

Hommage respectueux
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THE DECAPODA MACRURA OF
THE SNELLIUS EXPEDITION. I

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PROEFSCHRIFT

TER VERKRIJGING VAN DEN GRAAD VAN DOCTOR
IN DE WIS- EN NATUURKUNDE AAN DE RIJKS-
UNIVERSITEIT TE LEIDEN, OP GEZAG VAN DEN
RECTOR MAGNIFICUS DR. B. G. ESCHER, HOOG-
LEERAAR IN DE FACULTEIT DER WIS- EN NATUUR-
KUNDE, VOOR DE FACULTEIT DER WIS- EN NA-
TUURKUNDE TE VERDEDIGEN OP WOENSDAG
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DOOR

LIPKE BIJDELEY HOLTHUIS

GEBOREN TE PROBOLINGGO, O. JAVA



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AAN MIJN OUDERS

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THE DECAPODA MACRURA OF THE SNELLIUS EXPEDITION

I. THE STENOPODIDAE, NEPHROPSIDAE, SCYLLARIDAE AND PALINURIDAE

(BIOLOGICAL RESULTS OF THE SNELLIUS EXPEDITION XIV)

The Stenopodidae, Nephropsidae, Scyllaridae and Palinuridae of the Snellius Expedition form a small, but highly interesting collection, which contains the following species:

Stenopodidae

Stenopus hispidus (Oliv.)

Stenopus tenuirostris De Man

Microprosthema validum Stimps.

Microprosthema scabricaudatum (Richt.)

Nephropsidae

Enoplometopus longirostris De Man

Enoplometopus spec. (young postlarval stages)

Scyllaridae

Scyllarus cultrifer (Ortm.)

Palinuridae

Palinustus mossambicus Barn.

Panulirus versicolor (Latr.)

As the collection of Stenopodidae of the Siboga Expedition was not yet studied (on the Siboga material of the other three groups excellent studies by Dr. J. G. de Man have already been published) and it was too small to justify separate publication, the material is treated here also. Furthermore all other Stenopodid material and the indopacific material of Nephropsidae, Scyllaridae and Palinuridae present in the collections of the Rijks-

museum van Natuurlijke Historie at Leiden and of the Zoölogical Museum at Amsterdam are inserted in the present paper too.

I wish to express here my sincere gratitude to Prof. Dr. H. Boschma, who entrusted me with the study of the collection of the Snellius Expedition and with that of the Rijksmuseum van Natuurlijke Historie, and to Prof. Dr. L. F. de Beaufort, who kindly placed the material of the Siboga Expedition and of the Zoölogical Museum at Amsterdam at my disposal. I am also greatly indebted to Miss A. M. Buitendijk at Leiden, to Mrs. W. S. S. van der Feen née van Benthem Jutting and to Dr. H. Engel, both at Amsterdam, for their informations and kind help with several questions. Finally I should like to thank Dr. K. Stephensen of the Zoological Museum at Copenhagen for his extensive information about the type specimen of *Enoplometopus antillensis* Lütken.

The material used, for the larger part originates from the Netherlands East Indies, to the carcinological fauna of which region several interesting additions could be made here. Furthermore the material is important because statements and identifications made by older authors as De Haan, Herklots, Hoffmann and De Man could be checked, as material used by them is preserved in the collections of the two museums mentioned above.

The greater part of the material is preserved in spirit; when specimens are preserved dry, this is mentioned in the lists of material.

For the geographical names in the Netherlands East Indies, the orthography used in: Boschma, H., 1936. Biological Data. Snellius Expedition, vol. 6 is followed; names not mentioned there are given in the official orthography, recommended in the „Lijst van de voornaamste aardrijkskundige namen in den Nederlandsch-Indischen Archipel, ed. 2 (1923)“.

When in the present paper the length of the rostrum is indicated, the distance from the posterior dorsal tooth of the rostrum to the tip is meant.

For the textfigures and part of the plates I am indebted to Mr. P. van 't Zelfde.

Tribus STENOPODIDEA

Stenopidea Bate, 1888, Rep. Voy. Challenger, Zool., vol. 24, p. 206.

Stenopides Borradaile, 1907, Ann. Mag. nat. Hist., ser. 7 vol. 19, p. 469.

Stenopodea Sclater, 1936, Zool. Rec. Crust., vol. 73, p. 39.

Historical. The first species belonging to this tribe mentioned in literature is the indopacific *Stenopus hispidus*, described and figured by Seba (1761) under the name *Squilla groenlandica*. By following authors, as for instance Herbst, the figure and description were copied, till Olivier (1811) again gave an original description of the species under the name *Palaemon*

hispidus. In 1814 the Mediterranean species *Stenopus spinosus* was discovered by Rafinesque and described as *Byzenus scaber*. Till about 1849 these two species, for which in 1819 the genus *Stenopus* was erected, remained the only known Stenopodidea. In 1849 De Haan created the genus *Spongiicola*, with one species, *Spongiicola venusta*. In 1852 Dana described a species called by him *Stenopus ensiferus*, which belongs to the genus *Odontozona*. Then between 1861 and 1880 the four species belonging to the genus *Microprosthema* were discovered and described under the names *Microprosthema valida* Stimpson, *Stenopus semilaevis* Von Martens, *Stenopusculus plumicornis* Richters and *Stenopusculus scabricaudatus* Richters. In 1881 a new genus *Richardina* was created by A. Milne Edwards for the species *Richardina spinicincta*. In the last twelve years of the century two new species of *Stenopus*, viz., *Stenopus tenuirostris* De Man and *Stenopus scutellatus* Rankin, one of *Odontozona* (as *Richardina spongiicola* Alcock & Anderson), one of *Spongiicoloides* (as *Spongiicola koehleri* Caullery) and a new genus *Engystenopus* with the species *E. palmipes* Alcock & Anderson were described. The rest of the species known at present were described in the first eight years of the present century, these are one new *Odontozona* (as *Richardina edwardsi* Bouvier), one new *Richardina* (*Richardina fredericii* Lo Bianco), two new *Spongiicolae* (*Spongiicola andamanica* Alcock and *Spongiicola henshawi* Rathbun) and three new *Spongiicoloides* (as *Spongiicola evoluta* Bouvier, *Richardina inermis* Bouvier and *Spongiicoloides profundus* Hansen); in 1908 for the first time the genus *Spongiicoloides* was separated from the genus *Spongiicola*. In 1909 A. Milne Edwards and Bouvier gave a summary of all species of the tribe, which were known to them. After 1908, as far as I could find in literature, no new species are described, but new records of old species enlarged our knowledge of their distribution. Other important work is done by Brooks & Herrick (1892) and by Gurney (1924, 1936) in their detailed papers on the development of Stenopodidae.

The place of this group in the system has been subject to much difference of opinion among various authors. The older authors as H. Milne Edwards and De Haan did not distinguish a separate family of Stenopodidae but brought the Stenopodid species to the Penaeidae, as was done also by Boas (1880). Huxley (1878) created the family Stenopidae, which formed with the families Penaeidae, Thalassinidae, Axiidae, Homaridae, Astacidae (called by him Potamobiidae), Parastacidae and Palinuridae the group Trichobranchiata. Smith & Weldon (1909) included the family Stenopodidae in the tribe Penaeidea; they also are the first to use the correct name Stenopodidae instead of the much used Stenopidae. In 1888,

Bate placed the family "Stenopidae" in a separate tribe "Stenopidea", which with the families Scyllaridae, Palinuridae, Eryonidae, Homaridae and Astacidae formed the group Normalia of the division Trichobranchiata; the group Aberrantia of the same division was formed by the Thalassini-dea, Galatheidae and some Paguridea; the Penaeidae are placed by Bate in the division Dendrobranchiata. Ortmann (1890), Alcock (1901), Borradaile (1907), Calman (1909) and Balss (1927) divided the suborder Macrura Natantia (or Macrura Caridides as Alcock called them) into three tribes, viz. Penaeidea, Caridea (= Eucyphidea) and "Stenopidea". Bouvier (1908a) divided the Macrura into two types, namely the lophogastridian type, which includes the lophogastridian Schizopodes, the Caridea and the Penaeidea, and the euphausidian type, which includes the Euphausiaceae, the Stenopodidae and the Macrura Reptantia. Gurney (1924) also makes a sharp separation between the Stenopodidae on one hand and the Caridea on the other; on account of the larval characteristics he thinks it probable that the Stenopodidea have to be placed in the group of the Reptantia near the higher Anomura and on account of the adult characteristics between the Penaeidea and the Homaridae (= Nephrop-sidae).

The tribe consists only of one family:

STENOPODIDAE

Stenopidae Huxley, 1878, Proc. zool. Soc. Lond., 1878, p. 785.

Stenopodidae Smith & Weldon, 1909, in Harmer & Shipley, Cambridge nat. Hist., vol 4, p. 162.

The literature on this group is very scanty and scattered. The only more or less complete survey is the paper of A. Milne Edwards and Bouvier (1909). They give a key to the genera of Stenopodidae and one to the species of the genus *Spongicola*, furthermore they mention all species known to them. The key to the genera, however, at present does not hold good and the genus *Spongicola* afterwards was divided into two genera, furthermore some species are overlooked by the authors. It is therefore useful to give here a revision of the whole family, with keys to all genera and species; of those species, which I have at my disposal, extensive descriptions will be given. During my study it became obvious that many species had to be transferred to other genera, that some genera are identical, for instance *Stenopus* Latr. and *Byzenus* Rafin., and *Microprosthemus* Stimps. and *Stenopusculus* Richters, as already stated by Balss (1915). Many species, described under different names proved to be

identical. A variety, *Stenopus tenuirostris* var. *intermedia* De Man, can not be maintained, since it is based on a young postlarval stage. Further the genus *Richardina* has to be divided into two separate genera, *Richardina* s.s. and *Odontozona*. Two new species are added to the 21 known at present. As I had the opportunity to study the material collected by the Snellius and the Siboga Expeditions, and the specimens from the Rijksmuseum van Natuurlijke Historie at Leiden and from the Zoölogical Museum at Amsterdam, I could examine 11 different species.

Key to the genera

1. Body compressed. Telson elongate lance-shaped, ending in two strong spines, sometimes with a minute median spinule between them. Endopod of uropod dorsally with two ridges, a strong median and a weaker inner one, the inner ridge with some dorsal hairs. Third maxillipede always with a distinct exopod. 2.
- Body depressed. Telson broadly lance-shaped or quadrangular, ending in 3 or 5 spines of equal size, sometimes without final spines. Endopod of uropod with one dorsal median ridge. Third maxillipede without or with a rudimentary exopod, sometimes, however, exopod well developed. 5.
2. Dactylus of fourth and fifth pereopod biunguiculate, short. 3.
- Dactylus of fourth and fifth pereopod uniunguiculate, relatively long and slender. 4.
3. Carapace and abdomen densely covered with evenly placed strong spinules, sometimes arranged in longitudinal rows. Spinules erect, curved forward. Ischium of third maxillipede with external spinules. *Stenopus* Latr.
- Abdomen dorsally without spinules, sometimes some spinules near lateral margin of pleurae. Carapace with a cincture of spinules along posterior margin of cervical groove. Often more parallel cinctures present. Spinules pressed against the body, straight, directed forward. Ischium of third maxillipede without external spinules. *Odontozona* nov.
4. Carapace dorsally with a distinct cincture of spinules along the posterior margin of the cervical groove. Propodus of third pereopod not more than twice as broad as carpus. Pincers of third pereopod without teeth. *Richardina* A. Milne Edw.
- Carapace glabrous or with evenly placed spinules, no distinct cincture of spinules along posterior margin of cervical groove. Propodus of third pereopod more than twice as broad as carpus. Pincers of third pereopod with distinct teeth at inner margin. *Engystenopus* Alcock & Anderson
5. Third maxillipede with the exopod long and slender. Carapace covered with many spinules. First pereopod with setiferous organs at ventral side of anterior part of carpus and posterior part of propodus. *Microprosthema* Stimpson
- Third maxillipede with the exopod rudimentary or absent. Carapace glabrous or with some spinules near the anterior margin. First pereopods without setiferous organs. 6.
6. Hand of third pereopod with upper and lower margin serrate. Exopod of second maxillipede present, that of third maxillipede rudimentary. *Spongicola* De Haan
- Hand of third pereopod with upper and lower margin entire. Exopod of second and third maxillipede absent. *Spongicoloides* Hansen

Stenopus Latreille

Astacus p.p. Olivier, 1791, Encycl. méth. Hist. nat., vol. 6, p. 346.

Cancer (*Astacus*) p.p. Herbst, 1793, Vers. Naturgesch. Krabben Krebse, vol. 2, p. 90.

- Penaeus* p.p. Latreille, 1802, Hist. nat. Crust. Ins., vol. 4, p. 250.
Crangon p.p. Latreille, 1802, Hist. nat. Crust. Ins., vol. 4, pl. 53 fig. 3.
Palaemon p.p. Olivier, 1811a, Encycl. méth. Hist. nat., vol. 8, p. 666.
Byzenus Rafinesque, 1814, Préc. Découv. somiol., p. 23.
Stenopus Latreille, 1819, Nouv. Dict. Hist. nat., ed. 2 vol. 30, p. 71.
Bizenus Desmarest, 1823, Dict. Sci. nat., vol. 28, p. 312.
Stenops Desmarest, 1823, Dict. Sci. nat., vol. 28, tab. 5, footnote 1 (non Illiger, 1811).
non *Stenopus* (Leach MSS) Latreille, 1825, Encycl. méth. Hist. nat., vol. 10, p. 486.
non *Stenopus* Guilding, 1828, Zool. Journ. Lond., vol. 3, p. 527.
Stenope H. Milne Edwards, 1838b, Ann. Sci. nat. Zool., ser. 2 vol. 10, p. 164.
non *Sthenopus* Richardson, 1843, Zool. Samarang, Fish., p. 10.
non *Stenopus* Broun, 1881, Man. New Zeal. Coleopt., p. 739.
Embryocaris Ortmann, 1893, Ergebn. Plankton-Exped., vol. 2Gb, p. 85.
non *Stenopus* Schwarz, 1900, Deutsch. ent. Zeitschr., 1900, p. 307.
non *Stenopus* Pagenstecher, 1909, Geogr. Verbr. Schmetterl., p. 448 (pro *Sthenopsis* Packard, 1864).
Stenopsus Maluquer, 1917, Junta Ci. nat. Barcelona, vol. 2, p. 225.

Description. Body slender, compressed. Rostrum well developed, provided with spines. Carapace densely covered with spinules, which are curved forward. Cervical groove very distinct, other grooves more or less obtuse. Posterolateral angles with marginal setae, which, however, often are worn away.

Abdomen more or less compressed, with a distinct sharp bend between the third and fourth segment. Spinulation of the first three and that of the last three segments strikingly different. The first three segments have the spinules similar to those of the carapace, erect and the tips curved forward, the last three with straight posteriorly directed spinules, which are pressed against the body; at the pleurae they are more erect. The first abdominal segment slightly overlaps the second, which overlaps the third. Dorsal surface of first segment with a median transverse carina; anterior part of the segment hollowed; its pleurae ending in two strong teeth, those of the second to fifth segment are broadly truncated and provided with three or four lateral spines; pleurae of the fourth and fifth segment directed posteriorly. Margins of all pleurae, except the fifth, provided with setae. Sixth abdominal segment without pleurae.

Telson lance-shaped, with a median groove flanked by two longitudinal carinae. These carinae provided with some strong, posteriorly directed spines, each of which has the outer side of the base with a long hair. Between each carina and the median groove a row of slender spinules is present. Two strong curved spines, each with one or two long hairs at the inner side of the base, are placed near the anterior margin of the telson, between the bases of the carinae. Anterior part of lateral margin provided with a carina, which in the posterior half becomes inconspicuous;

the base of this carina with a strong spine. Lateral margin with a lateral median spine and with setae along the posterior two thirds; an additional row of setae at the posterior margin. Telson ends into two blunt spines, no median spinule present.

Eyes well developed, peduncle slightly longer than and as broad as cornea, dorsally provided with spinules. Facets and pigment distinct in cornea.

Antennular peduncle with the segments provided with some spinules; first segment with a small stylocerite at base of outer margin, and an, often indistinct, scale, which is provided with spines, at the outer anterolateral angle. Antennula with two long flagella, which are of about the same length, the upper flagellum slightly stronger, its basal segments dorsally with spinules, ventrally with hairs.

Basal segments of antenna provided with spines of different size. No laminate process present at internal margin. There is one long flagellum. Scaphocerite long, slender, outer margin strongly concave at base, straight or slightly convex in the upper part, with one or more spinules near the base, serrate in the upper part and ending in a distinct tooth; inner and anterior margin with setae, upper surface with two longitudinal ridges, with or without rows of spinules.

Mandibles robust (Pl. II fig. e), provided with a strong three-jointed palp. Maxillulae (Pl. II fig. f) with a slender undivided palp; the endites of about the same length. Maxilla (Pl. II fig. g) with the basipod and coxopod of the same size, both divided into two elongate lobes, the median lobes being narrowest; palp slender, undivided; exopod large. Palp of first maxillipede (Pl. II fig. h) consisting of three segments, the ultimate being very narrow; flagellum of exopod long, slender; epipod large, flat, divided into two parts. Second maxillipede (Pl. II fig. i) seven-jointed; ischium and coxa fused, a groove indicates the line of separation; dactylus placed at the end of the propodus; propodus at the inner margin, near the base, often with a spine; exopod not divided, long, slender. Third maxillipede composed of seven segments; merus to dactylus with an internal and external row of setae, which are directed ventrally, in the merus these rows are proximally converging; ischium with hairs at the internal margin only; ischium, merus and carpus with spinules, mostly an external row and some scattered ones on the rest of the surface, the external row of the ischium consists of about ten very strong spinules; propodus and dactylus sometimes with external spinules too. Propodus at the anterior part of inner margin with a setiferous organ.

First pereopod, when stretched, reaches about the ultimate point of

the scaphocerite; dactylus about half as long as propodus, carpus longer than propodus or merus; both carpus and propodus provided with a setiferous organ at the ventral surface, the carpus in the anterior, the propodus in the posterior part; segments with or without spinules; some small tufts of hair at the tips of the pincers.

Second pereiopods similarly built as the first, but longer and stronger; carpus reaches with about one third of its length beyond the ultimate tip of the scaphocerite. No setiferous organs on carpus or propodus; only some small tufts of hair on the tips of the pincers. Segments often with spinules.

Third pereiopod largest and strongest, reaching with the entire carpus beyond the ultimate point of the scaphocerite. Dactylus much shorter than half the propodus, carpus considerably shorter than propodus, merus of about the same length as carpus. Ischium compressed, dorsally and ventrally provided with spinules; merus compressed at base, more cylindrical in the distal part. Merus, carpus and propodus covered with many longitudinal rows of spinules. Dactylus with one large ventral tooth, which is fitting in two large dorsal teeth of the lower pincer, all teeth are triangular and sharply pointed; distal part of the pincers elongate, often minutely serrate at inner margin and with crossing tips.

Fourth and fifth pereiopods very long and slender; carpus long, about twice or more as long as propodus, merus somewhat shorter than carpus. Dactylus small, biunguiculate. Segments often with spinules, propodus always with a ventral row of many movable spinules, carpus too with some ventral movable spinules. Carpus and propodus subdivided into several smaller segments.

Branchial formula as follows:

appendages	maxillipedes			pereiopods				
	I	II	III	I	II	III	IV	V
pleurobranches	—	I	I	I	I	I	I	I
arthrobranches	—	I	2	2	2	2	2	—
podobranchs	—	I	—	—	—	—	—	—
epipods	I	I	I	I	I	I	I	—
exopods	I	I	I	—	—	—	—	—

My observations on the branchial formula agree entirely with those of Bouvier (1908). Huxley (1878) found the second maxillipede with two arthrobranches and without podobranch. Bate (1888) did not mention the pleurobranch of that maxillipede. The fact that the pleurobranch of the second maxillipede is overlooked (this also has often occurred in descriptions of species belonging to other Stenopodid genera) is, according to

A. Milne Edwards & Bouvier (1909), due to the fact that it is concealed under the large epipod of the first maxillipede.

First pleopod uni-, the others biramous. Basal segment and posterior surfaces of the branches of the pleopods provided with spinules.

Uropods about as long as the telson. Exopod rectangular, outer margin straight and serrate, a considerable part of it before the final tooth entire. Anterior and inner margin fringed with hairs. Upper surface with two longitudinal parallel median ridges and with spinules in different number, often arranged in longitudinal rows. Endopod elongate triangular, exterior margin with some teeth at base, rest of the margin fringed with hairs. Upper surface with two ridges: the median of these is strongest, the other, which is weaker, rises near the lower part of the inner margin and curves towards the median one, at last running parallel with it. Upper surface provided with spinules, internal carina dorsally with four to six long hairs.

Eggs are small and numerous, with a diameter of about 0.4-0.9 mm.

Sexual differences. Borradaile (1898) found the following sexual differences in *Stenopus hispidus*: in the female the first pleopod "has the last joint longer than the preceding, narrow and acuminate, and the preceding joint usually without, sometimes with, one spine at the proximal end of the inner margin. In the male the same appendage has the last joint broad and not longer than the preceding, which is armed on its inner margin with one, usually with two or three spines. Further, in the male the first abdominal appendage is shorter relatively to the rest than in the female". Borradaile evidently makes a mistake when he states that spines are present on the inner margin of the basal segment of the pleopod, as his figure shows and as I found also in my specimens they are placed at the outer margin. The differences mentioned by Borradaile for *Stenopus hispidus* are, as far as I could control, also present in the other *Stenopus* species. Another difference is that in the adult females the median spines on the ventral surface of the abdominal segments are absent, while in the males the segments are provided there with one or more spines. This difference is conspicuous only in adult specimens; in my material of *Stenopus hispidus* specimens shorter than 35 mm all have the abdominal segments ventrally with spines; Borradaile's characteristic too is not distinct in small specimens.

Size. The smallest adult specimens are found in the species *Stenopus tenuirostris* and *S. scutellatus*, in the former I have measured ovigerous females of 21-28 mm, in the latter two such females of 23 mm. The largest specimen was a *Stenopus spinosus* measuring 73 mm.

Vertical distribution. All *Stenopus* species are recorded from superficial waters, some also occur in greater depths, so *Stenopus spinosus* is known from 690 m.

Horizontal distribution. The genus is recorded from the Mediterranean, the Indopacific region and from the tropical east American seas.

Type species is *Palaemon hispidus* Olivier.

Remarks. C. S. Rafinesque Schmaltz (1814) in his "Précis de découvertes somiologiques" described a new "palaemonid" genus *Byzenus*, with one species, *B. scaber* from Sicily. As Rafinesque's paper is not available to me, I know his description only from Desmarest's (1823 and 1825) and H. Milne Edwards's (1837) notes. The genus was described as follows: „Ecaïlles de la base des antennes extérieures sans dents; les deux paires de pattes antérieures pincifères, mais très-courtes; la troisième, pincifère, chélique, très-grosse." And the species: "Entièrement couvert de tubercules aigus; rostre serreté en dessus et en dessous, bidenté latéralement, plus court que les écaïlles des antennes; doigts tridentés intérieurement." The description clearly shows that *Byzenus* is a Stenopodid genus, and as *Byzenus scaber* is identical with *Stenopus spinosus* Risso, which is distinctly shown by the description and affirmed by the fact that it is reported from the Mediterranean, *Byzenus* must be a synonym of *Stenopus*. That Rafinesque describes the scaphocerite without teeth probably is an error or a wrong observation. As the name *Byzenus* was published five years before *Stenopus*, it has priority over Latreille's name. The changing of *Stenopus* into *Byzenus*, however, will cause more confusion than its retention will do; the name *Stenopus*, namely, is used for this genus by more than forty authors, the name *Byzenus* only by four, two of which mentioned it in a footnote or in a short remark. Therefore I will use the name *Stenopus* till a final decision is made by the International Commission for Zoological Nomenclature.

Latreille (1825) in the Encyclopédie Méthodique vol. 10 on p. 486 under the word *Stenopus* and on p. 700 in his article "Triangulaires" uses the name *Stenopus* Leach for a brachyuran genus, which is identical with the genus *Leptopus* Lam., which afterwards was united with the genus *Egeria* Leach. As type species of *Stenopus* Leach Latreille indicated *Maja longipes*, a species which at present is named *Egeria longipes* (Fabr.). It is very probable that *Stenopus* Leach was never published by Leach himself, at least I could not find the name in his papers. Latreille perhaps took the name from a manuscript of Leach.

It is very strange, that Latreille in 1825 in the Encyclopédie Méthodique under the name *Stenopus* only mentioned Leach's name, while his own

name *Stenopus* for the present genus, which was published six years earlier (in 1819 in the *Nouveau Dictionnaire d'Histoire naturelle*) was not mentioned at all there, the more as Guérin, in the same volume of the *Encyclopédie*, p. 327, mentions Latreille's genus in his article "Salicoques" in which he refers to Latreille's article "*Stenopus*".

The following species described with the generic name *Stenopus* or *Sthenopus* do not belong to the present genus:

Pisces:

Sthenopus mollis Richardson (1843)

Gastropoda:

Stenopus cruentatus Guilding (1828)

Stenopus lividus Guilding (1828)

Coleoptera:

Stenopus angustus Schwarz (1900)

Stenopus elongatus Schwarz (1900)

Stenopus rubripennis Schwarz (1900)

Stenopus rufo-piceus Broun (1881)

Crustacea (Stenopodidea):

Stenopus ensiferus Dana = *Odontozona ensifera* (Dana)

Stenopus robustus Borradaile = *Microprosthema validum* Stimps.

Stenopus semilaevis Von Martens = *Microprosthema semilaeve* (Von Martens)

Stenopus validus (Stimps.) A. Milne Edw. & Bouv. = *Microprosthema validum* Stimps.

Key to the species of *Stenopus*

1. Scaphocerite with the outer margin for a considerable distance before the final tooth entire. Spinules on the last three abdominal segments not in distinct transverse rows, those of the sixth segment even in more or less distinct longitudinal rows. 2.
- Scaphocerite with the outer margin serrate up to the final tooth. Spinules on the last three abdominal segments arranged in distinct transverse rows. 3.
2. Rostrum at lower surface without spines. Ultimate point of rostrum reaching about to the middle of the second segment of antennular peduncle. Third abdominal segment with the shield-shaped area on median part of posterior margin absent. Pereiopods 1, 2, 4 and 5 with all segments naked or provided with some scattered spinules. *Stenopus hispidus* (Oliv.)
- Rostrum with 3-9 spines at lower surface. Ultimate point of rostrum mostly reaching beyond antennular peduncle. Spinules on carapace much more dense and slender than in *Stenopus hispidus*. Third abdominal segment with a distinct shield-shaped area. Pereiopods 1, 2, 4 and 5 mostly with longitudinal rows of numerous spinules on most segments. *Stenopus tenuirostris* De Man

3. Rostrum with a lateral row of spines. Scaphocerite with three or more spinules at base of outer margin and upper surface always with some longitudinal rows of spinules. *Stenopus spinosus* Risso
- Rostrum with one or without lateral spines, seldom with two. Scaphocerite at base of outer margin with one spinule, the upper surface glabrous.

Stenopus scutellatus Rankin

***Stenopus hispidus* (Oliv.) (Pl. I figs. a-g)**

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- Astacus muricatus* Olivier, 1791, Encycl. méth. Hist. nat., vol. 6, p. 346.
- Cancer (Astacus) longipes* Herbst, 1793, Vers. Naturg. Krabben Krebse, vol. 2, p. 90, pl. 31 fig. 2.
- Penaeus borealis* Latreille, 1802, Hist. nat. Crust. Ins., vol. 6, p. 250.
- Crangon boréal Latreille, 1802, Hist. nat. Crust. Ins., vol. 6, pl. 53 fig. 3.
- Palaemon hispidus* Olivier, 1811a, Encycl. méth. Hist. nat., vol. 8, p. 666.
- Palaemon longipes* Olivier, 1811a, Encycl. méth. Hist. nat., vol. 8, p. 666.
- Palaemon* ? *asper* Latreille, 1818, Tabl. encycl. méth., expl. p. 3, pl. 293 fig. 3.
- Palaemon longipes* Latreille, 1818, Tabl. encycl. méth., expl. p. 3, pl. 293 fig. 4.
- Palaemon hispidus* Latreille, 1818, Tabl. encycl. méth., expl. p. 5, pl. 319 fig. 2.
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- Palaemon hispidus* Latreille, 1836, in Cuvier, Règne anim., ed. 3 vol. 2, p. 189.
- Stenopus hispidus* H. Milne Edwards, 1837a, in Cuvier, Règne anim., ed. 4 vol. 17, p. 137, vol. 18, pl. 50 fig. 2.
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- Stenopus hispidus* H. Milne Edwards, 1838a, in Lamarck, Hist. nat. Anim. s. Vert., ed. 2 vol. 5, p. 361.
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- Stenopus hispidus* Lucas, 1851, Hist. nat. Crust. Arachn. Myriap., p. 193.
- Stenopus hispidus* Dana, 1852b, U. S. Explor. Exped., vol. 13, p. 607.
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- Stenopus Hispidus* Herklots, 1861, Tijdschr. Ent., vol. 4, p. 148.
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Snellius Expedition:

- Bay of Mamoejdjoe, Celebes; handnet; August 5, 1929.—1 juv. 14 mm.
 Sissie, Misool Group; reef; October 6, 1929.—1 specimen 30 mm.
 Wotap, Tenimber Islands; shore and reef; October 20-23, 1929.—6 specimens 20-30 mm.
 Near Koe pang; November 18-20, 1929.—2 specimens 26 and 28 mm.
 Station 216*: 2° 16' 5 S, 124° 22' E; straminipose, 300 m wire; March 17, 1930.—1 juv. 19 mm.
 Islet near Menado; September 25, 1930.—1 specimen 41 mm.

Siboga Expedition:

- Java Sea, about 7° 20' S, 118° E; surface, 0-10 m; April 3, 1899.—1 juv. 13 mm.
 Station 53: Bay of Nangamesi, Soemba; coral sand, near the shore mud; up to 36 m; April 21 and 22, 1899.—2 specimens 21 and 40 mm.
 Station 58: Anchorage off Seba, Sawoe; reef; April 25, 1899.—2 almost unidentifiable specimens.
 Station 77: Borneo Bank, 3° 27' S, 117° 36' E; fine grey coral sand; 59 m; June 10, 1899.—2 specimens 25 and 35 mm.
 Station 86: Anchorage off Donggala, Paloe Bay, Celebes; fine grey river mud; 36 m; June 18 and 19, 1899.—1 specimen 20 mm.
 Station 93: Poeloe Sanguisiapo, Tawitawi Islands, Sulu Archipelago; reef; June 24 and 25, 1899.—1 specimen 29 mm.
 Station 115: East side of Pajoenga Island, Kwandang Bay; reef; July 9-11, 1899.—4 specimens 20-27 mm.
 Station 144: Anchorage north of Damar Island; reef; August 7-9, 1899.—1 specimen about 35 mm (heavily damaged).
 Stations 213: Salajar Anchorage and surroundings, included Poeloe Pasitanete; reef; September 26-October 26, 1899.—7 specimens 21-51 mm (included 3 ovigerous ♀♀ 39-51 mm).
 Station 220: Anchorage off Pasirpandjang, west coast of Binongko; reef; November 1-3, 1899.—4 specimens 21-53 mm (included 1 ovigerous ♀ 53 mm).
 Station 301: Pepela Bay, east coast of Roti Island; reef; January 30-February 1, 1900.—2 specimens 37-42 mm.
 Station 60 or 303: Hainsisi, Semaue Island near Timor; reef; April 27 and 28, 1899 or February 2-5, 1900.—5 specimens 24-41 mm.
 Station 181 or 231: Ambon; reef; September 5-11 or November 14-18, 1899.—2 specimens 26 and 39 mm (both ovigerous ♀♀).

Museum Leiden:

- Ceram; 1864; leg. D. J. Hoedt.—1 specimen 34 mm.
 Ambon; 1849; leg. Schorel.—3 specimens 35-47 mm.
 Ambon; 1864; leg. D. J. Hoedt.—2 specimens 51 (ovigerous ♀) and 53 mm.
 Ambon; 1864; leg. E. W. A. Ludeking.—7 specimens 34-61 mm (included 2 ovigerous ♀♀ 43 and 56 mm).
 Bandanaira; 1881; leg. J. Semmelink.—5 specimens 28-42 mm (included 1 ovigerous ♀ 42 mm).

Timor; 1861-1868; leg. G. F. Wienecke.—2 specimens 33 and 38 mm (ovigerous ♀).
 Samoa; 1887; Museum Godeffroy.—2 specimens 50 (ovigerous ♀) and 52 mm.
 St. Martin, Simson's Bay; lagoon, sandy bottom, in horn sponges; ½ fathom; September, 7, 1905; leg. J. Boeke.—5 specimens 18-41 mm.

Museum Amsterdam:

Inhaca, Portuguese E. Africa; leg. C. J. v. d. Horst.—Some fragments.
 Isipingo, near Durban; shore; 1894; leg. M. Weber.—1 specimen 52 mm.
 Tambelan Islands, S. China Sea; on Saigon cable; 30 fathoms; June 4, 1914; leg. J. W. van Nieuhuys, cable ship "Telegraaf".—1 specimen 70 mm.
 North Coast of Sumatra, east of Sigli; on telegraph cable Medan-Oleleh (near Kotaradja); 40-70 fathoms; May 16, 1909; leg. capt. B. Holthuis, cable ship "Telegraaf".—1 specimen 23 mm.
 Sinabang, Simaloer Island, W. of Sumatra; March, 1913; leg. E. Jacobson.—1 specimen 26 mm.
 Cocos Islands, Indian Ocean.—1 specimen (ovigerous ♀) 51 mm.
 Poeloe Oebi (= Rotterdam Island), Bay of Batavia; 1928; leg. J. Verwey.—1 specimen 56 mm.
 Bay of Batavia; leg. C. P. Sluiter.—2 specimens 39 and 42 mm.
 Ternate; leg. W. Kükenthal.—3 juv. 16-19 mm.
 Ambon; leg. J. Brock; coll. J. G. de Man.—1 specimen 22 mm.
 Ambon; 1913; leg. M. M. Willemsz Geeroms.—3 specimens 28-42 mm.
 Hainsisi, S. W. of Timor; coral reefs; November 2, 1909; leg. H. J. M. Laurens.—1 specimen 31 mm.
 Lesser Sunda Islands; December 18, 1909; leg. H. J. M. Laurens.—2 specimens both 32 mm.
 S. W. New Guinea, Kaimana, 3° 41' S, 113° 44' E; reef; August 28, 1910.—1 specimen (ovigerous ♀) 38 mm.
 East Indian Archipelago; leg. J. H. R. Schoo, cable ship "Telegraaf".—1 specimen 55 mm.
 Curaçao, Caracas Bay; April 19, 1920; leg. C. J. van der Horst.—1 specimen 26 mm.
 Curaçao, rifwater, muddy bottom; September 27, 1905; leg. J. Boeke.—1 specimen 46 mm.
 Locality unknown.—4 specimens 40-53 mm.

Description. Rostrum (Pl. I fig. a) triangular at base, compressed near the apex, slender, straight, its length about half that of the carapace, when measured in dorsal line. Ultimate point reaching not further than the articulation between second and last segment of antennular peduncle, mostly only to the middle of the second segment. Rostrum dorsally with six or seven, rarely eight, strong spines, the last of which reaches beyond the apex; laterally at each side it is provided with one row of two to eight spines, which are directed obliquely upwards, often one to three of these spines are minute, while the others are much stronger. Lower surface of rostrum without spines, provided with feather-shaped setae.

Carapace densely covered with spinules, though not so dense as in *Stenopus tenuirostris*. Spinules slender, placed in more or less distinct longitudinal rows; a double row of four to six spinules extends in the

median of the carapace from the base of the rostrum to the cervical groove.

First three abdominal segments with similar spinules as on carapace. Pleura of first segment ending in two strong, pointed teeth, those of the second to fifth segment are truncated, the lateral margin provided with three spines. Third abdominal segment (Pl. I fig. e) is broadly triangularly produced in the median posterior part, no shield-shaped area present. Spinules of the last three segments numerous, not placed in transverse rows, those of the sixth segment even in more or less distinct longitudinal rows. In the posterior median part of the third and in the anteromedian part of the fourth segment the surface often bears no spinules. Ventral surface of sixth segment densely covered with spinules.

Median carinae on telson each provided with six or seven, seldom five, strong spines, excluded the final spines at the posterior margin. One or two small spinules are placed at the bases of the carinae. Between each carina and the median groove the telson is provided with two rows of spinules, the inner row consists of 4-8 rather large, the outer row of 0-12 minute spinules. Outside the carina some scattered small spinules are present, the larger among them often forming a distinct row.

Ophthalmic peduncle (Pl. I figs. b, c) dorsally with minute spinules, sometimes those on the line of separation between eyestalk and cornea very long and curved over the cornea, reaching almost its ultimate point, resembling thereby in this feature *Stenopus tenuirostris*.

The two lower segments of antennular peduncle (Pl. I fig. d) about of the same size, the third segment considerably shorter. Stylocerite short and pressed against the basal segment, therefore not so conspicuous as in the other *Stenopus* species. Basal segment at the outer anterior angle with a small scale provided with one to five spines. Centre of the anterior margin with one or two spines. Second segment provided with spinules at both surfaces, these spinules often placed in longitudinal or oblique rows. Third segment dorsally and ventrally with a forwardly directed spine.

Antennal peduncle with many spines of different size. Scaphocerite (Pl. I fig. f) reaches with more than half its length beyond the tip of the rostrum. Outer margin with 2-8 small spinules at base and 16-26 teeth in the upper part; between these teeth and the final tooth of the scaphocerite, there is a considerable distance, in which the margin is not serrate. Upper surface with the two longitudinal ridges distinct, both ridges provided with a row of spinules, often a third row is present. Lower surface too with some rows of spinules.

Third maxilliped with ischium, merus and carpus provided with an external row of spinules, those of ischium strongest, rest of the surfaces

sometimes also provided with some scattered spinules. Propodus and dactylus mostly without, sometimes with two or three spinules at outer margin.

Carpus of the first pereiopod mostly with one, sometimes with more dorsal spinules, all other segments without them. Second pereiopod with merus and carpus dorsally provided with some spinules, other segments glabrous.

Third pereiopods very strong, mostly of the same length at both sides, sometimes the left and right pereiopod asymmetrical. Ischium dorsally and ventrally with a row of spinules, which vary considerably in number (9-26). Merus with upper surface with two, seldom one row of 10-18 spinules, ventrally with a row of 7-16, lateral margins with some scattered spinules, which sometimes form distinct rows. Carpus narrows abruptly near the base, not gradually as in *Stenopus tenuirostris*; dorsally it bears three anteriorly diverging rows of 9-18 spinules, ventrally two such rows of 8-12 spinules. Propodus dorsally with a row of 16-25, ventrally with a row of 21-32 spinules, lateral surfaces with numerous rows of about 20 spinules, sometimes some scattered ones are present too. Dactylus dorsally with 6-10 spinules. The spinules of the third pereiopod, especially the dorsal and ventral rows of carpus and propodus, vary considerably in form: sometimes they are small, conical, with large spaces between them, often they are large, compressed and placed so close near one another, that they seem to form a sharp, high carina.

Fourth and fifth pereiopod with the ischium without or with 1-3 spinules, the merus with some rows of 2-12, carpus with 4-6 ventral movable ones near the anterior margin and the propodus with a ventral row of 17-25 movable spines. Carpus is subdivided into 9-13, the propodus into 5-9 segments.

Branches of the pleopods with the posterior surface spinose. Abdominal segments in the male ventrally each with one strong median spine.

Outer margin of uropodal exopod (Pl. I fig. g) with 10-16 teeth. Longitudinal rows of spinules at both sides of the ridges on the upper surface. The outer margin of the endopod bears near the base 4-10 lateral teeth. Outside the median ridge the upper surface bears many spinules, often arranged in longitudinal rows; inner ridge with 6 long dorsal hairs. Lower surface of exopod with some rows of numerous spinules, that of endopod naked or with one row. Basal segment of uropod provided with spinules too.

Eggs are numerous and small. In my material the eggs, in which the larva is not yet visible, are 0.4-0.7 mm long and 0.4-0.6 mm broad, those, in which the larva is already visible, are 0.7-0.8 mm long and 0.5-0.7 mm broad.

Postlarval stage. Young specimens, of about 16-20 mm, differ from the adults by the relatively longer antennular peduncle, the relatively longer and more compressed rostrum, which has no lateral spines, by the carapace and abdomen, which bear less spinules, by the relatively longer sixth abdominal segment and by the propodus of the third pereopod, which is more than 3 times as long as dactylus. Some of these differences are already mentioned by Rathbun (1906).

Colour. Spirit specimens are coloured plain pale brownish yellow, in rather fresh specimens something of the red bands, so conspicuous in the living animal, is visible. The colour of the living specimens was discussed by various authors; as their opinions in some points differ rather considerably, what is due either to variability of the species or to wrong observation, I will give here a summary of the descriptions.

Ground colour. Pure or transparent white (Herrick, 1893a; Nobili, 1907; Stebbing, 1917; Roughley, 1936). Bright apple green at carapace and ventral abdomen, abdomen dorsally yellowish green, chelipeds cream with a pale green tinge (Boone, 1927). Carapace pale sienna, with median area tinged with green, uropods and telson white with sienna markings (McNeill & Ward, 1930). Often the blue or green eggs are dorsally visible through the transparent abdomen (Herrick, 1893a; Doflein, 1906a; McNeill & Ward, 1930). Antennae white, sometimes sienna near the base (Herrick, 1893a; Doflein, 1906; Stebbing, 1917; McNeill & Ward, 1930; Roughley, 1936).

Red spot on carapace. All authors, except Boone (1927), mention a blood red spot on the anterior part of the carapace, the exact limits of it differ in the various descriptions and figures. Posteriorly it almost or entirely reaches the cervical groove. According to Adams & White (1848), Herrick (1893a), and McNeill & Ward (1930) it includes anteriorly the rostrum, the eyes and the peduncles of antennae and antennulae, in Dana's (1855) figure, however, it reaches only to the base of the rostrum. According to McNeill & Ward (1930) there are darker patches in the spot.

Red bands on abdomen. One band covering the third abdominal segment and one covering the sixth segment and the bases of telson and uropods (Adams & White, 1848; Herrick, 1893a; Roughley, 1936). One band covering second and third segment and one covering sixth segment (Dana, 1855). Red spot on median region of third and fourth segment, smaller bands on fifth and sixth segment, median band across telson and uropods (Boone, 1927). Red band across the middle of the abdomen and a band on the greater part of the sixth segment and the base of the telson (McNeill & Ward, 1930). Doflein (1906a) states that the body bears bright

red, brown, bright yellow and carmine coloured bands; in the blue part of the body and the 3rd pereopod the spines are red, in the yellow part they are white and in the red part they are dark brown or black.

Red bands on third pereopod. One band over the middle of the propodus and the base of the dactylus, one over the base of the propodus, one over the median or the proximal part of the carpus, one over the distal or the median part of the merus (Adams & White, 1848; Dana, 1855; Herrick, 1893a; McNeill & Ward, 1930; Roughley, 1936). Distal part of pincers, distal and proximal part of propodus, distal and proximal part of carpus and distal part of merus red (Boone, 1927). Doflein (1906a) states the third pereopod provided with orange-red, violet, bright yellow and radiant blue bands.

Further Adams & White (1848), Herrick (1893a), Nobili (1907), and McNeill & Ward (1930) observed that the base of the third, sometimes also those of the other pereopods were coloured blue or violet.

Size. Largest specimen in the collections studied by me measures 61 mm; smallest adult specimen 38 mm (to be sure that the specimens really were adult, only ovigerous females were measured). Smallest juvenile specimen is 16 mm long. In literature the size varies between 20 and 62 mm.

The type specimen is, according to Boone (1930), preserved in the Paris Museum; Bouvier (1908b) in his list of the Stenopodidae of the Paris Museum does not mention it.

Vertical distribution. The species is mostly reported from superficial waters near the shore, between coral reefs, etc. The greatest depth from which it is recorded is 210 m (Faxon, 1896).

