 15 specimens in this series clearly show that *Naxia hystrix* Miers and *Egeria investigatoris* Alcock are conspecific.

DISTRIBUTION.—Widespread Indo-West Pacific from the Red Sea through the Malay Archipelago to Japan, the Philippine Islands, and Western Australia.

Phalangipus indicus (Leach)

Cancer longipes.—Herbst, 1788:231–233, pl. 16: fig. 93 [not *Cancer longipes* Linnaeus, 1758].

Egeria indica Leach, 1815:40, pl. 73.

Egeria Herbstii H. Milne Edwards, 1834:292.

Phalangipus indicus.—Griffin, 1973:179–182, figs. 2a, 4a,b, 6e, 7e, 9a,b.

MATERIAL EXAMINED.—71 ♂♂, 54 ♀♀ (11 ovig.), 14.5–33.5 mm, smallest ovig. ♀ 26.3 mm (117, USNM 135217–18; 8, AM P.17790).

Anton Bruun Cruises: N Andaman Sea, Sta. 41A, 29–33 m, 122 specs.; Sta. 42, 35 m, 3 specs.

REMARKS.—This species was taken in very large numbers at Sta. 41A along with *P. longipes* and two species of *Doclea*. *P. indicus* is easily distinguished from *P. longipes* by the longer rostrum, closed orbit, and acuminate, naked sternal spines of the male. Males are also easily distinguished by the strongly curved first pleopod. The largest specimens in the series are about half as large again as the largest *P. longipes*. Tables 3 and 4 and Figure 8 demonstrate some of these differences between the two species contained in the sample of Sta. 41A.

DISTRIBUTION.—Bay of Bengal, Ceylon, Andaman Sea, and northwestern Malay Archipelago in the Singapore region.

TABLE 3.—Values for ratio rostrum length/carapace length for part of the sample of *Phalangipus* species from Anton Bruun Sta. 41A ($P < 0.001$)

Species	N	Mean	S.D.	Max.	Min.
<i>P. indicus</i>	55	0.189	0.017	0.259	0.154
<i>P. longipes</i>	102	0.144	0.019	0.208	0.099

Phalangipus longipes (Linnaeus)

Cancer aragnoides Rumphius, 1705:16, pl. 7: fig. 4.

Cancer longipes Linnaeus, 1758:358–359.

Phalangipus longipes.—Griffin, 1973:182–186, figs. 1c, 3c,d, 6d, 7d, 8a,b.

MATERIAL EXAMINED.—125 ♂♂, 160 ♀♀ (93 ovig.), 11.5–23.1 mm, smallest ovig. ♀ 14.5 mm (277, USNM 135226–9, 138270 [neotype of *Cancer longipes* Linnaeus]; 8, AM P.17792).

Anton Bruun Cruises: N Andaman Sea, Sta. 41A, 29–33 m, 254 specs.; Sta. 42, 35 m, 28 specs. NE Bay of Bengal, Sta. 46, 23–25 m, 2 specs.

Te Vega Cruises: Strait of Malakka, Sta. 73, 72–74 m, 1 spec.

REMARKS.—Although this species is easily distinguished from its congener, *P. indicus*, it is very similar to *P. australiensis* (see Griffin, 1973). The large *Anton Bruun* series, however, possesses the characters typical of this species, i.e., the epibranchial region is smooth, the ischium of the third maxilliped lacks any basal tubercle, the male abdomen lacks a lateral tubercle on segment 3, and the first pleopod of the males is weakly curved outward distally.

DISTRIBUTION.—Bay of Bengal, Andaman Sea, China Sea, Gulf of Thailand, Philippine Islands, Malay Archipelago, New Guinea, northern Australia.

TABLE 4.—Values for regression carapace length (X) against carapace width (Y) (in the equation $Y = A + BX$) for part of the sample of *Phalangipus* species from Anton Bruun Sta. 41A

Species	N	A	B (SE)	Cor. coef. (SE)
<i>P. indicus</i>	55	0.171	0.727 (0.017)	0.986 (0.455)
<i>P. longipes</i>	102	-0.797	0.832 (0.015)	0.984 (0.400)

Phalangipus retusus Rathbun

Phalangipus retusus Rathbun, 1916:552.—Griffin, 1973:190–192, figs. 1d, 3g,h, 6c, 7c, 8e,f.

MATERIAL EXAMINED.—1 ♀, 11.6 mm (USNM 135230).

Anton Bruun Cruises: NE Bay of Bengal, Sta. 47A, 13–15 m, 1 spec.

REMARKS.—Rathbun (1916) has correctly pointed out that the notable characteristic of this species is the dorsoventrally flattened pterygostomian spine.

DISTRIBUTION.—Northern Bay of Bengal, Malay Archipelago, and Philippine Islands.

Platymaia alcocki Rathbun

Platymaia wyvillethomsoni.—Wood-Mason and Alcock, 1891: 258.—Alcock, 1895:182–183.—Alcock and Anderson, 1896: pl. 16.—Doflein, 1904:59–69, 160–165, figs. 2–6; pls. 2, 20–23, 39, 43: figs. 5, 6; pl. 50: figs. 2, 5, 6 [not *Platymaia wyvillethomsoni* Miers, 1886].

Platymaia alcocki Rathbun, 1916:530; 1918:8.

MATERIAL EXAMINED.—4 ♂♂, 6 ♀♀ (2 ovig.), 11.6–73.0 m, smaller ovig. ♀ 58.4 mm (8, USNM 135232–34; 2 AM P.17793–94).

Anton Bruun Cruises: E of Lourenço Marques, Sta. 397A, 230–297 m, 6 specs.; Sta. 397C, 600–665 m, 1 spec. E of Mombasa, Sta. 421G, 240 m, 2 specs.; Sta. 421H, 290 m, 1 spec.

REMARKS.—These specimens agree with the Indian Ocean material reported on by Alcock and Anderson and by Doflein in the approximation of the branchial regions medially, the position of the spines, particularly a protogastric ridge with two spines or tubercles, the elongation of the chelae of the adult male, and the presence of scattered spines on the abdomen of the female. In all but the smallest specimens (1 ♂, 16.1 mm, 2 ♀♀, 16.4, 16.9 mm) the supraorbital cave bears one to five spinules or small tubercles laterally. This feature does not appear to be of specific importance although it is stressed by Rathbun (1918:8). The male first pleopod is very similar to that of *P. wyvillethomsoni*.

The specimens from Japan discussed under the name *P. alcocki* by Takeda and Miyake (1969) are almost certainly *P. remifera* Rathbun and not *P. alcocki*.

DISTRIBUTION.—Indian Ocean: eastern Africa

from Lourenço Marques to Mombasa; Andaman Sea.

Platymaia turbynei Stebbing

Platymaia turbynei Stebbing, 1903:3–5, pl. 5.—Barnard, 1950: 31–32, 816, figs. 6a,c.

MATERIAL EXAMINED.—6 ♂♂, 16 ♀♀ (8 ovig.), 1 damaged juv., 8.0–45.0 mm, smallest ovig. ♀ 39.6 mm (1, USNM 136236–39; 4, AM P.17795).

Anton Bruun Cruises: Between Tulear and Madagascar, trawled, August 1964, 1 spec.; Sta. 397C, 600–665 m, 11 specs.; Sta. 398B, 740 m, 8 specs. Mozambique Channel, Sta. 399B, 850–960 m, 3 specs.

REMARKS.—Some of the numerous differences between this and other species of the genus have been mentioned by Stebbing (1902) and Barnard (1950). These include the much narrower and smoother carapace, the small size of the postorbital lobe, the presence of dense fringes of hairs along the chelipeds and first two pairs of ambulatories, the tapering dactyli of the third and fourth ambulatories, and the stout fingers of the chelae in the male.

The spination of the ambulatories of the large adults in this series agrees with that of the type as figured by Stebbing (1903). The smallest specimen, a female cl. ca. 8 mm from Sta. 374D differs from the other specimens only in having slightly shorter spines on the carapace.