Horizontal distribution. The species is known from the entire Indo-pacific and from the tropical east American seas. The records in literature are:

Indopacific: Australasiatic seas (Latreille, 1829; H. Milne Edwards, 1837a), Red Sea (Hilgendorf, 1869; Nobili, 1906a; Bouvier, 1908b), Mersa Halaib, Red Sea ¹⁾ (Balss, 1915), Abu Sayer, Red Sea ²⁾ (Balss, 1915), Obock (Nobili, 1906a; Bouvier, 1908b), Jibuti (Nobili, 1906a; Bouvier, 1908b), Indian Ocean (H. Milne Edwards, 1837b), Western Indian Ocean (Borradaile, 1910), Zanzibar (Lenz, 1905), Durban Bay (Stebbing, 1917), Seychelles (Richters, 1880; Bouvier, 1908b), Mayotte (Bouvier, 1908b), Madagascar (Bouvier, 1908b), St. Marie de Madagascar (Bouvier, 1908b), Mauritius (White, 1847; Hoffmann, 1874), Chagos Archipelago (Balss,

1) Probably Mersa Hali at east coast of the Red Sea about 18° 40' N, 41° 20' E is meant.

2) This locality is unknown to me.

1925b), Trincomalee, Ceylon (Müller, 1880), Sagami Bay, Japan (Doflein, 1906a; Balss, 1914a), Misaki, Sagami Bay (Balss, 1914a), Enoshima, Sagami Bay (Parisi, 1919), Okinose Bank, Sagami Bay (Parisi, 1919), Tanabe, Kishu¹) (Parisi, 1919), Formosa (Balss, 1914a; Maki & Tsuchiya, 1923), Guam (Parisi, 1919), Philippines (White, 1847; Adams & White, 1848), Manila (Casto de Elera, 1895), Mindoro (Roxas, 1930; Estampador, 1937), Annam (Serène, 1937), Balabac Strait, north of Borneo (Dana, 1852b), Borneo (Adams & White, 1848), China Sea (Adams & White, 1848), Lembeh Island, N. Celebes (Hickson, 1889), Batavia (Bouvier, 1908b), Timorlaoet (Miers, 1885), Ambon (De Man, 1888a; Ortmann, 1890 and 1894; Zehntner, 1894; Bedot, 1909), Christmas Island (Calman, 1909b), New Guinea (Miers, 1880b), Ansoes, near N. New Guinea (Nobili, 1899), Blanche Bay, New Britain (Borradaile, 1899), Low Isles, off Port Douglas, North Queensland (McNeill & Ward, 1930), Hope Islands, North Queensland (McNeill & Ward, 1930), Green Island, off Cairns, Queensland (McNeill & Ward, 1930), Dunk Island, off Cardwell, Queensland (McNeill & Ward, 1930), Great Barrier Reef (Roughly, 1936), Garden Island, Port Jackson, near Sydney, New South Wales (McNeill & Ward, 1930), Pacific (Bouvier, 1908b), South Pacific (McNeill & Ward, 1930), Lord Howe Island (McNeill & Ward, 1930), New Caledonia (Bouvier, 1908b), New Hebrides (McNeill & Ward, 1930), Vanikoro (Bouvier, 1908b), Kandavu, Fiji (Bate, 1888), Rotuma (Borradaile, 1898), Hawaiian Islands (Bouvier, 1908b), Kauai Channel, Hawaiian Islands (Rathbun, 1906), South coast of Oahu (Rathbun, 1906), Honolulu, Oahu (Rathbun, 1906), Waikiki, Oahu (McNeill & Ward, 1930), Puako Bay, Hawaii (Rathbun, 1906), Hilo, Hawaii (Rathbun, 1906), Palmyra (Edmonson, 1923), Tahiti (Bouvier, 1908b), Raraka, Tuamotu Islands (Dana, 1852b), Hao, Tuamotu Islands (Nobili, 1907), Makatea, Tuamotu Islands (Sender, 1923).

Atlantic: Bermudas (Bate, 1888; Rankin, 1900; Rathbun, 1902a), Cooper's Island, Bermudas (Verrill, 1922), Bahamas (Rathbun, 1902a), New Providence, Bahamas (Herrick, 1893a; Rankin, 1898), Green Turtle Key, Bahamas (Herrick, 1893a), Abaco Island, Bahamas (Herrick, 1893a), Royal Island Cay, Bahamas (Boone, 1927), Bay of Biscayne, off Miami, Florida (Boone, 1930), Turtle Harbor, Florida (Boone, 1930), Florida Reefs (Boone, 1930), Dry Tortugas, Florida (Rathbun, 1902a), Gulf of Mexico, near Tortugas Keys (Faxon, 1896), Gulf of Mexico, north of Yucatan (Faxon 1896), Glover Reef, east of British Honduras (Boone, 1927), Cuba

1) With Tanabe probably the town 33° 50' N, 135° 20' E is meant.

(Von Martens, 1872; Rathbun, 1902a; Bouvier, 1908b), Port Tanamo, E. Cuba (Boone, 1930), Isle of Pines, south of Cuba (Boone, 1927), Jamaica (Conant, 1900; Rathbun, 1902a), San Juan, Porto Rico (Rathbun, 1902a), near Frederiksted, Santa Cruz (Faxon, 1896; Schmitt, 1935), Simson's Bay, St. Martin (Rathbun, 1919), Guadeloupe (Bouvier, 1908b), Port Castries, St. Lucia (Rathbun, 1902a), Curaçao (Rathbun, 1919), Caracas Bay, Curaçao (Schmitt, 1924a), near Morosquillo, Gulf of Darien (Rathbun, 1902a). The record from Greenland by Seba (1761) obviously is a mistake.

Remarks. Seba figured and described the present species as *Squilla groenlandica*; in his specimens the third pereopods are missing, but from all other characteristics the identity with *Stenopus hispidus* is evident. Olivier (1791) besides a references to Seba's description, gives a short description of the present species, which he named *Astacus muricatus*. As Olivier is the first binomial author, who described this species, his name should be used. The name *hispidus*, however, was used by more than fifty authors, the name *muricatus* only by one; this I think a sufficient reason to retain the name *hispidus*, as the changing of this name into *muricatus* will cause a larger confusion than the retention of the name *hispidus* will do.

H. Milne Edwards (1837) wrongly regarded *Cancer setiferus* L. as a synonym of the present species, afterwards other authors pointed out that *Cancer setiferus* L. belongs to the genus *Penaeus*.

The specimens in the collections of the Leiden and Amsterdam Museums from St. Martin and Curaçao were already mentioned in the papers of Rathbun (1919) and Schmitt (1924a), that from Ambon collected by J. Brock is reported upon by De Man (1888a).

***Stenopus tenuirostris* De Man (Pl. III figs. c-e)**

Stenopus tenuirostris De Man, 1888a, Arch. Naturgesch., vol. 53 pt. 1, p. 567, pl. 22a fig. 5.

Stenopus tenuirostris Herrick, 1893a, Mem. Nat. Acad. Sci. Wash., vol. 5, p. 352.

Stenopus tenuirostris Ortmann, 1894, Denkschr. med.-naturw. Ges. Jena, vol. 8, p. 18.

Stenopus tenuirostris A. Milne Edwards & Bouvier, 1909, Mem. Mus. comp. Zool. Harvard, vol. 27, p. 264.

Stenopus tenuirostris Borradaile, 1910, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 13, p. 260.

Stenopus tenuirostris Balss, 1915, Denkschr. Akad. Wiss. Wien, vol. 91 suppl., p. 33.

Snellius Expedition:

Kera, near Timor; November 15-16, November 22-23, 1929.—3 specimens 19-23 mm.

Siboga Expedition:

Station 213: Salajar Anchorage and surroundings, including Poeloe Pasitanete; reef; September 26-October 26, 1899.—6 specimens 19-24 mm (included 1 ovigerous ♀ 22 mm).

Station 213: Poeloe Pasitanete; reef; September 26-October 26, 1899.—1 specimen 26 mm.

Station 225: 5700 m N., 279° E from south point of South-Lucipara Island; reef; November 8, 1899.—4 specimens 24-27 mm (included 2 ovigerous ♀♀ 24 and 26 mm).

Station 301: Pepela Bay, east coast of Roti Island; reef; January 30-February 1, 1900.—2 specimens (an ovigerous ♀ 21 mm and a juvenile 16 mm).

Station 60 or 303: Hainsisi, Semaoe Island, near Timor; reef; April 27 and 28, 1899 or February 2-5, 1900.—2 specimens 18 and 28 mm (the latter ovigerous ♀).

Station 181 or 231: Ambon; reef; September 5-11, or November 14-18, 1899.—2 specimens 24 and 25 mm (both ovigerous ♀♀).

Museum Leiden:

Bandanaira; 1881; leg. J. Semmelink.—1 specimen 20 mm.

Museum Amsterdam:

Sinabang, Simaloer, off west coast of Sumatra; March, 1913; leg. E. Jacobson.—2 specimens 20 and 23 mm (the latter ovigerous ♀).

Ambon; leg. J. Brock; coll. J. G. de Man; type.—1 specimen 25 mm.

Description. Rostrum (Pl. III fig. d) triangular at base, compressed near the apex, slender, straight, slightly shorter than carapace, when measured in dorsal line. Ultimate point mostly reaching beyond antennular peduncle. Rostrum dorsally with 7-12 strong spines; laterally in the posterior part of each half with two, seldom one, rows of spines; the upper row consists of 0-8 small slender spines, the lower of 4-9 stronger ones, rarely no distinct row is visible, then the spines are scattered over the lateral surface; lower surface of the rostrum in the ultimate half with 2-9, mostly 3 or 4 spines.

Carapace densely covered with spinules, much denser than in *Stenopus hispidus*. Spinules long and slender, relatively longer and slenderer than in that species. No distinct longitudinal rows are visible, the double row of spinules between the base of the rostrum and the cervical groove mostly distinct in the anterior part only.

First three abdominal segments with similar spinules as on carapace. Pleura of first segment ending in two strong pointed teeth, those of the second to fifth segment are truncated, the lateral margins provided with three spines. Third abdominal segment produced broadly triangular in the median posterior part; there it is provided with a distinct shield-shaped area, which at each side bears 5-6 lobes. Spinules on the last three segments also more numerous and slender than in *Stenopus hispidus*; they are not placed in transverse rows, those on the sixth segment even in distinct longitudinal rows. In the posterior median part of the third and the anterior median part of the fourth segment the spinules often are missing. Ventral surface of sixth segment densely covered with spinules.

Median carinae on telson each provided with six to eight, mostly seven strong spines, excluded the final spines at the posterior margin. Some small spinules are placed at the bases of the carinae. Between each carina and the median groove the telson is provided with one to three rows of spinules, the outer row consists of 0-6, the second of 5-15 and the inner row of 0-9 spinules. Outside the carina a row of 4-13 and some scattered spinules are present; often some spinules are placed so close near the lateral margin, that there seem to be two to four lateral teeth instead of one.

Ophthalmic peduncle (Pl. III fig. c) dorsally with large spinules, which become longer towards the cornea; those which are placed on the line which separates the cornea from the stalk are longest and curved over the cornea, almost reaching its ultimate point.

The two lower segments of antennular peduncle about of the same size, the third segment considerably shorter. Stylocerite not pressed against the basal segment, therefore more distinct than in *Stenopus hispidus*. Basal segment at the outer anterior angle with a small scale provided with two long spines. Dorsal surfaces of the two lower segments covered with spinules, which vary in number. Last segment dorsally and ventrally with a long spine.

Antennal peduncle with many spines of different size. Scaphocerite (Pl. III fig. e) reaches with half its length or less beyond the tip of the rostrum. Outer margin with 2-6 very small and one stronger spinule at base and 8-14 teeth in the upper part; between these teeth and the final tooth of the scaphocerite there is a considerable distance, in which the margin is not serrate. Upper surface with the two longitudinal ridges distinct, dorsally and ventrally it is provided with some longitudinal rows of spinules.

Third maxillipede with ischium, merus and carpus provided with many spinules on the entire surface, ischium bears an external row of 8-19 strong spinules. Propodus and dactylus sometimes with some external spinules too.

First pereopod with ischium, merus and propodus mostly and carpus always with spinules, often in great number. Second pereopod with ischium and propodus sometimes and merus and carpus always with many (up to 30) spinules.

Third pereopod very strong, mostly symmetrically built at both sides, the segments more cylindrical than in *Stenopus hispidus*. Ischium dorsally and ventrally with a row of 3-16 spinules. Merus with two dorsal and one ventral row of 6-15 spinules, also some scattered ones on the lateral surfaces. Carpus narrows gradually towards the base, not abruptly as in *Stenopus hispidus*; dorsally it bears three anteriorly diverging rows of 8-

14 spinules, ventrally two such rows of 5-11 spinules. Propodus dorsally with a row of 12-20 spinules, no distinct ventral row is visible, there are many lateral rows of 10-13 spinules. Dactylus dorsally with some spinules, which often are arranged in two parallel rows. Never such large broad spinules as in *Stenopus hispidus*.

Fourth and fifth pereopod with ischium, merus and carpus provided with numerous small spinules, which mostly are arranged in longitudinal rows. These rows often consist of about 30 spinules. Propodus ventrally with a row of 12-18 movable spines. Carpus subdivided in about 8-10, propodus in 4-6 segments; subdivision often indistinct.

Branches of the pleopods with the posterior surface spinose. Ventral surface of the abdominal segments in the male mostly with one or two rows of spinules, sometimes only one median spinule is present.

Outer margin of uropodal exopod with 9-11, seldom 14 teeth. The number of spinules on upper surface is subject to considerable variation, sometimes the entire surface is densely covered with spinules, which are placed in rather distinct longitudinal rows, sometimes only two such rows are present. The same variation is visible in the spinulation of the lower surface. The outer margin of the endopod bears near the base 3-5 teeth. Inner ridge on upper surface of endopod rather indistinct, with 4-6 dorsal hairs. Here too the number of spinules shows considerable variation, there are two to six longitudinal rows of spinules on the upper and no or one row on the lower surface. Basal segment of uropod provided with spinules too.

Eggs are numerous and small. In my material the eggs in which the larvae are not yet visible are 0.4-0.7 mm long and 0.4-0.7 mm broad, those in which the larvae are already distinct are 0.6-0.8 mm long and 0.5-0.6 mm broad.

Postlarval stage. As in *Stenopus hispidus* the small specimens of about 16 mm have the rostrum, the antennular peduncle and the sixth abdominal segment relatively longer than in the adult specimens, further the carapace and abdomen are covered with less spinules, the rostrum is more compressed, bears no lateral and only one ventral spine, and the propodus of the third pereopod is more than three times as long as the dactylus.

Colour. Spirit specimens are coloured pale plain brownish yellow, in rather fresh material something of the original colour is visible. The only remark on the colour of the living animal is that of De Man (1888a), in which he states that *Stenopus tenuirostris* has the same red bands on the third pereopod as *Stenopus hispidus*, only the tips of the pincers in the former species are coloured red also. In some of my spirit specimens faint

traces of the colour of the living animal are visible. Combining these I got the following probable pattern: Entire carapace, included rostrum, antennular peduncle, outer margin, median ridge and setae of scaphocerite, coloured red, one band over third abdominal segment, one band over fifth and anterior part of sixth segment, and a transverse band over the middle of telson and uropods.

Size. Largest specimen in the collections studied by me measures 28 mm. Smallest adult specimen (ovigerous ♀) 22 mm. Smallest postlarval stage 16 mm. De Man stated his specimens to be about 25 mm.

One type specimen is preserved in the Zoölogical Museum at Amsterdam, the others probably in the Zoölogical Museum at Göttingen.

Vertical distribution. The species is recorded only from superficial waters near the shore, from coral reefs, etc.

Horizontal distribution. The species is known from the Indian Ocean and the Malay Archipelago. Records in literature are: Coetivy Islands, Seychelles (Borradaile, 1910), Ambon (De Man, 1888a; Ortmann, 1894).

Remarks. The variety described by De Man (1902) as *Stenopus tenuirostris* var. *intermedia*, is a young postlarval stage probable either of *Stenopus hispidus* or of *Stenopus tenuirostris*; it is namely only 14 mm long, therefore it can not be considered as a distinct variety and is not dealt with here.

A female of 24 mm from Station 213 of the Siboga Expedition bears at the ventral surface of the abdomen a Rhizocephalan parasite.

Stenopus spinosus Risso (Pl. II figs. a-i)

Byzenus scaber Rafinesque, 1814, Préc. Découv. somiol., p. 23.

Byzenus scaber Desmarest, 1823, Dict. Sci. nat., vol. 28, p. 312 (footnote).

Byzenus scaber Desmarest, 1825, Consid. gén. Crust., p. 216 (footnote).

Stenopus spinosus Risso, 1826, Hist. nat. Europ. mérid., vol. 5, p. 66, (pl. 3) fig. 8.

Peneus spinosus Risso, 1827, Nova Acta Acad. Leop. Carol., vol. 13 pt. 2, p. 819, pl. 42 fig. 1.

Penaeus spinosus Risso, 1829, Bull. univ. Sci., vol. 16, p. 147.

Stenopus spinosus Roux, 1831, Mém. Classif. Crust. Salicoq., p. 23.

Byzenus scaber Roux, 1831, Mém. Classif. Crust. Salicoq., p. 32.

Stenopus spinosus H. Milne Edwards, 1837b, Hist. nat. Crust., vol. 2, p. 408.

Byzenus scaber H. Milne Edwards, 1837b, Hist. nat. Crust., vol. 2, p. 408.

Stenope spinosus H. Milne Edwards, 1838b, Ann. Sci. nat. Zool., ser. 2 vol. 10, p. 164.

Stenopus spinosus De Haan, 1841, Fauna Japonica, Crust., pl. P.

Stenopus spinosus Heller, 1863, Crust. südl. Europ., p. 299.

Stenopus spinosus Schmidtlein, 1879, Mitt. zool. Sta. Neapel, vol. 1, p. 511.

Stenopus spinosus A. Milne Edwards, 1882, Arch. Miss. sci. litt., ser. 3 vol. 9, p. 14.

Stenopus spinosus Carus, 1885, Prodr. Faun. Medit., vol. 1, p. 472.

Stenopus spinosus Norman, 1886, Mus. Normanianum, Crust., p. 9.

Stenopus spinosus Bate, 1888, Rep. Voy. Challenger, Zool., vol. 24, p. 210.

Stenopus spinosus Cano, 1892, Boll. Soc. Nat. Napoli, ser. 1 vol. 5, p. 134.

- Stenopus spinosus* Herrick, 1893a, Mem. Nat. Acad. Sci. Wash., vol. 5, p. 352.
Stenopus spinosus Stebbing, 1893, Hist. Crust., p. 212.
Stenopus spinosus Acloque, 1899, Faune de France, vol. 4, p. 165.
Stenopus spinosus Lo Bianco, 1903, Mitt. zool. Sta. Neapel, vol. 16, p. 252.
Stenopus spinosus Bouvier, 1905a, C. R. Acad. Sci. Paris, vol. 140, p. 983.
Stenopus spinosus Bouvier, 1908a, C. R. Acad. Sci. Paris, vol. 146, p. 889.
Stenopus spinosus Bouvier, 1908b, Bull. Mus. Hist. nat. Paris, vol. 14, p. 150.
Stenopus spinosus A. Milne Edwards & Bouvier, 1909, Mem. Mus. comp. Zoöl. Harvard, vol. 27, p. 263.
Stenopus spinosus Magri, 1911, Atti Accad. gioen. Sci. nat., ser. 5 vol. 4 pt. 14, p. 22.
Stenopus spinosus Balss, 1914b, Anz. Akad. Wiss. Wien, vol. 51, p. 137.
Stenopus spinosus Balss, 1915, Denkschr. Akad. Wiss. Wien, vol. 91 suppl., p. 33.
Stenopus spinosus Maluquer, 1917, Junta Ci. nat. Barcelona, vol. 2, p. 225.
non *Stenopus spinosus* Rathbun, 1919, Rapp. Vissch. Zeeprod. Curaçao, vol. 2, p. 325.
non *Stenopus spinosus* Balss, 1924b, Zool. Anz., vol. 61, p. 177.
non *Stenopus spinosus* Schmitt, 1924a, Bijdr. Dierk., vol. 23, p. 73.
Stenopus spinosus Monod, 1931, Arch. Mus. Hist. nat. Paris, ser. 6 vol. 7, p. 123.

Museum Leiden:

Mediterranean; leg. P. Antiga.—1 specimen 73 mm.

Mediterranean.—2 specimens 54 and 62 mm (dry).

Museum Amsterdam:

Gulf of Naples; coll. J. G. de Man.—1 specimen 51 mm.

Description. Rostrum (Pl. II fig. a) slightly triangular at base, compressed in the ultimate part, slender, straight, its length about half that of carapace, when measured in dorsal line. Ultimate point reaching slightly beyond the last segment of antennular peduncle. Rostrum dorsally with 11-13 strong spines, which distally become shorter, laterally at each side it is provided with one row of 2-5, seldom one spine. Lower surface with 5-9 spines.

Carapace densely covered with spinules, which are of similar size and number as in *Stenopus hispidus*, they are arranged in more or less distinct longitudinal rows; a double row of four or five spinules extends in the median region of the carapace from the base of the rostrum to the cervical groove.

First three abdominal segments with similar spinules as on carapace. Pleura of first segment ending in two strong teeth, the anterior sharply pointed, the posterior often more blunt and provided with some spinules; pleurae of second to fifth segment are truncated, the lateral margin provided with three or four spines. Third abdominal segment is produced broadly triangularly in the median posterior part, there it bears a distinct shield-shaped area. Spinules on the last three segments (Pl. II fig. d) arranged in distinct transverse rows, fourth and fifth segment each with one or two, sixth segment with three rows. In the posterior median part of the third

and in the anterior median part of the fourth segment the surface often is devoid of spinules. Ventral surface of sixth segment with some scattered spinules.

Median carinae on telson each provided with five strong spines, excluded the final spines at the posterior margin. Some small spinules are placed at the bases of the carinae. Between each carina and the median groove, the telson is provided with a row of 8-10 small, sharp spinules. Outside the carina some scattered small spinules are present, often arranged in a distinct longitudinal row.

Ophthalmic peduncle dorsally with minute spinules of different size, never becoming so long and curved as in *Stenopus tenuirostris*.

First segment of antennular peduncle (Pl. II fig. c) slightly longer than second; third segment considerably shorter. Stylocerite, when compared with that of *Stenopus hispidus*, strong and pronounced, reaching about to the middle of the basal segment. Basal segment at the outer anterior angle with a small scale provided with two spines. Dorsal surface without, ventral surface with some spinules. Second segment provided with some spinules at both surfaces. Third segment dorsally and ventrally with a forwardly directed spine.

Antennal peduncle with many spines of different size. Scaphocerite (Pl. II fig. b) reaches with slightly less than half its length beyond the tip of the rostrum. Outer margin with 3 or 4 small spinules at base and 14-18 teeth in the upper part; the margin is serrate up to the final tooth. Upper surface with the two longitudinal carinae distinct; both upper and lower surface with longitudinal rows of spinules.

Third maxilliped with ischium, merus and carpus provided with an external row of spinules, those of ischium strongest, propodus sometimes with spinules too.

First pereopod with the ischium ventrally with about two, carpus dorsally with a short row of some spinules, other segments glabrous. Second pereopod with merus sometimes with few, carpus dorsally with about ten spinules.

Third pereopod very strong, in my specimens the chelae are symmetrically built. Ischium dorsally and ventrally with a row of 2-9 spinules. Merus dorsally with two, and ventrally with one row of 8-17 spinules, and some scattered ones on the rest of the surface, often forming a distinct row. Carpus narrowing gradually towards the base, dorsally it bears two or three anteriorly diverging rows of 10-15 spinules, ventrally two such rows of 4-8 spinules. Propodus dorsally with a row of 15-20 spinules, ventral row, if distinct, composed of very small spinules, lateral surfaces with some

spinules, which often are arranged in conspicuous longitudinal rows. Breadth of the propodus in different specimens is subject to considerable variation, sometimes it is very strong and swollen, sometimes it is almost as broad as carpus. Dactylus dorsally with some spinules.

Fourth and fifth pereiopod with the ischium without or with 1-3 spinules, the merus and carpus provided with a rather large number of them, the propodus bears a ventral row of 23-26 movable spines. Carpus is subdivided into 8-11, propodus into 6 or 7 segments.

Branches of pleopods with the posterior surface spinose. Ventral surface of abdominal segments in the males with one median spine.

Outer margin of uropodal exopod with 7-10 teeth. Upper surface outside the ridges with one or two rows of spinules, inner half with some scattered ones. Outer margin of the endopod bears near the base 6-9 teeth. Both dorsal ridges distinct, outside the median ridge the upper surface bears several spinules; inner ridge with 4 long dorsal hairs. Lower surface of exopod with some spinules, that of endopod without.

Eggs not present on my specimens.

Colour. Spirit specimens are coloured plain pale brownish yellow. According to Risso (1826) the body is golden red with deep red uropods, Schmittlein (1879) described the living animal as being entirely reddish yellow.

Size. The specimens examined by me are 51-73 mm long, Risso's specimen measured 70 mm.

Vertical distribution. While Risso remarks that the species is found in deep waters, Lo Bianco calls it a superficial, coastal form. Balss recorded the species from depths of 650 and 690 m.

Horizontal distribution. This rather rare species is known from the Mediterranean and the Red Sea. The records in literature are: Mediterranean (H. Milne Edwards, 1837b; Heller, 1863; Lo Bianco, 1903; Bouvier, 1908b), Nice (Risso, 1826; A. Milne Edwards, 1882), St. Hospice (A. Milne Edwards, 1882), Genoa (Carus, 1885), Naples (Carus, 1885; Maluquer, 1917), Sicily (Rafinesque, 1814), Messina (Bouvier, 1908b), Northern Red Sea, 26° 40' N, 35° 33' E and 26° 45' N, 34° 28' E (Balss, 1914b, 1915).

***Stenopus scutellatus* Rankin (Pl. III figs. a, b)**

Stenopus scutellatus Rankin, 1898, Ann. New York Acad. Sci., vol. 11, p. 242, pl. 29 fig. 3.

Stenopus spinosus Rathbun, 1919, Rapp. Vissch. Zeeprod. Curaçao, vol. 2, p. 325.

Stenopus spinosus Balss, 1924b, Zool. Anz., vol. 61, p. 177.

Stenopus spinosus Schmitt, 1924a, Bijdr. Dierk., vol. 23, p. 73.

Stenopus scutellatus Boone, 1927, Bull. Bingham oceanogr. Coll., vol. 1 pt. 2, p. 83, figs. 15, 16.

Stenopus scutellatus Boone, 1930, Bull. Vanderbilt mar. Mus., vol. 3, p. 100, pl. 29.

Museum Leiden:

St. Eustatius, Tumble Down Dick Bay; rocky bottom; 30 fathoms; September 17, 1905; leg. J. Boeke.—1 specimen 23 mm (ovigerous ♀).

Aruba; July, 1883; leg. A. J. van Koolwijk.—2 specimens 19 and 35 mm.

Museum Amsterdam:

St. Martin, Simson's Bay; lagoon, sandy bottom, in horn sponges; $\frac{1}{2}$ fathom; September 7, 1905; leg. J. Boeke.—1 specimen 25 mm.

Curaçao, Caracas Bay; from sponge; May 10, 1920; leg. C. J. van der Horst.—1 specimen 23 mm (ovigerous ♀).

Description. Rostrum (Pl. III fig. a) slightly triangular at base, strongly compressed near the apex, slender, straight, almost as long as the carapace, when measured in dorsal line. Ultimate point reaching beyond the last segment of the antennular peduncle. Rostrum dorsally with 10-11 strong spines, laterally with one or without, seldom with two, lower margin with 6-8 spines.

Carapace densely covered with spinules, which are slender and placed in more or less distinct longitudinal rows; a double row of three spinules extends in the median region of the carapace from the base of the rostrum to the cervical groove. The spinules are not so dense and slender as in *Stenopus tenuirostris*.

First three abdominal segments with similar spinules as on carapace. Pleura of first segment ending in two strong pointed teeth, those of the second to fifth segment are truncated, the lateral margins provided with three spines. Third abdominal segment is produced broadly triangularly in the median posterior part, there it is provided with a distinct shield-shaped area bearing about 4 lobes at each side. Spinules on the last three segments arranged in distinct transverse rows, fourth and fifth segment each with one, sixth with three rows. In the posterior median part of the third and in the anterior median part of the fourth segment the surface often is naked. Ventral surface of sixth segment glabrous or with some spinules.

Median carinae on telson each provided with five spines, excluded the final spines at the posterior margin. No spinules at the bases of the carinae. Between each carina and the median groove, the telson is provided with a row of 2-4 sharp slender spinules. Outside the carina there are no spinules.

Ophthalmic peduncle with some minute spinules.

The two lower segments of antennular peduncle about of the same size,

the third segment considerably shorter. Stylocerite small but distinct, more conspicuous than in *Stenopus hispidus*. Basal segment at the outer anterior angle with a small scale provided with 2 or 3 spines. Second segment with some dorsal spinules. Third segment dorsally with a forwardly directed spine.

Antennal peduncle with many spines of different size. Scaphocerite (Pl. III fig. b) reaches with about one third of its length beyond the tip of the rostrum. Outer margin with one spinule at base and 13-15 teeth in the upper part; the margin is serrate up to the final tooth of the scaphocerite. Upper surface without spinules.

Third maxillipede with ischium, merus and carpus provided with an external row of spinules; exterior margin of ischium with about 8 spinules. Propodus and dactylus mostly without them.

Carpus of the first pereopod often with some dorsal spines, all other segments glabrous. In the second pereopod too the carpus often with some dorsal spinules and the other segments without spinules.

Third pereopod very strong, mostly of the same length at both sides. Ischium dorsally and ventrally with a row of 3-5 spinules. Merus dorsally and ventrally with a row of 9-15 spinules, some scattered ones on the lateral surfaces often forming distinct rows. Carpus narrows gradually towards the base, dorsally it bears three anteriorly diverging rows of 7-11 spinules, ventrally two such rows of 4-6 spinules. Propodus dorsally with a row of 11-14 spinules, no distinct ventral row is visible; lateral surfaces with some rows of about 10 spinules. Dactylus dorsally with some spinules.

Fourth and fifth pereopod with the ischium mostly without, merus and carpus with some scattered spinules, propodus with a ventral row of about 15 movable spines. Carpus is subdivided into 9 or 10, the propodus into 4-6 segments.

Branches of the pleopods with some spinules on the posterior surface. Ventral surface of the abdominal segments in the males with one median spine.

Outer margin of uropodal exopod with 8-10 teeth. Upper surface without or with two spinules near the base of the outer margin. The outer margin of the endopod bears near the base 5 lateral teeth. Upper surface with one row of spinules near the median ridge; inner ridge rather indistinct, dorsally with 4 or 5 hairs. Lower surface of both exopod and endopod without spinules.

Eggs are numerous and small, in my material those in which the larva is not yet visible are 0.5-0.6 mm long and 0.4-0.6 mm broad, those in which the larva is faintly visible are 0.7-0.9 mm long and 0.6-0.8 mm broad.

Colour. Spirit specimens as all *Stenopus* species are plain pale brownish yellow. According to Boone (1927) living specimens have the entire body coloured carmine.

Size. The specimens measured by me, all adults, are 19-35 mm long. Rankin's specimen measured 18 mm (as total length is defined in Rankin's paper the "length from tip of rostrum to tip of thorax", the last word probably is a misprint and must be "telson", which also better agrees with the other measurements. Boone (1927 and 1930) gives no exact measurements; according to the figures the specimens are about 40 mm long.

Vertical distribution. The species is found near the shore in superficial waters, between corals and in sponges. The greatest depth recorded is 55 m.

Horizontal distribution. The species is found throughout the tropical east American seas. The records in literature are: Bermudas (Rathbun, 1919), Little Stirrup Cay, Bahamas (Boone, 1930), New Providence, Bahamas (Rankin, 1898), Gulf of Mexico (Rathbun, 1919), Glover Reef, east of British Honduras (Boone, 1927), St. Thomas (Balss, 1924b), Simson's Bay, St. Martin (Rathbun, 1919), Tumble Down Dick Bay, St. Eustatius (Rathbun, 1919), Barbados (Balss, 1924b), Caracas Bay, Curaçao (Schmitt, 1924a), Fernando de Noronha (Rathbun, 1919).

Remarks. The specimens from the Museums at Leiden and at Amsterdam are already mentioned by Rathbun (1919) and Schmitt (1924a) under the name *Stenopus spinosus*.

Odontozona nov. gen.

Stenopus p. p. Dana, 1852b, U. S. Explor. Exped., vol. 13, p. 607.

? *Richardina* Alcock & Anderson, 1899, Ann. Mag. nat. Hist., ser. 7 vol. 3, p. 291.
(non A. Milne Edwards, 1881)

Richardina p. p. Alcock, 1899, Ill. Zool. Investigator. Crust., vol. 7, pl. 42 fig. 4.

Description. Body slender, compressed. Rostrum well developed, provided with spines at dorsal and ventral surface. Carapace with spinules; always a distinct cincture of spinules present along the posterior margin of the cervical groove, sometimes more similar rows on the rest of the carapace. The spinules are pressed against the body, they are straight, sharp and directed forward. Antennal, branchiostegal and pterygostomial spines present.

Abdomen more or less compressed, with a distinct sharp bend between the third and fourth segment. Dorsal surfaces of the segments with grooves or carinae, but never with spinules. Often some spinules at the pleurae, near their lateral margins. First segment with a transverse carina over the

middle, surface of the segment before the carina hollowed; pleura ending in two, often blunt, teeth. Pleurae of second and third segment broadly rounded, those of fourth and fifth segment more pointed and directed posteriorly, sixth segment with a small pleura in the posterior half. First abdominal segment slightly overlapping second. Third segment broadly triangularly produced in the median posterior part. Posterior margin of fourth and fifth segment with a blunt incision near the base of each pleura.

Telson elongate lance-shaped, with a median groove flanked by two longitudinal carinae. These carinae provided dorsally with a row of strong posteriorly directed spines. Between the carinae and the median groove mostly a row of spinules is present, and between the bases of the carinae two posteriorly curved blunt spines are placed. Anterior part of lateral margin provided with a carina, which in the posterior half becomes inconspicuous; this carina bears a strong spine near the base. Lateral margin of telson with one lateral tooth, final margin with two strong blunt teeth and a minute median spinule. Posterior half of telson fringed with setae, an additional row of setae is present at the final margin.

Eyes distinct. Cornea about as long as or slightly shorter than and about as broad as stalk. Cornea sometimes without pigment and then not differentiated from the eyestalk. Line of separation between cornea and stalk dorsally with some spinules.

First segment of antennular peduncle about as long as or slightly longer than second segment, third segment much shorter; basal segment with a distinct stylocerite, the scale at the outer anterolateral angle without spines, but provided with a row of setae. Antennula with two flagella, which are shorter than those in *Stenopus*; upper flagellum slightly stronger at base.

Basal segments of antenna with some spines. Antenna with one flagellum. A laminate process is present at the inner side of the antennal peduncle. Scaphocerite long and slender, outer margin straight and serrate, inner margin convex and fringed with setae, upper surface with two longitudinal ridges.

Mandibles, maxillulae, first and second maxillipedes not essentially different from those of *Stenopus*.

Third maxillipede composed of seven segments, merus to dactylus with an internal and external row of setae, which are directed ventrally, in the merus these rows are converging near the base, ischium only with a row of hairs at the internal margin. Propodus in the anterior part of the inner margin with a setiferous organ. Ischium without external spinules, merus mostly with some external ones.

First pereopod reaches, when stretched, slightly beyond the tip of the

scaphocerite. Dactylus about half as long as propodus, merus and carpus of about the same length and slightly longer than propodus, ischium shorter. Segments without spinules; both carpus and propodus provided with a setiferous organ at the ventral surface, the carpus in the anterior, the propodus in the posterior part.

Second pereopod similarly built as first, but longer and stronger, reaching with entire propodus beyond the tip of scaphocerite. No spinules or setiferous organs present.

Third pereopod longest and strongest, reaching almost with the entire carpus beyond the tip of the scaphocerite. Dactylus less than half the length of propodus, carpus and merus shorter than propodus, ischium shorter than merus. Ischium compressed, mostly without spinules. Merus compressed at base, cylindrical in the distal part. Carpus broadening distally, mostly provided with spinules. Propodus glabrous or with spinules. Dactylus ventrally with a large, sharp triangular tooth, which fits in two dorsal teeth of the lower pincer, of these two teeth the proximal mostly is rounded, the distal sharply triangular. Tips of the pincers crossing.

Fourth and fifth pereopod long and slender. Carpus and propodus subdivided into several segments. Dactylus biunguicular.

Branchial formula in the species examined by me entirely the same as in *Stenopus*. Alcock (1901), however, finds the branchial formula of *Odontozona spongicola* identical with that of *Engystenopus*, which according to him differs from the branchial formula of *Stenopus* by missing the pleurobranch on the second maxillipede; as A. Milne Edwards & Bouvier (1909) already pointed out, this pleurobranch is easily overlooked, because it is mostly covered by the large epipod of the first maxillipede. Therefore it is probable that the branchial formulae of *Odontozona* and *Engystenopus* are identical with that of *Stenopus*.

First pleopod uni-, the others biramous. Basal segments and posterior surfaces of the branches without spinules. Ventral surface of the abdominal segments in the male with a median spine.

Uropods about as long as telson. Exopod about quadrangular in form, outer margin straight, serrate, without setae; posterior and inner margin fringed with setae. Upper surface with two longitudinal carinae, without spinules. Endopod elongate triangular or ovate, outer margin near the base with some teeth, there without setae, the rest of the margin fringed with hairs. Upper surface with one distinct median carina and a weak one, which rises from the inner margin and curves towards the median carina, at last running parallel with it. This inner ridge with some dorsal hairs. Upper surface without spinules.

Eggs rather large, about 0.5-1.5 mm in diameter, numerous or few.

Size. Smallest adult specimen examined by me is an ovigerous female of *Odontozona ensifera* measuring 13 mm. Largest specimen known to me is a specimen of *Odontozona spongicola* of 26 mm recorded by Alcock & Anderson. The Siboga Expedition collected a juvenile specimen of 8 mm, of *Odontozona ensifera*.

Vertical distribution. The genus is known from superficial waters near the shore, between coral reefs (*O. ensifera*) and from great depths (*O. spongicola* from about 900 m).

Horizontal distribution. The genus is known from the Indopacific region and from the northwest coast of Africa.

Type species is *Stenopus ensiferus* Dana.

Remarks. Till now the present genus was united with the genus *Richardina* A. Milne Edw., from which it differs in some points so much, that I think it justified to separate the genera. The points of difference are: *Richardina* has the dactyli of the fourth and fifth pereopods uniungiculate, while in *Odontozona* they are biungiculate, furthermore the third pereopods in *Odontozona* are much stronger than those in *Richardina*, and they have the pincers provided with distinct teeth.

Key to the species of *Odontozona*

1. Posterior half of carapace, behind the cincture of spinules along the cervical groove, with some distinct transverse rows of spinules. Carapace not swollen. 2.
— Posterior half of carapace, behind the cincture of spinules along the cervical groove, without spinules. Carapace swollen.

Odontozona spongicola (Alcock & Anders.)

2. Abdomen without grooves. Carapace with some distinct rows of spinules behind cervical groove, some spinules near anterior margin, but not densely covered with many rows of spinules.

Odontozona ensifera (Dana)

- Abdomen with the first, second, fourth, fifth and sixth segment with distinct transverse, the third segment with distinct longitudinal grooves. Carapace densely covered with spinules, which are more or less conspicuously arranged in transverse rows.

Odontozona sculpticaudata nov. spec.

The fourth species of this genus, *Odontozona edwardsi* (Bouvier) is not included in the key, as too little is known of its characteristics (vid. p. 40).

***Odontozona ensifera* (Dana) (Pl. IV fig. d)**

- Stenopus ensiferus* Dana, 1852a, Proc. Acad. nat. Sci. Philad., 1852, p. 27.
Stenopus ensiferus Dana, 1852b, U. S. Explor. Exped., vol. 13, p. 607.
Stenopus ensiferus Dana, 1855, U. S. Explor. Exped., vol. 13, atlas, p. 13, pl. 40 fig. 9.
Stenopus ensiferus Bate, 1888, Rep. Voy. Challenger, Zool., vol. 24, p. 210.
Stenopus ensiferus Herrick, 1893a, Mem. Nat. Acad. Sci. Wash., vol. 5, p. 352.
Stenopus ensiferus Lo Bianco, 1903, Mitt. zool. Sta. Neapel, vol. 16, p. 252.
Stenopus ensiferus A. Milne Edwards & Bouvier, 1909, Mem. Mus. comp. Zoöl. Harvard, vol. 27, p. 264.

Siboga Expedition:

Station 115: East side of Pajoenga Island, Kwandang Bay, N. Celebes; reef; July 9-11, 1899.—2 specimens 8 (juv.) and 12 mm.

Station 154: North of Waigeo, $0^{\circ} 7'.2$ N, $130^{\circ} 25'.5$ E; 59-83 m; grey muddy sand, shells and *Lithothamnion*; August 14, 1899.—1 specimen (ovigerous ♀) 13 mm.

Description. Rostrum compressed, slender, straight, the tip slightly curved upward, about as long as the carapace, when measured in dorsal line. Ultimate point reaching beyond the antennular peduncle, but failing to reach the tip of the scaphocerite. Rostrum dorsally with eight or nine, ventrally with one to three spines; laterally at each side often a minute, mostly indistinct spine is present.

Carapace with the cervical groove very distinct, postcervical groove slightly less distinct. Posterior margin of cervical groove provided with a cincture of about 14 rather large spinules, which are placed almost horizontally and are directed forward. Postcervical groove with a similar cincture of about 70 much smaller and slenderer spinules. Between the postcervical row and the posterolateral angles the carapace at each side is provided with a short transverse row of about 20 spinules, similar to the spinules of the postcervical row. Furthermore a transverse row of 12 very small spinules is placed near the posterior margin, at each side of the median part. The lateral surfaces each bear, near the end of the postcervical row of spinules, an oblique row of about 10 stronger ones. Near the anterior margin and near the anterolateral angles some scattered spinules are present. Between the base of rostrum and the median part of the cervical groove a double row of 2 spinules extends in the median region of the carapace. Antennal, branchiostegal and pterygostomial spines well developed. Posterolateral angles of carapace fringed with setae.

First abdominal segment with a transverse carina in the posterior half, this carina is bent forward near the bases of the pleurae; dorsally it is provided with a row of setae. The pleura ends in two teeth, the posterior tooth reaches not so far as the anterior, which also is more truncated; some two small additional teeth are placed at the posterior margin of the posterior tooth. The carina ends between the two teeth. Second abdominal segment with a median transverse carina, which ends near the bases of the pleurae. Pleura with the top broadly rounded, anterior margin with two, posterior margin with three small additional teeth; a short groove is present in the posterior part of the pleura. Third segment with an anterior transverse carina, which ends near the bases of the pleurae, it is interrupted in the middle of each half. The posterior margin of the third segment is broadly triangularly produced in the median part of the posterior margin.

Pleura with the top broadly rounded, anterior margin provided with two, posterior margin with three small additional teeth; the posterior part of the pleura is provided with a short deep groove, a distinct spinule is placed anteriorly of this groove. Fourth and fifth segment without carinae, pleurae directed posteriorly, ending in a rather sharp tooth, which anteriorly is provided with 2 or 3, posteriorly with one small additional marginal tooth; often a small spine is placed on the pleura near the anterior margin. Sixth segment with a short transverse carina in the anterior median part, this carina is curved, with the convex side posteriorly. The posterior part of the sixth segment bears two submedian transverse carinae, each of which is provided with about 10 posteriorly directed spinules. Posterior margin sinuate. Pleura sharply pointed. Lateral margin of sixth segment with 2 spinules, one near the anterior margin and one near the base of the pleura.

Median carinae on telson each provided with 5 strong spines, excluded the final spines at the posterior margin. Between each carina and the median groove a row of one to three spinules is present; between the bases of the carinae 2 strong posteriorly directed spines are present. Outside the carina sometimes one spinule is present.

Eyes with the cornea shorter than stalk. Cornea with distinct facets and provided with pigment. Peduncle covered with some spinules, a distinct row along the line of separation between cornea and stalk.

Antennula with the basal segment slightly longer than the second. Third segment dorsally with a spine. Upper flagellum with some ventral setae at fifth to seventh segment.

Antenna with the scaphocerite reaching slightly beyond the tip of rostrum, outer margin convex at base, slightly concave in the upper part, one spinule at base and 6-8 teeth in the upper half, excluded the final tooth. Inner margin convex, with setae. Upper surface without spinules.