DISTRIBUTION.—Southeast Africa from Cape Natal (Durban) to southern Mozambique Channel; previously recorded as far north as Delagoa Bay (Lourenço Marques) only.

Pleistacantha moseleyi (Miers)

Echinoplax moseleyi Miers, 1886:32–33, pl. 4: figs. 2, 2a–c.

Echinoplax pungens Wood-Mason in Wood-Mason and Alcock, 1891:259.—Alcock, 1895:179; 1899, pl. 39.—Alcock and Anderson, 1896, pl. 17: fig. 1.

Pleistacantha moseleyi.—Doflein, 1904:76–78, pl. 24: figs. 5, 6; pls. 25, 26.—Barnard, 1950:34–35, fig. 6e.—Sakai, 1965, fig. 10c.

MATERIAL EXAMINED.—1 ♂, 1 ♀, 21.5, 60.0 mm (USNM 135240–41).

Anton Bruun Cruises: Andaman Sea, Sta. 22B, 290 m, 1 spec. E of Durban, Sta. 396B, 450–455 m, 1 spec.

REMARKS.—The distinctions between this species and *P. oryx* are discussed under the latter species. Wood-Mason's species has been accepted as a synonym of Miers's since Doflein (1904).

DISTRIBUTION.—Indo-West Pacific: South Africa, Andaman Sea, Philippine Islands, and Japan

Pleistacantha oryx Ortmann

Pleistacantha oryx Ortmann, 1893:39.—Sakai, 1963:3, 6; 1965:69–70, fig. 10a,b,d; pl. 30: fig. 2.

Echinoplax rubida Alcock, 1895:179–180.—Alcock and Anderson, 1896:pl. 17: figs. 2, 2a.

Pleistacantha moseleyi.—Sakai, 1938:234–236, fig. 20; pl. 24: figs. 2, 3 [not *Echinoplax moseleyi* Miers, 1886].

Pleistacantha oryx [sic].—Takeda and Miyake, 1969:492–493.

MATERIAL EXAMINED.—6 ♂♂, 5 ♀♀, 28.0–35.0 mm (USNM 135242–43).

Anton Bruun Cruises: Gulf of Oman, Sta. 264A, 291–272 m, 1 spec. Mouth of Gulf of Aden, Sta. 463, 75–175 m, 10 specs.

REMARKS.—That this species is not a synonym of *P. moseleyi* was elucidated by Sakai (1963, 1965). The main differences between the two are (1) in *P. oryx* the interantennular spine is bifid for only the distal third, or more often apically only, whereas in *P. moseleyi* it is bifid for at least the distal half and more often for almost the whole length; (2) in *P. oryx* the carapace is covered by small spines with several prominent, much larger spines on the gastric, cardiac, and branchial regions, whereas in *P. moseleyi* almost all the spines are of uniform size. However, in both these features and in others such as the shape of the rostrum, there is sufficient variation to make discrimination between juveniles of the two species difficult. *Pleistacantha oryx* also differs from *P. moseleyi* in that the rostral spines are usually much less divergent and the ambulatory propodi bear only short spines, whereas at least the first three pairs of legs of *P. moseleyi* usually bear long spines on the propodi. The form of the first pleopod of the male is extremely similar in the two species. *Pleistacantha oryx* reaches maturity at about one-third the maximum size of *P. moseleyi*.

DISTRIBUTION.—Western Arabian Sea, Andaman Sea, East China Sea, and Japan.

Schizophrys aspera (H. Milne Edwards)

Mithrax asper H. Milne Edwards, 1834:320.

Schizophrys aspera.—Sankarankutty, 1962:159–160, figs. 15, 16.—Sakai, 1965:89, pl. 41: fig. 2.—Griffin, 1966a:286, pl. 16; 1966c:312–313.

MATERIAL EXAMINED.—2 ♂♂, 15.4, 17.4 mm (USNM 135244, 135253).

Anton Bruun Cruises: NE bay of Bengal, Sta. 47B, 30–22 m, 1 spec. St. Joseph's I., Amirante Is., Sta. HA20, reef flat, among coral rubble, intertidal, H. A. Fehlman and party, 8 December 1964, 1 spec.