First pereopod with the segments without spines. Some small tufts of hair on the tips of the pincers, as in the second pereopod.

Third pereopod (Pl. IV fig. d) with the ischium only with an antero-dorsal spine. Merus with about 4 ventral spines, of which the distal is largest, and 2 dorsal ones, which are placed near the posterior margin; the rest of the surface bears some spinules. Carpus gradually narrowing towards the base, dorsally with two rows of 2-5 spines, ventrally with three spines. Propodus dorsally with 11-14 spines, ventrally with about 5. Dactylus dorsally with one or two minute spinules, ventrally with one sharp triangular tooth, which fits in two dorsal teeth of the lower pincer. Posterior tooth of lower pincer rounded, anterior sharply triangular.

Fourth and fifth pereopod long and slender, carpus about twice as long

as propodus, merus slightly longer than propodus, ischium very short. Propodus with 12-16 movable spines, carpus with some movable ventral spines too. Carpus subdivided into about 8 or 9, propodus into about 5 or 6 often indistinct segments.

Outer margin of uropodal exopod with 7-9 teeth. Upper surface without spinules. Endopod with the basal half of outer margin with 2 teeth. Dorsal surface with two longitudinal ridges, inner ridge weak, provided with about two dorsal hairs. No spinules present.

Eggs rather numerous. The eggs in which the larvae are already visible are 0.5-0.7 mm long and about 0.5 mm broad.

Colour. The colour of spirit specimens is pale plain brownish yellow, the colour of the living animal is unknown.

Size. Dana's specimen measured about 13 mm, my specimens 8-13 mm.

Vertical distribution. The depth from which the type specimen was collected is not known. Two specimens from the Siboga Expedition were collected from coral reefs and one from a depth of 59-83 m.

Horizontal distribution. Except Dana's record from the Fiji Islands, the species is only known from North Celebes and from the northern Moluccas where the Siboga Expedition collected it.

Remarks. Till now the species was known under the generic name *Stenopus*, only Lo Bianco (1903) thought it very probable that it belonged to the genus *Richardina*, which at that moment included the genus *Odontozona*.

Odontozona sculpticauda nov. spec. (Pl. III fig. f, Pl. IV fig. c)

Siboga Expedition:

Station 49a: Sape Strait, east of Soembawa; 70 m; coral and shells; April 14, 1899.—
1 specimen (ovigerous ♀) 14 mm.

Description. Rostrum compressed, slender, straight, the tip slightly curved upward, about as long as carapace, when measured in dorsal line. Ultimate point reaches slightly beyond antennular peduncle, but fails to reach the tip of the scaphocerite. Rostrum dorsally with 5 spines, the distance between the last spine and the tip of the rostrum is larger than the spaces between the spines; ventrally two teeth are placed in the distal part of the rostrum, laterally no spine or one small spine is present.

Carapace with the cervical and postcervical grooves distinct, the latter not so conspicuous as the former. Posterior margin of the cervical groove with a cincture of about 20 rather large spinules, postcervical groove with such a cincture of about 80 much smaller spinules. Rest of the surface covered with many transverse rows or cinctures of small spinules. All

spinules are straight, sharply pointed, pressed against the body and directed forward. Antennal, branchiostegal and pterygostomial spines present. Between the base of rostrum and the median part of the cervical groove a double row of three spinules extends in the median region of the carapace. Posterolateral angles of carapace fringed with some hairs.

First abdominal segment with a transverse carina in the posterior half, this carina bent forward near the bases of the pleurae; dorsally it is provided with a row of setae. Pleura ending in a blunt anterior tooth, posterior angle rounded, provided with a minute spinule. Posterior half of first segment with a transverse groove, which is obliquely incised in the texture of the segment, so that the groove is overlapped by its posterior margin. Pleura with three blunt tubercles. Second segment with an anterior transverse carina, which ends near the bases of the pleurae, and is interrupted in the middle of each half. Dorsal surface of the segment with some transverse grooves, which, similar to the groove of the first segment, are obliquely posteriorly incised in the texture of the segment; the first of these grooves is placed in the median part of the posterior half and reaches about to the bases of the pleurae, a shorter groove is present at each half, it starts in the submedian region and reaches slightly further than the first groove, furthermore a short groove, provided with sidegrooves, runs over the middle of the pleura. Pleura with a broadly rounded top. Third segment broadly triangularly produced in the posterior median part. Pleura with the top broadly rounded. A transverse carina is present in the median part, this carina ends near the bases of the pleurae and is interrupted in the middle of each half. Dorsal surface of the segment with 9 longitudinal carinae, which are sinuate, of different length and not symmetrically arranged; these grooves are obliquely incised in the texture of the segment, so that the groove is overlapped by its inner margin. A transverse groove, provided with some sidegrooves is present on the pleura; some tubercles near the anterior margin of the pleura. Fourth segment with a short median transverse groove in the anterior part and two lateral transverse ones which start in the posterior median part and end near the anterior part of the bases of the pleurae. These grooves, as well as those of the fifth and sixth segment, are obliquely anteriorly incised in the texture of the segments, so that the groove is overlapped by its anterior margin, being thus the contrary of the grooves of the first two segments. Pleura of fourth segment with the top bluntly pointed, anterior and posterior margin each with a small tooth; upper surface of the pleura with two spinules near the anterior margin and a short branched groove. Fifth segment with a similar anterior median groove as fourth, further a short median groove in the

middle of the segment and two oblique grooves, which start in the submedian region of the posterior half and end near the anterior part of the base of the pleura. Pleura sharply pointed, with one tooth at anterior and one at posterior margin, upper surface with two spinules near anterior margin, a branched groove in posterior part. Sixth segment rather long, with 4 transverse grooves, the third of which is long, reaching almost to the bases of the pleurae, the others very short. Near the posterior margin two lateral rows, each provided with about 12 triangular sharp, posteriorly directed spinules, are present; these rows start in the submedian region and end near the bases of the pleurae. Anterior lateral margin of the sixth segment with two short rows, each of two spinules. Pleura only distinct in the posterior half of the segment, rather broad, sharply pointed.

Median carinae on telson each provided with 5 strong spines, excluded the final spines at the posterior margin. Between each carina and the median groove the telson is provided with a row of about six slender spinules.

Eyes with the cornea about as long as the stalk. Cornea with distinct facets and pigment. Stalk dorsally with some spinules, those placed on the line that separates the cornea from the stalk being strongest.

Basal segment of antennula slightly larger than second segment. Third segment dorsally with a spine. Upper flagellum with some ventral setae at seventh to tenth segment.

Antenna with the scaphocerite (Pl. III fig. f) reaching with about half its length beyond the tip of the rostrum, outer margin concave at base, almost straight in the upper part, there provided with 7 teeth, excluded the final tooth. Upper surface with a row of about 6 spinules; by error these spinules are not figured on pl. III fig. f.

First and second pereopods without spinules; only some small tufts of hair on the tips of the pincers.

Third pereopods missing in my specimen.

Fourth and fifth pereopods long and slender. Propodus and carpus divided into several, mostly indistinct segments.

Outer margin of uropodal exopod with 6 teeth. Upper surface without spinules. Endopod with the basal half of outer margin with 2 teeth. Upper surface with the inner ridge provided with 4 dorsal hairs. Outside the outer ridge a row of about 4 spinules is present, lower surface naked.

Eggs rather numerous, those in which the larva is already visible are 0.5-0.6 mm long and 0.4-0.5 mm broad.

Colour. The colour of spirit specimens is pale plain brownish yellow, the colour of the living animal is unknown to me.

Remarks. Though the specimen is missing both third pereopods, it is obvious by the other characteristics that it belongs to the present genus. It can easily be distinguished from the related species by the curiously ornated abdomen and by the dense spinulation of the carapace.

Odontozona spongicola (Alcock & Anderson)

? *Richardina spongicola* Alcock & Anderson, 1899, Ann. Mag. nat. Hist., ser. 7 vol. 3, p. 291.

Richardina spongicola Alcock, 1899a, Ill. Zool. Investigator, Crust., vol. 7, pl. 42 figs. 4, 4a.

Richardina spongicola Alcock, 1901, Descr. Catal. Indian Deep-sea Crust., p. 146.

Richardina spongicola Lo Bianco, 1903, Mitt. zool. Sta. Neapel, vol. 16, p. 251, 252.

Richardina spongicola Bouvier, 1905a, C. R. Acad. Sci. Paris, vol. 140, p. 983.

Richardina spongicola Bouvier, 1905b, C. R. Acad. Sci. Paris, vol. 141, p. 749.

Richardina spongicola Bouvier, 1908a, C. R. Acad. Sci. Paris, vol. 146, p. 888.

Richardina spongicola A. Milne Edwards & Bouvier, 1909, Mem. Mus. comp. Zool. Harvard, vol. 27, p. 264.

Description. As I have no specimens of this species at my disposal, I refer for the description to Alcock and Anderson (1899) or to Alcock (1901).

Vertical distribution. The specimens of Alcock and Anderson were collected from depths of about 800 and 900 m, they inhabited the Hexactinellid sponge *Hyalonema masoni* (F. E. Sch.).

Horizontal distribution. The species is recorded from the Andaman Sea (Alcock & Anderson, 1899) and from the Travancore Coast (Alcock, 1901).

Odontozona edwardsi (Bouvier)

Richardina edwardsi Bouvier, 1908a, C. R. Acad. Sci. Paris, vol. 146, p. 888.

Richardina edwardsi Bouvier, 1908b, Bull. Mus. Hist. nat. Paris, vol. 14, p. 151.

Richardina edwardsi A. Milne Edwards & Bouvier, 1909, Mem. Mus. comp. Zool. Harvard, vol. 27, p. 264.

Description. Bouvier (1908a) gives following characteristics for the species: Dactyli of fourth and fifth pereopods biunguiculate. The present species differs from *O. spongicola* by having the fourth and fifth pereopods much longer, the carpus subdivided into 4, the propodus into 5 segments. A more extensive description, or a figure is badly needed.

Vertical distribution unknown.

Horizontal distribution. The species is recorded from the African north-west coast: Morocco (Bouvier, 1908a, 1908b), Cap Bojador (Bouvier, 1908b), Sudanese coasts (Bouvier, 1908a), Les Pilones, Sudan (Bouvier, 1908b).

Richardina A. Milne Edw.

Richardina A. Milne Edwards, 1881, C. R. Acad. Sci. Paris, vol. 93, p. 933.

non ?*Richardina* Alcock & Anderson, 1899, Ann. Mag. nat. Hist., ser. 7 vol. 3, p. 291.

non *Richardina* Alcock, 1899, Ill. Zool. Investigator, Crust., vol. 7, pl. 42 figs. 4, 4a. *Richardina* p.p. Bouvier, 1905b, C. R. Acad. Sci. Paris, vol. 141, p. 749.

Description. Body slender, compressed. Rostrum well developed, provided with spines. Carapace with the cervical groove very distinct, other grooves more or less obtuse. A cincture of spinules placed at the posterior margin of the cervical groove. Some spinules near the base of the rostrum and near the anterolateral angles.

Abdomen more or less compressed, with an indistinct bend between the third and fourth segment. All segments glabrous. First segment slightly overlapping second, and second overlapping third. Pleura of first segment ending in two blunt lobes, those of second and third segment broadly rounded, those of fourth and fifth segment more pointed and directed posteriorly. Third segment not conspicuously produced in the posterior median part. Sixth segment rather long, with a small pleura in the posterior half.

Telson elongate lance-shaped, with a median groove flanked by two longitudinal ridges. These ridges are provided with many strong, posteriorly directed spines. Between each carina and the median groove a small row of spinules is present, sometimes two spines are placed between the bases of the carinae. Lateral margin of the telson with one lateral median spine, mostly final margin with two blunt spines. Posterior half of telson surrounded by hairs, an additional row of hairs present on final margin.

Eyes rather distinct, peduncle longer and broader than cornea, sometimes provided with some spinules. Cornea very small and degenerate, not distinctly separated from the stalk, without pigment and only with faint traces of facets. The animals are blind.

Antennular peduncle with the segments provided anteriorly with some spinules. Two rather short (when compared with those of *Stenopus*) flagella present.

Basal segments of antenna provided with some spinules. Flagellum mostly long. Scaphocerite rather long, slightly convex at base, straight in the upper part, without spinules at base and provided with some teeth in the upper part. Inner margin convex, fringed with setae.

Mandibles, maxillulae, maxillae, and maxillipedes not essentially different from those of *Stenopus*. Kemp (1910) gives very good figures of those of *R. spinicineta*.

First pereopod, when stretched, reaches slightly further than the tip of the scaphocerite. Dactylus shorter than half propodus. Carpus much longer than propodus, merus slightly shorter than carpus. No spinules present. Small tufts of hair on the tips of the pincers, probably propodus and

carpus both provided with setiferous organs at the lower surface.

Second pereopod much longer than first, but similarly built.

Third pereopod longest and strongest, but much slenderer than in the other *Stenopodid* genera. It reaches with entire or larger part of carpus beyond the scaphocerite. Dactylus is much shorter than half the propodus. Carpus as long as or slightly shorter than propodus. Merus about as long as carpus. Ischium much shorter, without spinules. Merus, carpus and propodus mostly provided with some rows of spinules. Pincers very slender, without teeth, with crossing tips and provided with some tufts of hair.

Fourth and fifth pereopods very long and slender, about as long as third. Carpus much longer than propodus or merus. Ischium relatively very short. Dactylus uniungiculate, long and slender. Carpus and propodus subdivided into several segments. All segments glabrous, or with some hairs.

The branchial formula given by Kemp (1910) differs from that of *Stenopus*, by the fact that the second maxillipede has no pleurobranch. As already pointed out before (pp. 8, 9, 33) this pleurobranch is easily overlooked and therefore the branchial formula of *Richardina* is probably identical with that of *Stenopus*.

First pair of pleopods uni-, the others biramous, without spinules.

Uropods about as long as telson. Exopod quadrangular, outer margin straight and serrate, anterior and inner margin fringed with setae, upper surface with two longitudinal ridges. Endopod elongate triangular, exterior margin without hairs or teeth at base, rest of the margin fringed with setae.

Eggs are large and very few, about 2 mm long.

Size. In literature sizes of 17 and 21.5 mm are recorded.

Vertical distribution. The species of this genus are recorded from depths between 950 and 1200 m.

Horizontal distribution. The genus is recorded from the Mediterranean, the Bay of Biscay and from the waters southwest of Ireland.

Type species is *Richardina spinicincta* A. Milne Edw.

Key to the species of *Richardina*

1. Cervical groove with the posterior margin provided with a cincture of 25-30 spines. Scaphocerite with outer margin in the middle provided with 2-5 teeth. Outer margin of uropodal exopod with 4 or 5 teeth.

Richardina spinicincta A. Milne Edw.

- Cervical groove with the posterior margin provided with a cincture of about 16 spines. Scaphocerite with outer margin provided with 6-8 teeth. Outer margin of uropodal exopod with about 7 teeth.

Richardina fredericii Lo Bianco

***Richardina spinicincta* A. Milne Edw.**

Richardina spinicincta A. Milne Edwards, 1881, C. R. Acad. Sci. Paris, vol. 93, p. 933.

Richardina spinicincta A. Milne Edwards, 1882, Arch. Miss. sci. litt., ser. 3 vol. 9, p. 37.

- Richardina spinicincta* A. Milne Edwards, 1883, Rec. Fig. Crust. nouv. peu conn., p. 3, pl. 41.
Richardina spinicincta Lo Bianco, 1903, Mitt. zool. Sta. Neapel, vol. 16, p. 251.
Richardina spinicincta Bouvier, 1905a, C. R. Acad. Sci. Paris, vol. 140, p. 983.
Richardina spinicincta Bouvier, 1905b, C. R. Acad. Sci. Paris, vol. 141, p. 749.
Richardina spinicincta Kemp, 1906, Sci. Invest. Fish. Br. Ire, 1905 pt. 5, p. 7.
Richardina spinicincta Bouvier, 1908a, C. R. Acad. Sci. Paris, vol. 146, p. 888.
Richardina spinicincta Bouvier, 1908b, Bull. Mus. Hist. nat. Paris, vol. 14, p. 151.
Richardina spinicincta A. Milne Edwards & Bouvier, 1909, Mem. Mus. comp. Zool. Harvard, vol. 27, p. 264.
Richardina spinicincta Kemp, 1910a, Sci. Invest. Fish. Br. Ire., 1908 pt. 1, p. 166, pl. 23 figs. 1-10.
Richardina spinicincta Williamson, 1915, Nord. Plankt., vol. 18 pt. 6, p. 349.

Description. For the description I refer to Kemp's (1910a) paper, in which he too gives excellent figures of the species. I have no specimens of this species at my disposal.

Vertical distribution. Depths of 1210-1230 m.

Horizontal distribution. The species is known from the northern Atlantic. Records in literature are: Bay of Biscay (A. Milne Edwards, 1881), Atlantic Ocean, southwest of Ireland (Kemp, 1910a).

***Richardina fredericii* Lo Bianco**

- Richardina Fredericii* Lo Bianco, 1903, Mitt. zool. Sta. Neapel, vol. 16, pp. 242, 243, 246, 247, 250, pl. 7 fig. 7, pl. 8 figs. 27, 28.
Richardina Fredericii Bouvier, 1905b, C. R. Acad. Sci. Paris, vol. 141, p. 749.
Richardina Fredericii Bouvier, 1908a, C. R. Acad. Sci. Paris, vol. 146, p. 888.
Richardina Fredericii A. Milne Edwards & Bouvier, 1909, Mem. Mus. comp. Zool. Harvard, vol. 27, p. 264.
Richardina Fredericii Kemp, 1910a, Sci. Invest. Fish. Br. Ire, 1908 pt. 1, p. 169.

Description. As I had not the opportunity to examine specimens of this species, I refer to the description and the figures of Lo Bianco.

Vertical distribution. Depths of 950-1100 m.

Horizontal distribution. The only record of this species is that of Lo Bianco from the waters west and southeast of the island Capri near Naples.

***Engystenopus* Alcock & Anderson**

- Engystenopus* Alcock & Anderson, 1894, Journ. Asiat. Soc. Bengal, vol. 63 pt. 2, p. 149.

Description. Body slender. Rostrum well developed, provided with spines, laterally compressed. Carapace smooth or with evenly placed spinules. Cervical groove distinct.

Abdomen with a more or less distinct sharp bend. Segments dorsally smooth or with some spinules, which are mostly arranged in transverse

rows. Pleura of first segment narrower than those of the second to fifth segments, lateral margin of the first with two, those of the other pleurae with three lateral spines; pleurae of fourth and fifth segment directed posteriorly.

Telson elongate lance-shaped, with a median groove flanked by two longitudinal carinae. These carinae provided with some strong posteriorly directed spines.

Eyes well developed. Cornea often small, indistinct and without pigment, sometimes the facets are distinctly visible and pigment is present. Stalk sometimes with spinules.

Basal segment of antennula longer than second and third segment, with a distinct stylocerite, without dorsal spinules. Two long flagella present.

Antennal peduncle with some spines. There is one long flagellum. Scaphocerite long, slender, outer margin rounded at base, straight or concave in the upper part and serrate there. Inner margin fringed with setae.

Mandibles, maxillulae, maxillae and maxillipedes similarly built as in *Stenopus*.

First pereopods slender, reaching slightly beyond the tip of the scaphocerite. No spinules present. Anterior part of carpus and posterior part of propodus with a setiferous organ at the lower surface.

Second pereopods similarly built as first but longer and slightly stronger. Probably without setiferous organs.

Third pereopods very long, reaching with entire carpus beyond the tip of scaphocerite. Ischium, merus and carpus slender, propodus very large and broad. Pincers with teeth.

Fourth and fifth pereopod very long and slender, but distinctly shorter than third. Dactylus uniunguiculate, long, slender. Carpus and propodus, often indistinctly, subdivided in several segments.

Branchial formula identical with that of *Stenopus*. Alcock's (1901) statement, that the pleurobranch on the second maxillipede is absent, is, as already pointed out before (pp. 8, 9, 33) probably due to the fact that it is overlooked.

First pleopods uni-, the others biramous. Ventral surface of the abdominal segments in the male with a median spine.

Uropods about as long as telson. Exopod quadrangular, outer margin straight, provided with several teeth. Anterior and inner margin fringed with setae. Upper surface with two longitudinal carinae. Endopod elongate triangular, base of outer margin often with some teeth, rest of the margin fringed with setae. Upper surface with two ridges, one strong median and one at the inner half, which starts from the basal part of the inner margin,

curves to the median one and at last runs parallel with it. This inner carina mostly with some dorsal hairs.

Size. The two specimens belonging to the present genus known at present measure 31-38 mm.

Vertical distribution. Probably depths of 247-564 m, it is, however, possible that *E. spinulatus* was collected at a depth of 29 m.

Horizontal distribution. The genus is recorded from the Bay of Bengal and from the Lesser Sunda Islands.

Type species is *Engystenopus palmipes* Alcock & Anderson.

Key to the species of *Engystenopus*

1. Carapace without spinules. Pincers of first pereopod not conspicuously long and slender. Fourth and fifth pereopod with the propodus and carpus not or indistinctly subdivided. *Engystenopus palmipes* Alcock & Anderson
- Carapace covered with spinules. Pincers of first pereopod conspicuously long and slender. Fourth and fifth pereopod with the propodus and carpus distinctly subdivided. *?Engystenopus spinulatus* nov. spec.

***Engystenopus palmipes* Alcock & Anderson**

Engystenopus palmipes Alcock & Anderson, 1894, Journ. Asiat. Soc. Bengal, vol. 63 pt. 2, p. 149, pl. 9 fig. 1.

Engystenopus palmipes Alcock & Anderson, 1896, Ill. Zool. Investigator, Crust., vol. 4, pl. 26 fig. 3.

Engystenopus palmipes Alcock, 1899b, Sci. Mem. med. Off. Army India, vol. 11, p. 33.

Engystenopus palmipes Alcock & McArdle, 1901, Ill. Zool. Investigator, Crust., vol. 9, pl. 50 fig. 5.

Engystenopus palmipes Alcock, 1901, Descr. Catal. Indian Deep-sea Crust., p. 144, pl. 2 fig.

Engystenopus palmipes A. Milne Edwards & Bouvier, 1909, Mem. Mus. comp. Zool. Harvard, vol. 27, p. 264.

Description. As I had not the opportunity to examine specimens of this species I refer for the description to Alcock & Anderson (1894), and to Alcock (1901).

Vertical distribution. Depths of 360-640 m.

Horizontal distribution. The species is recorded from the Bay of Bengal, off Trincomalee.

***?Engystenopus spinulatus* nov. spec. (Pl. IV figs a, b)**

Siboga Expedition:

Station 306: Lobetobi strait, E. of Flores, 8° 27' S, 122° 54'.5 E; 247 m depth, sandy mud, also in 29 m, *Lithothamnion* bottom; February 8, 1900.—1 specimen about 38 mm.

Description. Rostrum triangular at base. As the rostrum is broken, nothing can be said about the length, spinulation, etc.

Carapace covered with scattered spinules, which are arranged in rather conspicuous longitudinal rows. Spinules short and curved forward, much less in number than in the *Stenopus* species. Cervical groove very distinct, other grooves slightly less conspicuous. A double row of 3 spinules extends in the median region of the carapace between the base of the rostrum and the cervical groove. Some setae are present at the posterolateral angles of the carapace.

First three abdominal segments dorsally with transverse ridges provided with small blunt spinules, first segment with one, second and third each with two ridges. Besides these transverse rows of spinules, some more small blunt spinules are present, for instance at the pleurae. Pleura of first segment narrower than those of the others. All pleurae broadly truncated, those of fourth and fifth segment directed posteriorly; lateral margin of first pleura with two, those of the others with three spines, margins of first four pleurae provided with setae. Third abdominal segment produced broadly triangularly in the median posterior part, the process entirely glabrous. Fourth and fifth segment in the median dorsal part entirely glabrous; laterally two short oblique rows of blunt, posteriorly directed spinules, which are pressed against the body, are visible. Sixth segment with some lateral spinules and two curved transverse dorsal rows of small spinules, one row in the anterior half, the other near the posterior margin; these rows consist of about 10 minute spinules, which are pressed against the body and directed posteriorly; in the median part the rows are interrupted.

Telson in my specimen broken, therefore only the lower part can be described. It is provided with a median groove flanked by two longitudinal ridges, which are provided with posteriorly directed spines. Between each carina and the groove a row of slender spinules is present, between the bases of the carinae two strong posteriorly directed spines are placed, each with a long hair at the inner side of the base. Marginal carina rather inconspicuous, with a spine at base.

Eyes well developed, cornea shorter than stalk, which bears some dorsal spinules. Cornea with distinct facets and pigment.

Basal segment of antennular peduncle slightly longer than second segment, third segment shortest. First segment with a distinct stylocerite, without dorsal spinules, its outer anterior angle bears a small scale which possesses no spines as in *Stenopus*, but is fringed with setae. Second segment with some spines at the anterior margin. Third segment with one strong dorsal spine. Basal segments of upper flagellum with some ventral hairs.

Basal segments of antenna with some spines, at inner side provided with a distinct laminate process. Scaphocerite with basal part of outer margin strongly concave, upper part straight or slightly concave. Base of outer margin provided with one or two spinules, upper part with 12 or 13 teeth, margin serrate up to the final tooth of scaphocerite. Inner margin convex, fringed with setae. Upper surface with two longitudinal ridges, one in the median and one along the outer margin, no dorsal or ventral spinules.

Third maxillipede seven-jointed, reaching with distal half of propodus beyond scaphocerite. Merus to dactylus with an internal and external row of setae, which are directed ventrally, in merus the rows are converging towards the base. Ischium with an internal row of setae only, externally provided with a row of 7 spines. Merus with an external row of 5 spines, carpus with one external spine, which is placed near the anterior margin, propodus and dactylus without spines, propodus with a setiferous organ placed at the anterior part of the inner margin.

First pereopod, when stretched, reaches slightly beyond the tip of the scaphocerite. Dactylus is longer than half the propodus, which is about as long as carpus, merus slightly shorter than carpus, ischium very short. Segments without spinules, anterior part of carpus and posterior part of propodus provided each with a setiferous organ at the ventral surface. Pincers of the chela long and slender, palm slightly swollen, chela thereby entirely different from those of all other Stenopodid species.

Second, third and fourth pereopods missing.

Fifth pereopod very long and slender, reaching with the articulation between merus and carpus to the end of the scaphocerite. No spinules at ischium, merus and carpus; propodus with about 5 ventral movable spines. Dactylus long, slender, uniunguiculate. Carpus more than twice as long as propodus, merus slightly shorter, ischium shortest. Carpus subdivided into 15-17, propodus into 7 segments, subdivision very distinct.

Basal segments of pleopods with spinules.

Outer margin of uropodal exopod provided with 12 teeth, excluded the final tooth. Upper surface without spinules. Endopod with 7 teeth at lower part of outer margin, rest of the margin fringed with hairs. Upper surface with two ridges, inner ridge with 6 long dorsal hairs.

Remarks. The specimen described above is rather heavily damaged, some important details as rostrum, part of the telson and third pereopods are missing. It is therefore with some hesitation, that I place the new species in the genus *Engystenopus*, to which genus it is at least closely related. It is obvious by all characteristics which are present that the species is new to science.

Microprosthema Stimpson

*Microprosthem*a Stimpson, 1860, Proc. Acad. nat. Sci. Philad., 1860, p. 44.

Stenopus p.p. Von Martens, 1872, Arch. Naturgesch., vol. 38 pt. 1, p. 144.

Stenopusculus Richters, 1880, Beitr. Meeresfauna Maurit., p. 167.

Description. Body broader and more depressed than in the genera mentioned above. Rostrum rather short, very broad and depressed at base, covering there the bases of the ophthalmic peduncles. Dorsally always, ventrally sometimes, laterally never with spines.

Carapace covered with spinules. Cervical groove very distinct, reaching far posteriorly, other grooves slightly less distinct.

Abdomen broad, depressed, with a rather indistinct bend. Abdominal segments dorsally glabrous, with transverse carinae or with transverse rows of tubercles. Sixth abdominal segment with a conspicuous pleura.

Telson broader than in the preceding genera, the longitudinal carinae along the median groove not so distinct as in *Stenopus*. The carinae provided with some spines, which are directed posteriorly. Marginal carina only conspicuous near the base. Lateral margin at each side provided with one median lateral spine, final margin with three spines of similar size. Posterior third of telson fringed with setae, final margin with an additional row of setae.

Eyes well developed, cornea very much smaller and narrower than the swollen stalk, which sometimes is provided with some spinules. Facets and pigment distinct in the cornea.

Antennulae with the two lower segments of about the same size, the third much smaller. Basal segment with a distinct stylocerite at outer margin. Richters (1880) described a scale at the basal segment of the antennular peduncle, which should be essential for the present genus, his figures show them almost quadrangular in form and provided with some setae at the top. The only scale I could find at the basal segment is the already above mentioned stylocerite, which in all specimens, which I had at my disposal, is pointed and without hairs. Richters does not mention where his scale was placed. In his figure of the whole animal of *Stenopusculus plumicornis* a scale at the outer side of the basal segment is distinctly visible, it is placed at the same place as the stylocerite in my specimens. As Richters does not mention any other scale at the basal segment, it is very probable that his scale is identical with the process indicated by me as stylocerite, though the shape is rather different. The difference in shape is perhaps due to variation, as all other characteristics of my specimens are entirely identical with those mentioned in Richters's description and shown in his

figures. Richters's remark that this scale is characteristic for the present genus is not correct, as a stylocerite is present in all species of Stenopodidae, though being sometimes rather indistinct, as in the commonest species *Stenopus hispidus*. Flagella two, provided with hairs.

Basal segments of antennae provided with spines of different size. Antennal peduncle provided with an internal laminate process. Scaphocerite different in form, mostly short and broad, sometimes short and slender, outer margin with some teeth, inner margin fringed with setae.

Mandibles, maxillulae, maxillae and maxillipedes not essentially different from those of *Stenopus*. Ischium of third maxillipede with one or more spines at external margin.

First pereopod, when stretched, reaches slightly beyond the tip of scaphocerite; dactylus slightly less than half as long as propodus. Carpus much longer than propodus or merus, ischium shorter than merus. Segments without spinules, setiferous organs at anterior part of the carpus and the posterior part of the propodus, both at the lower surface. Pincers with some small tufts of hair.

Second pereopod similarly built as first, only longer and slightly stronger. Dorsal surface of merus sometimes with spinules, other segments glabrous, no setiferous organs present, only some small tufts of hair on the pincers.

Third pereopod very strong. Dactylus shorter than half the propodus. Carpus as long as, or slightly shorter than merus, and much shorter than propodus. Ischium slightly shorter than merus, compressed, slightly broadened towards the top, with or without marginal spinules. Merus compressed at base, more cylindrical in the anterior part, ventrally with some strong spinules. Carpus broadened towards the top, with many spinules. Propodus strong, dorsally serrate, sometimes with spinules. Dactylus dorsally often with spinules, ventrally with one large sharply triangular tooth, which fits in two dorsal teeth of the lower pincer. The posterior of these two teeth sharply triangular in form, the anterior rounded. Pincers short, with crossing tips.

Fourth and fifth pereopods with the carpus about twice as long as propodus, ischium shorter than merus. Dactylus short biunguiculate. Propodus ventrally with a row of movable spines, carpus often with some movable ventral spines too. Other segments without spinules. Carpus and propodus subdivided into several segments, but often very indistinctly.

Branchial formula identical with that of *Stenopus*.

First pleopod uni-, the other ones biramous. Ventral surface of the abdominal segments in the male with a median spine.

Uropods about as long as telson. Exopod and endopod ovate, outer margin more or less straight, devoid of hairs and provided with some teeth. Inner margins fringed with setae. Upper margin with a median carina, without spinules.

Eggs relatively large, rather numerous, measuring about 0.5-0.7 mm.

Sexual differences. In the females the pleurae of the abdominal segments are much more rounded than in the males; the basal segments of the pleopods are much broader in the females.

Size. The largest specimen known to me measures 16 mm, the smallest adult specimen (ovigerous ♀) 11 mm.

Vertical distribution. The species are recorded from superficial waters near the shore to a depth of 70 m.

Horizontal distribution: Known from the entire Indopacific region and from the tropical east American seas.

Type species is *Microprosthema validum* Stimpson.

Remarks. The genus was at first described by Stimpson (1860). This description remained unobserved till 1909, when A. Milne Edwards & Bouvier mentioned it; they regarded it as a synonym of *Stenopus*, an error, which was corrected by Balss (1915). In the meantime Richters (1880), described the present genus under the name *Stenopusculus*, a name, which was used by various other authors; the synonymy of *Stenopusculus* and *Microprosthema* was also pointed out first by Balss (1915).

Key to the species of *Microprosthema*

1. Propodus of the third pereiopod with a distinct dorsal crista. 2.
- Propodus of the third pereiopod without a distinct dorsal crista. 3.
2. Third abdominal segment with a short longitudinal median carina at the posterior half of the dorsal surface. Scaphocerite with 2 or 3 very strong teeth at the outer margin. *Microprosthema validum* Stimpson
- Third abdominal segment without a longitudinal median carina at the posterior half of the dorsal surface. Scaphocerite with 5-6 small teeth at the outer margin. *Microprosthema semilaeve* (Von Martens)
3. Abdomen glabrous. Telson with two longitudinal ridges, each bearing three strong spines. Rostrum reaching beyond scaphocerite. Scaphocerite rather broad. *Microprosthema plumicorne* (Richters)
- Abdomen with transverse rows of tubercles. Telson with two longitudinal ridges, each bearing one strong spine. Rostrum reaching beyond scaphocerite. Scaphocerite very narrow, with inconspicuous external teeth. *Microprosthema scabricaudatum* (Richters)

***Microprosthema validum* Stimpson (Pl. III fig. h)**

Microprosthema valida Stimpson, 1860, Proc. Acad. nat. Sci. Philad., 1860, p. 45.

Stenopusculus crassimanus Richters, 1860, Beitr. Meeresfauna Maurit., p. 168, pl. 18 figs. 27-29.

Stenopusculus crassimanus De Man, 1888a, Arch. Naturgesch., vol. 53 pt. 1, p. 565.

- Stenopusculus crassimanus* Lanchester, 1901, Proc. zool. Soc. Lond., 1901, p. 573.
Stenopusculus crassimanus Bouvier, 1908b, Bull. Mus. Hist. nat. Paris, vol. 14, p. 150.
Stenopusculus crassimanus A. Milne Edwards & Bouvier, 1909, Mem. Mus. comp. Zoöl. Harvard, vol. 27, p. 263.
Stenopus (Microprosthema) validus A. Milne Edwards & Bouvier, 1909, Mem. Mus. comp. Zoöl. Harvard, vol. 27, p. 264.
Stenopus robustus Borradaile, 1910, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 13, p. 260, pl. 16 fig. 4.
Stenopus (Microprosthema) validus Balss, 1914a, Abh. Bayer. Akad. Wiss., suppl. vol. 2 pt. 10, p. 73.
?Microprosthema crassimanum Balss, 1915, Denkschr. Akad. Wiss. Wien, vol. 91 suppl., p. 33, figs. 26-30.
Microprosthema valida Balss, 1915, Denkschr. Akad. Wiss. Wien, vol. 91 suppl., p. 33.
Stenopus robustus McNeill, 1926, Aust. Zool., vol. 4, p. 302.
Stenopus robustus Gravely, 1927, Bull. Madras Govt. Mus., n. ser. vol. 1 pt. 1, p. 138, pl. 19 fig. 6.
Stenopus robustus McNeill & Ward, 1930, Rec. Aust. Mus., vol. 17, p. 361.

Snellius Expedition:

Wotap, Tenimber Islands; shore and reef; October 20-23, 1929.—3 specimens 14-15 mm (included one ovigerous ♀ 14 mm).

Siboga Expedition:

Station 49a: Sape Strait, near Soembawa; coral and shells; 70 m; April 14, 1899.—3 specimens 13-14 mm (two ovigerous ♀♀ both 14 mm).

Description. Rostrum straight or slightly curved downward; it reaches slightly beyond the antennular peduncle, but fails to reach the end of the scaphocerite. Dorsally it bears 5-8 spines, ventrally without or with one spine, no lateral spines present.

Carapace covered with scattered spinules, which are short, often blunt, directed forward and placed in more or less longitudinal rows; a double row of 3 or 4 spinules extends in the median region of the carapace, from the base of the rostrum to the cervical groove. Surface of the carapace and abdomen minutely pitted.

First abdominal segment with a posterior transverse ridge, which dorsally is provided with a row of setae, this carina provided near the base of the pleura with a distinct tooth. Pleura with an anterior blunt tooth, which often is provided with a small additional spine at the posterior margin; the above mentioned carina ends posteriorly of the final tooth of the pleura. Second abdominal segment also with a transverse posterior ridge, which, however, bears no setae; laterally the ridge is interrupted at four places, forming thereby three blunt teeth; pleura ends in a blunt tooth, which at the anterior margin is provided with one, at the posterior margin with two small additional teeth; the carina ends in the tip of the pleura. Third abdominal segment with a transverse carina near the anterior

margin; as in second segment the carina is laterally interrupted at four places and forms three teeth; pleura ends in a broad blunt tooth, which bears at the anterior margin one, at the posterior margin one or two small additional teeth; carina ends in the tip of the pleura. Posteriorly the third segment is broadly triangularly produced, a distinct sharp longitudinal carina extends in the median region of the third segment from the transverse carina to the posterior margin. Fourth and fifth segments dorsally almost glabrous, often with a similar longitudinal carina as on third segment, here, however, the carina is less distinct and sometimes absent. Posterior margin with a deep blunt incision near the base of each pleura; pleurae of fourth and fifth segment not so broad as in the preceding segments and ending in a sharp tooth, which bears a small additional spine at the anterior and sometimes also one at the posterior margin; a short carina is present near the anterior margin. Sixth abdominal segment with the dorsal surface with two posteriorly diverging, rather indistinct ridges, which extend from the median part of the anterior margin to the posterior margin near the lateral parts of the base of the telson. Pleura bluntly pointed. Margins of all pleurae, except those of the sixth segment, posteriorly with setae.

Telson about as long as uropods, triangular, slightly constricted near the base. Upper surface with two longitudinal carinae, which end at a considerable distance before the posterior margin of the telson; each ridge is provided with 3 spines, often a small spinule is present near the base; spines sometimes provided with a long hair at the outer part of the base. Between the bases of the carinae two strong blunt spines, each with a long hair at the inner part of the base, are present. Lateral margin of telson with a small spine at base, with a carina in the anterior half and with a lateral tooth in the middle.

Eyes with the stalk glabrous or with some spinules.

Basal segment of antennular peduncle (Pl. III fig. h) with the stylocerite distinct, curved, and ending in a sharp point. First and second segment with some spinules.

Antennal peduncle with the scaphocerite fixed at the dorsal surface and directed inward; outer margin of scaphocerite concave at base, straight in the upper part, ending in a sharp strong tooth and provided before this tooth with two or three similar lateral teeth. Inner margin convex, fringed with setae. Scaphocerite short and broad in comparison with that of *Stenopus* species.

Third maxillipede reaching almost with the entire merus beyond the scaphocerite. Ischium externally with about 5 spines and one small spinule

at anterior point of the inner margin. Merus externally with two or three spines. Balss (1915) figured the ischium of his specimen, which he referred with some doubt to the present species, with only one external spine, all my specimens, however, show five spines there.

First pereiopod with all segments without spinules, second pereiopod with two or three dorsal spinules at anterior part of merus.

Third pereiopod very strong, reaching with entire carpus or more beyond tip of scaphocerite. Ischium with a row of small internal spinules, dorsal margin with one strong anterior spine and often with a row of small spinules. Merus with 3 or 4 strong ventral spines and some small spinules scattered over the rest of the surface. Carpus dorsally with a rather distinct crista and some spinules, some of which sometimes are very large; ventrally with a row of spinules of different size; laterally with some blunt tubercles. Propodus very broad and swollen, dorsally with a high crista, dorsal and ventral margin serrate, lateral surface with many blunt tubercles. Dactylus dorsally with some spinules, ventrally with one large triangular tooth, which fits in two dorsal teeth of the lower pincer.

Fourth and fifth pereiopods long and slender. Propodus with a ventral row of 10-12 movables spines, carpus too with some ventral spines, all other segments glabrous. Segmentation of carpus and propodus often indistinct, carpus mostly subdivided into 4, propodus into 3 segments.

Uropodal exopod with the outer margin straight and naked, the inner margin semicircular and fringed with setae; outer margin with about 6-12 teeth, upper surface with two longitudinal ridges, without spinules. Endopod ovate, outer margin naked, with 1-4 teeth, inner margin fringed with setae, upper surface with one median ridge, without spinules.

Eggs relatively large and numerous, those in which the larva is not yet visible are in my material 0.5-0.8 mm long and 0.4-0.8 mm broad.

Sexual differences. Except those differences mentioned in the description of the genus, the female of *M. validum* has the crista of the propodus not so high as the male and the propodus slenderer.

Colour. Spirit specimens are coloured plain pale brownish yellow. Nothing is known of the colour of the living animal.

Size. The specimens recorded in literature and those examined by me are 11-16 mm long. McNeill (1926) recorded two specimens, which were 6 and 8.5 mm long, when measured from tip of rostrum to posterior margin of carapace.

Vertical distribution. The species is known from the superficial water near the shore, greatest depth from which it is recorded is 70 m (Siboga Expedition).

Horizontal distribution. The species is known throughout the Indopacific region. The records in literature are: Berenice, Red Sea (Balss, 1915), Jibuti (Nobili, 1906a; Bouvier, 1908b), Ile aux Fouquets, Mauritius (Richters, 1880), Salomon Atoll, Chagos Archipelago (Borradaile, 1910), Krusadai Island, Gulf of Manaar (Gravely, 1927), Shingle Island, Gulf of Manaar (Gravely, 1927), Pulau Bidan, Penang (Lanchester, 1901), Island "Ousima", Japan¹⁾ (Stimpson, 1860), Poeloe Edam, Bay of Batavia (De Man, 1888a), Hope Islands near Cooktown, N. Queensland (McNeill, 1926), Masthead Island, Capricorn Group, Queensland (McNeill & Ward, 1930), Long Reef, Collaroy near Port Jackson, New S. Wales (McNeill & Ward, 1930), Port Jackson, New S. Wales (McNeill, 1926).

Remarks. The species was first described under the name *Microprosthema valida*, but as *prosthema* is neuter, the name *valida* is an orthographical error and must be changed in *validum*.

The species was described under three different names, viz., *Microprosthema valida*, *Stenopusculus crassimanus* and *Stenopus robustus*. Comparison of the descriptions and figures of these species with my material made it obvious that they belong to one species, which has to bear the name *Microprosthema validum*.

Microprosthema semilaeve (Von Martens) (Pl. III fig. i)

- Stenopus semilaevis* Von Martens, 1872, Arch. Naturgesch., vol. 38 pt. 1, p. 144.
Stenopusculus spinosus Pocock, 1890, Journ. Linn. Soc. Lond. Zool., vol. 20, p. 523.
Stenopus semilaevis Herrick, 1893a, Mem. Nat. Acad. Sci. Wash., vol. 5, p. 352.
Stenopus semilaevis Rankin, 1898, Ann. New York Acad. Sci., vol. 11, p. 241, pl. 29 fig. 2.
Stenopus semilaevis A. Milne Edwards & Bouvier, 1909, Mem. Mus. comp. Zool. Harvard, vol. 27, p. 263.
Microprosthema spinosum Balss, 1915, Denkschr. Akad. Wiss. Wien, vol. 91 suppl., p. 33.
Stenopus semilaevis Schmitt, 1924b, Stud. nat. Hist. Iowa Univ., vol. 10, p. 86.
Stenopus semilaevis Schmitt, 1936, Zool. Jb. Syst., vol. 67, p. 373.
Stenopus semilaevis Schmitt, 1939, Smiths. misc. Coll., vol. 98 pt. 6, p. 28.

Museum Amsterdam:

Aruba, Oranjestad, Punta Braboe; between corals; June 18, 1930; leg. P. Wagenaar Hummelinck.—1 specimen 14 mm (ovigerous ♀).

Description. Rostrum straight, broadly triangular and depressed at base, compressed in the anterior part. Tip of rostrum reaching to the end of the antennular peduncle and failing to reach to the tip of the scaphocerite. Dorsally with 4-11 spines; this large variability in the number of spines on

1) Probably the island Oshima off Sagami Bay is meant.

the dorsal surface of the rostrum is probably due to the fact that different authors had not the same opinion about this subject. There are namely large and small spinules; in the specimen studied by me there are 5 large and 3 small indistinct spinules; Pocock (1890) finds in his specimen 5 large and 6 small ones; Rankin (1898) 6 large and 2 small ones. As Von Martens only mentioned 4 dorsal spines, it is probable that he overlooked or at least did not include the smaller ones. Probably, therefore, the number of spines on the dorsal surface varies between 8 and 11; 4-6 of which are large, the rest small and rather indistinct.

Carapace covered with small blunt, often forwardly directed spinules, which are arranged in more or less distinct longitudinal rows; no distinct median double row behind the rostrum visible. Cervical groove reaching far posteriorly.

First abdominal segment with a posterior transverse ridge, which dorsally is provided with a row of setae, this carina near the base of the pleura provided with a distinct broad lateral tooth. Lateral margin of pleura with a tooth in the anterior half and almost straight in the posterior half. Carina ending in the middle of the lateral margin. Second abdominal segment with a median transverse ridge, which near the bases of the pleurae shows some irregularities. Lateral margin of pleura in my specimen, an adult female, broadly rounded, with some inconspicuous additional teeth. Third abdominal segment dorsally entirely glabrous or nearly so. Transverse carina only conspicuous at the pleurae. No short longitudinal median carina in the posterior part. Lateral margins in my specimen broadly rounded with some small inconspicuous additional teeth. Posterior margin broadly triangularly produced posteriorly. Fourth and fifth segment dorsally glabrous, posterior margin near base of pleura with a deep broad blunt incision. Pleurae broadly triangular with a blunt top, anterior margin, sometimes posterior margin too, with some small additional teeth. Each pleura with a short median carina. Pleurae of sixth segment triangular, anterior margin rounded, posterior margin almost straight; dorsal surface of sixth segment glabrous.

Telson about as long as the uropods, triangular in shape, slightly constricted near the base. Upper surface with two longitudinal ridges, which end a considerable distance before the posterior margin of the telson, and dorsally bear three strong teeth, each of which is provided with a long hair at the exterior part of the base. Between these carinae, at the level of the anterior pair of teeth, two smaller teeth are placed, and more anteriorly between the bases of the carinae there are two blunt spines, each provided with a long hair at the inner side of the base. Lateral margin of

telson in its anterior part provided with a carina, which bears a dorsal spine at the base.

Ophthalmic peduncle with some spinules.

Lower segment of antennular peduncle with a distinct, sharply pointed, curved stylocerite. First and second segments with some spinules. Both flagella rather short, provided with setae.

Basal segments of antenna with some spines. Scaphocerite (Pl. III fig. i) small, rather broad at base, tapering towards the tip, outer margin straight or slightly concave, without setae, bearing 5-6 small teeth, which are never so conspicuous as in *Microprosthemum validum*. Inner margin strongly convex and fringed with setae. Both surfaces glabrous.

Third maxilliped reaches far beyond the tip of the scaphocerite. Ischium at the outer margin with about 4 strong spines, at the inner margin with a small anterior spinule. Merus externally with 2-3 strong spines.

First pereopod with all segments without spinules, second pereopod with one spine at the anterodorsal part of merus, other segments glabrous.

Third pereopod very strong, reaching with entire carpus beyond scaphocerite. Ischium without spinules, merus with 3 strong ventral spines and scattered blunt spinules on the rest of the surface. Carpus covered with many blunt spinules, dorsally a ridge of stronger ones; at the upper half of the inner margin a large longitudinal part of the surface is deeply hollowed and devoid of spinules or almost so. Propodus broad and swollen, with a distinct dorsal crista, upper and lower margin densely serrate; outer surface with longitudinal rows of minute tubercles, sometimes almost smooth; inner surface densely covered with tubercles, sometimes with a dense layer of hairs. Dactylus dorsally with a row of blunt spinules, at the lateral surfaces sometimes with a rather distinct broad carina.

Fourth and fifth pereopods long and slender. Propodus with a ventral row of 15 movable spines, carpus too with three ventral spines. Other segments without spinules. No distinct segmentation of carpus or propodus is visible in my specimen; Pocock (1890) states that the propodus is subdivided into 3-5 segments.

Uropodal exopod with the outer margin straight, without setae and with 9 teeth, inner margin semicircular and fringed with setae. Endopod ovate, outer margin straight, with three teeth, inner margin fringed with setae, upper surface with a longitudinal ridge.

Eggs relatively large and numerous, those in which the larva is already visible are 0.6-0.7 mm long and 0.5-0.6 mm broad.

Colour. Spirit specimens plain pale brownish yellow, colour of living specimens unknown.

Size. The specimens known at present measure 12-15 mm.

Vertical distribution. Recorded from superficial waters near the shore, between corals, in tide pools, etc.

Horizontal distribution. The species is recorded from the tropical east American seas, from the Bahamas to Fernando Noronha. Records in literature are: West Indies (Von Martens, 1872), New Providence, Bahamas (Rankin, 1898), English Harbor, Barbados (Schmitt, 1924b), Pelican Island, Barbados (Schmitt, 1924b), Oranjestad, Aruba (Schmitt, 1936), Old Providence Island, Colombia (Schmitt, 1939), Fernando Noronha (Pocock, 1890).

Remarks. The specimen from the Zoölogical Museum at Amsterdam was already mentioned in Schmitt's (1936) paper.

A comparison of the descriptions of *Stenopus semilaevis* and *Stenopusculus spinosus* with my specimen made it clear that these two species are identical.

Microprosthema scabricaudatum (Richters) (Pl. III fig. g, textfig. 1)

Stenopusculus scabricaudatus Richters, 1880, Beitr. Meeresfauna Maurit., p. 168, pl. 18 figs. 30-32.

Stenopusculus scabricaudatus Bouvier, 1908a, C. R. Acad. Sci. Paris, vol. 146, p. 888.

Stenopusculus scabricaudatus A. Milne Edwards & Bouvier, 1909, Mem. Mus. comp. Zoöl. Harvard, vol. 27, p. 263.

Microprosthema scabricaudatum Balss, 1915, Denkschr. Akad. Wiss. Wien, vol. 91 suppl., p. 33.

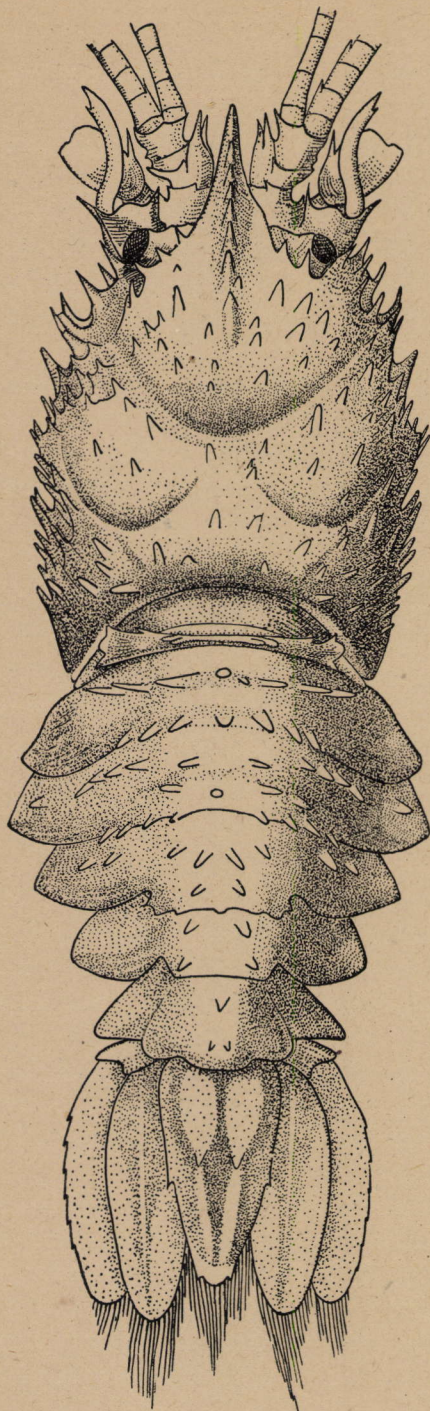
Snellius Expedition:

Boo Islands; October 5, 1930. — 1 specimen 11 mm (ovigerous ♀).

Description. Rostrum straight, depressed and broadly triangular at base, compressed near the tip. Tip of rostrum reaching beyond antennular peduncle, but fails to reach to the tip of the scaphocerite. Dorsally the rostrum is provided with 9 large spines, ventrally and laterally no spines are present.

Carapace covered with scattered blunt spinules, which are curved forward and placed in more or less distinct longitudinal rows; a double row of four spinules extends in the median region of the carapace between the base of the rostrum and the cervical groove.

First abdominal segment with a posterior transverse carina, which bears 7-10 blunt spinules, posterior margin near the base of the pleura with a single spinule. Pleura ending in a sharp anterior tooth. Second segment with a median transverse carina bearing 9 blunt spinules, and a row of 7-11 spinules is present at the posterior margin; pleura in my specimen (a female) broadly rounded, ending in a blunt tooth, anterior margin with



1 or 2 small additional teeth; the carina runs towards the tip of the pleura. Posterior margin of third segment not produced in the median region. Fourth segment with a median carina provided with 8-14 blunt spinules, posterior margin with 5 or 6 spinules, between these two long transverse rows of spinules there is a short one of 2-4 spinules. Posterior margin of fourth segment with a broad blunt incision near the base of the pleura. Pleura broad, rounded, ending in a blunt tooth, with two anterior additional teeth. Fifth segment without carinae, with two transverse rows of spinules, the anterior of 2-5, the posterior of 2 spinules. Posterior margin, as in the fourth segment, with a deep blunt incision near the base of the pleura. Pleura similar to those of the fourth segment, with one anterior additional tooth. Sixth segment glabrous or with one median spinule near the anterior margin and two near the posterior margin. Posterior margin sinuate. Pleura bluntly triangular.

Telson broadly lance-shaped. Upper surface with two longitudinal carinae, which in the posterior half of the telson curve exteriorly and end in the lateral margin. Each carina dorsally provided with one strong spine and often with a minute spinule near the end. The strong spines are provided with a long hair at the

Fig. 1. *Microprosthema scabricaudatum*
(Richters). $\times 18$.

external part of the base. No spines in the median anterior part of the telson. Lateral margin with a carina near the base, posteriorly the carina becomes inconspicuous.

Ophthalmic peduncle with some spinules.

Lower segment of antennular peduncle at outer side with a distinct sharply pointed stylocerite, which is curved forward. First and second segment of the peduncle with some spines. Flagella with rather long setae.

Basal segments of antenna with strong spines, and with a distinct laminate process at the inner margin. Scaphocerite (Pl. III fig. g) reaching slightly beyond the tip of rostrum; entirely different from those of the other *Microprosthema* species, it is very narrow, ending in two distinct teeth, outer margin curved at base, straight in the upper part, without setae and provided with two microscopical spinules; inner margin almost straight or slightly convex, almost parallel to the outer margin, fringed with setae; both surfaces glabrous. The scaphocerite is so narrow and delicate, that my first impression was that it was regenerated, which, however, is very improbable, as the left and right scaphocerite are similarly built.

Third maxillipede, when stretched, reaches with about entire carpus beyond the tip of scaphocerite. Outer margin of ischium with a strong anterior and a small median spine, inner margin with a small anterior spine. Merus with two strong anterior spines, other segments without spines.

All pereopods missing in my specimen; Richters (1880) in his description of the species, does not describe the first and second pereopod at all, and states that the third pereopod is similarly built and spinulated as in *Microprosthema plumicorne*, the chela only is slightly slenderer, furthermore he states that the fourth and fifth pereopod are more thick-set than in *M. plumicorne* and *M. validum*, and that carpus and propodus are not subdivided; according to the figure the propodus bears a ventral row of 16, probably movable spines, and has all the other segments naked.

Uropodal exopod with the outer margin straight and naked, the inner margin convex, not semicircular; outer margin provided with 7 or 8 teeth. Endopod with the outer margin naked with 1 or 2 teeth, inner margin fringed with setae. Both exo- and endopod with a median ridge at the dorsal surface.

Eggs rather large and numerous, those in which the larva is already visible are 0.6-0.7 mm long and about 0.5 mm broad.

Colour. Spirit specimens plain pale brownish yellow. Colour of living specimens unknown.

Size. Richters's specimen measured 12 mm, mine 11 mm.

Vertical distribution. The species probably lives in the superficial waters near the shore.

Horizontal distribution. The species previously is only recorded from Ile aux Fouquets, Mauritius (Richters, 1880). The locality Boo Islands, near N.W. New Guinea, where the Snellius Expedition collected a specimen, forms therefore a considerable extension of the range of distribution.

Microprosthema plumicorne (Richters)

Stenopusculus plumicornis Richters, 1880, Beitr. Meeresfauna Maurit., p. 167, pl. 18 figs. 16-26.

Stenopusculus plumicornis A. Milne Edwards & Bouvier, 1909, Mem. Mus. comp. Zool. Harvard, vol. 27, p. 263.

Microprosthema plumicornis Balss, 1915, Denkschr. Akad. Wiss. Wien, vol. 91 suppl., p. 33.

Description. For the description I refer to Richters (1880).

Size. Richters's specimen measured 11 mm.

Vertical distribution. Probably a species from the coral reefs.

Horizontal distribution. Only known from Richters's record from Ile aux Fouquets, Mauritius.

Spongicola De Haan

Spongicola De Haan, 1849, Fauna Japonica, Crust., p. 189.

non *Spongicola* F. E. Schulze, 1877, Arch. mikr. Anat., vol. 13, p. 795.

Spongicola p.p. Caullery, 1896, Ann. Univ. Lyon, vol. 26, p. 382.

Description. Body stout, depressed. Rostrum well developed, provided with some spines dorsally, with one ventrally. Carapace smooth, some spinules at anterior margin, one at base of rostrum and a row near the anterolateral angle, parallel to the anterior margin.

Abdomen depressed, with a rather indistinct bend. First segment overlaps second, which overlaps third. Dorsal surface of first segment with a posterior transverse ridge, anterior half of first segment before the ridge strongly hollowed. Dorsal surfaces of second to sixth segment glabrous, pleurae of second and third segment broadly rounded, those of fourth to sixth segment more triangular and directed posteriorly. Third segment slightly produced in the median part of posterior margin. Sixth segment with a distinct pleura.

Telson broadly lance-shaped, with a median groove flanked by two longitudinal carinae. These carinae provided with some posteriorly directed spines. Lateral margin of telson provided with several lateral teeth, final margin with 3 or 5 teeth. Posterior half of telson fringed with setae.

Eyes well developed, cornea shorter than stalk. Stalk often with some dorsal spinules. Cornea with pigment and distinct facets.

Basal segment of antennula very long, about twice as long as second segment, third segment much shorter. Stylocerite present. Outer anterior angle of basal segment with a small scale provided with hairs. Antennula provided with two flagella.

Antennal peduncle mostly with some spines, at inner margin a small laminate process is present. Scaphocerite short, semicircular, outer margin straight, provided with some teeth. Inner margin convex, fringed with setae.

Oral appendages not essentially different from those of *Stenopus*.

Third maxillipede, when stretched, reaches to or beyond the tip of scaphocerite. Merus to dactylus with an internal and external row of setae, which are directed ventrally, those of merus proximally converging. Propodus with a setiferous organ at inner anterior margin. Ischium with an internal row of setae only. All segments without spines.

First pereopod, when stretched, reaches with propodus or more beyond tip of scaphocerite. All segments without spinules, some scattered hairs present. No setiferous organs at ventral margin of propodus or carpus.

Second pereopod reaches, when stretched, with entire carpus or larger part beyond the tip of the scaphocerite. No spinules, often some tufts of hair on the tips of the pincers.

Third pereopod about as long as second, but much stronger, especially the propodus; it reaches with a part of the carpus beyond the tip of the scaphocerite. Ischium compressed, mostly with a small anterior dorsal spine; merus narrow, compressed in the lower part, more cylindrical near the top; carpus very short, rapidly broadening towards the anterior margin; propodus very broad and high, dorsally and ventrally serrate, dactylus with one ventral tooth, lower pincer with one or two dorsal teeth.

Fourth and fifth pereopod slightly shorter than third. Dactylus bi- or triunguiculate, short. Propodus with a ventral row of many movable spines, carpus often with some such spines too. Carpus and propodus not subdivided in smaller segments.

Branchial formula differs from that of the previously discussed genera by the fact that the exopod of the third maxillipede is rudimental, it runs as follows:

appendages	maxillipedes			pereopods				
	I	II	III	I	II	III	IV	V
pleurobranchs	—	I	I	I	I	I	I	I
arthrobranchs	—	I	2	2	2	2	2	—
podobranchs	—	I	—	—	—	—	—	—
epipods	I	I	I	I	I	I	I	—
exopods	I	I	rud.	—	—	—	—	—

First pleopod uni-, the others biramous. Basal segments of pleopods

without spinules. No median spines on the ventral surface of the abdominal segments in the males.

Uropods about as long as telson. Exopod ovate or almost circular, outer margin almost straight or slightly convex, without hairs, with some teeth. Inner and posterior margin fringed with setae. Upper surface with two longitudinal ridges, without spinules. Endopod ovate, outer margin without hairs, with some teeth, upper surface with one median ridge. Basal segment of uropod without spinules.

Eggs rather numerous, large.

Size. Specimens of this genus known at present vary in size from 24 to 34 mm.

Vertical distribution. The genus is known from depths of 74-550 m.

Horizontal distribution. The genus is confined to the indopacific region, it is recorded from the Andaman Sea, southern Japan, the Philippines and Hawaii.

Type species is *Spongicola venusta* De Haan.

Remarks. The species described as *Spongicola koehleri*, *S. evoluta*, and *S. inermis* do not belong in the present genus, but in the genus *Spongicoloides*. *Spongicola fistularis* F. E. Schulze (Arch. mikr. Anat., vol. 13, 1877, p. 795) is no Crustacean, but belongs to the Scyphozoa.

Key to the species of *Spongicola*

1. Dactylus of third pereopod with one ventral tooth, which is placed opposite a dorsal tooth of the lower pincer. Dactylus of fourth and fifth pereopods, triunguiculate *Spongicola venusta* De Haan
- Dactylus of third pereopod with one ventral tooth, which fits in two dorsal teeth of the lower pincer. Dactyli of fourth and fifth pereopods biunguiculate. 2.
2. Merus of third pereopod with two ventral spines. Pincers of that pereopod measuring less than $\frac{3}{4}$ of length of palma. *Spongicola andamanica* Alcock
- Merus of third pereopod without ventral spines, with one dorsal and one lateral spine. Pincers of that pereopod measuring more than $\frac{3}{4}$ of length of palma. *Spongicola henshawi* Rathbun

***Spongicola venusta* De Haan (Pl. III fig. j)**

Spongicola venusta De Haan, 1841, Fauna Japonica, Crust., pl. 46 fig. 9.

Spongicola venusta De Haan, 1849, Fauna Japonica, Crust., p. 194, pl. P.

Spongicola Venusta Herklots, 1861, Tijdschr. Ent., vol. 4, p. 148.

"a crab" Gray, 1866, Ann. Mag. nat. Hist., ser. 3 vol. 18, p. 489.

"a crab" Gray, 1867, Ann. Mag. nat. Hist., ser. 3 vol. 19, p. 44.

"eine Palaemonide" Semper, 1867, Arch. Naturgesch., vol. 33 pt. 1, p. 87.

"a Palaemonid" Semper, 1868, Ann. Mag. nat. Hist., ser. 4 vol. 2, p. 28.

"an animal of the crab species" Moore, 1869, Ann. Mag. nat. Hist., ser. 4 vol. 3, p. 198, textfig.

"ein Palaemon" Willemoes-Suhm, 1876, Zeitschr. wiss. Zool., vol. 26 append., p. lxxiv.

Spongicola venusta Miers, 1878b, Journ. Linn. Soc. Lond. Zool., vol. 13, p. 507, pl. 24 figs. 1, 2.

- Spongicola venusta* Bate, 1888, Rep. Voy. Challenger, Zool., vol. 24, p. 213, textfigs. 41, 42, pl. 29.
- Spongicola venusta* Ortmann, 1890, Zool. Jb. Syst., vol. 5, p. 539.
- Spongicola venusta* Thallwitz, 1892, Abh. zool.-anthropol. Mus. Dresden, 1890-91 pt. 3, p. 50.
- Spongicola venusta* Stebbing, 1893, Hist. Crust., p. 212.
- Spongicola venusta* Caullery, 1896, Ann. Univ. Lyon, vol. 26, p. 382.
- Spongicola venusta* Ijima, 1901, Journ. Coll. Sci. Tokyo, vol. 15, pp. 87, 201, 215.
- Spongicola venusta* Thompson, 1901, Catal. Crust. Mus. Dundee, p. 18.
- Spongicola venusta* Doflein, 1902, Abh. Bayer. Akad. Wiss., vol. 21, p. 642.
- Spongicola venusta* Bouvier, 1905a, C. R. Acad. Sci. Paris, vol. 140, p. 983.
- Spongicola venusta* Bouvier, 1908a, C. R. Acad. Sci. Paris, vol. 146, p. 889.
- Spongicola venusta* Bouvier, 1908b, Bull. Mus. Hist. nat. Paris, vol. 14, p. 151.
- Spongicola venusta* A. Milne Edwards & Bouvier, 1909, Mem. Mus. comp. Zoöl. Harvard, vol. 27, p. 264.
- Spongicola venusta* Kemp, 1910b, Journ. mar. biol. Ass. U. K., n. ser. vol. 8, p. 409.
- Spongicola venusta* Balss, 1914a, Abh. Bayer. Akad. Wiss., suppl. vol. 2 pt. 10, p. 74.
- Spongicola venusta* Parisi, 1919, Atti Soc. Ital. Sci. nat., vol. 58, p. 92.
- Spongicola venusta* Arndt, 1933, Mitt. zool. Mus. Berlin, vol. 19, p. 251.
- Spongicola venusta* Yokoya, 1933, Journ. Coll. Agric. Tokyo, vol. 12, p. 44.
- Spongicola venusta* Estampador, 1937, Philipp. Journ. Sci., vol. 62, p. 497.

Museum Leiden:

- Japan; cotypes.—1 ♂ 34 mm, 1 ♀ (ovigerous) 31 mm.
- Japan.—2 ♂ ♂ 24 and 25 mm, 4 ♀ ♀ (all ovigerous) 25-32 mm.
- Japan, Kii; in *Euplectella oweni* Herkl. & Marsh.; March 1, 1930. — 1 ♂ 28 mm, 1 ♀ 31 mm (dry).
- Challenger Sta. 209, 10° 14' N, 123° 54' E, near Cebu; in *Euplectella aspergillum* Owen; 185 m; January 22, 1875; coll. G. C. J. Vosmaer.—1 ♂ 32 mm, 1 ♀ 34 mm
- Locality unknown; in *Euplectella aspergillum* Owen.—2 badly damaged, almost unidentifiable specimens (dry).

Description. Rostrum compressed, triangular at base, straight, longer than half the length of the carapace. Ultimate point reaches about to the base of the last segment of the antennular peduncle, and further than the middle of the scaphocerite. Dorsally it is provided with 8-12, ventrally with one tooth. Lateral margins straight or with some minute teeth.

Carapace smooth, shining when dry, with the cervical groove distinct. At each side of the base of the rostrum a spine is present, also in the type specimens, though they are omitted in De Haan's figure. Antennal spine distinct; a second spine is placed more posteriorly at about the same level. Lateral part of anterior margin with a row of 7 or 8 spines, parallel to this row, but more posteriorly, a row of about 4 spines is present. Posterolateral angles naked.

Pleura of first abdominal segment with a strong anterior tooth, posterior angle rounded; transverse carina ending posteriorly of the anterior tooth of the pleura. Pleurae of second and third segment broadly rounded in the female, more pointed in the male, anterior margin of pleura often provided

with two, posterior margin often with two to four small additional teeth. Third segment slightly produced in the posterior median part. Pleura of sixth segment is much narrower than the rest of the segment and has the top rounded. Margins of the pleurae for a larger or smaller part mostly provided with setae. Posterior margin of sixth segment sinuate.

The two longitudinal carinae on the dorsal surface of telson each provided with two or three spines, which at the inner and outer side of the base mostly are provided with a long hair. Between the bases of the carinae two spines are present, each with a long hair at the inner side of the base. A strong spine is placed at the base of the marginal carina, this carina only distinct in the basal part of the telson, in the upper part it becomes inconspicuous. Lateral margin of telson with three or four teeth, final margin with three teeth, sometimes a fourth and fifth tooth are placed close to the two outer teeth. Besides the row of setae along the posterior part of the margin of the telson, an additional row is present at the final margin.

Eyes with the stalk covered mostly with some spinules. Stalk about as broad as cornea.

Basal segment of antennula very long, about twice or more as long as second segment; third segment about $\frac{3}{4}$ of the length of second. Stylocerite small, but distinct, pointed. Segments without spinules. Upper flagellum stronger than lower.

Peduncle of antenna with one ventral and some anterior spines. Scaphocerite short, semicircular, reaching slightly beyond the tip of rostrum; outer margin straight, with four or five teeth before final tooth. Upper surface with two longitudinal ridges, without spinules.

First pereopod with the dactylus less than half as long as propodus, carpus much longer than propodus and merus, ischium shorter than carpus. Chela with crossing tips.

Second pereopod similarly built as first, but longer and stronger, carpus relatively shorter. Sometimes the second pereopod is densely covered with hairs, sometimes the hairs are scattered on ischium, merus and carpus, but chela is always densely setose, most conspicuously near the pincers. Pincers with crossing tips. De Haan's statement that in the male the second pereopods are asymmetrically built is due to the fact that in the male type specimen the second pereopod has been broken between ischium and coxa and that the ischium, merus, carpus, propodus and dactylus are regenerated, but have not yet reached the original size.

Third pereopods symmetrically built, dactylus shorter than half propodus, carpus very short, even shorter than dactylus, merus too shorter than

propodus, but longer than carpus, ischium about as long as carpus. Ischium without spines or with one small anterodorsal spine. Merus swollen in its anterior part, with a rather small spine in the anterior part of the outer surface and one in the anterior part of the upper margin. Carpus swollen, short, very narrow at base, rapidly broadening towards anterior margin, with a blunt anterior dorsal lobe. Propodus with a very narrow base, broad, swollen, surface with some tubercles; upper margin serrate, teeth of different size, lower margin serrate in the anterior part only, with about 20 blunt teeth. Dactylus dorsally with some tubercles, ventrally with one tooth, which is placed opposite the only dorsal tooth of the lower pincer. Lower pincer at inner surface, near the top, with an additional tooth. Pincers strongly curved inwards at the top.

Fourth and fifth pereopod (Pl. III fig. j) with the propodus slightly less than half as long as carpus, which is about as long as merus, ischium very short. Dactylus triunguiculate, almost similarly built as bifid dactylus, only at the ventral side of the lower tooth a much smaller tooth is present. Propodus with a ventral row of 10-15 movable spines, carpus too with some such spines. Segments with some scattered hairs.

Uropodal exopod with the outer margin provided with 10-16 teeth. Outer margin of endopod with 9-17 spinules, which are placed from the base to close near the top. Posterior third of the outer margin and entire inner margin fringed with setae.

Eggs rather numerous and large, those in which the larvae are not yet visible are 0.7-0.8 mm long and 0.6-0.7 mm broad, those in which the larvae are already visible are 0.9-1.0 mm long and 0.8-1.0 mm broad.

Sexual differences. In the female the pleurae of the abdominal segments are broader and much more rounded than in the males. The males generally are the smaller.

Size. The specimens examined by me measure 24-34 mm, I could find in literature no records of smaller or larger specimens.

Vertical distribution. The species is recorded from depths varying between 74 and 315 m.

Horizontal distribution. The species is only known from southern Japan and from the Philippines. The records in literature are: Japan (De Haan, 1849; Herklots, 1861; Bouvier, 1908), Sagami Bay, Japan (Ortmann, 1890; Dolfein, 1902; Balss, 1914a; Parisi, 1919), Sagami Sea (Ijima, 1901), Vries Island (= Oshima) (Ijima, 1901), Senoumi, Suruga Gulf (Ijima, 1901), N. W. of Kyushyu, Corean Channel (Ijima, 1901), Tsushima, Corean Channel (Parisi, 1919), east of southern Miyazaki-ken (Yokoya, 1933), south of Kyushyu (Ijima, 1901), off Cebu, Philippines (Gray, 1866;

Semper, 1867; Moore, 1869; Willemoes-Suhm, 1876; Miers, 1878b; Bate, 1888; Thallwitz, 1892; Thompson, 1901; Estampador, 1937).

Remarks. This species inhabits Hexactinellid sponges, it is found in the following species: *Euplectella aspergillum* Owen, *E. curvistellata* Ij., *E. marshalli* Ij., *E. oweni* Herkl. & Marsh. and *Hyalonema sieboldi* Gray. The shrimps probably get in the sponges in a young stage, afterwards the sponges grow and close above the shrimps, which then are locked as in a cage, so that they cannot be taken out without damaging the sponge. The shrimps mostly are found in pairs in the sponge. More details on the relations between *Spongiicola* and Hexactinellid sponges are given in the paper of Arndt (1933).

***Spongiicola andamanica* Alcock**

Spongiicola andamanica Alcock, 1901, Descr. Catal. Indian Deep-sea Crust., p. 148, pl. 2 fig. 2.

Spongiicola andamanica Rathbun, 1906, Bull. U. S. Fish Comm., vol. 23 pt. 3, p. 901.

Spongiicola audamanica Bouvier, 1908a, C. R. Acad. Sci. Paris, vol. 146, p. 889.

Spongiicola andamanica A. Milne Edwards & Bouvier, 1909, Mem. Mus. comp. Zoöl. Harvard, vol. 27, p. 264.

Description. As I had no specimens of this species at my disposal, I refer for the description to Alcock (1901).

Size. Alcock's specimen measured 26 mm.

Vertical distribution. The species was collected from about 300-550 m depth.

Horizontal distribution. The only record is that of Alcock (1901) from the Andaman Sea.

Remarks. Alcock in his description of the species italicized the points of difference with *Spongiicola venusta*; many of these points, however, do not exist. Alcock probably had no material of *Spongiicola venusta* and had to rely upon De Haan's description and figure, which in some respects are not quite correct and in other respects wrongly interpreted by Alcock. So the row of spinules near the anterolateral angle of the carapace, which runs parallel to the anterior margin is present in *Spongiicola venusta*, as well as the dorsal spinules on the ophthalmic peduncle, the fifth pair of pereopods in *S. venusta* too is longer than the fourth pair, about in the same relation as in *S. andamanica*. Alcock's statement that the third

Spongiicola andamanica is very closely related to *S. venusta*, the most conspicuous differences I could find are: the merus in *S. andamanica* ventrally has two strong spines, in *S. venusta* no ventral, but one dorsal ane with his figure, which shows the third pereopod only slightly longer. pereopod of *S. andamanica* is much longer than the second is not in accord-

and one lateral. Furthermore the pincers of the third pereopod in *S. venusta* are provided with two, in *S. andamanica* with three internal teeth, and the dactyli of the fourth and fifth pereopods are triunguiculate in *S. venusta*, biunguiculate in *S. andamanica*.

***Spongicola henshawi* Rathbun**

Spongicola henshawi Rathbun, 1906, Bull. U.S. Fish Comm., vol. 23 pt. 3, p. 901, pl. 24 fig. 8.

Description. For the description I refer to Rathbun (1906).

Size. Rathbun's specimen measured 26.2 mm.

Vertical distribution. The species was collected between 310 and 340 m.

Horizontal distribution. The only record is that of Rathbun from the south coast of Molokai Island, Hawaiian Group.

***Spongicoloides* Hansen**

Spongicola p.p. Caullery, 1896, Ann. Univ. Lyon, vol. 26, p. 382.

Richardina p.p. Bouvier, 1905b, C. R. Acad. Sci. Paris, vol. 141, p. 749.

Spongicoloides Hansen, 1908, Dan. Ingolf Exped., vol. 3 pt. 2, p. 44.

Description. Body stout, depressed. Rostrum small, but distinct, with dorsal and often without ventral spines. Carapace smooth or with some small spines near the anterior margin. Cervical groove distinct.

Abdomen depressed, with a rather indistinct bend. First segment overlaps second, which overlaps third. All segments glabrous dorsally. Pleurae broadly rounded or truncated. Third abdominal segment not produced in the median posterior part. Sixth segment with distinct pleurae.

Telson broad, quadrangular or slightly triangular in form, slightly constricted at base. Dorsally with two longitudinal ridges provided with some posteriorly directed small spines. Lateral margins with several teeth, final margin often without teeth. Posterior part of telson fringed with setae.

Eyes distinct. Cornea sometimes very much reduced and sometimes without pigment. Stalk without spinules.

Basal segment of antennula very long, twice or more as long as second; third segment much shorter than second. Stylocerite short but distinct. The two flagella of about the same strength.

Antennae without spines, probably no laminate process present at inner margin. Scaphocerite broad, almost quadrangular in form, outer margin straight or slightly concave, without hairs, with some teeth, inner margin convex, inner and anterior margin fringed with setae.

Oral appendages not essentially different from those of the other genera. Third maxillipede without spines.

First pereopod, when stretched, reaches slightly beyond scaphocerite. Dactylus slightly less than half the length of propodus, carpus about as long as, or slightly longer than merus, much longer than propodus, ischium very short. No spinules or setiferous organs, sometimes hairs on the tips of the pincers.

Second pereopod similarly built as first, only longer and stronger, reaching with a small part of carpus beyond tip of scaphocerite.

Third pereopod strongest and longest, reaching almost with entire carpus beyond scaphocerite. Dactylus much less than half as long as propodus, carpus as long as or shorter than dactylus, merus about twice as long as carpus, ischium very short, of about the same length as carpus. Ischium mostly without, sometimes with spines; merus, carpus and propodus entirely glabrous; dactylus sometimes serrate dorsally, ventral margin irregular; tips of the pincers crossing.

Fourth and fifth pereopods long and slender. Dactylus small, biunguiculate; propodus about half as long as carpus, carpus about as long as merus, ischium very short. Propodus with many, carpus with few ventral spines, all other segments without spines. Carpus and propodus not subdivided.

The branchial formula differs in the four species, it shows a gradual reduction in the number of appendages. It is very strange that in the first five genera dealt with in the present paper the formula is the same and it only shows a small reduction in the sixth genus, while here in one genus there is such a large difference between the species. For comparison I give here the branchial formulae of all the four species of the genus.

Spongicoloides koehleri:

appendages	maxillipedes			pereopods				
	I	II	III	I	II	III	IV	V
pleurobranchs	—	I	I	I	I	I	I	I
arthrobranchs	—	I	2	2	2	2	2	—
podobbranchs	—	I	—	—	—	—	—	—
epipods	I	I	I	I	I	I	I	—
exopods	I	—	—	—	—	—	—	—

Spongicoloides evolutus:

appendages	maxillipedes			pereopods				
	I	II	III	I	II	III	IV	V
pleurobranchs	—	I	I	I	I	I	I	I
anthrobranchs	—	I	I	2	2	2	2	—
podobbranchs	—	I	—	—	—	—	—	—
epipods	I	I	I	—	—	—	—	—
exopods	I	—	—	—	—	—	—	—

Spongicoloides profundus:

appendages	maxillipedes			pereiopods				
	I	II	III	I	II	III	IV	V
pleurobranchs	—	—	I	I	I	I	I	I
arthrobranchs	rud.	rud.	I	I	I	I	I	—
podobranchs	—	rud.	—	—	—	—	—	—
epipods	I	I	I	—	—	—	—	—
exopods	I	—	—	—	—	—	—	—

Spongicoloides inermis:

appendages	maxillipedes			pereiopods				
	I	II	III	I	II	III	IV	V
pleurobranchs	—	—	I	I	I	I	I	I
arthrobranchs	—	—	I	I	I	I	rud.	—
podobranchs	—	rud.	—	—	—	—	—	—
epipods	I	I	I	—	—	—	—	—
exopods	I	—	—	—	—	—	—	—

First pleopod uni-, the others biramous. Basal segments of pleopods without spinules.

Uropods about as long as telson. Exo- and endopod both ovate. Outer margin of exopod without hairs, straight or slightly convex, provided with teeth. Inner and posterior margin fringed with setae. Dorsal surface provided with a median ridge. Endopod with outer margin without hairs or teeth, posterior and inner margin fringed with setae. Dorsal surface with one ridge.

Eggs few and large.

Size. Of this genus specimens are recorded which measure 24-30 mm.

Vertical distribution. The species of this genus were collected at depths varying between 882 and 1478 m.

Horizontal distribution. Recorded from the Atlantic Ocean from Iceland to the Antilles.

Type species is *Spongicoloides profundus* Hansen.

Remarks. Three species of this genus formerly were inserted in the genus *Spongicola*.

Key to the species of *Spongicoloides*

1. Epipods present at bases of pereiopods 1-4.

Spongicoloides koehleri (Caullery)

- No epipods at bases of the pereiopods, sometimes cicatrices of the epipods visible.

2.

2. Third maxillipede and first to fourth pereiopods all with two arthrobranchs. Cicatrices of epipods of pereiopods visible.

Spongicoloides evolutus (Bouvier)

- Third maxillipede and first to fourth pereiopods all with only one arthrobranch. No cicatrices of epipods visible at pereiopods.

3.

3. Cornea as broad as, or broader than stalk. Carapace with some anterior spinules.
Spongicoloides profundus Hansen
- Cornea much narrower than stalk. Carapace entirely glabrous.
Spongicoloides inermis (Bouvier)

***Spongicoloides koehleri* (Caullery)**

- Spongicola Koehleri* Caullery, 1896, Ann. Univ. Lyon, vol. 26, p. 382, pl. 16 figs. 1-9.
Spongicola Koehleri Bouvier, 1905a, C. R. Acad. Sci. Paris, vol. 140, p. 983.
Spongicola Koehleri Bouvier, 1908a, C. R. Acad. Sci. Paris, vol. 146, p. 889.
Spongicola Koehleri A. Milne Edwards & Bouvier, 1909, Mem. Mus. comp. Zoöl. Harvard, vol. 27, p. 264.
Spongicola Koehleri Kemp, 1910b, Journ. mar. biol. Ass. U. K., n. ser. vol. 8, p. 408.
Spongicola Koehleri Sund, 1920, Rep. Sars North Atl. Deep Sea Exped., vol. 3 pt. 2, p. 32.
Spongicola Koehleri Arndt, 1933, Mitt. zool. Mus. Berlin, vol. 19, p. 252.

Description. As I have no specimens of this species at my disposal, I refer for the description to Caullery (1896) and Kemp (1910b).

Size. Kemp's (1910b) adult specimens measured 25-46 mm, some juveniles about 8 mm; Caullery (1896) gives no measurements of the specimens examined by him. Sund's (1920) specimen measured 24 mm.

Vertical distribution. The species is recorded from 760 m (Kemp, 1910b), 1215 m (Sund, 1920) and 1410 m (Caullery, 1896).

Horizontal distribution. The species is known from the Bay of Biscay and from the Atlantic Ocean near the Strait of Gibraltar, the exact localities are: 45° 57' N, 6° 21' W (Caullery), 48° 7' N, 8° 13' W (Kemp) and about 36° N, 7° W (Sund).

Remarks. Caullery's as well as Kemp's specimens inhabited the Hexactinellid sponge *Regadrella phoenix* O. Schmidt.

***Spongicoloides evolutus* (Bouvier)**

- Spongicola evoluta* Bouvier, 1905a, C. R. Acad. Sci. Paris, vol. 140, p. 983.
Spongicola evoluta Bouvier, 1908a, C. R. Acad. Sci. Paris, vol. 146, p. 889.
Spongicola evoluta A. Milne Edwards & Bouvier, 1909, Mem. Mus. comp. Zoöl. Harvard, vol. 27, p. 264.

Description. In the three papers mentioned above some characteristics of the species are mentioned, but an extensive description or figure is badly needed.

Size. Unknown.

Vertical distribution. The only known specimen was collected at a depth of 882 m.

Horizontal distribution. The specimen was collected off the west coast of the Sahara (Bouvier, 1905a).

Spongicoloides profundus Hansen

Spongicoloides profundus Hansen, 1908, Dan. Ingolf Exped., vol. 3 pt. 2, p. 45, pl. 3 figs. 5a-k, pl. 4, figs. 1a-l.

Spongicoloides profundus Williamson, 1915, Nord. Plankt., vol. 18 pt. 6, p. 352.

Description. For the description I refer to Hansen's paper.

Size. Hansen's largest specimen measured 24 mm.

Vertical distribution. About 1480 m.

Horizontal distribution. The only record is from waters southwest of Iceland, 60° 37' N, 27° 52' W (Hansen, 1908).

Remarks. In the same haul of the trawl several sponges were present; if *Spongicoloides profundus* inhabited these sponges is not known.

Spongicoloides inermis (Bouvier)

Richardina inermis Bouvier, 1905b, C. R. Acad. Sci. Paris, vol. 141, p. 749.

Spongicola inermis Bouvier, 1908a, C. R. Acad. Sci. Paris, vol. 146, p. 888.

Spongicola inermis Bouvier, 1908b, Bull. Mus. Hist. nat. Paris, vol. 14, p. 151.

Spongicola inermis A. Milne Edwards & Bouvier, 1909, Mem. Mus. comp. Zoöl. Harvard, vol. 27, p. 266, figs. 89-91, pl. 9 figs. 1-14.

Description. For the description I refer to A. Milne Edwards & Bouvier (1909).

Size. The specimens described by A. Milne Edwards & Bouvier measured 25-30 mm.

Vertical distribution. Collected at a depth of about 780 m.

Horizontal distribution. All known specimens were collected off St. Lucia in the Caribbean Sea (Bouvier, 1905b; A. Milne Edwards & Bouvier, 1909).

NEPHROPSIDAE

In 1915, De Man, in the monographs of the Siboga Expedition, vol. 39a2, gave a list of all genera and species of Nephropsidae known at that moment. As a result of later investigations this list must be corrected in the following points:

1. *Enoplometopus pictus* A. Milne Edwards and *E. occidentalis* (Randall) are specifically distinct (vid. Bouvier, 1915, p. 182).

2. The genus *Eutrichocheles* Wood Mason does not belong to the Nephropsidae but to the Axiidae (vid. Balss, 1933, p. 86, and Chopra, 1933, p. 277).

3. The genus *Homoriscus* Rathbun (1902a) is identical with the genus *Naushonia* Kingsley (1897) and belongs to the family Laomediidae (vid. Chace, 1939b, p. 524). Nobili (1906a, p. 83), Balss (1933, p. 86), and Glassell (1938, p. 414) brought the genus to the family Crangonidae.

4. In the genus *Nephrops* the following species have afterwards been described as new: *N. sagamiensis* Parisi (1917, p. 15), *N. intermedius* Balss (1921a, p. 176), and *N. binghami* Boone (1927, p. 91, figs. 18-20); the two former names, however, are synonyms, the latter is regarded by Glassell (1934, p. 454) as a synonym of *N. rubellus* Moreira.

5. In the genus *Eunephrops* a new species *E. cadenasi* is described by Chace (1939a, p. 40).

6. *Nephropsis aculeata* Smith (1881, p. 431) is considered by Bouvier (1917, p. 20) as a valid species.

Bouvier (1917) gave a key to the genera of Nephropsidae (p. 13), dealt with their affinities and variation, and more extensively treated the genus *Nephropsis*, to the species of which a key was given (p. 20).

In the three collections at my disposal only the genera *Enoplometopus* and *Homarus* are represented.

Enoplometopus A. Milne Edw.

Nephrops Randall, 1839, Journ. Acad. nat. Sci. Philad., vol. 8, p. 139 (non Leach, 1814).
Enoplometopus A. Milne Edwards, 1862a, Ann. Sci. nat. Zool., ser. 4 vol. 17, p. 362.

Of this interesting genus at present five species have been described, two of which, *E. antillensis* Lütken and *E. dentatus* Miers, probably are identical.