REMARKS.—These two juvenile specimens clearly belong to this extremely widespread species. The figures of the male first pleopod given by Sankarankutty (1962) are based on a juvenile; the tip is strongly curved outward in adults.

DISTRIBUTION.—Widespread Indo-West Pacific from South and eastern Africa and the Red Sea to Japan, Australia, Lord Howe Island, Samoa, and Hawaii.

Simocarcinus obtusirostris (Miers), new combination

Trigonothir obtusirostris Miers, 1879a:4–5, pl. 4: figs. 2, 2a.—Balls, 1938:18–19, figs. 3–6.—Forest and Guinot, 1961:14–15.

MATERIAL EXAMINED.—3 ♂♂, 10.0–11.4 mm (USNM 135245–46).

Cocos (Keeling) Island: Lagoon 2 miles E of N end of West I., Virginia Orr Sta. B34, 24 ft, hard, fine sand and weed, dredged, 11 February 1963, 2 specs.; seaward reef off SE end of West I., 6 December 1963, R. T. Abbott, 1 spec.

REMARKS.—This species differs from the other two in the genus in that the branchial expansion is laterally inflated and blunt rather than flattened and marginally cristate. The rostrum seldom exceeds half the length of the carapace proper in the males and in the females is extremely short, generally not extending beyond the orbits; in both sexes it is extremely deep. There is also marked sexual dimorphism in the shape of the carapace, the hepatic margin being so greatly expanded in females that the width across the hepatic region exceeds that across the branchial region; it is much narrower in males. In *S. simplex*, although the hepatic margin is expanded in females, the greatest carapace width is always across the branchial

region. *Simocarcinus simplex* generally has a pair of strong protogastric tubercles; the protogastric region is smooth in *S. obtusirostris*.

DISTRIBUTION.—Indian Ocean: Cocos (Keeling) Island. Pacific Ocean: Gilbert, Ellice, and Marianas islands, Tahiti.

Simocarcinus pyramidatus (Heller)

Huenia pyramidata Heller, 1861:307, pl. 1: fig. 9.

Simocarcinus simplex.—Rathbun, 1911:249 [not *Huenia simplex* Dana, 1852].

Simocarcinus pyramidatus.—Balss, 1929:11.

MATERIAL EXAMINED.—3 ♂♂, 1 ♀, 15.0–16.8 mm (USNM 135247–48).

Cocos (Keeling) Island: Lagoon 2 miles E of N end of West I., Virginia Orr Sta. B34, 24 ft, hard, fine sand and weed, dredged 11 February 1963, 2 specs.; lagoon, 300 yds off West I. just N of North Lagoon, 6 ft, heavy seaweed (*Thalassia* and *Caulerpa* spp.), 6 December 1963, R. T. Abbott, 2 specs.

REMARKS.—In these four specimens the rostrum is about as long as the remainder of the carapace and is directed forward from the front. In *S. simplex* (Dana) the rostrum is no more than half the length of the carapace and is usually curved in the vertical plane, being directed upward basally and is horizontal, in those with a longer rostrum, only toward the tip. There is little difference between the males and the females, the hepatic margin being poorly expanded or without any lobe in both sexes, whereas in *S. simplex* the hepatic margin is broadly expanded in females.

DISTRIBUTION.—Red Sea; Indian Ocean: Aldabra, Mauritius, Seychelles, Ceylon, Nicobar, and Cocos (Keeling) islands.

Sphenocarcinus cuneus (Wood-Mason)

Oxypleurodon cuneus Wood-Mason in Wood-Mason and Alcock, 1891:261.

Sphenocarcinus cuneus.—Alcock, 1895:193–194.—Alcock and Anderson, 1896:pl. 21: figs. 1, 1a.

MATERIAL EXAMINED.—1 ♀, 14.2 mm (USNM 135249).

Anton Bruun Cruises: E of Mombasa, Sta. 421H, 290 m, 1 spec.

REMARKS.—This specimen represents only the third record of this species from the western Indian

Ocean. It is easily distinguished from its congeners by the long rostrum, the four large plates on the carapace, and the prominently carinate chelipeds and ambulatories. A single ovigerous female was taken by HMS *Sealark* at Providence I. (Rathbun, 1911:249).

DISTRIBUTION.—Western Indian Ocean: East of Mombasa, Providence Island; Andaman Sea.

Discussion

The material collected by the RV *Anton Bruun* includes 50 species. Shore parties at Madagascar and islands to the north collected five species including two not taken at *Anton Bruun* Stations. Of the eight species collected by the *Te Vega* one was not taken by the *Anton Bruun* or by shore parties. Finally, Virginia Orr and associates collected three species at Cocos (Keeling) Island in the eastern Indian Ocean; only one of these was also collected by the *Anton Bruun*. This makes a total of 56 species belonging to 30 genera (see Table 5).

The majority of the species were taken in the western Indian Ocean. About one-third (32) of the number of continental shelf species known from that area (Guinot, 1966) were collected. Included were three species, *Chlorinoides tosaensis*, *Majella brevipes*, and *Oncinopus neptunus*, previ-

TABLE 5.—List by subspecies of the majid spider crabs dealt with in this report and the collection from which they came (AB = *Anton Bruun*; TV = *Te Vega*; SH = shore collecting at Madagascar and nearby islands; VO = collections at Cocos [Keeling] I. by Virginia Orr and associates)

Species	Collections			
	AB	TV	SH	VO
INACHINAE				
<i>Achaeus barnardi</i>	x			
<i>A. curvirostris</i>	x			
<i>A. erythraeus</i>	x			
<i>A. lacertosus</i>	x			
<i>A. laeviculis</i>	x			
<i>A. spinosissimus</i>	x			
<i>Aepinus indicus</i>	x			
<i>Camposcia retusa</i>	x			
<i>Cyrtomaia suhmi</i>	x			
<i>Encephaloides armstrongi</i>	x			

Species	Collections			
	AB	TV	SH	VO
<i>Gryphachaeus hyalinus</i>	x			
<i>Inachoides dolichorhynchus</i>	x			
<i>Inachus dorsettensis</i>	x			
<i>I. guentheri</i>	x			
<i>Macropodia formosa</i>	x			
<i>M. intermedia</i>	x			
<i>Oncinopus neptunus</i>	x	x		
<i>Platymaia alcocki</i>	x			
<i>P. turbynei</i>	x			
<i>Pleistacantha moseleyi</i>	x			
<i>P. oryx</i>	x			
OPHTHALMIINAE				
<i>Ophthalmias cervicornis</i>	x			
<i>O. curvirostris</i>	x			
ACANTHONYCHINAE				
<i>Huenia proteus</i>			x	
<i>Menaethiops delagoae</i>	x			
<i>Menaethius monoceros</i>		x	x	x
<i>Simocarcinus obtusirostris</i>				x
<i>S. pyramidatus</i>				x
<i>Sphenocarcinus cuneus</i>	x			
PISINAE				
<i>Collodes malabaricus</i>	x			
<i>Doclea calcitrapa</i>	x			
<i>D. canalifera</i>	x			
<i>D. muricata</i>	x			
<i>D. ovis</i>	x			
<i>Eurynome aspera</i>	x			
<i>E. elegans</i>	x			
<i>Hyastenus convexus</i>	x			
<i>H. diacanthus</i>	x			
<i>H. hilgendorfi</i>	x	x		
<i>H. inermis</i>	x			
<i>H. ovatus</i>	x	x		
<i>H. spinosus</i>	x	x		
<i>H. uncifer</i>	x			
<i>Naxioides robillardi</i>	x			
<i>Perinia tumida</i>			x	
<i>Phalangipus filiformis</i>		x		
<i>P. hystrix</i>	x	x		
<i>P. indicus</i>	x			
<i>P. longipes</i>	x	x		
<i>P. retusus</i>	x			
MAJINAE				
<i>Chlorinoides aculeatus</i>	x			
<i>C. tosaensis</i>	x			
<i>Entomonyx spinosus</i>	x			
<i>Majella brevipes</i>	x			
<i>Schizophrys aspera</i>	x		x	
MITHRACINAE				
<i>Micippa thalia</i>	x		x	

ously known only from the western Pacific and three species, *Eurynome aspera*, *Inachus dorsettensis*, and *Macropodia intermedia*, up till now recorded from the Atlantic or at most southern Africa. Seven species, *Achaeus barnardi* and *A. erythraeus*, *Encephaloides armstrongi*, *Eurynome elegans*, *Gryphachaeus hyalinus*, *Macropodia formosa*, and *Phalangipus retusus*, previously taken only once, were collected by the *Anton Bruun*.