Most authors consider this genus as belonging to the Nephropsidae, Gurney (1938), however, places it among the Axiidae¹⁾, because "*Enoplometopus* has chelae upon leg 1 only". Bouvier (1917, p. 13, in the key) also states that the second and third pereopods of *Enoplometopus* are without true chelae; he regards them as subchela. The definition of subchela given by Zimmer in Handbuch der Zoologie, vol. 3 pt. 1, p. 304, runs as follows: „Das Ende einer Extremität, bei der das letzte Glied gegen das vorletzte oder gegen eine Verbreiterung des vorletzten Gliedes, nicht aber gegen eine Verlängerung des letzteren schlägt."; the second and third pereopods of *Enoplometopus*, therefore, must be regarded as true chelae because, as shown in Pl. V fig. 1 the dactylus strikes against a prolongation of the propodus. Also the fact that in adult forms no appendix interna is present in the pleopods (except in the second pleopod of the male) is an argument for the retention of this genus in the family Nephropsidae.

While Bouvier (1917) found affinities between this genus and the

1) Cf. in the end of his introduction, p. 294; in the systematical part, however, he still ranges it under the Nephropsidae.

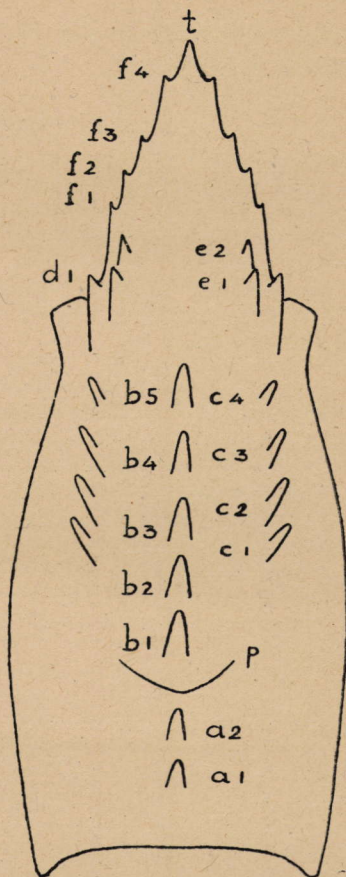
Penaeidae, Gurney (1938) pointed to the relation with the Axiidae.

In the description of the members of this genus given below, the spines of the carapace are named as is indicated in the accompanying diagram (textfig. 2).

The oral parts of the adult *Enoplometopus* never have been figured, except Bouvier's (1915) figure of the second maxillipede of *E. occidentalis*. Figures of the oral parts of a young postlarval stage are given by Gurney (1938, figs. 3, 4). Here the oral parts of the adult *E. antillensis* are represented.

The branchial formula also is known only from the young postlarval stage (Gurney, 1938). In the adult *E. occidentalis* I found the following formula:

Fig. 2. Diagram of the carapace of *Enoplometopus*. a 1-2, postcervical spines; b 1-5, median spines; c 1-4, lateral spines; d, supraocular spine; e 1-2, intermediate spines; f 1-4, lateral teeth of the rostrum; p, postcervical groove; t, apex of the rostrum.



appendages	maxillipedes			pereiopods				
	I	II	III	I	II	III	IV	V
pleurobranchs	—	—	—	—	I	I	I	I
arthrobranchs	—	—	2	2	2	2	2	—
podobranchs	—	I	I	I	I	I	I	—
epipods	I	I	I	I	I	I	I	—
exopods	I	I	I	—	—	—	—	—

It differs from Gurney's formula by the absence of the pleurobranch on the first pereiopod and by the presence of a podobranch on maxillipede II (this podobranch, however, is figured indeed by Gurney for his specimen).

The present genus differs from all other genera of Nephropsidae by the fact that the second pleopod of the male is provided with two appendices, viz., an appendix interna (= stylamblys) and an appendix masculina. This it has in common with the Eucyphidea and Axiidae, but there a stylamblys is present also in the pleopods 3-5, where it is missing in adult stages of *Enoplometopus* (in postlarval stages as *E. longirostris* De Man and the

stage mentioned and figured by Gurney (1938) all pleopods are provided with a stylamblys).

Key to the indopacific species of *Enoplometopus*¹⁾

1. Rostrum not very long, reaching to or slightly beyond the tip of scaphocerite, lower margin of rostrum without teeth. Chelae provided with strong marginal spines. First pleopods present. Telson posteriorly truncated or rounded, never ending in a median tooth. Adults. 2.
- Rostrum very long, reaching far beyond tip of scaphocerite, lower margin of rostrum serrate. Chelae without spines. First pleopods absent. Telson posteriorly produced in a strong median spine. Postlarval stage.

Enoplometopus longirostris De Man

2. Only one intermediate spine on carapace and two postcervical spines. Chelae with very long and slender pinners, upper pincer without external spines. Pleurae of abdominal segments ending in a sharp, posteriorly curved median tooth. Posterior margin of sixth abdominal segment with three blunt median teeth, flanked by two strong spines. Lateral margin of telson with two median spines, posterolateral angles also with two spines. 3.

Enoplometopus antillensis Lütken

- Two intermediate and no or one postcervical spine on carapace. Chelae with relatively broad compressed pinners, upper pincer with strong external spines and tubercles. Pleurae of abdominal segments rounded or bluntly pointed. Sixth abdominal segment with three median blunt teeth only at posterior margin. Lateral margin of telson with only one median spine, posterolateral angles with three spines.

3. One postcervical spine present. Upper pincer of chela externally with two or three strong anterior spines, rest of margin with tubercles. Lateral surface of chela with one or more rather indistinct rows of tubercles. Carpus of second and third pereopod with an anteroventral spine.

Enoplometopus occidentalis (Randall)

- No postcervical spine. Upper pincer of chela externally bordered with strong spines, which are of about the same size. Lateral surface of chela with many large tubercles. Carpus of second and third pereopod without spines.

Enoplometopus pictus A. Milne Edwards

***Enoplometopus occidentalis* (Randall) (Pl. V figs. a, c, f, i)**

Nephrops occidentalis Randall, 1840, Journ. Acad. nat. Sci. Philad., vol. 8, p. 139.

Nephrops occidentalis Gibbes, 1850, Proc. Amer. Ass. Adv. Sci., vol. 3, p. 195.

Nephrops occidentalis Gibbes, 1852, Proc. Acad. nat. Sci. Philad., 1850, p. 25.

Nephrops occidentalis Stimpson, 1857, Boston Journ. nat. Hist., vol. 6, p. 495.

Enoplometopus pictus Miers, 1880a, Ann. Mag. nat. Hist., ser. 5 vol. 5, p. 380.

Nephrops occidentalis Kingsley, 1883, Bull. Essex Inst., vol. 14, p. 131, pl. 2 fig. 1.

Enoplometopus pictus De Man, 1888a, Arch. Naturgesch., vol. 53 pt. 1, p. 486, pl. 21 fig. 3.

Enoplometopus pictus Ortmann, 1894, Denkschr. med.-naturw. Ges. Jena, vol. 8, p. 21.

Enoplometopus occidentalis Ortmann, 1897, Zool. Jb. Syst., vol. 10, p. 274.

Nephrops occidentalis Kingsley, 1899, Amer. Nat., vol. 33, p. 822.

Enoplometopus occidentalis Rathbun, 1906, Bull. U. S. Fish Comm., vol. 23 pt. 3, p. 900, pl. 17 fig. 2.

Enoplometopus occidentalis Bouvier, 1910, Bull. Mus. Hist. nat. Paris, vol. 16, p. 376.

1) If *E. dentatus* is identical with *E. antillensis*, this key includes all species of *Enoplometopus* known at present.

- Enoplometopus occidentalis* Bouvier, 1914, C. R. Acad. Sci. Paris, vol. 159, p. 700.
Enoplometopus occidentalis Bouvier, 1915, Bull. sci. France Belg., vol. 48, p. 182, textfig. 1, pl. 7 fig. 1.
Enoplometopus occidentalis De Man, 1924, Arch. Naturgesch., vol. 90 pt. 2, p. 57, fig. 20.
Enoplometopus occidentalis Balss, 1933, Mitt. zool. Mus. Berlin, vol. 19, p. 87.
Enoplometopus occidentalis Barnard, 1934, Nature Lond., vol. 134, p. 665.
Enoplometopus occidentalis C. von Bonde & Marchand, 1935, Fish. Bull. Fish. mar. biol. Surv. S. Afr., vol. 1, p. 6.

Museum Leiden:

Ambon; leg. D. J. Hoedt. — 1 ♂ 93 mm.

Museum Amsterdam:

Ambon; 1885; leg. J. Brock; coll. J. G. de Man. — 1 ♀ 40 mm.

Description. Rostrum depressed, hollowed above, base about as broad as half the length of rostrum, apex pointed, margins with 3 or 4 strong teeth. Length of rostrum (from tip to posterior margin of orbit) about half the length of rest of carapace, when measured in dorsal line.

Carapace (Pl. V fig. a) more or less compressed, densely covered with short hairs; where these hairs are worn away the surface is shining and minutely pitted by the implantations of the hairs. Only one postcervical spine is present; of the five median spines, the fifth, which is blunt and provided with two long hairs at the top, lies just behind the orbits; the other median spines are sharply pointed. There are three or four lateral spines, the first of which is placed at a level between the first and second median, the third at a level between the third and fourth median. Two intermediate and one strong supraocular spine are present. Below the eye the anterior margin of the carapace is produced in a sharp point, forming thereby the lower margin of the orbit. Ventrally of the implantation of the antenna the anterior margin of carapace bears one small spine. The entire margin of carapace is fringed with setae.

The abdomen (Pl. V fig. c) is covered with short tomentose hairs, except for a rather large part along the anterior and a small part along the posterior margin of each segment; here too the surface is shining and minutely pitted when the hairs are worn away. Faint sculptations are visible on the dorsal surface. The first abdominal segment is short and narrow, with small pleurae and a transverse groove near the posterior margin. The other segments have the lateral margins of the broad pleurae rounded or bluntly pointed. The pleura of the second segment overlaps those of the first and third segment; that of the sixth segment ends in a sharply pointed lateral angle. The posterior margin of this segment bears three blunt median teeth, between which some long hairs are implanted; near the anterolateral angles

of the telson, the posterior margin of the sixth somite at each side is provided with a deep incision, at the interior side of which a row of long hairs is present, furthermore the entire margin is fringed with setae.

The telson (Pl. V fig. f) is slightly longer than its basal breadth, almost quadrangular and slightly narrower at top than at base; lateral margins straight, naked and in the middle provided with one movable lateral spine; posterior margin slightly convex, fringed with long hairs and setae, posterolateral angles rounded and provided with three movable spines, the inner of which are strongest. The upper surface of telson bears some tubercles on which some long hairs are implanted, four of these tubercles are placed in a transverse row along the posterior margin, two in the centre of the telson and a broad median tubercle in the anterior part. The lower margin at each side bears a row of setae near the lateral margin.

The eyes are large, globose, partly covered by the rostrum. Cornea black, about as long as the stalk.

The antennular peduncle is provided with some longitudinal rows of setae. The basal segment is about twice as long as the second, which is about twice as long as the third. Third segment provided with a small but distinct anterodorsal spine. The flagella are about one third of the length of the entire body, the outer is the stronger, it becomes broader in the anterior part and then rapidly narrows to the top, the inner slenderer flagellum is slightly longer than the outer.

The basal segment of the antennal peduncle ventrally bears a strong spine at the outer side of the aperture of antennal gland. The second segment bears a strong curved exterior spine at the base of the scaphocerite. The peduncular segments of the flagellum bear no spines at all; the flagellum is about as long as the whole body. The scaphocerite is broadest at base, gradually tapering towards the apex, which is provided with a final tooth; exterior margin of scaphocerite straight, entire, naked, inner margin convex, fringed with setae. Upper surface of scaphocerite with a longitudinal carina, which is most distinct near the base.

Third maxillipede reaches with entire propodus beyond tip of rostrum. All segments more or less triangular in transverse section, provided with setae at the inner margins, except the upper inner margin of ischium, which is naked and provided with about 18 small teeth. The lower inner margin of propodus bears two spines; ischium and merus with an anterodorsal, propodus with an anteroventral spine.

First pereopod strong, chelae less than three times as long as broad, compressed; fingers rather broad, about as long as or slightly longer than palma, bordered with long hairs. The fingers have the tips curved and

crossing, at the inner side they are provided with teeth of different size. The dactylus dorsally bears a double row of some (in my adult specimen 9) tubercles and three strong spines in the anterior part; the lateral surface bears, near the lower margin in the posterior half, a row of about four blunt tubercles, furthermore two tubercles are placed in the median region of the dactylus, near the articulation with the propodus. The propodus dorsally is provided with a double row of about six spines, between each two successive spines two small tubercles are placed. A double row of about 16 spines is present at the lower margin. The lateral surface is densely tomentose and provided with a rather distinct median longitudinal row of tubercles, often with two indistinct additional rows. Near the upper and lower margin some tubercles, which are provided with long hairs, are present. Carpus is short and triangular, with strong spines at anterior margin and on upper surface, lower surface smooth; the spines at the upper anterior margin very strong and broad, almost triangular. Merus strongly compressed at base, becoming thicker towards top, dorsally with a double row of five spines, which anteriorly diverge; ventrally with two rows of six spines, furthermore some spines are placed at the anterior margin. Ischium strongly compressed, lower margin with one anterior spine, upper margin with a row of seven spines. Basis with some small spinules at anterior margin.

Second to fifth pereopod almost similarly built, posteriorly they become shorter. Second and third pereopod chelate, fourth and fifth without distinct chelae. Dactylus with some strong spines, a ventral row of very small spinules and many tufts of hair. Propodus in second and third pereopod with a distinct prolongation, which ends in some strong spines, and which has the upper margin provided with a row of small spinules. In the fourth and fifth pereopod this prolongation is replaced by some spines, the spines of the fourth pereopod stronger than those of the fifth. Propodus cylindrical, about three times as long as dactylus. Carpus about half as long, merus about as long as propodus. Carpus and merus in pereopod 2 and 3 with an anteroventral spine. Ischium very short, about half as long as merus. The seminal receptacle in my female specimen has already been described and figured by De Man (1924); therefore the sternum of the male will be described here only. As in the female the sternum of the male bears behind the first, second and third pair of pereopods a vertical plate ending in two spines, those behind the second and third pair reach forward between the bases of the pereopods and at their base are provided with two additional spines, the third plate moreover shows an indication of two lateral spines behind the anterior ones. Between the third and fifth pere-

opod the plates become so excavate, that they can be considered as two longitudinal vertical plates, which run at each side along the bases of the pereopods. They begin between the third and fourth pereopod and end slightly before the fifth. Their upper margin is provided with two anterior spines before the fourth pereopod and with 2-5 spines between the fourth and fifth pereopods.

The first pleopods (Pl. V fig. i) both in male and female uniramous, the others biramous. The shape of the pleopod in the male is entirely different from that of the other pleopods, it has become an organ, which functions during copulation (the "stylet" of Herrick, 1911, Bull. U. S. Bur. Fish., vol. 29, p. 289, pl. 43 fig. 5, pl. 39 fig. 1a). In the female this pleopod is very narrow and slender, weak and setose. The second pleopod in the male bears a stylamblys and an appendix masculina, while the other pleopods have no appendix at all, just as the pleopods of the female.

The basal segment of the uropods by a deep dorsal groove is divided into two parts, each of which is provided with a strong posteriorly directed spine. Exo- and endopod are triangular in shape. Outer margin of exopod straight and naked, posterior margin strongly convex and provided with long hairs, inner margin straight and provided with hairs also. Posterolateral angle of exopod with two strong spines, the inner of which is the stronger. A transverse groove divides the exopod into two parts, which articulate along that groove; anterior margin of the groove with a row of about 20 posteriorly directed spinules, in the middle one spinule is stronger than the others. Upper surface of anterior part of exopod with a longitudinal carina. Endopod with lateral margins almost straight, naked, posterior margin convex, provided with a row of setae; posterolateral angle with one spine, upper surface with a longitudinal carina. About three tubercles, on which long hairs have been implanted, are present at the exterior margin of the endopod.

Colour. The colour in my male specimen, which was collected about 1865, has almost entirely disappeared, some red bands are visible on the pincers and some light spots on the rest of the surface. Many of the long hairs, which are scattered over the entire body, have the upper half coloured bright greenish blue.

Size. The specimens recorded in literature vary between 40 mm (De Man, 1888a) and 140 mm (Rathbun, 1906).

The type specimen is preserved in the Philadelphia Museum.

Distribution. The species has an indopacific distribution and is rather rare, notwithstanding it is the most common species of the genus. The records in literature are: Natal coast (Barnard, 1925; C. von Bonde &

Marchand, 1935), Port Louis, Mauritius (Bouvier, 1910, 1914, 1915), Ambon (Miers, 1880a; De Man, 1888a, 1924; Ortmann, 1894), Banda (Balss, 1933), Hawaiian Islands (Kingsley, 1883; Rathbun, 1906), N.W. coast of America (Randall, 1840). The last record, however, probably is due to wrong labelling, and as already pointed out by Kingsley (1883), Ortmann (1897) and Rathbun (1906) the specimen probably originates from the Hawaiian Islands.

Enoplometopus pictus A. Milne Edw.

Enoplometopus pictus A. Milne Edwards, 1862a, Ann. Sci. nat. Zool., ser. 4 vol. 17, p. 362.

Enoplometopus pictus A. Milne Edwards, 1862b, in Maillard, Note Ile Réunion, Ann. F, p. 15, pl. 19.

Enoplometopus pictus Hoffmann, 1874, Rech. Faune Madagasc., vol. 5 pt. 2, p. 42. non *Enoplometopus pictus* Miers, 1880a, Ann. Mag. nat. Hist., ser. 5 vol. 5, p. 380. non *Enoplometopus pictus* De Man, 1888a, Arch. Naturgesch., vol. 53 pt. 1, p. 486, pl. 21 fig. 3.

non *Enoplometopus pictus* Ortmann, 1894, Denkschr. med.-naturw. Ges. Jena, vol. 8, p. 21.

Enoplometopus pictus Bouvier, 1914, C. R. Acad. Sci. Paris, vol. 159, p. 700.

Enoplometopus pictus Bouvier, 1915, Bull. sci. France Belg., vol. 48, p. 182.

Till 1914 this species was considered identical with *E. occidentalis* (Randall); in 1915 Bouvier pointed out the differences between the two species. The type specimen described by A. Milne Edwards is preserved in the Paris museum and at present is the only one known to belong to this species, all other specimens described as *E. pictus* belong to *E. occidentalis*.

Size. Milne Edwards's specimen measured 130 mm.

Distribution. The only record is Réunion (A. Milne Edwards, 1862).

Enoplometopus antillensis Lütken (Pl. V figs. b, d, e, g, h, j, k, l, Pl. VI figs. a-e, Pl. VII figs. a, b)

Enoplometopus antillensis Lütken, 1865, Vidensk. Medd. naturh. Foren. Kbh., vol. 6, p. 265.

? *Enoplometopus dentatus* Miers, 1880a, Ann. Mag. nat. Hist., ser. 5 vol. 5, p. 381, pl. 15 fig. 7.

Enoplometopus antillensis De Man, 1916, Siboga Exped., mon. 39a2, p. 96.

? *Enoplometopus dentatus* De Man, 1916, Siboga Exped., mon. 39a2, p. 96.

Museum Amsterdam:

Banda; received May, 1921; leg. E. van der Velde. — 1 ♂, 1 ♀ 104 and 117 mm.

Description. Rostrum depressed, hollowed above, base broad, about as broad as half the length of rostrum, tip sharply pointed, left margin with four, right margin with three lateral teeth (it is very remarkable that in the type as well as in my specimens this difference in the armature of the left

and right margin is present). Length of rostrum (from tip to posterior margin of orbit) about half the length of rest of carapace, when measured in dorsal line.

Carapace (Pl. V fig. b) more or less compressed, densely covered with short hairs, where these hairs are worn away the surface is shining and minutely pitted by the implantations of the hairs. Two postcervical spines are present; of the five median spines the fifth is sharply pointed and similar in shape as the others; it lies a short distance behind the orbit. There are three or four lateral spines, the first of which is placed at the same level or slightly behind the second median spine, the third about at the same level of the fourth median spine. Only one intermediate spine is present; as in the other species of this genus there is also one strong supraocular spine. Below the eye the anterior margin of the carapace is produced in a sharp point, thereby forming the lower margin of the orbit. Below the antenna the anterior margin of carapace is provided with one strong and one or two smaller spines, the smaller are placed below the stronger but sometimes they are absent. The entire margin of carapace is fringed with setae.

The abdomen (Pl. V fig. d) is entirely smooth and shining, but numerous minute pits indicate that a cover of short hairs, as on carapace, has been present. These pits are missing in the region along the anterior margin of the segments. First abdominal segment is short and narrow, with small pleurae and a faint transverse groove near the posterior margin. The other segments have the pleurae broad and laterally produced in a sharply pointed tooth, which is curved posteriorly. This tooth is very strong in the second, third and fourth segment, much smaller in the fifth and absent in the sixth. The posterolateral angles of the abdominal segments are bluntly pointed. As in *E. occidentalis* the pleura of the second segment overlaps those of the first and third segment. The pleura of the sixth segment ends in a pointed angle. The posterior margin of this segment bears three blunt median teeth, flanked by two rather strong sharp spines; near the anterolateral angles of the telson the posterior margin at each side is provided with a rather deep incision, the entire margin is fringed with setae, it also bears some long hairs.

The telson (Pl. V figs. g, h) is almost quadrangular, its length is about equal to its basal breadth, it is slightly narrower at top than at base; lateral margins straight, naked and provided in the middle with a pair of small sharp movable spines; posterior margin slightly convex, fringed with long hairs and setae, posterolateral angles rounded and provided with two movable spines, the inner of which is the stronger. The upper surface of

telson bears some tubercles on which some long hairs have been implanted, near the posterior margin a transverse row of four such tubercles is present, in the centre of the telson there are two tubercles, and in the anterior part one broad median tubercle. The lower surface of telson with a row of setae at each side near the lateral margin.

The eyes are large, globose, partly covered by the rostrum. Cornea black and about as long as, or slightly longer than stalk.

The basal segment of antennular peduncle is longest, about $1\frac{1}{2}$ times as long as second segment, which is about $1\frac{1}{2}$ times as long as third. At their inner side, the basal segment also at the upper surface, the segments are provided with hairs. Flagella two, rather short, about $\frac{1}{3}$ - $\frac{1}{4}$ of the length of the whole body; the outer flagellum is stronger and shorter than the inner, it becomes broader near the anterior part and then rapidly narrows in the top.

The basal segment of antennal peduncle at its ventral surface bears a strong spine at the external side of the aperture of the antennal gland. The second segment bears a strong curved spine at the outer margin, near the base of the scaphocerite. The basal segment of the peduncle of the flagellum at the ventral surface near the top is provided with a small spinule and with a row of setae at the inner margin. The second segment is slightly longer than the last. Flagellum rather short, about half as long as the whole body. Scaphocerite broadest at base, at first gradually, near the top rapidly narrowing into a final tooth. Outer margin straight, entire, naked, inner margin curved and fringed with setae. Upper surface with a longitudinal carina, which is most distinct at base.

For the oral parts I refer to the figures (Pl. VI figs. a-e).

Third maxilliped reaches with entire or part of propodus beyond the tip of rostrum. All segments more or less triangular in transverse section, at the inner margins provided with setae, except ischium, which bears no hairs at the upper inner margin, but is provided there with a row of about 20 spinules. Lower inner margin of merus with a row of 5 spines. Ischium, merus and propodus provided with an anterior spine at the outer margin. Exopod long and slender, anterior part divided into many segments.

First pereopod (Pl. V fig. e) strong, chela very long and slender, about six times as long as broad, fingers about as long as palma, narrow and cylindrical, with sharp inward curved crossing tips; their inner margin provided with small teeth of different size, the rest of the surface without spines, some long hairs are present. Palma slightly compressed, upper margin provided with a double row of about 5 spines, lower margin with a single row of about 9 spines, the last of which is placed at the base of the

lower pincer. The rest of the surface is smooth and shining. Carpus very short, triangular, provided with two dorsal rows of three or four spines, one or two spines on the rest of the surface, especially at the anterior margin. Merus compressed, strongest so near the base, with a single dorsal row of 9 spines, a short additional row of three spines near the anterior margin and one strong anterodorsal spine; ventrally a double row of about 8 rather small spines is present; anterior margin at ventral part with two strong spines, lateral surface smooth. Ischium compressed, with some anterodorsal spines.

Second pereopod with a small chela, both pincers ending in some spines and with a row of spinules at the inner margin, entire chela with many tufts of hair. Propodus very long, four or five times as long as dactylus, carpus slightly less than half the length of propodus, merus of same length as propodus, with a strong anteroventral spine, ischium again very short; all segments almost cylindrical, glabrous. Pereopods 3-5 missing in both specimens.

In the female (Pl. VII figs. a, b) the sternum posteriorly of the bases of the first and second pereopods bears a median vertical plate, which ends in two spines; in the first segment this plate is placed behind the bases of the first pereopods, while in the second segment it reaches forward between the bases, this last plate bears two additional spines near the base. The seminal receptacle, which is placed between the third, fourth and fifth pairs of pereopods, is elongate triangular, broadest posteriorly; the anterior margin is rounded and provided at each side dorsally with two teeth, it is constricted between the bases of third and fourth pereopods. Between the third and fourth pereopod the upper lateral margin at each side bears three denticles. The posterolateral angles are provided with two strong anteriorly directed spines. In the posterior half of the receptacle a median slit is present, which is covered by long transverse hairs.

The male has the receptacle replaced by two posteriorly diverging longitudinal vertical plates, which run along the bases of the pereopods, they start slightly behind the third pereopod and end slightly before the fifth pair. Anteriorly they end in a strong short spine, which is directed anteriorly; except this spine the dorsal margin of each plate before the base of the fourth pereopod is provided with two small teeth; posteriorly each plate ends in a strong forwardly curved spine.

The first pleopod in the female is uniramous, rather long, very narrow and slender; in the male (Pl. V fig. j) it is modified to an accessory organ for the copulation, and entirely differently shaped from that of *E. occidentalis*. The second pleopod in the male (Pl. V fig. k) is biramous and just

as in *E. occidentalis* bears two appendices: a stylamblys and an appendix interna. The other pleopods, and also those of the second to fifth abdominal segment in the female are biramous and without any appendix.

The basal segment of the uropods dorsally is divided into two parts by a longitudinal groove; each of these parts ends posteriorly in a strong spine. Exo- and endopod both are triangular in shape, broadest posteriorly. Exopod with the lateral margins straight, outer margin naked, inner provided with setae; posterior margin slightly convex, provided with long hairs. A transverse groove divides exopod into two parts, which articulate along that groove. Anterior margin of the groove with a row of about 20 spinules, one of those spinules is larger than the others. Upper surface of anterior part of exopod with a faint longitudinal carina; both surfaces covered with tomentose hairs, just as on carapace, abdomen, telson and endopod. Posterolateral angle of exopod with 2 (or 3) strong spines. Endopod with the lateral margins straight and naked, posterior margin strongly convex and provided with long hairs. Upper surface with a faint longitudinal carina, outer posterolateral angle with a strong spine.

Colour. Some faint transverse red bands are present on the chela; in the other parts the colour is almost entirely faded away.

The specimens studied by me agree with Lütken's description. Furthermore Dr. K. Stephensen from the Zoological Museum at Copenhagen was so kind to compare sketches of my female specimen (carapace, chela, sternum, abdomen and telson) with the type, also a female, which is preserved in the Copenhagen Museum. The only differences between the type and my specimens are:

1. The seminal receptacle in Lütken's specimen bears at the part anterior of the third pereopod three teeth at each side, while in my specimen only two are present; between the third and fourth pereopod the type bears 4-5 denticulations, my specimen only three (Pl. VII figs. a and b).

2. The posterior margin of telson in the type is more convex (Pl. V figs. g and h).

3. The outer posterolateral angle of the uropodal exopod bears three spines in Lütken's specimen and only two in mine. This last feature was only distinct in one uropod of my female, as the angle of the other uropod of this specimen and both those of the male were damaged.

I entirely agree with Dr. Stephensen that these differences are of little importance and probably due to age only (Lütken's specimen measures 61 and the Banda specimen 117 mm), so that the identification of my specimens with *Enoplometopus antillensis* is fully justified.

For comparison figures of the sternum (Pl. VII fig. b) and the telson

(Pl. V fig. h) of the type specimen, drawn by Dr. Stephensen, who kindly placed them at my disposal, are given here.

Enoplometopus dentatus Miers probably is identical with this species; Miers gave only the following characteristics: "a species, which is distinguishable from the Indo-Pacific *E. pictus* by the slenderer chelipedes, which are smooth above, and by the existence of a distinct tooth on the lateral margin of the second to fifth postabdominal segments". From the last character a figure is given, which agrees entirely with *E. antillensis*. But as the other characters of this species are unknown one cannot identify the two species with certainty.

Distribution. The species is only known from two localities, namely West Indies (Lütken, 1865) and the present record from Banda (Moluccas), while *E. dentatus* was recorded from St. Helena. The record Banda makes this species, which till now was known only from the Atlantic, to a circumtropic form. An error in the labelling is very improbable, as Mrs. W. S. S. van der Feen née van Benthem Jutting of the Zoölogical Museum at Amsterdam informed me, the more as the two specimens were preserved in separate jars, which bore labels with the same indication.

The occurrence of a species in the Indopacific as well as in the Caribbean region is shown by more species dealt with in this paper, viz., *Stenopus hispidus*, *Parribacus antarcticus*, *Palinurellus gundlachi*, and *Iustitia longimana*.

***Enoplometopus longirostris* De Man**

Enoplometopus longirostris De Man, 1888a, Arch. Naturgesch., vol. 53 pt. 1, p. 488, pl. 21 fig. 4.

Enoplometopus longirostris De Man, 1921, Zool. Meded., vol. 6, p. 94.

Enoplometopus longirostris De Man, 1922, Siboga Exped., mon. 39a4, p. 50, pl. 4 fig. 20.

Snellius Expedition:

Menado; August 26 and 27, 1929.—24 specimens 22-25 mm.

Menado; handnet, 0-1 m; August 28-September 1, 1929.—6 specimens 23-25 mm.

Ternate; handnet, 0-1 m; September 25-27, 1929.—12 specimens 22-25 mm.

Station 91*, east of Ceram, 3° 50'.0 S, 131° 41'.5 E; straminpose, 200 m wire; October 8, 1929.—1 specimen 24 mm.

Station 199*, S. of the S. E. peninsula of Celebes, 5° 24'.5 S, 121° 28'.0 E; straminpose, 200 m wire; March 5, 1930.—2 specimens 24 and 25 mm.

Station 210*, S. W. of Boeroe, 3° 44'.0 S, 126° 01'.5 E; straminpose, 100 m wire; March 14, 1930.—1 specimen 24 mm.

Station 259*, W. of Batjan, 0° 27'.5 S, 126° 54'.0 E; straminpose, 300 m wire; May 11, 1930.—1 specimen 25 mm.

Description. For the description I refer to the paper of De Man (1888a).

Remarks. The specimens known under the name *Enoplometopus longirostris* are postlarval stages, a fact which was already supposed by De Man

(1921, 1922), who, struck by the large differences with all other species, thought them to be postlarval stages of a still unknown species. There is, however, reason to consider *E. longirostris* the postlarval stage of *E. occidentalis*. The large differences as:

1. the long rostrum, which has the lower margin serrate,
2. the strongly acuminate abdominal pleurae,
3. the two median spines at the posterior margin of the sixth abdominal segment,
4. the telson, which ends in a strong median point,
5. the unarmed chelipedes,
6. the absence of the first pleopods,
7. the presence of a stylamblys on pleopods 2-5,

probably only are juvenile characters, which disappear in the adult specimens; at least all postlarval stages of *Enoplometopus* known at present (vid. Gurney, 1938) show these characters, which are absent in all known adult *Enoplometopus* specimens. Furthermore it should be rather strange, that from *E. occidentalis*, the less rare *Enoplometopus* species, no postlarval stage should be known, and that the postlarval stage of an entirely unknown adult species should be rather abundant. The fact that the arrangement of the spines on the carapace, a character of rather large importance in this genus, is the same both in *E. occidentalis* and *E. longirostris*, also is in favour of the supposition that *E. longirostris* is only the postlarval stage of *E. occidentalis*.

The cotype of this species from Dr. De Man's private collection, which at present is preserved in the Zoölogical Museum at Amsterdam could not be examined by me, as all type material of that Museum is brought in safety in an airraid shelter ¹⁾.

Distribution. *Enoplometopus longirostris* is only recorded from the Malay Archipelago. The previous records are: Sailoes-ketjil, Paternoster Islands, Java Sea (De Man, 1921, 1922), Roemahloesi, north point of Tioor Island, Banda Sea (De Man, 1921, 1922), Ambon (De Man, 1888a).

Enoplometopus spec.

Snellius Expedition:

Station 32*, Makassar Strait, 4° 42'.5 S, 118° 53'.0 E; straminpose, 100 m wire; August 2, 1929.—1 specimen 9 mm.

Station 41*, Makassar Strait, 0° 24'.0 N, 119° 01'.0 E; straminpose, 200 m wire; August 12, 1929.—2 specimens 9 and 14 mm.

Station 79, Moluccan Sea, 1° 52'.0 N, 125° 41'.0 E; straminpose as vertical net, 2500-0 m; September 22, 1929.—1 specimen 11 mm.

¹⁾ This cotype recently could be studied by me; it originates from Ambon and is 24 mm long.

- Station 80, N. W. of Obi latoe, $1^{\circ} 06'.5$ S, $126^{\circ} 46'.5$ E; straminpose as vertical net, 4000-0 m; October 1, 1929.—1 specimen 18.5 mm.
- Station 83*, E. of Obi Major, $1^{\circ} 38'.0$ S, $128^{\circ} 23'.5$ E; straminpose, 100 m wire; October 2, 1929.—12 specimens 5-8 mm.
- Station 91*, between Ceram and New Guinea, $3^{\circ} 50'.0$ S, $131^{\circ} 41'.5$ E; straminpose, 200 m wire; October 8, 1929.—1 specimen 10 mm.
- Station 164*, Flores Sea, $7^{\circ} 25'.0$ S, $123^{\circ} 20'.5$ E; straminpose, 200 m wire; December 18, 1929.—2 specimens 14 and 17 mm.
- Station 190*, S. of Celebes, $5^{\circ} 24'.5$ S, $121^{\circ} 28'.0$ E; straminpose, 200 m of wire; March 5, 1930.—1 specimen 7 mm.
- Station 210*, S. W. of Boeroe, $3^{\circ} 44'.0$ S, $126^{\circ} 01'.5$ E; straminpose, 200 m wire; March 14, 1930.—7 specimens 11-18 mm.
- Station 216*, S. of Taliaboe, $2^{\circ} 16'.5$ S, $124^{\circ} 22'.0$ E; straminpose, 300 m wire; March 17, 1930.—1 specimen 17 mm.
- Station 222*, N. of Boeroe, $3^{\circ} 03'.0$ S, $126^{\circ} 04'.5$ E; straminpose, 300 m wire; March 22, 1930.—5 specimens 4-19 mm.
- Station 229*, N. of Boeroe, $3^{\circ} 01'.5$ S, $126^{\circ} 59'.5$ E; straminpose, 200 m wire; April 5, 1930.—1 specimen 8 mm.
- Station 275*, N. E. of Halmahera, $2^{\circ} 28'.5$ N, $129^{\circ} 38'.5$ E; straminpose, 50 m wire; May 25, 1930.—1 specimen 7 mm.
- Station 288*, N. of Halmahera, $2^{\circ} 19'.5$ N, $127^{\circ} 44'.5$ E; straminpose, 300 m wire; June 2, 1930.—2 specimens 11 and 12 mm.
- Station 300*, Celebes Sea, $4^{\circ} 45'.0$ N, $124^{\circ} 31'.5$ E; straminpose, 200 m wire; June 22, 1930.—2 specimens both 9 mm.

The larger of these postlarval specimens agree in almost all respects with the specimen figured by Gurney (1938, p. 297, fig. 3). Also the gill formula is the same, with the exception of the second maxilliped, which, just as in Gurney's figure 4b but in contradistinction to his description, in my specimens bears a podobranch.

In the specimens of about 10 mm length and smaller, the pleopods are not yet developed. The smaller the specimens are the less elongate the telson is, in specimens of about 7 mm for instance the apex is more or less truncate and the margin at each side of the median posterior spine is concave. In specimens of about 4 and 5 mm the caudal fan is not yet differentiated into a telson and uropods, but only forms a simple lamellar organ; in the smaller of these specimens the posterior margin of the caudal fan is emarginate, while in the larger that margin is about straight and ends in a median posterior tooth. Chelipedes are well developed in all specimens, in the smaller specimens the palm is more swollen than in the larger.

Gurney's specimens were partly collected in the Atlantic and partly in the Indian Ocean, he does not mention, however, if there is any difference between these forms.

The stages mentioned by Gurney and those of the Snellius Expedition show all the juvenile characters mentioned under *Enoplometopus longirostris*.

Homarus H. Milne Edw.**Homarus capensis** (Herbst)

Cancer (Astacus) capensis Herbst, 1792, Vers. Naturg. Krabben Krebse, vol. 2, p. 49, pl. 26 fig. 1.

Astacus capensis Latreille, 1802, Hist. nat. Crust. Ins., vol. 6, p. 240.

Homarus capensis H. Milne Edwards, 1837b, Hist. nat. Crust., vol. 2, p. 335.

Astacus capensis H. Milne Edwards, 1838b, Ann. Sci. nat. Zool., ser. 2 vol. 10, p. 168.

Homarus capensis Krauss, 1843, Südafr. Crust., p. 54.

Homarus capensis H. Milne Edwards, 1851, Ann. Sci. nat. Zool., ser. 3 vol. 16, p. 291, pl. 11 figs. 1, 2.

Cancer capensis Huxley, 1878, Proc. zool. Soc. Lond., 1878, p. 754.

Astacus capensis Huxley, 1879, Crayfish, p. 304.

Astacus capensis Stebbing, 1902, Mar. Invest. S. Afr., vol. 1, p. 34.

Astacus capensis Stebbing, 1910, Ann. S. Afr. Mus., vol. 6, p. 378.

Homarus capensis Herrick, 1912, Science, ser. 2 vol. 36, p. 58.

Homarus capensis Gilchrist, 1918, Mar. biol. Rep. S. Afr., vol. 4, p. 44.

Homarus capensis C. von Bonde & Marchand, 1935, Fish. Bull. Fish. mar. biol. Surv. S. Afr., vol. 1, p. 6.

Museum Leiden:

Locality unknown.—1 ♂ 83.5 mm.

The above mentioned specimen has already served Dr. W. de Haan for his study of the oral parts of Crustacea, published in Fauna Japonica; the specimen is preserved in spirit, the oral parts are dry, glued to a piece of cardboard.

Distribution. This rare species is only known from the region of the Cape of Good Hope. The records in literature are: Cape of Good Hope (Herbst, 1793; Stebbing, 1902), Table Bay, S. Africa (Stebbing, 1902; C. von Bonde & Marchand, 1935), Algoa Bay, S. Africa (Stebbing, 1902; C. von Bonde & Marchand, 1935). Herbst mentioned the species from fresh-water, which is, as pointed out by Stebbing, very improbable.

SCYLLARIDAE White

From this family too De Man (1916) gave a list of all genera, species and varieties, known to him at that moment. The following corrections and additions of this list are needed at present:

1. As Paulson (1875) already remarked the name *Scyllarus Haanii* Berthold (1845) is preoccupied by the name *Scyllarus Haanii* De Haan (1841); therefore he proposed for the former species the name *Scyllarus Bertholdii*, which is used here.

2. A similar case is that the name *Scyllarus orientalis* (Bate 1888) is preoccupied by *Scyllarus orientalis* Lund (1793). I propose therefore the name *Scyllarus batei* for the species of C. Spence Bate. Vid. p. 94.

3. As pointed out below (pp. 89, 90) *Scyllarus tuberculatus* (Bate) has to be regarded as a synonym of *S. rugosus* H. Milne Edw.

4. Of the genus *Scyllarus* the following species are not inserted in De Man's list:

a. *Scyllarus thiriouxi* Bouvier (1914) from Mauritius, which is very closely allied, if not identical with *Scyllarus sordidus* Stimps.

b. *Scyllarus faxoni* Bouvier (1925) from Guadeloupe. *Scyllarus faxoni*, which was never inserted as a new species in the Zoological Record, firstly was mentioned by Bouvier (1917, p. 106) as a nomen nudum, in 1925 it was extensively described and figured by the same author, who considers it a representative in the Atlantic of the indopacific *Scyllarus rubens* (Alcock & Anderson).

c. *Scyllarus rugosus* (Yokoya, 1933) from Japan. The name *rugosus* is preoccupied by *Scyllarus rugosus* H. Milne Edw. (1837), therefore the specific name *brevicornis* is proposed for this species, which was firstly described under the generic name *Arctus*. Vid. p. 92.

d. *Scyllarus mawsoni* (Bage, 1938) from Tasmania. The affinities of this species, which was described under the generic name *Arctus*, can not be concluded with certainty from Bage's description.

e. *Scyllarus demani* nov. spec. from Banka, E. of Sumatra. Vid. p. 91.

5. The species at present known as *Scyllarides sculptus* (Latr., 1818), which was described and figured by Latreille as *Scyllarus sculptus*, was already extensively described and figured by L. Spengler as early as 1799 under the name *Scyllarus guineensis*. The name *Scyllarides sculptus* therefore has to be changed into *Scyllarides guineensis* (Spengl.).

6. Of the genus *Scyllarides* the following new species and variety were published after 1916:

a. *Scyllarides americanus* Verrill (1922) from Bermuda, Florida, Savannah and Cuba; as Verrill remarks this species is perhaps only a subspecies of *Scyllarides latus* (Latr.).

b. *Scyllarides guineensis* var. *bermudensis* Verrill (1922) from Bermuda, described as *Scyllarides sculptus* var. *bermudensis*.

7. The following species incertae are omitted in De Man's list:

a. *Scyllarus australis* Fabr. (1781) described after a dried, mutilated specimen, probably belonging to a *Scyllarides* species, as the antennal squamae are described as entire and rounded. The locality from which it is recorded (Southern Seas) makes its identity with *S. squamosus* the most probable, but nothing can be concluded with certainty from Fabricius's description.

b. *Scyllarus carinatus* Guilding (1825) from the Caribbean Sea. Which species is meant here is not to conclude from the description.

c. *Scyllarus insularis* White (1847) nom. nud. from the Philippines.

d. *Scyllarus rubrotestaceus* Wagner (1885) nom. nud. from the White Sea; this species to all probability is no *Scyllarus*, as the range of distribution of that genus does not extend so far northward.

e. *Scyllarus sinensis* White (1847) nom. nud. from China.

f. *Scyllarus variegatus* Wagner (1885) nom. nud. from the White Sea; for the same reason as *S. rubrotestaceus*, it is improbable that the present species belongs to *Scyllarus*.

Scyllarus Fabr.

In his key to the indopacific species of this genus De Man (1916) made an error by considering the notch at the anterior extremity of the sternum in *Scyllarus arctus* not deep and triangular, as he only had young specimens at his disposal; this error was corrected by him in his paper of 1921.

Stearns (1891, p. vii) mentions a species assigned by him to the family Scyllaridae, under the name *Scyllarus ceratophthalmus* (Pall.), to all probability here *Ocypode ceratophthalma* (Pall.), a Brachyuran belonging to the family Ocypodidae is meant.

Scyllarus rugosus H. Milne Edw. (Pl. VII fig. c, Pl. VIII fig. a, Pl. IX fig. c)

Scyllarus rugosus H. Milne Edwards, 1837b, Hist. nat. Crust., vol. 2, p. 283.

Scyllarus rugosus H. Milne Edwards, 1838b, Ann. Sci. nat. Zool., ser. 2 vol. 10, p. 168.

Scyllarus rugosus White, 1847, List Crust. Brit. Mus., p. 67.

Scyllarus rugosus Pfeffer, 1881, Verh. naturw. Ver. Hamburg, ser. 2 vol. 5, p. 47.

Arctus tuberculatus Bate, 1888, Rep. Voy. Challenger, Zool., vol. 24, p. 70, pl. 10 figs. 1, 2.

Arctus tuberculatus Doflein, 1900, S. B. Bayer. Akad. Wiss., vol. 30, p. 132.

Arctus tuberculatus Lanchester, 1901, Proc. zool. Soc. Lond., 1901, p. 557.

Scyllarus tuberculatus Nobili, 1903b, Boll. Mus. Zool. Anat. comp. Torino, vol. 18 n. 455, p. 12.

Scyllarus tuberculatus Pearson, 1905, Rep. Ceylon Pearl Oyster Fish., vol. 4, p. 90.

Scyllarus tuberculatus De Man, 1916, Siboga Exped., mon. 39a2, pp. 68, 89.

Thenus orientalis Stebbing, 1920, Ann. S. Afr. Mus., vol. 17, p. 267.

non *Scyllarus tuberculatus* De Man, 1924, Arch. Naturgesch., vol. 90 pt. 2, p. 53, fig. 18.

Scyllarus tuberculatus Barnard, 1926, Trans. Roy. Soc. S. Afr., vol. 13, p. 123, pl. 10. non *Arctus rugosus* Yokoya, 1933, Journ. Coll. Agric. Tokyo, vol. 12, p. 46, fig. 24.

Museum Leiden:

Ambon; 1863; leg. E. W. A. Ludeking.—1 ♀ (ovigerous) 61 mm.

Scyllarus rugosus H. Milne Edw. is better known as *S. tuberculatus* (Bate). De Man (1916, p. 89) denied the identity of *S. rugosus* and *S.*

tuberculatus. He thought the identity of *S. rugosus* with *S. martensii* Pfeffer more probable, because, as he says: "Milne Edwards describes *Scyll. rugosus* as "très-voisine" to *Scyll. arctus* (L.): this is the case with *Scyll. Martensii*, but not with *Scyll. tuberculatus*, because in the latter the structure and areolation of the abdomen, that are not described in the "Histoire Naturelle des Crustacés", are quite different from what is observed in *Scyll. Martensii*." Now the genus *Scyllarus* in Milne Edwards's work contains six species, four of which are placed at present in a separate genus *Scyllarides*, the other two being *Scyllarus arctus* and *S. rugosus*, it is therefore very obvious that Milne Edwards, when comparing *S. rugosus* with his other *Scyllarus* species, found it "très-voisine" to *S. arctus*. Furthermore Milne Edwards rightly enough did describe the structure of the abdomen when he remarked: "Abdomen profondément sillonné en travers". Only *S. tuberculatus* and its immediate relatives (*S. demani* nov. spec. and *S. brevicornis* nom. nov., which will be treated below) have the abdomen with such deep transverse grooves. A third reason which pleads against the identity of *S. rugosus* and *S. martensii* is the fact that Milne Edwards's specimen had a length of "2 pouces", 54 mm. The specimen of *S. tuberculatus* at my disposal and those mentioned in literature measure 50-72 mm, while *S. martensii* never has been recorded larger than 36 mm. Other *Scyllarus* species than those mentioned above all differ from Milne Edwards's description by missing the prominent gibbosity on the third abdominal segment, which is very distinct in *S. martensii*, *S. tuberculatus*, *S. demani* and *S. brevicornis*. For these reasons we safely may consider *S. rugosus* H. Milne Edw. identical with *S. tuberculatus* (Bate), as the two other species (*S. demani* and *S. brevicornis*), which show a similar structure of the abdomen as *S. tuberculatus*, both differ from the description of *S. rugosus*; the former because the second segment of the antenna bears seven rather indistinct teeth at the exterior margin, whereas in *S. rugosus* it only bears four distinct teeth, the latter because it is provided at the same place with only three teeth.

According to Barnard (1926) the specimen mentioned by Stebbing (1915) under the name *Thenus orientalis* is a young specimen of the present species.

Figures of some details of *S. rugosus* are given here for comparison with the two following species.

Size. The size of this species recorded in literature and that of the specimen mentioned above vary between 50 and 61 mm, when measured without antennae, and between 58 and 72 mm, measured including antennae.

Distribution. The species has an indopacific distribution. The records in literature are: East Africa (Barnard, 1926), Indian Ocean (White, 1847), Pondichery (Milne Edwards, 1837b), Kelantan, Malay Peninsula (Lanchester, 1901), Singapore (Nobili, 1903b), Japan (Doflein, 1900), Hongkong (Pfeffer, 1881), between New Guinea and Australia (Bate, 1888).

Scyllarus demani nov. spec. (Pl. VII fig. d, Pl. VIII fig. b, Pl. IX fig. a)

Scyllarus tuberculatus De Man, 1924, Arch. Naturgesch., vol. 90 pt. 2, p. 53, fig. 18.

Museum Amsterdam:

Banka; 1912; leg. H. van der Horst.—1 ♀ 70 mm.

The type specimen of this species was already extensively described and figured by De Man (1924). The differences between this specimen and the type specimen of *S. tuberculatus* Bate, which are very evident, were considered by Dr. De Man to be due to age only; Bate's specimen namely is much smaller than that of De Man. As I could compare De Man's specimen with a specimen of *Scyllarus rugosus* (= *S. tuberculatus*) of about the same size, I found those differences also present in these specimens, so that the specimen of De Man must be considered to belong to a new species. I should like to name this new species in honour of Dr. J. G. de Man, the famous Dutch carcinologist, who firstly described and figured it.

The differences between *S. demani* and *S. rugosus* are:

S. rugosus H. Milne Edw.

S. demani nov. spec.

1. The median part of the posterior margin of the first and second abdominal segment dorsally incised under a blunt angle (Pl. IX fig. c).

2. The transverse ridges on the second and third abdominal segment almost smooth (Pl. IX fig. c).

3. The posterior half of the abdominal pleurae without tubercles.

4. Outer margin of second antennal segment with four distinct teeth.

1. The median part of the posterior margin of the first and second abdominal segment dorsally deeply and sharply incised (Pl. IX fig. a).

2. The transverse ridges on the second and third abdominal segment distinctly tuberculate (Pl. IX fig. a).

3. The posterior half of the abdominal pleurae provided with a distinct longitudinal row of tubercles.

4. Outer margin of second antennal segment with about seven indistinct teeth.

5. Anterior margin of sternum with a truncate incision (Pl. VIII fig. a).

6. Pereiopods naked or provided with very short hairs.

7. Dactylus of fifth pereipod in the female slightly longer than the lower pincer (Pl. VII fig. c).

8. Posterior margin of fifth thoracic segment ventrally with a row of tubercles.

5. Anterior margin of sternum deeply triangularly incised (Pl. VIII fig. b).

6. Pereiopods provided with long hairs at external margin of merus and carpus.

7. Dactylus of fifth pereipod in the female about twice as long as the lower pincer (Pl. VII fig. d).

8. Posterior margin of fifth thoracic segment ventrally entire.

As only one specimen of each species is at my disposal and many of the characters used are not mentioned in literature, these differences only can be considered specific, when they are confirmed by more data.

Distribution. Banka, east of Sumatra. Perhaps some of the specimens described in literature as *Scyllarus rugosus* or *tuberculatus* will prove to belong to this species or to the next.

***Scyllarus brevicornis* nom. nov.**

Arctus rugosus Yokoya, 1933, Journ. Coll. Agric. Tokyo, vol. 12, p. 46, fig. 24.

Yokoya described this species as new under the specific name *rugosus*, which is preoccupied by H. Milne Edwards's *Scyllarus rugosus*.

The features, which Yokoya mentions for distinguishing this species from *Scyllarus rugosus* H. Milne Edw. (= *S. tuberculatus*) are not very constant in the latter; so in *S. rugosus* H. Milne Edw. the carapace sometimes is broader than long and the length of the antennula often is shorter than in the specimen figured by Bate. But some other differences, not mentioned by Yokoya, are shown in his figure, so the second antennal segment is provided at its exterior margin with three instead of four teeth (Yokoya mentions in his description four teeth, he probably includes the final tooth), and its inner margin with only two, thereby largely differing from both species mentioned above. The structure of the antennulae too is curious, when they are figured in extended position; the penultimate joint of the peduncle namely is remarkably short, which, however, may be due to the fact that it is directed downward, and therefore seems very short when seen from above.

More extensive study of this specimen is badly needed, as detailed examination of the exact shape of the antennulae, the antennae, the ab-

dominal pleurae, the sternum and of the pereopods probably will show more specific differences.

Size. The type specimen probably is not yet adult, it measures (according to the figure) 38 mm.

Distribution. The only record is from Bungo Strait, Japan.

Scyllarus cultrifer (Ortm.) (Pl. VIII figs. c-e)

Arctus sordidus Bate, 1888, Rep. Voy. Challenger, Zool., vol. 24, p. 66, pl. 9 fig. 3.

Arctus haani Ortmann, 1891, Zool. Jb. Syst., vol. 6, p. 42.

Arctus cultrifer Ortmann, 1897, Zool. Jb. Syst., vol. 10, p. 272.

Scyllarus cultrifer Balss, 1914a, Abh. Bayer. Akad. Wiss., suppl. vol. 2 pt. 10, p. 80.

Scyllarus cultrifer De Man, 1916, Siboga Exped., mon. 39a2, p. 68.

Scyllarus cultrifer Parisi, 1917, Atti Soc. Ital. Sci. nat., vol. 56, p. 9.

Scyllarus sordidus Barnard, 1926, Trans. Roy. Soc. S. Afr., vol. 13, p. 122, pl. 10.

Arctus cultrifer Yokoya, 1933, Journ. Coll. Agric. Tokyo, vol. 12, p. 46.

Snellius Expedition:

Station 60*, Basilan Strait, 6° 58'.0 N, 121° 52'.5 E; dredge, 72-80 m; September 5, 1929. — 2 ♂♂ and 3 ♀♀ 31-72 mm.

These specimens agree in almost all respects with Bate's description and figures of *Arctus sordidus*; they differ from it by having the propodus of the third pereopod without the sharp anteroventral tooth, furthermore the propodus of the fourth pereopod is longer in my specimens than in Bate's figure.

The propodus of the third pereopod in my specimens is similarly shaped as those of *Scyllarus bertholdii* and *S. batei*, but the specimens differ from both these species by having the propodus of the second pereopod much slenderer than that of the third.

Very characteristic for *S. cultrifer* are:

1. The strongly elevated second median tooth on the carapace (Pl. VIII fig. c).

2. The abdominal pleurae, which are sharply pointed¹⁾.

3. The cusps of the last antennal segment, which at the top abruptly narrow into small teeth.

4. The second antennal segment, which bears both on the inner and the outer margin two distinct teeth.

5. The shape of the anterior part of the sternum (Pl. VIII fig. d).

6. The propodus of the third pereopod which is distinctly broader than those of the second and fourth, and sometimes subchelate (Pl. VIII fig. e).

In my specimens the males have the posterolateral angles of the ster-

¹⁾ This feature is not mentioned by any other author, but is very distinct in all my specimens.

num each provided with a prominent tooth; this tooth is missing in the females.

Distribution. The species is recorded from: E. Africa (Barnard, 1926), Japan (Ortmann, 1891; Balss, 1914; Parisi, 1917; Yokoya, 1933), Kai Islands (Bate, 1888).

***Scyllarus batei* nom. nov.**

Arctus orientalis Bate, 1888, Rep. Voy. Challenger, Zool., vol. 24, p. 68, pl. 9 fig. 4.
Arctus orientalis Alcock & Anderson, 1894, Journ. Asiat. Soc. Bengal, vol. 63 pt. 2, p. 165.

Arctus orientalis Alcock, 1901, Descr. Catal. Indian Deep-sea Crust., p. 181.

Arctus orientalis Lloyd, 1907, Rec. Indian Mus., vol. 1, p. 6.

Scyllarus orientalis De Man, 1916, Siboga Exp., mon. 39a2, p. 73.

Arctus orientalis Estampador, 1937, Philipp. Journ. Sci., vol. 62, p. 495.

Scyllarus orientalis Ramadan, 1938, Sci. Rep. John Murray Exped., vol. 5 pt. 5, p. 126, fig. 2.

The name *Scyllarus orientalis* was already used by Lund (1793), Fabricius (1798), Latreille (1802, 1818), Lamarck (1818), Desmarest (1823, 1825), Von Siebold (1824) and Herklots (1861) for the species at present known as *Thenus orientalis* (Lund), furthermore it was used by Bosc (1801) and Desmarest (1830) for *Scyllarides latus* (Latr.). Therefore the preoccupied name *Scyllarus orientalis* (Bate) must be changed into *Scyllarus batei* nom. nov.

Distribution. The species is known from: Gulf of Aden (Lloyd, 1907; Ramadan, 1938), Zanzibar Area (Ramadan, 1938), Arabian Sea off Calicut (Alcock, 1901), Bay of Bengal, off Madras (Alcock & Anderson, 1894; Alcock, 1901), Philippines, between Bohol and Cebu (Bate, 1888; Estampador, 1938), Lesser Sunda Islands, between Roti and Timor, and N. of Soembawa (De Man, 1916).

***Scyllarus bertholdii* Paulson**

Scyllarus Arctus var. De Haan, 1841, Fauna Japonica, Crust., p. 154 (third variety). non *Scyllarus Haanii* De Haan, 1841, Fauna Japonica, Crust., p. 152, pl. 38 fig. 1.

Scyllarus Haanii Berthold, 1845, Nachr. Ges. Wiss. Göttingen, 1845, p. 45.

Scyllarus Haanii Berthold, 1847, Abh. Ges. Wiss. Göttingen, vol. 3, p. 23, pl. 2 figs. 2, 3.

Scyllarus Arctus var. c. Herklots, 1861, Tijdschr. Ent., vol. 4, p. 142.

Scyllarus Bertholdii Paulson, 1875, Invest. Crust. Red Sea, p. 97.

Scyllarus Haanii De Man, 1916, Siboga Exped., mon. 39a2, p. 74, pl. 2 fig. 10.

Museum Leiden:

China; type of *Scyllarus arctus* var. c De Haan. — 1 ♀ 50 mm (dry).

This specimen, which De Haan described as a third variety of *Scyllarus arctus*, agrees entirely with the description which De Man (1916) gives

of *Scyllarus Haanii*. Already Berthold thought the specimen of De Haan belonging to his species, the only difference he found was that De Haan mentioned in his specimen only one median tooth on the carapace, while in *S. haanii* there are two. Examination of De Haan's specimen showed that it is provided with two median teeth, though the anterior is rather small.

As already pointed out (p. 87) Paulson's name must be used for this species, as the name *Scyllarus haani* of Berthold is preoccupied by that of De Haan (for the present *Scyllarides haani*). As far as I know the name given by Paulson was never used by any other author.

Distribution. Records in literature are: China (De Haan, 1841; Berthold, 1845), N. E. of Ceram (De Man, 1916), Sape Strait, N. E. of Soemba (De Man, 1916), Madoera Bay, W. Flores (De Man, 1916).

***Scyllarus bicuspidatus* (De Man) (Pl. VII fig. e)**

Scyllarus Arctus var. De Haan, 1841, Fauna Japonica, Crust., p. 154 (first variety).

Scyllarus Arctus var. a Herklots, 1861, Tijdschr. Ent., vol. 4, p. 142.

Arctus bicuspidatus De Man, 1905, Tijdschr. Nederl. dierk. Ver., ser. 2 vol. 9, p. 589.

Scyllarus bicuspidatus De Man, 1916, Siboga Exped., mon. 39a2, p. 80, pl. 2 fig. 12.

Scyllarus bicuspidatus Parisi, 1917, Atti Soc. Ital. Sci. nat., vol. 56, p. 9.

Museum Leiden:

Japan; type of *Scyllarus arctus* var. a De Haan. — 1 ♀ 64 mm (dry).

This specimen, which is in a rather good condition, though telson and uropods are missing, agrees in all respects with De Man's description and figures of *Scyllarus bicuspidatus*. As in Parisi's adult specimen, my specimen too shows a dark median spot on the first abdominal segment, the other spots mentioned by Parisi are no more visible in my specimen.

Like in the young *Scyllarus arctus* (L.), the incision at the anterior notch of the sternum is truncate in De Man's young specimen, but while in the adult specimens of *Scyllarus arctus* this incision becomes deeply triangular, in *Scyllarus bicuspidatus* it remains truncate (Pl. VII fig. e).

In my specimen a minute spinule, which is concealed by the stiff hairs of the carapace, is present between the two median teeth of the anterior half of the carapace.

Size. My specimen measures 64 mm from rostrum to base of telson, and 78 mm, when the antennae are included. The length of the entire animal (from tip of antenna to tip of telson) probably will have been about 90 mm. De Man's specimen measured 25.5 mm and Parisi's 83 mm (in both antennae included).

Distribution. The three records in literature are: Japan (De Haan,

1841), Sagami Bay, Japan (Parisi, 1917), Sape Bay, Soembawa, Lesser Sunda Islands (De Man, 1905, 1916).

Scyllarus martensii Pfeffer

Scyllarus Arctus var. De Haan, 1841, Fauna Japonica, Crust., p. 154, pl. 38 fig. 2 (second variety).

Scyllarus Arctus var. b Herklots, 1861, Tijdschr. Ent., vol. 4, p. 142.

Scyllarus Martensii Pfeffer, 1881, Verh. naturw. Ver. Hamburg, ser. 2 vol. 5, p. 48.

Arctus martensii Ortmann, 1891, Zool. Jb. Syst., vol. 6, p. 44.

Scyllarus Martensi Nobili, 1903b, Boll. Mus. Zool. Anat. comp. Torino, vol. 18 n. 455, p. 12.

Scyllarus martensi Borradaile, 1904, Fauna Geogr. Mald. Laccad., vol. 2 pt. 3, p. 754, pl. 58 fig. 4.

Scyllarus Martensii Nobili, 1905, Boll. Mus. Zool. Anat. comp. Torino, vol. 20 n. 506, p. 3.

Scyllarus martensi Rathbun, 1906, Bull. U.S. Fish Comm., vol. 23 pt. 3, p. 896, pl. 18 fig. 2.

Scyllarus martensii Balss, 1914a, Abh. Bayer. Akad. Wiss., suppl. vol. 2 pt. 10, p. 79.

Scyllarus Martensii De Man, 1916, Siboga Exped., mon. 39a2, p. 84, pl. 3 fig. 13.

Scyllarus martensii Estampador, 1937, Philipp. Journ. Sci., vol. 62, p. 496.

Scyllarus Martensi Serène, 1937, Notes Inst. océanogr. Indochine, vol. 30, p. 71.

Museum Leiden:

Japan; cotypes of *Scyllarus arctus* var. b De Haan. — 3 ♂♂, 1 ♀ 25-30 mm (dry).
Japan. — 1 ♀ 25 mm (dry).

Celebes; leg. E. A. Forsten. — 1 ♂ 28 mm (dry).

Sicily; Cabinet Roux. — 2 ♂♂, 6 ♀♀ 20-29 mm (dry).

All specimens agree entirely with De Man's (1916) description.

The specimens indicated as "Sicily; Cabinet Roux", probably are wrongly labelled, as this species is not known from the Mediterranean and the large number of specimens (8) make an occasional introduction, for instance by means of ships, not very probable.

Size. As already pointed out under *S. rugosus*, this species does not attain a size larger than 36 mm, when measured including the antennae.

Distribution. The species is known throughout the indopacific region. The records in literature are: Zanzibar (Nobili, 1903b, 1905), Maldives and Laccadives (Borradaile, 1904), Singapore (Nobili, 1903b), Japan (De Haan, 1841; Ortmann, 1891; Balss, 1914a), Annam (Serène, 1937), Sulu Islands (De Man, 1916), Celebes (De Man, 1916), Lesser Sunda Islands (De Man, 1916), Hawaiian Islands (Rathbun, 1906).

Scyllarides Gill

Scyllarides haanii (De Haan)

Scyllarus Haanii De Haan, 1841, Fauna Japonica, Crust., p. 152, pl. 38 fig. 1.

non *Scyllarus Haanii* Berthold, 1845, Nachr. Ges. Wiss. Göttingen, 1845, p. 45.

- non *Scyllarus Haanii* Berthold, 1847, Abh. Ges. Wiss. Göttingen, vol. 3, p. 23, pl. 2 figs. 2, 3.
 non *Scyllarus Dehaanii* Herklots, 1851, Addit. Faun. carc. Afr. occ., p. 14, pl. 2 figs. 12, 13.
Scyllarus Haanii Herklots, 1861, Tijdschr. Ent., vol. 4, p. 142.
Scyllarus Haani Miers, 1880a, Ann. Mag. nat. Hist., ser. 5 vol. 5, p. 377.
Scyllarus Haanii Gavino, 1888, Viaggio Circumnavig. Caracciolo, Crost., p. 6.
Scyllarus Haanii De Man, 1888a, Arch. Naturgesch., vol. 53 pt. 1, p. 485.
Scyllarus sieboldi p.p. Ortmann, 1891, Zool. Jb. Syst., vol. 6, p. 40.
Scyllarus Haanii Ortmann, 1894, Denkschr. med.-naturw. Ges. Jena, vol. 8, p. 20.
Scyllarus haani Ortmann, 1897, Zool. Jb. Syst., vol. 10, p. 269.
Scyllarus Haanii Doflein, 1906a, Ostasienfahrt, p. 198.
Scyllarides Haani Bouvier, 1914, C. R. Acad. Sci. Paris, vol. 159, p. 702.
Scyllarides Haani Bouvier, 1915, Bull. sci. France Belg., vol. 48, p. 191, pl. 4 fig. 1, pl. 5 fig. 1, pl. 6 fig. 1.
 non *Scyllarus Haanii* De Man, 1916, Siboga Exped., mon. 39a2, p. 74, pl. 2 fig. 10.
Scyllarides Haanii De Man, 1916, Siboga Exped., mon. 39a2, p. 65.
Scyllarides haani Parisi, 1917, Atti Soc. Ital. Sci. nat., vol. 56, p. 10.
Scyllarides sp. Parisi, 1917, Atti Soc. Ital. Sci. nat., vol. 56, p. 11, fig. 2.
Scyllarus haani Maki & Tsuchiya, 1923, Rep. Dept. Agric. Formosa, vol. 3, p. 91, pl. 9 fig. 1.
Scyllarides Haanii De Man, 1924, Arch. Naturgesch., vol. 90 pt. 2, p. 56, fig. 19.
 non *Scyllarus haani* Fish. Soc. Japan, 1935, Ill. Japan. aq. Plants Anim., vol. 2, pl. 58 fig. 2.

Museum Leiden:

Japan; cotypes; leg. D. W. Burger.—2 ♂♂ 280 and 350 mm (dry).
 Ambon; 1863; leg. E. W. A. Ludeking.—1 ♀ 290 mm.
 Ambon; 1864; leg. D. J. Hoedt. — 2 ♂♂ 250 and 260 mm.
 Locality unknown. — 1 specimen 130 mm, damaged (dry).

Museum Amsterdam:

Bay of Batavia; leg. C. P. Sluiter. — 1 ♂ 260 mm.

Rathbun's (1906, p. 896) opinion, that this species should only be a variety of *Scyllarides squamosus*, is not shared by later authors.

Bouvier (1915) gives the following differences between *S. haanii* and *S. squamosus*:

1. Dorsal surface of carapace in *S. haanii* with flattened polygonal tubercles, surrounded by setae; in *S. squamosus* with squamae provided with setae at their anterior margin only.
2. The spines at the internal margins of the antennal squamae are more erect in *S. haanii* than in *S. squamosus*.
3. Carpus of first and second pereopods with very distinct dorsal carinae in *S. squamosus*; these carinae obtuse in *S. haanii*.
4. Two strong tubercles at basis of first pereopod in *S. haanii*; these tubercles absent in *S. squamosus*.
5. Strong tubercles at sternum, near the bases of the pereopods in *S. haanii*; they are much weaker in *S. squamosus*.

6. The marginal spines of the pleurae of the second abdominal segment differently arranged in the two species.

My specimens of *S. squamosus*, however, often have the carapace with tubercles, which are surrounded with setae; also the two strong tubercles on the basis of the first pereopod often are distinct.

Parisi (1917) in a table gave the differences between this species and *S. squamosus*. As second point he states that the anterior third of the carapace in *S. squamosus* is much broader than the posterior two thirds, and much narrower in *S. haanii*. In my specimens of both species, however, this character is so variable, that I think it of no value for distinguishing the two species. As far as concerns Parisi's fifth point, in my largest male specimen the sternal margins of the third and fourth abdominal segments show some tubercles, but these are much fewer and less distinct than in *Scyllarides squamosus*.

As De Man (1924) pointed out the sternum of the second abdominal segment in the males in the median line shows an incision, which is deeper than the incisions on the rest of the sternal margin. This deeper incision is absent in all my male specimens of *Scyllarides squamosus*.

Further differences between the two species, not mentioned by Bouvier or Parisi, are:

1. In *S. haanii* the carapace is broader in relation to the length than in *S. squamosus*. As length the distance between the median point of the anterior part of the carapace (rostrum excluded) and the corresponding point of the posterior margin is taken; the breadth was measured at the level of the postcervical groove. Length/breadth in *S. haanii* varies between 0.99 and 1.03 and in *S. squamosus* between 1.10 and 1.16. The difference is not large, but remarkably constant in my material.

2. The carapace in *S. haanii* is much more constricted behind the eyes than in *S. squamosus*, where this feature is almost absent.

3. The anterior ventral margin of the carapace in *S. haanii* is deeper emarginate than in *S. squamosus*.

4. The sternum in *S. haanii* is deeply hollowed and the lateral margins form distinct cones. In *S. squamosus* the sternum is flatter and the lateral tubercles are indistinct.

The species figured by the Fishery Society Japan (1935) as *Scyllarus haani* does not belong to this species but to *Parribacus antarcticus* (Lund).

The specimen from the Zoölogical Museum at Amsterdam has already been treated by De Man (1924).

Size. The largest specimens known at present, measuring about 500 mm.,

is recorded by Bouvier (1915), the smallest specimen, a juvenile of 30 mm (excluded antennae) by Parisi (1917) as *Scyllarides* sp.

Distribution. Indopacific. The records in literature are: Mauritius (Bouvier, 1915), Singapore (Gavino, 1888), Japan (De Haan, 1841; Parisi, 1917; Doflein, 1906a), Formosa (Maki & Tsuchiya, 1923), Ambon (De Man, 1888a; Ortmann, 1894), Aroe Islands (Miers, 1880a), Bay of Batavia (De Man, 1924).

Scyllarides squamosus (H. Milne Edw.)

- Scyllarus squamosus* H. Milne Edwards, 1837b, Hist. nat. Crust., vol. 2, p. 284.
Scyllarus squamosus H. Milne Edwards, 1838b, Ann. Sci. nat. Zool., ser. 2 vol. 10, p. 168.
Scyllarus latus Randall, 1840, Journ. Acad. nat. Sci. Philad., vol. 8, p. 137.
Scyllarus Sieboldi De Haan, 1841, Fauna Japonica, Crust., p. 152, pl. 36/37 fig. 1.
Scyllarus squamosus White, 1847, List Crust. Brit. Mus., p. 67.
Scyllarus squamosus Gibbes, 1850a, Proc. Amer. Ass. Adv. Sci., vol. 3, p. 193.
Scyllarus squamosus Gibbes, 1850b, Proc. Acad. nat. Sci. Philad., 1850, p. 25.
Scyllarus squamosus H. Milne Edwards, 1851, Ann. Sci. nat. Zool., ser. 3 vol. 16, p. 291, pl. 11 figs. 3, 4.
Scyllarus Sieboldii Stimpson, 1860, Proc. Acad. nat. Sci. Philad., 1860, p. 23.
Scyllarus Sieboldi Herklots, 1861, Tijdschr. Ent., vol. 4, p. 142.
Scyllarus squamosus A. Milne Edwards, 1862b, Note Ile Réunion, Ann. F., p. 14.
Scyllarus squamosus A. Milne Edwards, 1868, Nouv. Arch. Mus. Hist. nat. Paris, vol. 4, p. 72.
Scyllarus squamosus Hoffmann, 1874, Rech. Faune Madagasc., vol. 5 pt. 2, p. 42.
Scyllarus squamosus Richters, 1880, Beitr. Meeresfauna Maurit., p. 161.
Pseudibacus Pfefferi Miers, 1882, Proc. zool. Soc. Lond., 1882, p. 542, pl. 36 figs. 2, 3.
Scyllarus sieboldi p.p. Ortmann, 1891, Zool. Jb. Syst., vol. 6, p. 40.
Scyllarus squamosus Ortmann, 1897, Zool. Jb. Syst., vol. 10, p. 268.
Scyllarus sieboldi Borradaile, 1899, Willey's Zool. Results, vol. 4, p. 419.
non *Scyllarus squamosus* Young, 1900, Stalk-eyed Crust. Brit. Guian., p. 432.
Scyllarus squamosus Lenz, 1901, Zool. Jb. Syst., vol. 14, p. 440.
Scyllarides sieboldi Doflein, 1902, Abh. Bayer. Akad. Wiss., vol. 21, p. 643.
Pseudibacus pfefferi Rathbun, 1902, Proc. Wash. Acad. Sci., vol. 4, p. 285.
Scyllarus Sieboldi Doflein, 1906a, Ostasienfahrt, p. 198.
Scyllarus sieboldi McCulloch, 1906, Rec. Aust. Mus., vol. 6, p. 231.
Scyllarides squamosus Rathbun, 1906, Bull. U.S. Fish Comm., vol. 23 pt. 3, p. 896.
Scyllarides squamosus Balss, 1914a, Abh. Bayer. Akad. Wiss., suppl. vol. 2 pt. 10, p. 79.
Scyllarides squamosus Bouvier, 1914, C. R. Acad. Sci. Paris, vol. 159, p. 701.
Scyllarides squamosus Bouvier, 1915, Bull. sci. France Belg., vol. 48, p. 192, textfigs. 5, 6, pl. 5 figs. 2-4.
Scyllarides squamosus Parisi, 1917, Atti Soc. Ital. Sci. nat., vol. 56, p. 10.
Scyllarides sieboldi Pesta, 1933, Zool. Anz., vol. 104, p. 280.

Museum Leiden:

- Japan; cotypes of *Scyllarus Sieboldi* De Haan. — 1 ♂, 2 ♀♀ 220-350 mm.
 Japan; cotypes of *Scyllarus Sieboldi* De Haan; leg. P. F. von Siebold & D. W. Burger. — 3 ♂♂, 3 ♀♀ 230-300 mm (dry).

Japan. — 1 ♂, 2 ♀ ♀ 230-280 mm.

Ambon; 1863; leg. E. W. A. Ludeking. — 1 ♀ 220 mm.

Ambon; 1864; leg. D. J. Hoedt. — 1 ♀ 290 mm.

Locality unknown. — 1 ♂ 240 mm, 1 specimen (carapace only) 125 mm (dry).

Museum Amsterdam:

Japan; don. K. N. Motoske. — 1 ♂ 280 mm (dry).

Ambon; 1913; leg. M. M. Willemsz Geerrooms. — 1 ♂ 190 mm.

New Ireland. — 1 ♂ 210 mm.

The differences between this species and the previous are already mentioned on pp. 78, 80.

The Crustacean figured in L. Renard's work (1754, pl. 47 fig. 195) with the explanation: "Tafel Kreeft. Écrevisse d'Amboine, assez commune et délicieuse." is, as far as identification is possible from the mosaic like figure, probably identical with the present species.

Distribution. The species has an indopacific distribution, it is recorded in literature from: Zanzibar (A. Milne Edwards, 1868), Réunion (A. Milne Edwards, 1862b), Mauritius (H. Milne Edwards, 1837b; White, 1847; Hoffmann, 1874; Richters, 1880; Miers, 1882; Ortmann, 1897; Bouvier, 1915), Japan (De Haan, 1841; Stimpson, 1860; Ortmann, 1891, 1897; Doflein, 1902, 1906a; Balss, 1914a; Parisi, 1917), Lord Howe Island, east of Australia (McCulloch, 1906), Lifu, Loyalty Islands (Borradaile, 1899), Hawaiian Islands (Randall, 1840; Ortmann, 1897; Lenz, 1901; Rathbun, 1906; Pesta, 1933), 200 miles N. of Clipperton Island (Rathbun, 1902).

***Scyllarides guineensis* (Spengler)**

Scyllarus Guineensis Spengler, 1799, K. Danske Vidensk. Selsk. Skr., n.ser. vol. 5, p. 333, pl. 1.

Scyllarus sculptus Latreille, 1818, Tabl. encycl. méth., vol. 24, p. 5, pl. 320 fig. 2.

Scyllarus sculptus Guérin, 1825, Encycl. méth. Hist. nat., vol. 10, p. 416.

Scyllarus sculptus H. Milne Edwards, 1837b, Hist. nat. Crust., vol. 2, p. 283.

Scyllarus sculptus Anonymus, 1845, Proc. Boston Soc. nat. Hist., vol. 2, p. 70.

Scyllarus sculptus Whitelegge, 1899, Rec. Aust. Mus., vol. 3, p. 155, pl. 29.

Scyllarus sculptus Coulon, 1918, Bull. Soc. Sci. nat. Elbeuf, vol. 36, p. 18.

var. ***bermudensis* Verrill**

Scyllarus sculptus Heilprin, 1888, Proc. Acad. nat. Sci. Philad., 1888, p. 321.

Scyllarus sculptus Heilprin, 1889, The Bermuda Islands, p. 150.

Scyllarides sculptus var. *bermudensis* Verrill, 1922, Trans. Connect. Acad. Arts Sci., vol. 26, p. 30, pl. 7 fig. 1.

The species was best known under the specific name *sculptus*, but as Spengler's description of this species, accompanied by a beautiful figure, was published long before that of Latreille, the specific name *guineensis* has priority over the name *sculptus*.

Distribution. *Scyllarides guineensis* s.s. is known from Pt. Stephen, New S. Wales (Whitelegge, 1899), Newcastle, New S. Wales (Whitelegge, 1899; Coulon, 1918), Pt. Jackson, New S. Wales (Whitelegge, 1899), the type specimen was recorded from Guinea, W. Africa. The variety is known only from Bermuda (Heilprin, 1888, 1889; Verrill, 1922). Both in New S. Wales and Bermuda the animals seem to be very rare.

Ibacus Leach

Ibacus ciliatus (Von Siebold)

- Scyllarus Ciliatus* Von Siebold, 1824, Spicil. Faun. Japon., p. 15.
 non *Ibacus ciliatus* Guilding, 1825, Trans. Linn. Soc. Lond., vol. 14, p. 337.
Scyllarus (Ibacus) ciliatus De Haan, 1841, Fauna Japonica, Crust., p. 153, pls. J. L.
Ibacus ciliatus De Haan, 1841, Fauna Japonica, Crust., pl. 36/37 fig. 2.
Ibacus ciliatus White, 1847, List Crust. Brit. Mus., p. 68.
Phyllosoma Guerini De Haan, 1849, Fauna Japonica, Crust., p. 226, pl. 50 fig. 6.
Scyllarus (Ibacus) Ciliatus Herklots, 1861, Tijdschr. Ent., vol. 4, p. 142.
Phyllosoma Guerini Herklots, 1861, Tijdschr. Ent., vol. 4, p. 153.
Ibacus ciliatus Whitelegge, 1890, Journ. Roy. Soc. New S. Wales, vol. 23, p. 223.
Ibacus ciliatus Ortmann, 1891, Zool. Jb. Syst., vol. 6, p. 45.
Ibacus ciliatus Bouvier, 1899, Bull. Mus. Hist. nat. Paris, vol. 5, p. 175.
Ibacus ciliatus Doflein, 1902, Abh. Bayer. Akad. Wiss., vol. 21, p. 643.
Ibacus ciliatus Doflein, 1906a, Ostasienfahrt, pp. 197, 198, fig.
Ibacus ciliatus Balss, 1914a, Abh. Bayer. Akad. Wiss., suppl. vol. 2 pt. 10, p. 80, fig. 44.
Ibacus ciliatus Parisi, 1917, Atti Soc. Ital. Sci. nat., vol. 56, p. 12.
Ibacus ciliatus Maki & Tsuchiya, 1923, Rep. Dept. Agric. Formosa, vol. 3, p. 89, pl. 8 fig. 1.
Ibacus ciliatus Yokoya, 1933, Journ. Coll. Agric. Tokyo, vol. 12, p. 48.
Ibacus ciliatus Fish. Soc. Japan, 1935, Ill. Japan. aq. Plants Anim., vol. 2, pl. 58 fig. 3.
Ibacus ciliatus Estampador, 1937, Philipp. Journ. Sci., vol. 62, p. 495.

Museum Leiden:

- Japan; cotypes. — 1 ♂, 1 ♀ 170 and 140 mm.
 Japan; cotypes; leg. D. W. Burger. — 1 ♂, 2 ♀♀ 70-200 mm (dry).
 Japan; cotypes; leg. P. F. von Siebold. — 2 ♀♀ 125 and 130 mm (dry).
 Japan; cotypes of *Phyllosoma Guerini*. — 3 specimens (larvae) 32-38 mm (dry).
 Japan. — 1 ♂, 1 ♀ 185 and 190 mm.
 Locality unknown. — 7 ♂♂, 2 ♀♀, 1 juv. 120-200 mm (dry).

The name *Ibacus ciliatus* is given by Guilding (1825) to a specimen of *Parribacus antarcticus* from the West Indies.

Phyllosoma Guerini De Haan is a larval stage of the present species, as is already pointed out by Balss (1914a).

Though De Haan in his description states the number of teeth before the lateral fissure as 3-4, and behind it as 10-11, the type specimens are provided there with 3-5 and 10-12 teeth respectively, as also was observed by Ortmann (1891) and Parisi (1917) in their specimens. Bouvier (1899) mentions a specimen with only two teeth before the fissure.

Distribution. The species is recorded from: Japan (Von Siebold, 1824; De Haan, 1841; White, 1847; Ortmann, 1891; Bouvier, 1899; Doflein, 1902, 1906a; Balss, 1914a; Parisi, 1917; Yokoya, 1933; Fish. Soc. Japan, 1935), China (White, 1847), Formosa (Maki & Tsuchiya, 1923; Yokoya, 1933), Luzon (Estampador, 1937), Port Jackson, New S. Wales (Whitelegge, 1890).

Parribacus Dana

Parribacus antarcticus (Lund)

- Potiquiyix Marcgraf, 1648, in Piso & Marcgraf, Hist. nat. Bras., pt. 2, p. 186, fig. Potiquiijix Jonstonus, 1650, Hist. nat. Exang. aquat., ed. 1, pl. 9 fig. 14. Potiquiunijxe Jonstonus, 1657, Hist. nat. Exang. aquat., ed. 2, pl. 9 fig. 14. Potiquiunijxe Jonston, 1660, Besch. Nat. Bloedl. Waterd., pl. 9 fig. 14. Squilla Brasilian. Potiquiyix Sachs, 1665, Gammarologia, p. 93, pl. 3. *Ursa-Cancer* p.p. Rumphius, 1705, Amboin. Rariteitkam., ed. 1, p. 3, pl. 2 fig. C. *Ursa-Cancer* p.p. Rumphius, 1711, Thesaurus Imag., ed. 1, p. 1, pl. 2 fig. C. *Squilla lata* Mas Petiver, 1713, Aquat. Anim. Amboin., p. 1, pl. 2 fig. 12. Potiquiunijxe Ruysch, 1718, Theatr. univ. Anim. Hist. nat. Exang., pl. 9 fig. 14. Potiquiyix Sloane, 1726, Nat. Hist. Jamaica, vol. 2, p. 271. *Ursa-Cancer* p.p. Rumphius, 1739, Thesaurus Imag., ed. 2, p. 1, pl. 2 fig. C. *Ursa-Cancer* p.p. Rumphius, 1740, Amboin. Rariteitkam., ed. 2, p. 3, pl. 2 fig. C. *Ursa-Cancer* p.p. Rumphius, 1741, Amboin. Rariteitkam., ed. 3, p. 3, pl. 2 fig. C. *Ursa-Cancer* Seba, 1761, Thesaurus, vol. 3, p. 50, pl. 20 fig. 1. Potiquiijix Jonstonus, 1767, Hist. nat. Exang. aquat., ed. 3, pl. 9 fig. 14. Langostino Parra, 1787, Descr. differ. piezas Hist. nat., pl. 54 fig. 2. *Scyllarus antarcticus* Lund, 1793, Skr. naturh. Selsk. Kbh., vol. 2 pt. 2, p. 22. *Cancer (Astacus) ursus major* Herbst, 1793, Vers. Naturgesch. Krabben Krebse, vol. 2, p. 82, pl. 30 fig. 2. *Scyllarus antarcticus* Fabricius, 1798, Suppl. Ent. Syst., p. 399. *Scyllarus antarcticus* Bosc, 1801, Hist. nat. Crust., vol. 2, p. 19. *Scyllarus antarcticus* Latreille, 1802, Hist. nat. Crust. Ins., vol. 6, p. 181. *Scyllarus antarcticus* Lamarck, 1818, Hist. nat. Anim. s. Vert., vol. 5, p. 212. *Ibacus ciliatus* Guilding, 1825, Trans. Linn. Soc. Lond., vol. 14, p. 337. *Scyllarus antarcticus* Desmarest, 1830, in Bosc, Man. Hist. nat. Crust., ed. 2 vol. 2, p. 53. *Scyllarus antarcticus* Henschel, 1833, Vita Rumphii, p. 203. *Ibacus antarcticus* H. Milne Edwards, 1837a, in Cuvier, Règne anim., ed. 4 vol. 17, p. 120, vol. 18, pl. 45 fig. 3. *Ibacus antarcticus* H. Milne Edwards, 1837b, Hist. nat. Crust., vol. 2, p. 287. ? *Ibacus Parrae* H. Milne Edwards, 1837b, Hist. nat. Crust., vol. 2, p. 288. *Scyllarus antarcticus* H. Milne Edwards, 1838a, in Lamarck, Hist. nat. Anim. s. Vert., ed. 2 vol. 5, p. 375. *Ibacus antarcticus* H. Milne Edwards, 1838b, Ann. Sci. nat. Zool., ser. 2 vol. 10, p. 168. *Scyllarus antarcticus* Owen, 1839, Zool. Beechey's Voy., p. 86. *Scyllarus (Ibacus) antarcticus* De Haan, 1841, Fauna Japonica, Crust., p. 153, pls. J, L. *Ibacus antarcticus* White, 1847, List Crust. Brit. Mus., p. 68. *Ibacus antarcticus* Gibbs, 1850a, Proc. Amer. Ass. Adv. Sci., vol. 3, p. 193. *Ibacus parrae* Gibbs, 1850a, Proc. Amer. Ass. Adv. Sci., vol. 3, p. 193. *Ibacus antarcticus* Gibbs, 1850b, Proc. Acad. nat. Sci. Philad., 1850, pp. 25, 28. *Parribacus antarcticus* Dana, 1852a, Proc. Acad. nat. Sci. Philad., 1852, p. 14.