Twenty-four continental shelf species were taken at more than one station by the *Anton Bruun* (Table 6). The collections from the shelf of the Andaman Sea-Bay of Bengal area showed marked differences from those in the western Indian Ocean. The former were typified by large species of the pisines *Doclea* and *Phalangipus* which occurred in very large numbers, 414 specimens of only four species coming from Sta. 41A near the Gulf of Martaban. A total of 16 species were collected from 14 stations in this area. Eleven of these species were not taken elsewhere by the *Anton Bruun* but all of them have been taken outside this area, mostly from the Indo-Malay Archipelago and western Pacific. By contrast, the collections in the western Indian Ocean, especially the area just south of the mouth of the Gulf of Aden, took up to 7 species at each station; these mostly small inachines, pisines and majines were collected in much smaller numbers, Sta. 463 taking the largest number (24 individuals). The 15 stations in this area produced 26 species, of which 19 were not taken elsewhere. Only one of these, *Hyastenus inermis*, is so far known only from the western Indian Ocean. However, two others, *Achaeus erythraeus* and *Ophthalmias curvirostris*, have been previously recorded only from the Red Sea-Iranian Gulf, four from South Africa, and three from the shelf around India. Ten species were taken in the Arabian Sea-Gulf of Oman and 13 species off South Africa.

Six deep-water species, *Cyrtomaia suhmi*, *Pleistacantha moseleyi*, and *P. oryx*, *Platymaia alcocki* and *P. turbynei*, and *Sphenocarcinus cuneus*, were taken from nine stations worked on the continental slope in depths of 230-960 m. These are well-known archibenthal species mostly with fairly wide geographic distributions.

The general concept of the Indo-West Pacific spider-crab fauna as being composed of diverse geographically widespread species is supported by the present study.

TABLE 6.—The geographic distribution (arranged by station numbers) of the 24 continental shelf species of majids taken by the Anton Bruun at more than two stations

Species	Andaman Sea, Bay of Bengal 17– 47	E Arabian Sea 202– 221	Gulf of Oman 245– 270	South Africa 357– 397	East Africa 400– 421	NE Africa 442– 463	West Pacific	Red Sea, Iranian Gulf	Atlantic Ocean
<i>Achaeus barnardi</i>					x	x			
<i>Aepinus indicus</i>				x	x	x	x		
<i>Chlorinoides tosaensis</i>					x	x	x		
<i>Doclea canalifera</i>	x						x		
<i>Encephaloides armstrongi</i>			x						
<i>Entomonox spinosus</i>					x		x		
<i>Eurynome aspera</i>				x					x
<i>E. elegans</i>			x						
<i>Gryphachaeus hyalinus</i>					x	x			
<i>Hyastenus convexus</i>	x			x			x		
<i>H. inermis</i>									
<i>H. ovatus</i>	x	x					x	x	
<i>H. spinosus</i>	x	x		x	x	x	x	x	
<i>Inachus dorsettensis</i>				x		x			x
<i>I. guentheri</i>				x	x				x
<i>Macropodia formosa</i>				x		x			
<i>M. intermedia</i>				x					x
<i>Majella brevipes</i>					x	x	x		
<i>Naxioides robillardi</i>			x		x	x	x		
<i>Oncinopus neptunus</i>		x			x	x	x		
<i>Ophthalmias curvirostris</i>						x		x	
<i>Phalangipus hystrix</i>	x	x					x	x	
<i>P. indicus</i>	x								
<i>P. longipes</i>	x						x		

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