- Parribacus Parrae* Dana, 1852a, Proc. Acad. nat. Sci. Philad., 1852, p. 14.
Ibacus antarcticus Dana, 1852b, U. S. Explor. Exped., vol. 13, p. 517.
Parribacus antarcticus Dana, 1855, U. S. Explor. Exped., vol. 13, pl. 32 fig. 6.
 ? *Ibacus Parrae* Guérin Méneville, 1857, in Sagra, Hist. Cuba, Crust., p. xlii.
Parribacus antarcticus Stimpson, 1860, Proc. Acad. nat. Sci. Philad., 1860, p. 23.
Scyllarus (Ibacus) Antarcticus Herklots, 1861, Tijdschr. Ent., vol. 4, p. 142.
 ? *Scyllarus (Ibacus) Parrae* Herklots, 1861, Tijdschr. Ent., vol. 4, p. 142.
Ibacus antarcticus A. Milne Edwards, 1862b, Note Ile Réunion, Ann. F., p. 14.
Ibacus antarcticus Von Martens, 1872, Arch. Naturgesch., vol. 38 pt. 1, p. 124.
Ibacus antarcticus Hoffmann, 1874, Rech. Faune Madagascar, vol. 5 pt. 2, p. 42.
Parribacus antarcticus Miers, 1877, Proc. zool. Soc. Lond., 1877, p. 138.
Ibacus antarcticus Neumann, 1878, Syst. Uebers. Oxyrh., p. 34.
Parribacus antarcticus Miers, 1880a, Ann. Mag. nat. Hist., ser. 5 vol. 5, p. 378.
Ibacus antarcticus Richters, 1880, Beitr. Meeresfauna Maurit., p. 161.
Paribacus antarcticus Pfeffer, 1881, Verh. naturw. Ver. Hamburg, ser. 2 vol. 5, p. 49.
Paribacus antarcticus carinatus Pfeffer, 1881, Verh. naturw. Ver. Hamburg, ser. 2 vol. 5, p. 49.
Ibacus antarcticus Haswell, 1882, Cat. Aust. Crust., p. 169.
Paribacus antarcticus Ortmann, 1891, Zool. Jb. Syst., vol. 6, p. 45.
Paribacus antarcticus Thallwitz, 1892, Abh. zool.-anthrop. Mus. Dresden, 1890-91, pt. 3, p. 50.
Parribacus antarcticus Rathbun, 1897, Ann. Jamaica Inst., vol. 1, p. 43.
Parribaccus antarcticus Whitelegge, 1897, Mem. Aust. Mus., vol. 3, p. 146.
Paribacus antarcticus Borradaile, 1898, Proc. zool. Soc. Lond., 1898, p. 1014.
Ibacus antarcticus Anonymus, 1899, Mem. Aust. Mus., vol. 3, p. 518.
Paribacus antarcticus Borradaile, 1899, Willey's Zool. Results, vol. 4, p. 419.
Paribaccus antarcticus Nobili, 1899, Ann. Mus. Stor. nat. Genova, vol. 40, p. 243.
 ? *Ibaccus parrae* Young, 1900, Stalk-eyed Crust. Brit. Guian., p. 430.
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Ibacus antarcticus Thompson, 1901, Catal. Crust. Mus. Dundee, p. 18.
Paribacus antarcticus De Man, 1902a, Rumphius Gedenkb., p. 101.
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Parribacus papyraceus Rathbun, 1906, Bull. U. S. Fish Comm., vol. 23 pt. 3, p. 897, pl. 18 fig. 5.
Parribacus antarcticus Nobili, 1907, Mem. Accad. Sci. Torino, ser. 2 vol. 57, p. 366.
Paribacus antarcticus Andrews, 1912, Zool. Jb. Suppl., vol. 15 pt. 3, p. 182, textfigs. C-G, pl. 6 fig. 2.
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Paribacus antarcticus Demandt, 1914, Mitt. Deutsch. Seefisch. Ver., vol. 30, p. 110.
Parribacus ursus Stebbing, 1915, Ann. S. Afr. Mus., vol. 15, p. 63.
Parribacus ursus major De Man, 1916, Siboga Exped., mon. 39a2, p. 93.
Paribacus ursus major Parisi, 1917, Atti Soc. Ital. Sci. nat., vol. 56, p. 13, fig. 3.
Parabacus antarcticus Edmondson, 1923, Bull. Bishop Mus. Honolulu, vol. 5, p. 28.
Parribacus ursus major De Man, 1924, Arch. Naturgesch., vol. 90 pt. 1, p. 57.
Parribacus ursus major Edmondson, 1925, Bull. Bishop Mus. Honolulu, vol. 27, p. 18.
Paribaccus ursus-major Matthews, 1926, Bol. Mus. Nac. Rio de Jan., vol. 2 pt. 2, pp. 8, 17.
Parribacus antarcticus Pesta, 1933, Zool. Anz., vol. 104, p. 280.
Parribacus ursus-major Boone, 1935, Bull. Vanderbilt mar. Mus., vol. 6, p. 54, pl. 13.
Scyllarus haani Fish. Soc. Japan, 1935, Ill. Japan. aq. Plants Anim., vol. 2, pl. 58 fig. 2.
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Museum Leiden:

Japan; leg. D. W. Burger.—2 ♂♂ both 160 mm (dry).

Japan.—2 ♂♂ 160 and 180 mm (dry).

Kisar; 1898; leg. K. Schädler.—1 ♀ 150 mm.

Sowek, Schouten Islands, north of Dutch New Guinea; 1869; leg. C. B. H. von Rosenberg.—1 ♀ 110 mm.

New Caledonia; 1880; don. A. Milne Edwards.—1 ♀ 165 mm (dry).

New Caledonia; coll. Frank.—1 ♂ 130 mm (dry).

Locality unknown; Mus. Godeffroy.—2 ♀♀ 130 and 160 mm.

Locality unknown.—1 ♂, 1 ♀ 170 and 225 mm (dry).

Museum Amsterdam:

Sabang Bay, N. Sumatra; leg. G. Herman.—1 ♂ 180 mm.

Locality unknown.—4 ♂♂, 1 ♀ 120-195 mm.

The specimens from Japan collected by Burger (not Bürger) were already mentioned by De Haan (1841), that from Sabang Bay already by De Man (1924).

In 1793 both Lund and Herbst gave a description of the present species. As before that time the species was not yet described by an author who applied the rules of binary nomenclature, either Lund's or Herbst's name must be used for the species. Lund named it *Scyllarus antarcticus*, Herbst described it under the name *Cancer (Astacus) ursus major*. It is not known which of the two descriptions was published first. Lund's specific name later was generally accepted, while that of Herbst, if it was not overlooked, was only treated as a synonym, till in 1915 Stebbing pointed out that Herbst's name is to be preferred to that of Lund, as Herbst's description is accompanied by a good figure. Stebbing named the species therefore *Parribacus ursus* (Herbst), which was corrected by later authors to *Parribacus ursus(-)major*. In my opinion, however, Lund's specific name for the species and not that of Herbst must be used. Article 28 of the International Rules of Zoological Nomenclature namely states that when two species, which bear names of the same date, are united, the name used by the first reviser shall stand. Now, as far as I know, H. Milne Edwards (1837b) is the first, who stated Herbst's *Cancer (Astacus) ursus major* to be identical with *Scyllarus antarcticus* Lund; he used for the species the name *Ibacus antarcticus* and treated Herbst's name only as a synonym. It is clear therefore that H. Milne Edwards (1837b) is the first reviser and the name used by him is the correct name for the species, which therefore must be called *Parribacus antarcticus*. The name *antarcticus* has the advantage that it consists of one word and is not compound as *ursus-major* is, moreover the name *antarcticus* is much more used in literature than Herbst's name; the only drawback of the name is that it

belongs to a tropical species, which does not occur in the antarctic region.

The species, though best known from the indopacific region, also occurs in the atlantic region. In 1837 H. Milne Edwards described a new species *Ibacus Parrae* from the West Indies; this species should differ from *Parribacus antarcticus* by missing the spines at the bases of the last pereopods. Twelve years before Milne Edwards's publication Guilding (1825) published a description of a *Parribacus* species named by him *Ibacus ciliatus* from the Caribbean Sea, this specimen does not belong to *Parribacus parrae*, as Guilding states in his description: "Pedes 2 postici ad basin spinâ validâ simplici." Gibbes (1850a, b) and Von Martens (1872) mention specimens from Santa Cruz and Cuba respectively, which also are provided with those spines, just like a specimen from Jamaica figured by Andrews (1912). Furthermore Neumann (1878), Rathbun (1897), Thompson (1901) and Matthews (1926) mention specimens from the West Indian region under the specific names *antarcticus* or *ursus-major*. As Von Martens already pointed out there are two possibilities, either *P. parrae* is distinct from *P. antarcticus* and then both species occur in the Caribbean, or, which is most probable, *P. parrae* is identical with *P. antarcticus* and is only founded on an aberrant or damaged specimen. Gibbes (1850a) supposed that the westindian form, of which *P. parrae* is an aberrant specimen only, would show some differences with the indopacific form; Von Martens, however, who had both forms at his disposal could not find any difference between them. If, however, Gibbes's supposition should prove to be correct, then the westindian species must be called *Parribacus parrae* (H. Milne Edwards); though the westindian form is firstly described as new by Guilding (1825), his specific name *ciliatus* can not be used, as it is preoccupied by the name *Ibacus ciliatus* (Von Siebold, 1824).

Distribution. The species is known throughout the indopacific region and from the West Indies. The records in literature are:

Indopacific: Indian Ocean (Lamarck, 1818; Desmarest, 1830; H. Milne Edwards, 1838a; Ortmann, 1891), Asiatic Seas (Latreille, 1802; H. Milne Edwards, 1837b, 1838b; White, 1847), Réunion (A. Milne Edwards, 1862b; Hoffmann, 1874), Mauritius (White, 1847; Hoffmann, 1774; Richters, 1880), Japan (Herbst, 1793; De Haan, 1841; Herklots, 1861; Ortmann, 1891; Thompson, 1901; Balss, 1914a; Parisi, 1917; Fish. Soc. Japan, 1935), Formosa (Oo-U-Kijo, 1937), Philippines (White, 1847), Sabang Bay, Sumatra (De Man, 1924), Talaud Islands (De Man, 1916), Ternate (Nobili, 1899), Ambon (Rumphius, 1705, 1711, 1739, 1740, 1741; Petiver, 1713; Seba 1761; Nobili, 1899), New Guinea (Miers,

1880a; Thallwitz, 1892), Duke of York Island (Miers, 1877), Australia (Haswell, 1882), Southern Seas (Pfeffer, 1881; Ortmann, 1891; Thompson, 1901), Marshall Islands (Balss, 1914a), Loyalty Islands (Borradaile, 1899; Anonymus, 1899), Rotuma (Borradaile, 1898), Upolu, Fiji Islands (Dana, 1852), Samoa (Thallwitz, 1892; Demandt, 1914), Hawaiian Archipelago (Gibbes, 1850a; Stimpson, 1860; Lenz, 1901; Rathbun, 1906; Edmondson, 1925; Pesta, 1933), Johnston Island (Edmondson, 1925), Palmyra (Edmondson, 1923), Tahiti (Stimpson, 1860; Boone, 1935), Rikitea, Tuamotu Islands (Nobili, 1907), Hao, Tuamotu Islands (Nobili, 1907), Carysfort Island (Owen, 1839).

Atlantic: Caribbean Sea (Guilding, 1825; ? H. Milne Edwards, 1837b), Cuba (Von Martens, 1872), Jamaica (Sloane, 1725; Rathbun, 1897; Andrews, 1912), Santa Cruz (Gibbes, 1850a, b), Virgin Islands (Thompson, 1901), ? Barbados (Young, 1900), Surinam (Neumann, 1878), Brazil (Marcgraf, 1648; Jonston, 1650, 1657, 1660; Sachs, 1665; Ruysch, 1718), Pernambuco, Brazil (Matthews, 1926).

Thenus Leach

Thenus orientalis (Lund)

- Ursa-Cancer* p.p. Rumphius, 1705, Amboin. Rariteitkam., ed. 1, p. 3, pl. 2 fig. D.
Ursa-Cancer p.p. Rumphius, 1711, Thesaurus Imag., ed. 1, p. 1, pl. 2 fig. D.
Squilla lata foemina Petiver, 1713, Aquat. Anim. Amboin., p. 1, pl. 5 fig. 1.
Ursa-Cancer p.p. Rumphius, 1739, Thesaurus Imag., ed. 2, pl. 2 fig. D.
Ursa-Cancer p.p. Rumphius, 1740, Amboin. Rariteitkam., ed. 2, p. 3, pl. 2 fig. D.
Ursa-Cancer p.p. Rumphius, 1741, Amboin. Rariteitkam., ed. 3, p. 3, pl. 2 fig. D.
Cancer (Astacus) arctus Herbst, 1793, Vers. Naturg. Krabben Krehse, vol. 2, p. 80, pl. 30 fig. 1.
Scyllarus orientalis Lund, 1793, Skr. naturh. Selsk. Kbh., vol. 2 pt. 2, p. 22.
Scyllarus orientalis Fabricius, 1798, Suppl. Ent. Syst., p. 399.
non *Scyllarus orientalis* Bosc, 1801, Hist. nat. Crust., vol. 2, p. 20, pl. 10 fig. 2.
Scyllarus orientalis Latreille, 1802, Hist. nat. Crust. Ins., vol. 6, p. 181, pl. 52 fig. 2.
Thenus indicus Leach, 1815, Trans. Linn. Soc. Lond., vol. 11, p. 338.
non *Scyllarus Orientalis* Risso, 1816, Hist. nat. Crust. Nice, p. 60.
Scyllarus orientalis Latreille, 1818, Tabl. encycl. méth., vol. 24, p. 5, pl. 314.
Scyllarus orientalis Lamarck, 1818, Hist. nat. Anim. s. Vert., vol. 5, p. 213.
Scyllarus orientalis Desmarest, 1823, Dict. Sci. nat., vol. 28, p. 291, atl. vol. 4, Crust., pl. 31 fig. 1.
? *Scyllarus Orientalis* Siebold, 1824, Spicil. Faun. Japon., p. 15.
Scyllarus orientalis Desmarest, 1825, Consid. gén. Crust., p. 182, pl. 31 fig. 1.
Thenus indicus Latreille, 1829, in Cuvier, Règne anim., ed. 2 vol. 4, p. 80.
non *Scyllarus orientalis* Desmarest, 1830, in Bosc, Man. Hist. nat. Crust., ed. 2 vol. 2, p. 53, pl. 10 fig. 2.
Scyllarus orientalis Henschel, 1833, Vita Rumphii, p. 203.
Thenus orientalis H. Milne Edwards, 1837a, in Cuvier, Règne anim., ed. 4 vol. 17, p. 120, vol. 18, pl. 45 fig. 2.
Thenus orientalis H. Milne Edwards, 1837b, Hist. nat. Crust., vol. 2, p. 286.
Thenus orientalis H. Milne Edwards, 1838b, Ann. Sci. nat. Zool., ser. 2 vol. 10, p. 168.

- Scyllarus orientalis* De Haan, 1841, Fauna Japonica, Crust., p. 150, pls. J, L.
Thenus orientalis Anonymus, 1845, Proc. Boston Soc. nat. Hist., vol. 2, p. 70.
Thenus indicus Berthold, 1845, Nachr. Ges. Wiss. Göttingen, 1845, p. 45.
Thenus indicus Berthold, 1847, Abh. Ges. Wiss. Göttingen, vol. 3, p. 26.
Thenus orientalis White, 1847, List Crust. Brit. Mus., p. 67.
Thenus orientalis Gibbes, 1850a, Proc. Amer. Ass. Adv. Sci., vol. 3, p. 193.
Thenus orientalis Gibbes, 1850b, Proc. Acad. nat. Sci. Philad., 1850, p. 29.
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Thenus orientalis Heller, 1865, Reise Novara, Zool., vol. 2 pt. 3, p. 93.
Thenus orientalis Hoffmann, 1874, Rech. Faune Madagasc., vol. 5 pt. 2, p. 42.
Thenus orientalis Hilgendorf, 1878, Mber. Akad. Wiss. Berlin, 1878, p. 849.
Thenus orientalis Neumann, 1878, Syst. Uebers. Oxyrh., p. 34.
Thenus orientalis Miers, 1880a, Ann. Mag. nat. Hist., ser. 5 vol. 5, p. 378.
Thenus orientalis Haswell, 1882, Catal. Aust. Crust., p. 170.
Thenus orientalis Walker, 1887, Journ. Linn. Soc. Lond. Zool., vol. 20, p. 112.
Thenus orientalis Bate, 1888, Rep. Voy. Challenger, Zool., vol. 24, p. 66.
Thenus orientalis Gavino, 1888, Viaggio Circumnavig. Caracciolo, Crost., p. 6.
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Thenus orientalis Ortmann, 1891, Zool. Jb. Syst., vol. 6, p. 46.
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Thenus orientalis Henderson, 1893, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 5, p. 433.
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Thenus orientalis Thurston, 1895, Bull. Madras Govt. Mus., vol. 3, p. 120.
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Thenus orientalis De Man, 1902a, Rumphius Gedenkb., p. 101.
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Thenus orientalis Nobili, 1906a, Ann. Sci. nat. Zool., ser. 9 vol. 4, p. 88.
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Thenus orientalis Chilton, 1911, Trans. Proc. New Zeal. Inst., vol. 43, p. 549.
Thenus orientalis Babič, 1913, Zool. Anz., vol. 41, p. 273.
Thenus orientalis Balss, 1914a, Abh. Bayer. Akad. Wiss., suppl. vol. 2 pt. 10, p. 80.
Thenus orientalis Stebbing, 1915, Ann. S. Afr. Mus., vol. 15, p. 65.
non *Scyllarus orientalis* De Man, 1916, Siboga Exped., mon. 39a2, p. 73.
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Thenus orientalis Balss, 1921b, K. Svenska Vetensk. Akad. Handl., vol. 61 pt. 10, p. 18.
Thenus orientalis Maki & Tsuchiya, 1923, Rep. Dept. Agric. Formosa, vol. 3, p. 88, pl. 8 fig. 2.
? *Thenus orientalis* Stephensen, 1923, Rep. Danish oceanogr. Exped. Mediterr., vol. 2 D3, p. 76, fig. 26.
Thenus orientalis Barnard, 1926, Trans. Roy. Soc. S. Afr., vol. 13, p. 121.

- Thenus orientalis* Santucci, 1926, Monit. zool. Ital., vol. 37, p. 19, figs. 1-4.
Thenus orientalis Boone, 1935, Bull. Vanderbilt mar. Mus., vol. 6, p. 58, pls. 14, 15.
Thenus orientalis Gordon, 1935, Ann. Mag. nat. Hist., ser. 10 vol. 16, p. 629.
Thenus orientalis C. von Bonde & Marchand, 1935, Fish. Bull. Fish. mar. biol. Surv. S. Afr., vol. 1, p. 7.
Thenus orientalis Estampador, 1937, Philipp. Journ. Sci., vol. 62, p. 496.
Thenus orientalis Serène, 1937, Notes Inst. oceanogr. Indochine, vol. 30, p. 71.
Thenus orientalis Suvatti, 1937, Check-List aq. Fauna Siam, p. 52.
Thenus orientalis Ramadan, 1938, Sci. Rep. John Murray Exped., vol. 5 pt. 5, p. 127.
non *Scyllarus orientalis* Ramadan, 1938, Sci. Rep. John Murray Exped., vol. 5 pt. 5, p. 126, fig. 2.

Museum Leiden :

- Indian Ocean; leg. B. Wils. — 1 juv. 59 mm.
 Amoy, China; leg. J. A. Buddingh. — 1 ♀ 120 mm.
 China. — 3 ♂♂, 2 ♀♀ 70-155 mm (dry).
 Deli, Sumatra. — 1 ♀ 200 mm.
 Banka; 1861; leg. J. F. R. S. Van den Bossche. — 2 ♂♂ 90 and 95 mm.
 Panaroekan or Pasoeroean, E. Java; leg. P. Schravenman. — 3 ♂♂ 134-180 mm.
 Java Sea; February, 1912; leg. P. Buitendijk. — 1 ♀ (ovigerous) 220 mm.
 Java Sea; leg. P. Bleeker. — 5 ♂♂, 7 ♀♀ 80-145 mm.
 East Indies; leg. C. G. C. Reinwardt. — 8 ♂♂, 9 ♀♀ 72-190 mm.
 Locality unknown. — 2 ♂♂ 100 and 110 mm.

Museum Amsterdam :

- Kamaron, Red Sea; February, 1924; leg. G. J. Terwiel. — 2 ♀♀ 160 and 180 mm.
 Bay of Batavia; 1933; leg. Van der Paardt. — 1 ♀ 150 mm.
 Balikpapan, Borneo; leg. W. J. Tissot van Patot. — 2 ♀♀ 180 and 190 mm.
 Ambon; 1913; leg. M. M. Willemsz Geeroms. — 1 ♀ 235 mm.
 Moluccas. — 11 ♂♂ 75-129 mm.
 Locality unknown. — 1 ♀ 110 mm.

The specimens in the Leiden Museum from China were already mentioned by Herklots (1861). The specimens mentioned by Bosc (1801), Risso (1816), and Desmarest (1830) as *Scyllarus orientalis* in reality belong to *Scyllarides latus* (Latr.). The specimen described by Stebbing (1915) as *Thenus orientalis*, according to Barnard (1926) who examined it, belongs to *Scyllarus rugosus* H. Milne Edw. *Scyllarus orientalis* mentioned by De Man (1920) and Ramadan (1938) must be named *Scyllarus batei*, as the name *Scyllarus orientalis* is preoccupied (vid. p. 94).

The specimens named *Scyllarus Orientalis* by Von Siebold (1824) probably belong to *Scyllarides haanii* or *squamosus*.

Distribution. The present species is common in the western part of the indopacific region and seems to lack entirely in Oceania. In literature it is recorded from: Red Sea (Nobili, 1906a), Gulf of Aden (Ramadan, 1938), Persian Gulf (Nobili, 1906b), Portuguese E. Africa (Barnard, 1926), Moçambique? (Hilgendorf, 1878), Natal (Stebbing 1915; C. von Bonde & Marchand, 1935), Madagascar (White, 1847; Hoffmann, 1874), Saya

de Malha Bank (Borradaile, 1910), Indian Seas (Latreille, 1802; Lamarck, 1818; Desmarest, 1823; H. Milne Edwards, 1837b; White, 1847; Lucas, 1851; Ortmann, 1891), India (White, 1847; Neumann, 1878; Ortmann, 1891; Henderson, 1893; Thompson, 1901), Muttuwartu, Ceylon (Thurston, 1895), Ceylon (Tennent, 1861), Madras (Heller, 1865; Henderson, 1893), Orissa coast (Alcock, 1902), China (Berthold, 1845, 1847; White, 1847; Herklots, 1861), ?Japan (Von Siebold, 1824), Making, Pescadores Islands (Balss, 1914a), Formosa (Maki & Tsuchiya, 1923), Philippines (White, 1847; Ortmann, 1891; Casto de Elera, 1895), Annam (Serène, 1937), Saigon (Stearns, 1891), N. of Singapore, Gulf of Siam (Suvatti, 1937), Kelantan, Malay Peninsula (Lanchester, 1901), Singapore (Walker, 1887; Gavino, 1888; Ortmann, 1891; Nobili, 1903b; Boone, 1935), Mergui Archipelago (De Man, 1888b), Ambon (Rumphius, 1705, 1711, 1739, 1740, 1741; Petiver, 1713), Christmas Island (Gordon, 1935), Arafoera Sea (Bate, 1888), Swan River, W. Australia (Haswell, 1882), W. Australia (White, 1847), N. W. Australia (Balss, 1921b), Kermadec Islands ? (Chilton, 1911a). The species is also once reported from the Adriatic Sea near Fiume (Babič, 1913), where it probably was introduced by ships. Stephensen (1923) refers a Scyllarid larva from the Western Mediterranean ($40^{\circ} 34' \text{ N}$, $3^{\circ} 03' \text{ E}$), with some doubt to the present species. Also Santucci (1926) records larvae of *Thenus orientalis* from the Mediterranean.

PALINURIDAE

Since the publication of De Man's (1916) list of the genera, species, and varieties of Palinuridae known in 1915, many changes have taken place in this group. Therefore I thought it useful to give here again such a list, which has been made up to date:

Palinurellus Von Martens (1878)

gundlachi Von Martens (1878), from Cuba and Barbados. Synonym: *Synaxes hybridica* Bate (1881).

gundlachi var. *wieneckeii* (De Man, 1881), from Mauritius and Bengkoeloe, Sumatra. Synonym: *Araeosternus Wieneckii* De Man (1881). Vid. p. 114.

Palinustus A. Milne Edw. (1880)

mossambicus Barnard (1926), from Portuguese E. Africa and Sulu Sea. Vid. p. 117.

truncatus A. Milne Edw. (1880), from Cariacou, Lesser Antilles. Synonym: *Palinurus truncatus* Gruvel (1911).

Linuparus White (1847)

trigonus (Von Siebold, 1824), from Japan. Synonyms: *Palinurus trigonus* Von Siebold (1824), *Avus trigonus* Ortmann (1891). Vid. p. 121.

Puerulus Ortmann (1897a)

angulatus (Bate, 1888), from N. of New Guinea, Bali Sea and between Roti and Timor. Synonyms: *Panulirus angulatus* Bate (1888) and *Puer angulatus* Ortmann (1891).

carinatus Borradaile (1910), from Saya de Malha Bank and Zanzibar area.

parkeri (Stebbing, 1902), from Buffalo River, S. Africa. Synonym: *Jasus parkeri* Stebbing (1902). Vid. p. 148.

sewelli Ramadan (1938), from Gulf of Aden, Arabian Sea and Gulf of Manaar. Synonym: *Panulirus angulatus* Alcock (1901) (non Bate).

Justitia nov. gen.

longimana (H. Milne Edw., 1837b) from Cuba, Santa Cruz, Martinique, Antilles. Synonym: *Palinurus longimanus* H. Milne Edw. (1837b). Vid. p. 115.

longimana var. *mauritiana* (Miers, 1882), from Mauritius. Synonym: *Palinurus longimanus* var. *mauritanus* Miers (1882). Vid. p. 115.

Panulirus White (1847)

argus (Latr., 1804), from Bermudas, Bahamas, Antilles and Eastcoast of the American continent from Florida to Rio de Janeiro. Synonyms: *Palinurus argus* Latr. (1804), *Palinurus americanus* H. Milne Edw. (1837b), *Palinurus Ricordi* Guérin Ménev. (1829-44) and *Senex argus* Ortmann (1891).

dasyopus (Latr., 1804), from Western Indian Ocean to Japan and Malay Archipelago. Synonyms: *Palinurus dasyopus* Latr. (1804), *Senex dasyopus* Ortmann (1891). Vid. p. 134.

echinatus S. I. Smith (1869), from Pernambuco and Fernando Noronha. Perhaps identical with *Panulirus guttatus* (Latr., 1804).

guttatus (Latr., 1804), from Eastcoast of America, from Bermuda and Florida to the Brazilian coasts and St. Paul's Rock. Synonyms: *Palinurus guttatus* Latr. (1804), *Palinurus inermis* Pocock (1890), *Senex guttatus* Ortmann (1891), *Puerulus inermis* Gruvel (1911).

homarus (L., 1758), from Red Sea and S. Africa to Japan and Polynesia. Synonyms: *Cancer Homarus* L. (1758), *Palinurus Burgeri* De Haan (1841), *Senex bürgeri* Ortmann (1891), *Panulirus burgeri* Bouvier (1905). Vid. p. 128.

inflatus (Bouvier, 1895), from the Pacific coast of Lower California and

- Panama, and from the Hawaiian Islands. Synonyms: *Palinurus inflatus* Bouvier (1895), *Palinurus Martensi* Nobili (1897), *Palinurus Paessleri* Pfeffer (1897).
- interruptus* (Randall, 1839), from the Pacific coast of America from California to the Gulf of Tehuantepec. Synonyms: *Palinurus interruptus* Randall (1839), *Senex interruptus* Ortmann (1891).
- japonicus* (Von Siebold, 1824), from E. Africa to Japan, Polynesia and the Hawaiian Islands. Synonyms: *Palinurus japonicus* Von Siebold (1824), *Palinurus longipes* A. Milne Edw. (1868), *Palinurus femoristriga* Von Martens (1872), *Palinurus longitarsus* Lenz & Richters (1881), *Senex japonicus* Ortmann (1891), *Senex femoristriga* Ortmann (1891), *Puer pellucidus* Ortmann (1891), *Puerulus pellucidus* Calman (1909). Vid. p. 123.
- laevicauda* (Latr., 1817), from Cuba and the Eastcoast of S. America from French Guiana to Brazil. Synonyms: *Palinurus laevicauda* Latr. (1817), *Palinurus* sp. (*ornatus*?) Von Martens (1872), *Panulirus ornatus* Pocock (1890) (non Fabricius).
- ornatus* (Fabr., 1798), from Red Sea and S. Africa to Formosa and Polynesia. Synonyms: *Palinurus ornatus* Fabr. (1798), *Palinurus sulcatus* H. Milne Edw. (1837b), *Palinurus brevipes* p. p. Pfeffer (1881). Vid. p. 138.
- penicillatus* (Oliv., 1791), from E. Africa and Red Sea to Korea, Polynesia, the Hawaiian and Galapagos Islands. Synonyms: *Astacus penicillatus* Oliv. (1791), *Palinurus gigas* Bosc (1801), *Palinurus penicillatus* Oliv. (1811b), *Palinurus Ehrenbergi* Heller (1861), *Senex penicillatus* Ortmann (1891). Vid. p. 125.
- polyphagus* (Herbst, 1793), from Mauritius, the coasts of India from Baluchistan to Singapore, Malay Archipelago, Indochina, Japan and Polynesia. Synonyms: *Cancer (Astacus) polyphagus* Herbst (1793), *Palinurus fasciatus* Fabr. (1798), *Senex fasciatus* Parker (1883), *Palinurus orientalis* Doflein (1900), *Panulirus fasciatus* Gruvel (1911). Vid. p. 136.
- rissonii* (Desmarest, 1825), from the western Mediterranean (Nice, Marseilles, Catalanian coast), the Westcoast of Africa from Cape Barbas (Rio de Oro) to Mossamedes and Praya Amelia (S. Angola), and the Cape Verde Islands. Synonyms: *Palinurus Fasciatus* Risso (1816) (non Fabricius), *Palinurus Rissonii* Desmarest (1825), *Palinurus ornatus* Herklots (1861) (non Fabricius), *Panulirus regius* Brito Capello (1864), *Palinurus longipes* Pfeffer (1881), *Palinustus phoberus* Rochebrune (1883), *Palinurus regius* Pfeffer (1897), *Palinostus phoberus*

Rathbun (1900), *Puer atlanticus* Bouvier (1905), *Puerulus atlanticus* Calman (1909). Vid. p. 122.

versicolor (Latr., 1804), from E. Africa to Japan and Polynesia. Synonyms: *Palinurus versicolor* Latr. (1804), *Palinurus taeniatus* Lamarck (1818), *Palinurus fasciatus* De Haan (1841) (non Fabricius), *Palinurus ornatus* var. *decoratus* Heller (1865), *Puer spiniger* Ortmann (1894), *Panulirus demani* Borradaile (1899), *Senex ornatus* var. *laevis* Lanchester (1901), *Puerulus spiniger* Calman (1909), *Panulirus ornatus* var. *taeniatus* Gruvel (1911). Vid. p. 142.

Palinurus Fabr. (1798)

elephas (Fabr., 1787) from the Mediterranean and the Atlantic coast of Europe and Africa from the Orkneys and the Hebrides to Cape Bojador (W. Africa). Synonyms: *Cancer (Astacus) Homarus* Pennant (1777) (non Linnaeus), *Astacus Elephas* Fabricius (1787), *Cancer Locusta* Wulfen (1791), *Cancer (Astacus) Elephas* Herbst (1793), *Palinurus quadricornis* Fabr. (1798), *Palinurus vulgaris* Latr. (1804), *Palinurus Locusta* Oliv. (1811), *Palinurus adriaticus* Costa (1836-57), *Palinurus marinus* Bate (1868). Vid. p. 145.

gilchristi Stebbing (1900), from False Bay to Algoa Bay (S. Africa).

gilchristi var. *delagoae* Barnard (1926), from Delagoa Bay (Portuguese E. Africa).

gilchristi var. *natalensis* Barnard (1926) from Natal coast from Umkomaas River to Tugela River, and off Delagoa Bay.

mauritanicus Gruvel (1911), from the Atlantic coasts of Europe and Africa, from S. W. Ireland to St. Louis (Senegal). Synonyms: *Palinurus vulgaris* var. *inflata* Gruvel (1910), *Palinurus vulgaris* var. *mauritanicus* Gruvel (1911), *Palinurus Thomsoni* Selbie (1914).

Jasus Parker (1884)

lalandei (H. Milne Edw., 1837b), from Cape Cross (S. W. Africa) to Algoa Bay (S. Africa) and from S. E. coast of Australia from Pt. Stephen (New S. Wales) to Reevesby Isl. (S. Australia). Synonym: *Palinurus Lalandii* H. Milne Edw. (1837b). Vid. p. 147.

lalandei var. *frontalis* (H. Milne Edw., 1837b), from Juan Fernandez (off the coast of Chile), New Zealand, Tasmania, St Paul Island and Tristan da Cunha. Synonyms: *Palinurus frontalis* H. Milne Edw. (1837b), *Palinurus Edwardsii* Hutton (1875), *Palinostus lalandei* Bate (1888), *Palinostus lalandei* Stebbing (1893). Vid. p. 150.

verreauxii (H. Milne Edw., 1851), from New S. Wales, Tasmania and New Zealand. Synonyms: *Palinurus Verreauxii* H. Milne Edw. (1851), *Palinurus Hügelii* Heller (1862), *Palinurus tumidus* Kirk (1880).

Species incertae:

- Palinurus affinis* Tennent (1861) from Ceylon. Nomen nudum.
- Palinurus striatus* Alcock (1902) from Great Coco Island, Andaman Group. Nomen nudum.
- Panulirus bispinosus* Borradaile (1899) from Loyalty Islands. Probably a young specimen of *Panulirus japonicus* (Von Siebold). Vid. Borradaile (1899) and De Man (1916).
- Panulirus gracilis* Streets (1871), from the Gulf of Tehuantepec (Pacific coast of Mexico). Probably identical with *Panulirus inflatus* (Bouvier).
- Panulirus marginatus* (Quoy & Gaimard, 1824), from the Hawaiian Islands. Probably identical with *Panulirus japonicus* (Von Siebold). Vid. Gruvel (1911). Synonym: *Palinurus marginatus* Quoy & Gaimard, 1824.
- Panulirus occidentalis* White (1847), from West Indies. Nomen nudum.
- Panulirus spinosus* (H. Milne Edw., 1837b), from Poeloe Condore, Tahiti and Pacific Islands. Gruvel (1911) brings this species with some doubt to *Panulirus guttatus*, while Bouvier (1905) regards it as a distinct species. Synonym: *Palinurus spinosus* H. Milne Edw., 1837b.

I give here a key to the genera of Palinuridae, in which some relations between the genera, which were found during the course of my studies on the group, and which hitherto remained unobserved, are put forward.

1. Eyestalks not overlapped by anteriorly directed processes or strong spines of the carapace. Carapace evenly tuberculate, without spines.

Palinurellus Von Martens

- Eyestalks each overlapped by an anteriorly directed process or strong spine of the carapace. Carapace with tubercles and spines.

2. Supraorbital spines dorsally smooth. Abdominal segments never with more than one transverse groove, sometimes, however, the rest of the surface is provided with squamiform sculpture. First pereopods not extremely long, without a distinctly hookshaped dactylus

- Supraorbital spines dorsally serrate. Abdominal segments each with four or five transverse grooves, never with squamiform sculpture. First pereopods extremely long, dactylus strongly curved.

Justitia nov. gen.

3. Carapace prismatic. Pleopods of the second abdominal segment in the female with a well developed stylamblys, which has the same size as those of the following pairs.

- Carapace cylindrical, not prismatic. Pleopods of the second abdominal segment in the female without or with a reduced stylamblys, which is much smaller than those of the following pairs.

4. Antennulae very long, first segment of the peduncle reaching farther than the last segment of the antennal peduncle. First pleopods present in the female. Pereopods provided with long stiff hairs. Supraorbital spines truncate and anteriorly crenulate, not fused in the middle.

Palinustus A. Milne Edw.

- Antennulae rather short, only third segment reaching entirely or partly beyond

- antennal peduncle. First pleopods absent in female. Pereiopods naked or with short hairs. 5.
5. Supraorbital spines fused in the median region to a broad swollen rostrum. *Linuparus* White
- Supraorbital spines with a large distance between them. *Puerulus* Ortmann
6. Antennula with two short flagella, which are shorter than half the length of the peduncle. Endopod of pleopods of second abdominal segment with a distinct stylamblys in female. 7.
- Antennula with very long flagella, which are much longer than the entire length of the peduncle. Supraorbital spines ventrally not serrate. Endopod of pleopods of second abdominal segment in female without a stylamblys. *Panulirus* White
7. Base of antenna without stridulating organ. Supraorbital spines without teeth at anteroventral margin. *Jasus* Parker
- Base of antenna with stridulating organ. Supraorbital spines serrate at anteroventral margin. *Palinurus* Fabr.

In the three collections at my disposal the following genera are present: *Palinurellus*, *Palinustus*, *Linuparus*, *Panulirus* and *Jasus*; they will be dealt with in this order.

Palinurellus Von Martens (1878)

Palinurellus gundlachi Von Martens var. **wieneckeii** (De Man)
(Pl. XI fig. o)

- Araeosternus wieneckii* De Man, 1881, Notes Leyden Mus., vol. 3, p. 131.
- Araeosternus Wieneckeii* Winkler, 1881, Arch. Mus. Teyler, ser. 2 vol. 1, p. 105, pl. 1 fig. 3.
- Araeosternus wieneckeii* De Man, 1882a, Tijdschr. Ent., vol. 25, p. 1, pls. 1, 2.
- Araeosternus Wieneckeii* Winkler, 1882, Ann. Mag. nat. Hist., ser. 5 vol. 10, p. 146.
- Palinurellus wienecki* De Man, 1882b, Notes Leyden Mus., vol. 4, p. 162.
- Palinurellus Wieneckii* Pfeffer, 1883, Verh. Ver. naturw. Unterh. Hamburg, vol. 5, p. 103.
- Palinurellus wieneckii* Ortmann, 1891, Zool. Jb. Syst., vol. 6, p. 16.
- Palinurellus Wienecki* Bouvier, 1910, Bull. Mus. Hist. nat. Paris, vol. 16, p. 376.
- Palinurellus Wienecki* Gruvel, 1911a, C. R. Acad. Sci. Paris, vol. 152, p. 1350.
- Palinurellus Gundlachi* var. *Wieneckii* Gruvel, 1911b, Ann. Inst. océanogr. Monaco, vol. 3 pt. 4, p. 9, pl. 1 figs. 1, 2.
- Palinurellus Wienecki* Bouvier, 1914, C. R. Acad. Sci. Paris, vol. 159, p. 701.
- Palinurellus Wieneckii* Bouvier, 1915, Bull. sci. France Belg., vol. 48, p. 186, pl. 7 fig. 2.
- Palinurellus Wieneckii* De Man, 1916, Siboga Exped., mon. 39a2, p. 34.

Museum Leiden:

Poeloe Tikoes (= Rat Island), near Bengkoeloe, Sumatra; 1865; type of *Araeosternus wieneckii* De Man; leg. G. F. Wienecke.—1 ♂ 137 mm.

Calman (1909) states that in the male specimen of a *Palinurellus* species in the British Museum the first pleopods are present, which statement is confirmed by Bouvier (1915). In the male specimen from Benkoeloe no trace of a first pleopod is visible. This species differs from almost all

Palinuridae by having the pleopods of the second abdominal segment (Pl. XI fig. o) biramous in the male. In the male specimens of the other Palinurid material at my disposal, including the non-indopacific species *Palinurus elephas*, *Panulirus argus* and *Panulirus regius*, the pleopods are uniramous, except in *Panulirus japonicus*, the males of which possess a distinct endopod.

Distribution. The typical species is known from the West Indies, the variety is recorded from: Bengkoeloe (De Man, 1881, 1882, 1916), Mauritius (Bouvier, 1910, 1914, 1915; Gruvel, 1911b). Calman (1909c) recorded a third specimen, which probably belongs to this variety too, from Mauritius, he only remarked that it belonged to *Palinurellus*, but gave no specific name.

Justitia nov. gen.

Palinurus p.p. H. Milne Edwards, 1837b, Hist. nat. Crust., vol. 2, p. 294.

The present genus consists of one species and one variety, which perhaps cannot be considered distinct. The main characters of *Justitia* are already mentioned in the key; its other characters are those of the only species, described by Gruvel (1911b).

Type of the genus: *Palinurus longimanus* H. Milne Edwards.

Justitia longimana (H. Milne Edw.)

Camaron de lo alto Parra, 1787, Descr. Piez. Hist. nat., p. 154, pl. 55 fig. 1.

Palinurus longimanus H. Milne Edwards, 1837b, Hist. nat. Crust., vol. 2, p. 294.

Palinurus longimanus H. Milne Edwards, 1838b, Ann. Sci. nat. Zool., ser. 2 vol. 10, p. 171.

Palinurus longimanus Guérin, 1857, in Sagra, Hist. Cuba, Crust., p. xliii.

Palinurus longimanus Heller, 1865, Reise Novara, Zool., vol. 2 pt. 3, p. 94.

Palinurus longimanus Von Martens, 1872, Arch. Naturgesch., vol. 38 pt. 1, p. 125.

Palinurus longimanus Boas, 1880, K. Danske Vidensk. Selsk. Skr., ser. 6 vol. 1, p. 91.

Palinurus longimanus Ortmann, 1891, Zool. Jb. Syst., vol. 6, p. 20.

Palinurus longimanus Kingsley, 1899, Amer. Nat., vol. 33, p. 823.

Palinurus longimanus Young, 1900, Stalk-eyed Crust. Brit. Guian., p. 434.

Palinurus longimanus Gruvel, 1911a, C. R. Acad. Sci. Paris, vol. 152, p. 1350.

Palinurus longimanus Gruvel, 1911b, Ann. Inst. océanogr. Monaco, vol. 3 pt. 4, p. 17, textfig. 7, pl. 1 fig. 3.

Palinurus longimanus Bouvier, 1917, Résult. Camp. sci. Monaco, vol. 50, p. 88.

Palinurus longimanus Bouvier, 1925, Mem. Mus. comp. Zoöl. Harvard, vol. 47, p. 442, pl. 8 fig. 1.

Palinurus longimanus Schmitt, 1935, Sci. Survey Porto Rico Virgin Isl., vol. 15, p. 173, fig. 37.

var. **mauritiana** (Miers)

Palinurus longimanus var. *mauritanus* Miers, 1882, Proc. zool. Soc. Lond., 1882, p. 540, pl. 36 fig. 1.

- Palinussus longimanus* var. *mauritanus* Bouvier, 1910, Bull. Mus. Hist. nat. Paris, vol. 16, p. 376.
Palinurus longimanus var. *Mauritanus* Gruvel, 1911b, Ann. Inst. océanogr. Monaco, vol. 3 pt. 4, p. 18.
Palinurus longimanus var. *mauritanus* Bouvier, 1915, Bull. sci. France Belg., vol. 48, p. 187.

According to Gruvel (1911b) the variety differs from the species s.s. by its larger size and its more yellowish colour; these characters, in my opinion, are not essential, and unless more important differences are found, the variety cannot be considered distinct. Gruvel (1911b) gave a rather extensive description and a beautiful photograph of the main species, while Bouvier (1925) figured its postlarval stage. Miers (1882) gave an extensive description and a beautiful figure of the variety. Nothing is known of the form of the pleopods (which furnish important characters in this group) except for Boas's statement, that they are similar to those of *Palinurus elephas*.

Distribution. Of the species s.s.: Antilles (H. Milne Edwards, 1837b; Guérin, 1857; Young, 1900; Gruvel, 1911b), Cuba (Von Martens, 1872), Santa Cruz (Bouvier, 1925). Of the variety: Mauritius (Miers, 1882; Gruvel, 1911b; Bouvier, 1910, 1915).

Palinustus A. Milne Edw.

- Palinustus* A. Milne Edwards, 1880, Bull. Mus. comp. Zoöl. Harvard, vol. 8, p. 66. non *Palinustus* Rochebrune, 1883, Bull. Soc. philom. Paris, ser. 7 vol. 7, p. 173.
Palinurus p.p. Gruvel, 1911b, Ann. Inst. océanogr. Monaco, vol. 3 pt. 4, p. 18.

The present genus was regarded by Gruvel as identical with *Palinurus*; it is, however, absolutely distinct. De Man's (1916, p. 36) opinion that it probably should be identical with *Puerulus* also is incorrect. Together with *Palinurellus* this genus differs from all other Palinurid genera by possessing pleopods on the first abdominal segment in the female. Furthermore by the structure of the pleopods of the second and third abdominal segments it forms a transition between the group containing the genera *Linuparus* (Pl. XI figs. i, j) and *Puerulus* (Pl. XI figs. k, l) and that containing the genera *Palinurus* (Pl. XI figs. a, b), *Panulirus* (Pl. XI figs. e, f, m) and *Jasus* (Pl. XI figs. c, d). The pleopods of the second segment in *Palinustus* resemble those of the species in the first group by having the stylamblys as large as those of the following pleopods, and those of the species of the second group by having the endopod well developed. The most important characters of the present genus are already mentioned in the key.

The genus contains two species, which are very closely related. The

type species *Palinustus truncatus* is known from the West Indies; Gruvel (1911b) gave an extensive description and photographs of it, while Bouvier (1925) published a detailed figure of a male specimen. The other species is *P. mossambicus* Barnard, which will be treated below.

Palinustus mossambicus Barnard (Pl. VI figs. f-j, Pl. VII figs. f-h, Pl. X figs. a, b, Pl. XI figs. g, h)

Palinustus mossambicus Barnard, 1926, Trans. Roy. Soc. S. Afr., vol. 13, p. 126, pl. 11.

Snellius Expedition:

Station 60*, Basilan Strait, 6° 58'.0 N, 121° 52'.5 E; dredge, 72-80 m; September 5, 1929.—4 ♂♂, 1 ♀ 49-90 mm.

Description. Carapace prismatic, covered with tubercles, which are fringed with stiff setae. The two supraorbital processes truncated anteriorly, their anterior margin crenulate, inner margin with two to four small teeth; dorsal surface of each process near the exterior margin with a strong forwardly directed spine, which mostly reaches as far forward as the process itself. Behind this spine a row of three smaller spines extends posteriorly towards the cervical groove; sometimes the last of these, which diminish in size posteriorly, at its inner side is provided with a small additional spinule. The anterior margin of carapace between the supra-orbital processes (Pl. VII fig. f) is straight and provided with 4-6 spinules of different size, no stronger median spine, so conspicuous in *P. truncatus*, is present. Before the cervical groove a double row of three or four posteriorly diverging spinules is placed in the median region of the carapace, furthermore some scattered spinules are present there. Each orbit is fringed by the supraocular process, by three strong forwardly directed spines, behind the upper of which a smaller spine is placed, and by some small spinules. Cervical groove very distinct; behind the groove a posteriorly converging double row of three or four rather indistinct spinules is present in the median region of the carapace, this row extends to about the middle of the distance between the cervical groove and the posterior margin of the carapace. The lateral row of spinules, which anteriorly of the cervical groove is formed by the above mentioned spines behind the supraocular process, consists behind the groove of about 6-8 spinules, which posteriorly become very indistinct. Lateral surface of carapace tuberculate, only some spinules are present near the cervical groove.

The upper surface of the first abdominal segment (Pl. VII fig. h) at each side is provided with a broad, rounded, anteriorly directed process, which overlaps the posterior margin of carapace. An uninterrupted trans-

verse groove, which bears a row of setae along the anterior margin, extends in the anterior part of the first segment, while an indication of a median longitudinal carina is visible near the posterior margin; in the posterior half of the segment many stiff hairs are present. The second to fifth abdominal segments are provided with an uninterrupted anterior transverse groove and a posterior groove, which in the middle is interrupted by a short longitudinal carina, which extends over the posterior half of each segment. These transverse grooves at their anterior margins are provided with a row of posteriorly directed setae. The pleurae of segments 2-5 end in two posteriorly curved teeth, the anterior of which is the longer. The anterior margin of the pleura of the second abdominal segment is provided with three or four small teeth. Each pleura is provided with two squamae on their outer surface, these squamae have the posterior margin fringed with setae, which form a continuation of the row of setae along the posterior groove of the abdominal segment. The posterior margins of the abdominal segments are provided with a row of posteriorly directed setae, between which sometimes strong stiff hairs are implanted, these hairs are missing in the anterior, becoming more frequent in the posterior segments, so that the posterior margin of the latter becomes crenulate by the implantations of the hairs. The sixth segment in its centre bears two median, posteriorly directed, tubercles and a row of four such tubercles lateral of the two mentioned above; near the anterolateral angles some more tubercles are present. These tubercles posteriorly are fringed with setae. The posterior margin of the sixth somite is provided with some 4-6 strong short spines. Its pleurae have similar teeth as are found in segments 2-5 but are more reduced in size.

The telson is elongate rectangular in form, about half as long as abdomen, and about 1.5 times as long as broad (breadth measured at base). The calcified basal part, about $\frac{1}{3}$ of its total length, at each side bears two lateral teeth. Behind the anterior tooth the telson rapidly narrows, the uncalcified portion remains of the same breadth throughout its entire length. Near the base the telson bears a transverse row of four teeth. The posterior margin of the calcified portion is strongly curved forwards in the middle, this posterior margin at each half bears two strong and one or two smaller teeth, the smaller placed between the outer stronger tooth and the last lateral. The uncalcified part is longitudinally grooved. Entire telson covered with stiff short setae.

The eyes (Pl. VII fig. f) are large and globose. The ophthalmic peduncle is about as long as cornea, and abruptly broadening in the distal part; the anterior margin provided with setae; furthermore some setae are present

near the base of the cornea. Ophthalmic segment entirely visible, without spines.

Antennular segment posteriorly with four erected spines in the median part, anteriorly tapering, with two lateral carinae on which the stridulating organs of the antennae are fitting. Antennulae very long, basal segment of peduncle reaching far beyond last segment of antennal peduncle. Second segment about $\frac{1}{3}$ of first and about half as long as third. Flagella very short, inner longer and more slender than outer, about half as long as third peduncular segment.

Antennal peduncle with about five longitudinal rows of strong spines, especially at outer surface; entire surface covered with short hairs, ventral margin with longer hairs. Basal segment with stridulating organ. One flagellum, very rigid, slightly curved upwards, a little longer than the length of the entire body. Segments with an anterior fringe of short spinules, covered with small setae and with long setae at lower surface.

For the oral parts I refer to Pl. VI figs. f-j.

The branchial formula runs as follows:

appendages	maxillipedes			pereiopods				
	I	II	III	I	II	III	IV	V
pleurobranchs	—	—	I	I	I	I	I	I
arthrobranchs	—	I	I	2	2	2	2	—
podobranchs	—	I	I	I	I	I	I	—
epipods	I	I	I	I	I	I	I	—
exopods	I	I	I	—	—	—	—	—

All pereiopods and third maxillipede with long and stiff hairs and longitudinal rows of spines; the anterior extremities with more hairs than the posterior, the distal parts of the legs also with more hairs than the proximal parts. All chelae uniunguicular, only the fifth pereiopod in the female is provided with a feeble but very distinct chela. Pereiopods 1-4 posteriorly becoming longer, but the differences in length are not large, fifth pereiopod slightly shorter than fourth. First to fourth pereiopods similarly built: dactylus slightly shorter than propodus, both with many longitudinal rows of movable spines and with a more or less distinct external groove. Dactylus about $\frac{3}{4}$ of the length of propodus, with a dorsal groove; except the rows of movable spines there are also longitudinal rows of fixed spines, which become larger anteriorly, those at anterior margin being very strong. Merus about twice as long as carpus, with a dorsal and a ventral row of about 15 fixed spines, which as on carpus anteriorly become larger; at the inner surface of merus a row of 7-10 spines is present except in pereiopod 4; exterior surface with a longitudinal groove, in which many setae are placed. Fifth pereiopod more slender than the others,

without the rows of fixed spines, only an anteroventral spine is present on carpus and an anteroventral and anterodorsal spine on merus.

The first three thoracic sterna (Pl. X figs. a and b) bear two median tubercles, the fourth only one and in the fifth the tubercles are absent, posterior margin of entire sternum with two median tubercles again. The female genital aperture in my specimens is very small, the male aperture, as already described by Barnard, forms a large papilla, it is provided with a flap, which closes the aperture and on the inner margin has a brush of stiff setae.

First abdominal segment in the male without pleopods, its ventral margin provided with about 15 spinules, which are confined to the median half. In the female two slender uniramous pleopods are present, the ventral margin too is provided with about 15 spinules. The pleopods of segments 2-5 are uniramous in the male, the ventral margin of the sternum there with two large and two small median spines, the small placed between the larger, the rest of the margin without spines except on segment 2, where 2-5 spines are present at each side exterior of the large median ones. In the female (Pl. XI figs. g and h) the pleopods 2-5 are biramous. The exopods all of the same size; the endopod of the second segment, though larger than those of the following segments, is distinctly smaller than the exopod; internal appendices of all pleopods of the same size and shape. Ventral sternal margins with some small tubercles. The ventral margin of the sixth segment in the male is provided with about 11 strong spines, in the female these spines are somewhat smaller.

Basal segment of uropods ends in two dorsal spines. Exo- and endopod almost triangular in shape, outer margin straight, inner margin curved, posterointernal angle broadly rounded. Calcified portions of exo- and endopod ending in a sharp spine, inner margin with a marginal carina and 4-6 spines. Surface of non-calcified portion longitudinally grooved; endo- and exopod thickly covered with setae.

Colour. My spirit specimens are pale yellowish brown to pale brown, little is visible of the original colour pattern; only in the young specimens the antennal flagella are provided with broad, the pereopods with rather narrow dark bands.

Size. Barnard's specimen, which is the only one of this species recorded in literature, measures 95 mm, which is slightly more than the largest of my specimens.

Vertical distribution. Barnard's specimen was collected at a depth of 406 m, those of the Snellius Expedition from 72-80 m.

Horizontal distribution. The only record in literature is Portuguese E.

Africa, 25° S, 33° 10' E (Barnard, 1926). The record of the Snellius specimens from the Sulu Sea, near the southwestern point of Mindanao, forms therefore a considerable extension of the range of distribution.

Remarks. The present species differs from the only other species belonging to this genus, *Palinustus truncatus*, in the following characters:

1. The anterior margin of carapace between the supraorbital processes bears no strong median spine.

2. There are four distinct spines at the posterior margin of the antennular segment in *Palinustus mossambicus*. These spines are not mentioned in the descriptions, nor are they visible in the figures of *P. truncatus* given by Gruvel (1911b) and Bouvier (1925).

3. The shape of the epistome in *P. mossambicus* (Pl VII fig. g) is entirely different from that in *P. truncatus*, so in the former the teeth at the anterior margin are much smaller, of the large lateral tooth only a vestige is visible, and the lateral grooves are much longer.

4. There are many more spines at the ventral margins of the abdominal sterna in *P. mossambicus*.

5. The strong spine at the base of the fifth pereopods, as it is figured by Bouvier (1925), is absent in all my specimens.

Gruvel's (1911b) fig. 8c is quite unintelligible, as neither in my specimens, nor in that from the West Indies figured by Bouvier (1925) a similar shape of the pleura of the third abdominal segment is visible; the only pleura which has its margin provided with small denticles is that of the second abdominal segment, but there the denticles are placed at the anterior margin, not at the posterior as in Gruvel's figure.

My specimens differ from Barnard's (1926) description and figures in the following points:

1. Barnard's specimen shows two strong submedian spines at the anterior margin of the carapace, while in my specimens 4-6 spines of different size are present there.

2. The posterior margins of the sterna of abdominal segment 1 and 2 in my specimens show many more spinules than in Barnard's specimen.

3. The preanal spines mentioned by Barnard and quite distinct in his figure are absent in all my specimens.

Linuparus White (1847)

Linuparus trigonus (Von Siebold) (Pl. XI figs. i, j)

Palinurus Trigonus Von Siebold, 1824, Spicil. Faun. Japon., p. 15.

Palinurus trigonus De Haan, 1841, Fauna Japonica, Crust., p. 157, pls. 39/40, L, M.

Linuparus trigonus White, 1847, List Crust. Brit. Mus., p. 70.

Palinurus Trigonus Herklots, 1861, Tijdschr. Ent., vol. 4, p. 143.

- Palinurus trigonus* Von Martens, 1876, Preuss. Exped. Ost-Asien, Zool., vol. 1, p. 142.
Palinurus trigonus Heller, 1865, Reise Novara, Zool., vol. 2 pt. 3, p. 94.
Palinurus trigonus Boas, 1880, K. Danske Vidensk. Selsk. Skr., ser. 6 vol. 1 pt. 2, p. 91.
Palinurus trigonus Parker, 1883, Nature Lond., vol. 29, p. 190.
Palinurus trigonus Parker, 1884, Trans. Proc. New Zeal. Inst., vol. 16, p. 304.
Avus trigonus Ortmann, 1891, Zool. Jb. Syst., vol. 6, p. 21.
Linuparus trigonus Stebbing, 1893, Hist. Crust., p. 197.
Avus trigonus Bouvier, 1899, Bull. Mus. Hist. nat. Paris, vol. 5, p. 175.
Linuparus trigonus Thompson, 1901, Catal. Crust. Mus. Dundee, p. 18.
Linuparus trigonus Doflein, 1902, Abh. Bayer. Akad. Wiss., vol. 21, p. 643.
Linuparus trigonus Doflein, 1906a, Ostasienfahrt, pp. 198, 256.
Linuparus trigonus Gruvel, 1911a, C. R. Acad. Sci. Paris, vol. 152, p. 1351.
Linuparus trigonus Gruvel, 1911b, Ann. Inst. océanogr. Monaco, vol. 3 pt. 4, p. 26, textfig. 10, pl. 1 fig. 5.
Linuparus trigonus Balss, 1914a, Abh. Bayer. Akad. Wiss., suppl. vol. 2 pt. 10, p. 76.
Linuparus trigonus Parisi, 1917, Atti Soc. Ital. Sci. nat., vol. 56, p. 8.
Linuparus trigonus Fish. Soc. Japan, 1935, Ill. Japan. aq. Plants Anim., vol. 2, pl. 58 fig. 1.
Linuparus trigonus Oo-U-Kijo, 1936, Trans. nat. Hist. Soc. Formosa, vol. 26, p. 385, figs. 1-3.

Museum Leiden:

Japan; cotypes; leg. P. F. von Siebold.—3 ♂♂, 1 ♀ 240-352 mm (dry).
 Japan.—6 ♂♂, 3 ♀♀, 1 damaged specimen 226-324 mm (dry).

The specimens, though preserved dry, are in an excellent condition.

Distribution: Japan. The records in literature are: Japan (Von Siebold, 1824; White, 1847; Herklots, 1861; Bouvier, 1899; Thompson, 1901; Gruvel, 1911; Parisi, 1917; Fish. Soc. Japan, 1935), Tokio Bay (Ortmann, 1891), Sagami Bay (Doflein, 1906a), Yokohama (Doflein, 1902; Parisi, 1917), Yeddo (Von Martens, 1876), Oomura and Simabara, West coast of Kyushu (De Haan, 1841), Formosa (Oo-U-Kijo, 1936).

Panulirus White (1847)

The species at present best known as *Panulirus regius* Brito Capello, was already described as early as 1816 by Risso from Nice under the name *Palinurus Fasciatus* Fabr. His description in all respects fits for *P. regius*, the most striking features being the green colour and the white bands at the posterior parts of the abdominal segments, this last feature is entirely lacking in *Palinurus elephas*. Desmarest (1825) considered Risso's specimen to be specifically different from Fabricius's species and gave it the new name *Palinurus Rissonii*, which name has to be used for the present species, as Brito Capello described his *Panulirus regius* as late as 1864.

Of this genus all indopacific representatives, doubtful forms excluded, are present in the three collections at my disposal.

Panulirus japonicus (Von Siebold) (Pl. XI fig. n)

- Palinurus Japonicus* Von Siebold, 1824, Spicil. Faun. Japon., p. 15.
Palinurus japonicus De Haan, 1841, Fauna Japonica, Crust., p. 158, pls. 41/42, L, M.
Panulirus Japonicus White, 1847, List. Crust. Brit. Mus., p. 69.
Panulirus japonicus Stimpson, 1860, Proc. Acad. nat. Sci. Philad., 1860, p. 24.
Palinurus Japonicus Herklots, 1861, Tijdschr. Ent., vol. 4, p. 143.
Palinurus (*Panulirus*) *japonicus* Heller, 1865, Reise Novara, Zool., vol. 2 pt. 3, p. 95.
Palinurus longipes A. Milne Edwards, 1868, Nouv. Arch. Mus. Hist. nat. Paris, vol. 4, p. 87, pl. 21.
Palinurus femoristriga Von Martens, 1872, Arch. Naturgesch., vol. 38 pt. 1, p. 125.
Palinurus Japonicus Von Martens, 1876, Preuss. Exped. Ost-Asien, Zool., vol. 1, pp. 142, 147.
Palinurus (*Panulirus*) *longipes* Miers, 1880a, Ann. Mag. nat. Hist., ser. 5 vol. 5, p. 379.
Palinurus longipes Richters, 1880, Beitr. Meeresfauna Maurit., p. 161.
Palinurus longitarsus Lenz & Richters, 1881, Abh. Senckenb. naturf. Ges., vol. 12, p. 426.
Palinurus (*Senex*) *femoristriga* Pfeffer, 1881, Verh. naturw. Ver. Hamb., ser. 2 vol. 5, p. 35.
Palinurus (*Senex*) *guttatus* p.p. Pfeffer, 1881, Verh. naturw. Ver. Hamb., ser. 2 vol. 5, p. 30.
Palinurus (*Panulirus*) *japonicus* Parker, 1884, Trans. Proc. New Zeal. Inst., vol. 16, p. 304.
Senex japonicus Ortmann, 1891, Zool. Jb. Syst., vol. 6, p. 25.
Senex femoristriga Ortmann, 1891, Zool. Jb. Syst., vol. 6, p. 23.
Puer pellucidus Ortmann, 1891, Zool. Jb. Syst., vol. 6, p. 37, pl. 1 fig. 3.
? *Palinurus guttatus* Whitelegge, 1897, Mem. Aust. Mus., vol. 3, p. 146.
? *Palinurus guttatus* Anonymus, 1899, Mem. Aust. Mus., vol. 3, p. 518.
Senex japonicus Bouvier, 1899, Bull. Mus. Hist. nat. Paris, vol. 5, p. 173.
Panulirus japonicus Doflein, 1900, S. B. Bayer. Akad. Wiss., vol. 30, p. 129.
Palinurus japonicus Lenz, 1901, Zool. Jb. Syst., vol. 14, p. 440.
Panulirus japonicus Thompson, 1901, Catal. Crust. Mus. Dundee, p. 18.
Panulirus japonicus Doflein, 1902, Abh. Bayer. Akad. Wiss., vol. 21, p. 643.
Panulirus japonicus Rathbun, 1902b, Proc. U.S. Nat. Mus., vol. 26, p. 37.
Puer pellucidus Bouvier, 1905d, Bull. Mus. océanogr. Monaco, n. 28, p. 2.
Panulirus japonicus Doflein, 1906a, Ostasienfahrt, pp. 148, 198.
Panulirus japonicus Doflein, 1906b, Verh. Deutsch. zool. Ges., vol. 16, p. 67.
Panulirus japonicus Rathbun, 1906, Bull. U. S. Fish Comm., vol. 23 pt. 3, p. 897, pl. 5.
Panulirus longipes Calman, 1909b, Proc. zool. Soc. Lond., 1909, p. 706.
Puerulus pellucidus Calman, 1909c, Ann. Mag. nat. Hist., ser. 8 vol. 3, p. 441.
Panulirus japonicus Gruvel, 1911a, C. R. Acad. Sci. Paris, vol. 152, p. 1351.
Panulirus Japonicus Gruvel, 1911b, Ann. Inst. océanogr. Monaco, vol. 3 pt. 4, p. 28, textfig. 11, pl. 5 figs. 1, 3.
Panulirus japonicus Balss, 1914a, Abh. Bayer. Akad. Wiss., suppl. vol. 2 pt. 10, p. 77.
Puer pellucidus Balss, 1914a, Abh. Bayer. Akad. Wiss., suppl. vol. 2 pt. 10, p. 79.
Panulirus japonicus Gruvel, 1914, Rev. gén. Sci., vol. 25, p. 715, fig. 5.
Panulirus japonicus Pesta, 1915, S. B. Akad. Wiss. Wien, vol. 124 pt. 1, p. 10.
Panulirus japonicus De Man, 1916, Siboga Exped., mon. 39a2, p. 44.
Panulirus japonicus Nakazawa, 1917, Dobuts. Zasshi Tokyo, vol. 29, p. 259, pl.
Panulirus japonicus Parisi, 1917, Atti Soc. Ital. Sci. nat., vol. 56, p. 8.
Panulirus japonicus Terao, 1919, Rep. Imp. Fish. Inst. Tokyo, vol. 14 pt. 5, p. 1, pls. 1-4.

- Panulirus japonicus* Maki & Tsuchiya, 1923, Rep. Dept. Agric. Formosa, vol. 3, p. 79, pl. 7 fig. 1.
Panulirus japonicus Edmondson, 1925, Bull. Bishop Mus. Honolulu, n. 27, p. 18.
Panulirus japonicus McNeill, 1929, Rec. Aust. Mus., vol. 17, p. 148.
Panulirus japonicus longipes Monod & Petit, 1929, Faune Colon. Franç., vol. 3, p. 273, fig. 1.
Panulirus japonicus Terao, 1929, Japan. Journ. Zool., vol. 2, p. 387, pls. 11-15.
Panulirus japonicus Ping, 1930, Bull. Fan Mem. Inst. Biol., vol. 1, p. 136.
Panulirus japonicus Yosii, 1931, Journ. Fac. Sci. Univ. Tokyo Zool., vol. 2, p. 445, figs. 1-3.
Panulirus japonicus Kinoshita, 1933, Bull. Jap. Soc. sci. Fish., vol. 1, p. 237, fig.
Panulirus japonicus Yosii, 1933, Journ. Fac. Sci. Univ. Tokyo Zool., vol. 3, p. 233, figs. 1-8.
Panulirus japonicus Kinoshita, 1934a, Proc. 5th Pacific Sci. Congr., vol. 5, p. 4191.
Panulirus japonicus Kinoshita, 1934b, Dobuts. Zasshi Tokyo, vol. 46, p. 391, figs. 1-9.
Panulirus japonicus C. von Bonde & Marchand, 1935, Fish. Bull. Fish. mar. biol. Surv. S. Afr., vol. 1, p. 7.
Panulirus japonicus Fish. Soc. Japan, 1935, Ill. Japan. aq. Plants Anim., vol. 2, pl. 59, fig. 3.
Panulirus japonicus Kubo, 1938, Journ. Imp. Fish. Inst. Tokyo, vol. 33, p. 101, text-figs. 1-4, pl. 1.

Museum Leiden:

- Japan; cotypes; leg. P. F. von Siebold.—4 ♂♂, 3 ♀♀ 134-290 mm.
 Japan; cotypes; leg. P. F. von Siebold.—5 ♂♂, 3 ♀♀ 168-316 mm (dry).
 Japan.—1 ♀ 177 mm (dry).
 Ambon; 1867; leg. D. J. Hoedt.—1 ♀ 240 mm.
 Locality unknown.—1 ♀ 80 mm.
 Locality unknown.—32 ♂♂, 2 ♀♀ 120-367 mm (dry).

Museum Amsterdam:

- Yokohama; October, 1909; leg. G. F. Tydeman.—1 ♀ 144 mm.
 Sabang; May, 1928; leg. J. A. van de Wetering de Rooij.—1 juv. 55 mm.
 Banda; May, 1921; leg. E. van der Velde.—1 ♀ 184 mm.

The variety *longipes*, which was still kept upright by De Man (1916) cannot be regarded as distinct. Already Gruvel remarked that all anatomical characters were the same in both forms, and that the only supposed difference should be that *P. japonicus* was plainly coloured, while var. *longipes* had the body with light spots; furthermore he remarked that in his material from Japan there was a specimen which had light spots too. When studying the material from the Leiden Museum, I found even between the types of *P. japonicus* some spotted specimens, so that Gruvel's opinion that var. *longipes* cannot be kept separate, even as a local variety, proves to be correct.

I agree with Gruvel's opinion that *Palinurus marginatus* Quoy & Gaimard (1824) probably is identical with *P. japonicus*, it shows the same structure and colouration of the abdomen as the present species (compare Quoy and Gaimard's plate with that of Rathbun, 1906, pl. 5); the only

important difference is the fact that Quoy & Gaimard figured their specimen with four spines at the antennular segment, while *P. japonicus* has only two there, it is, however, possible that the figure of 1824 is not correct in this point, as at that time this character was not considered important.

The present species differs from all other species at my disposal (the American species *P. echinatus*, *guttatus*, *inflatus*, *interruptus* and *laevicauda* could not be studied by me) by having the pleopods of the second abdominal segment in the male provided with a distinct endopod (Pl. XI fig. n). Also in the genera *Palinustus*, *Linuparus*, *Puerulus*, *Palinurus* and *Jasus* the pleopods of the second abdominal segment in the male are uniramous, in *Palinurellus*, however, they are biramous.

The specimen from Yokohama has already been mentioned by De Man (1916).

Distribution. The species is known throughout the indopacific region. The records in literature are: Zanzibar (A. Milne Edwards, 1868), Natal (C. von Bonde & Marchand, 1935), Madagascar (Lenz & Richters, 1881; Gruvel, 1914; Monod & Petit, 1929), Mauritius (Miers, 1880a; Richters, 1880; Ortmann, 1891; Monod & Petit, 1929), Réunion (Gruvel, 1911b; Monod & Petit, 1929), Christmas Island (Calman, 1909b), Japan (Von Siebold, 1824; De Haan, 1841; White, 1847; Herklots, 1861; Ortmann, 1891; Bouvier, 1899; Thompson, 1901; Doflein, 1906b; Gruvel, 1911b; Parisi, 1917; Fish. Soc. Japan, 1935), Sendai Bight (Doflein, 1906a), Tokio Bay (Ortmann, 1891), Tokio (Doflein, 1902), Yokohama (De Man, 1916), Yeddo (Von Martens, 1876), Sagami Bay (Doflein, 1906a; Parisi, 1917), Aburatsubo, Sagami Bay (Balss, 1914a), Shimoda (Stimpson, 1860), Wakayama Province (Kinoshita, 1934a), Kochi (Ortmann, 1891), Misaki (Yosii, 1933), Nagasaki (Von Martens, 1876; Rathbun, 1902b; Balss, 1914a), Formosa (Balss, 1914a; Parisi, 1917; Maki & Tsuchiya, 1923), Amoy (Ping, 1930), Baten¹) (Parisi, 1917), Ambon (Von Martens, 1872), New Guinea (Pfeffer, 1881), New Hebrides (Miers, 1880a), N. New S. Wales (McNeill, 1929), Funafuti? (Whitelegge, 1897; Anonymus, 1899), Tahiti (Ortmann, 1891), Hawaiian Islands (Lenz, 1901; Rathbun, 1906; Gruvel, 1911b; Pesta, 1915; Edmondson, 1925).

***Panulirus penicillatus* (Oliv.)**

Astacus penicillatus Olivier, 1791, Encycl. méth. Hist. nat., vol. 6, p. 343.

Palinurus gigas Bosc, 1801, Hist. nat. Crust., vol. 2, p. 93.

Palinurus gigas Latreille, 1802, Hist. nat. Crust. Ins., vol. 6, p. 193.

Palinurus penicillatus Olivier, 1811b, Encycl. méth. Hist. nat., vol. 8, p. 674.

1) Probably the Batan Islands north of the Philippines are meant.

- Palinurus penicillatus* Latreille, 1817, Nouv. Dict. Hist. nat., vol. 17, p. 295.
Palinurus versicolor Lamarck, 1818, Hist. nat. Anim. s. Vert., vol. 5, p. 211.
Palinurus versicolor Var.? Lamarck, 1818, Hist. nat. Anim. s. Vert., vol. 5, p. 211.
Palinurus penicillatus Desmarest, 1823, Dict. Sci. nat., vol. 28, p. 294.
Palinurus penicillatus Desmarest, 1825, Consid. gén. Crust., p. 186.
Palinurus Gigas Desmarest, 1830, in Bosc, Man. Hist. nat. Crust., ed. 2 vol. 2, p. 59.
Palinurus penicillatus H. Milne Edwards, 1837b, Hist. nat. Crust., vol. 2, p. 299.
Palinurus versicolor H. Milne Edwards, 1838a, in Lamarck, Hist. nat. Anim. s. Vert., ed. 2 vol. 5, p. 372.
Palinurus versicolor Var.? H. Milne Edwards, 1838a, in Lamarck, Hist. nat. Anim. s. Vert., ed. 2 vol. 5, p. 372.
Palinurus penicillatus H. Milne Edwards, 1838b, Ann. Sci. nat. Zool., ser. 2 vol. 10, p. 168.
Palinurus penicillatus De Haan, 1841, Fauna Japonica, Crust., p. 157, pls. L, M.
Panulirus penicillatus White, 1847, List Crust. Brit. Mus., p. 69.
Langouste sillonnée H. Milne Edwards, 1851, Ann. Sci. nat. Zool., ser. 3 vol. 16, p. 290, pl. 8 fig. 5.
Panulirus penicillatus Dana, 1852b, U. S. Explor. Exped., vol. 13, p. 519.
Panulirus penicillatus Stimpson, 1860, Proc. Acad. nat. Sci. Philad., 1860, p. 24.
Palinurus Ehrenbergi Heller, 1861, Verh. zool.-bot. Ges. Wien, vol. 11, p. 25.
Palinurus Penicillatus Herklotz, 1861, Tijdschr. Ent., vol. 4, p. 143.
Palinurus Ehrenbergi Heller, 1862a, S. B. Akad. Wiss. Wien, vol. 44, p. 260, pl. 2 fig. 8.
Palinurus penicillatus A. Milne Edwards, 1862b, Note Ile Réunion, Ann. F, p. 14.
Palinurus penicillatus A. Milne Edwards, 1864, C. R. Acad. Sci. Paris, vol. 59, p. 710.
Palinurus (Panulirus) Ehrenbergi Heller, 1865, Reise Novara, Zool., vol. 2 pt. 3, p. 95.
Palinurus (Panulirus) penicillatus Heller, 1865, Reise Novara, Zool., vol. 2 pt. 3, p. 95.
Palinurus Ehrenbergi Hoffmann, 1874, Rech. Faune Madagasc., vol. 5 pt. 2, p. 30, pl. 8.
Palinurus penicillatus Schmeltz, 1876, Journ. Mus. Godeffroy, vol. 5, p. 17.
Palinurus (Panulirus) penicillatus Miers, 1878a, Ann. Mag. nat. Hist., ser. 5 vol. 2, p. 410.
Palinurus penicillatus De Man, 1880, Notes Leyden Mus., vol. 2, p. 185.
Palinurus (Panulirus) penicillatus Miers, 1880a, Ann. Mag. nat. Hist., ser. 5 vol. 5, p. 379.
Palinurus penicillatus Richters, 1880, Beitr. Meeresfauna Mauritz., p. 161.
Palinurus (Senex) penicillatus Pfeffer, 1881, Verh. naturw. Ver. Hamburg, ser. 2 vol. 5, p. 34.
Palinurus penicillatus Haswell, 1882, Catal. Aust. Crust., p. 172.
Palinurus (Panulirus) penicillatus Parker, 1884, Trans. Proc. New Zeal. Inst., vol. 16, p. 304.
Palinurus penicillatus Howes, 1887, Proc. zool. Soc. Lond., 1887, p. 468, fig.
Panulirus penicillatus Bate, 1888, Rep. Voy. Challenger, Zool., vol. 24, p. 82, pl. 12 fig. 2.
Senex penicillatus Ortmann, 1891, Zool. Jb. Syst., vol. 6, p. 28.
Panulirus penicillatus Henderson, 1893, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 5, p. 433.
Panulirus penicillatus Stebbing, 1893, Hist. Crust., p. 197.
Panulirus penicillatus Borradaile, 1898, Proc. zool. Soc. Lond., 1898, p. 1014.
Panulirus penicillatus Borradaile, 1899, Willey's Zool. Results, vol. 4, p. 419.
Panulirus penicillatus Rathbun, 1902c, Proc. Nat. Acad. Sci. Wash., vol. 4, p. 287.
Panulirus penicillatus Borradaile, 1904, Fauna Geogr. Mald. Laccad., vol. 2 pt. 3, p. 754.

- Panulirus penicillatus* Nobili, 1906a, Ann. Sci. nat. Zool., ser. 9 vol. 4, p. 88.
Panulirus penicillatus Rathbun, 1906, Bull. U. S. Fish Comm., vol. 23 pt. 3, p. 897.
Panulirus penicillatus Nobili, 1907, Mem. Accad. Sci. Torino, ser. 2 vol. 57, p. 366.
Panulirus penicillatus Stebbing, 1908, Ann. S. Afr. Mus., vol. 6, p. 33.
Panulirus penicillatus Calman, 1909b, Proc. zool. Soc. Lond., 1909 p. 706.
Panulirus penicillatus Borradaile, 1910, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 13, p. 260.
Panulirus penicillatus Rathbun, 1910b, Proc. U. S. Nat. Mus., vol. 38, p. 603.
Panulirus penicillatus Stebbing, 1910, Ann. S. Afr. Mus., vol. 6, p. 374.
Panulirus penicillatus Gruvel, 1911a, C. R. Acad. Sci. Paris, vol. 152, p. 1351.
Panulirus penicillatus Gruvel, 1911b, Ann. Inst. océanogr. Monaco, vol. 3 pt. 4, p. 31, textfig. 13, pl. 2 fig. 4.
Palinurus penicillatus Gruvel, 1913, C. R. Acad. Sci. Paris, vol. 157, p. 603.
Panulirus penicillatus Balss, 1914a, Abh. Bayer. Akad. Wiss., suppl. vol. 2 pt. 10, p. 77.
Palinurus penicillatus Demandt, 1914, Mitt. Deutsch. Seefisch. Ver., vol. 30, p. 110.
Panulirus penicillatus Gruvel, 1914, Rev. gén. Sci., vol. 25, p. 713, fig. 2.
Senex penicillatus Pesta, 1914, Denkschr. Akad. Wiss. Wien, vol. 89, p. 678.
Panulirus penicillatus Pesta, 1915, S. B. Akad. Wiss. Wien, vol. 124 pt. 1, p. 10.
Panulirus penicillatus De Man, 1916, Siboga Exped., mon. 39a2, p. 45, pl. 2 fig. 6.
Panulirus penicillatus Maki & Tsuchiya, 1923, Rep. Dept. Agric. Formosa, vol. 3, p. 81.
Panulirus penicillatus Edmondson, 1925, Bull. Bishop Mus. Honolulu, vol. 27, p. 18.
Panulirus penicillatus Monod & Petit, 1929, Faune Colon. Franç., vol. 3, p. 275, fig. 2.
Panulirus penicillatus Sivertsen, 1934, Nyt Mag. Naturvidensk., vol. 74, p. 7, textfig. 1.
Panulirus penicillatus C. von Bonde & Marchand, 1935, Fish. Bull. Fish. mar. biol. Surv. S. Afr., vol. 1, p. 7.
Panulirus penicillatus Boone, 1935, Bull. Vanderbilt mar. Mus., vol. 6, p. 67, textfig. 2, pl. 17.
Panulirus penicillatus Gordon, 1935, Ann. Mag. nat. Hist., ser. 10 vol. 16, p. 629.
Panulirus penicillatus Estampador, 1937, Philipp. Journ. Sci., vol. 62, p. 496.

Museum Leiden:

- Jidda; 1880; leg. J. A. Kruyt.—1 ♂ 267 mm.
 Réunion; leg. F. P. L. Pollen & D. C. van Dam.—1 ♂ 218 mm.
 Réunion?—1 ♂ 208 mm.
 Lasikin, Simaloer Island, W. of Sumatra; April, 1913; leg. E. Jacobson.—1 ♂ 276 mm.
 Laboean Badjau, Simaloer Island, W. of Sumatra; June, 1913; leg. E. Jacobson.—1 ♂ 192 mm.
 Padang, W. coast of Sumatra.—2 ♂ 280 and 300 mm.
 Ambon; 1863; leg. D. J. Hoedt.—3 ♂ 190-234 mm.
 Ambon; 1863; leg. E. W. A. Ludeking.—1 juv. 80 mm.
 Ambon; 1877; leg. J. E. Teysmann.—1 ♀ 223 mm (dry).
 Haroekoe, E. of Ambon; 1865; leg. D. J. Hoedt.—1 ♂ 191 mm.
 Kisar, N. of Timor; 1898; leg. K. Schädler.—1 ♂ 160 mm.
 Locality unknown.—2 ♂ 270 and 300 mm.

Museum Amsterdam:

- W. Nias Island, W. of Sumatra; 1910; leg. J. P. Kleiweg de Zwaan.—3 ♂, 1 ♀ 141-203 mm.

The specimens from Jidda and Padang were already mentioned by De Man (1880), those from Simaloer and Nias already by De Man (1916).

Of the three specimens mentioned by Hoffmann (1874) from Réunion at least one is present in the collection of the Leiden Museum, the specimen labelled „Réunion?“ perhaps also belongs to the collection of Pollen & Van Dam, while the third specimen possibly is one of the two from unknown locality.

Distribution. The species is known throughout the Indian and southern Pacific Oceans. The records in literature are: Red Sea (White, 1847; Nobili, 1906a), Gulf of Aqaba (Miers, 1878a), El Qoseir (Heller, 1861, 1862a), Jidda (De Man, 1880), Natal (C. von Bonde & Marchand, 1935), Agulhas Bank? (Stebbing, 1908, 1910), Indian Ocean (H. Milne Edwards, 1837b), Madagascar (Gruvel, 1913, 1914; Monod & Petit, 1929), Réunion (A. Milne Edwards, 1862b; Hoffmann, 1874; Gruvel, 1911b; Monod & Petit, 1929), Mauritius (Olivier, 1811b; Lamarck, 1818; Desmarest, 1823, 1825; H. Milne Edwards, 1838a; A. Milne Edwards, 1864; Richters, 1880; Howes, 1887), Chagos Archipelago (Borradaile, 1910), Minikoi Island (Borradaile, 1904), Ceylon (Henderson, 1893), Fusan, Korea (Pesta, 1915), Formosa (Balss, 1914a; Maki & Tsuchiya, 1923), Indomalayan Seas (Miers, 1880a), Mindoro (Estampador, 1937), Simaloer Island (De Man, 1916), Nias (De Man, 1916), Sumatra (Gruvel, 1911b), Padang, Sumatra (De Man, 1880), Christmas Island (Calman, 1909b; Gordon, 1935), New Guinea (Pfeffer, 1881), N. Australia (Haswell, 1882), South Seas (Pfeffer, 1881; Ortmann, 1891), Pacific Islands (Dana, 1852b), Marianne Islands (Gruvel, 1911b), New Hebrides (Miers, 1878a; Bate, 1888; Gruvel, 1911b), New Caledonia (Gruvel, 1911b), Loyalty Islands (Borradaile, 1899), Rotuma (Borradaile, 1898), Fiji (Schmeltz, 1876; Miers, 1878a; Bate, 1888), Samoa (Demandt, 1914; Pesta, 1914), Tahiti (Stimpson, 1860; Bate, 1888; Boone, 1935), Wake Island (Edmondson, 1925), Hawaiian Islands (Rathbun, 1900, 1906; Pesta, 1915; Edmondson, 1925), Johnston Island (Edmondson, 1925), Hao, Tuamotu Islands (Nobili, 1907; Gruvel, 1911b), Galapagos Islands (Rathbun, 1900; Sivertsen, 1934).

Panulirus homarus (L.)

- Locusta marina* Rumphius, 1705, Amboin. Rariteitkam., ed. 1, p. 2, pl. 1 fig. A.
Locusta Marina Indica Rumphius, 1711, Thesaur. Imag., ed. 1, p. 1, pl. 1 fig. A.
Locusta marina indica Petiver, 1713, Aquat. Anim. Amboin., p. 2, pl. 6 fig. 1.
Locusta Marina Indica Rumphius, 1739, Thesaur. Imag., ed. 2, p. 1, pl. 1 fig. A.
Locusta marina Rumphius, 1740, Amboin. Rariteitkam., ed. 2, p. 2, pl. 1 fig. A.
Locusta marina Rumphius, 1741, Amboin. Rariteitkam., ed. 3, p. 2, pl. 1 fig. A.
Cancer Homarus Linnaeus, 1758, Syst. Nat., ed. 10 vol. 1, p. 633.
Cancer 52 Linnaeus, 1759, Anim. Spec., p. 203.
Cancer Homarus Linnaeus, 1760, Syst. Nat., ed. 11 vol. 1, p. 633.

- ? *Cancer Homarus* Linnaeus, 1764, Mus. nat. Lud. Ulr., p. 457.
Cancer Homarus p.p. Linnaeus, 1767a, Syst. Nat., ed. 12 vol. 1, p. 1053.
Cancer Homarus p.p. Linnaeus, 1767b, Syst. Nat., ed. 13 vol. 1, p. 1053.
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Astacus homarus p.p. Fabricius, 1775, Syst. Ent., p. 414.
non *Cancer homarus* Müller, 1775, Linn. Natursyst., vol. 5 pt. 2, p. 1129, pl. 35 fig. 1.
non *Cancer (Astacus) Homarus* Pennant, 1777, Brit. Zool., ed. 4 vol. 4, p. 16, pl. 11 fig. 22.
Astacus homarus p.p. Fabricius, 1781, Spec. Ins., vol. 1, p. 510.
? *Cancer Homarus* Houttuyn, 1782, Verh. Holl. Mij. Weetensch., vol. 20 pt. 2, p. 347.
non *Astacus homarus* Fabricius, 1787, Mant. Ins., vol. 1, p. 331.
non *Cancer Homarus* Herbst, 1787, Gemeinn. Naturgesch. Thierr., vol. 8, p. 178, pl. 363.
Cancer Homarus p.p. Gmelin, 1789, Linn. Syst. Nat., ed. 13 vol. 1 pt. 5, p. 2988.
non *Astacus Homarus* Olivier, 1791, Encycl. méth. Hist. nat., vol. 6, p. 343.
non *Cancer Homarus* Olivi, 1792, Zool. Adriat., p. 49.
Astacus homarus p.p. Fabricius, 1793, Ent. Syst., vol. 2, p. 479.
non *Cancer (Astacus) homarus* Herbst, 1793, Vers. Naturg. Krabben Krebse, vol. 2, p. 84, pl. 31 figs. 1, 2.
Astacus Homarus Forster, 1795, Faunula Indica, p. 22.
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non *Palinurus homarus* Bosc, 1801, Hist. nat. Crust., vol. 2, p. 92, pl. 13 fig. 1.
non *Astacus Homarus* Pennant, 1812, Brit. Zool., ed. 5 vol. 4, p. 22, pl. 12.
non *Palinurus Homarus* Leach, 1814, Edinb. Encycl., vol. 7, p. 397.
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non *Astacus homarus* Ekstrand, 1823, Faun. Bras., p. 9.
non *Palinurus Homarus* Desmarest, 1830, in Bosc, Man. Hist. nat. Crust., ed. 2 vol. 2, p. 58, pl. 13 fig. 1.
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Palinurus Burgeri De Haan, 1841, Fauna Japonica, Crust., p. 159, pl. 43/44 fig. 1.
non *Palinurus homarus* White, 1850, List Brit. Crust. Brit. Mus., p. 31.
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Palinurus (Senex) Bürgeri Pfeffer, 1881, Verh. naturw. Ver. Hamburg, ser. 2, vol. 5, p. 35.
Senex bürgeri Ortmann, 1891, Zool. Jb. Syst., vol. 6, p. 32.
Palinurus Burgeri De Man, 1892, in Weber, Zool. Ergebn. Reise Niederl. O. Ind., vol. 2, p. 354.
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Palinurus Bürgeri Pfeffer, 1897, Mitt. naturh. Mus. Hamburg, vol. 14, p. 260.
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Panulirus bürgeri Stebbing, 1908, Ann. S. Afr. Mus., vol. 6, p. 34.
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Panulirus Burgeri Gruvel, 1911a, C. R. Acad. Sci. Paris, vol. 152, p. 1351.
Panulirus Burgeri Gruvel, 1911b, Ann. Inst. océanogr. Monaco, vol. 3 pt. 4, p. 32, textfig. 14, pl. 1 fig. 6.

- Palinurus Burgeri* Gruvel, 1913, C. R. Acad. Sci. Paris, vol. 157, p. 603.
Panulirus burgeri Balss, 1914a, Abh. Bayer. Akad. Wiss., suppl. vol. 2 pt. 10, p. 76.
Panulirus Burgeri Gruvel, 1914, Rev. gén. Sci., vol. 25, p. 714, fig. 3.
Panulirus burgeri Pesta, 1915, S.B. Akad. Wiss. Wien, vol. 124 pt. 1, p. 6.
Panulirus burgeri var. *megasculpta* Pesta, 1915, S.B. Akad. Wiss. Wien, vol. 124 pt. 1, p. 7, textfigs. 1, 2, pl. 1.
Panulirus dasyptus De Man, 1916, Siboga Exped., mon. 39a2, p. 48.
Panulirus dasyptus Roux, 1917, Nova Guinea, vol. 5, p. 602.
Panulirus bürgeri Calman, 1923, Rep. Fish. mar. biol. Surv. S. Afr., vol. 3 pt. 6, p. 1.
Panulirus dasyptus De Man, 1924, Arch. Naturgesch., vol. 90 pt. 2, p. 52.
Panulirus bürgeri Calman, 1925, Rep. Fish. mar. biol. Surv. S. Afr., vol. 4 pt. 3, p. 21.
Panulirus Bürgeri Monod & Petit, 1929, Faun. Colon. Franç., vol. 3, p. 279, textfig. 4.
Panulirus burgeri C. von Bonde & Marchand, 1935, Fish. Bull. Fish. mar. biol. Surv. S. Afr., vol. 1, p. 7.

Museum Leiden:

- Japan; type of *Palinurus Burgeri* De Haan; leg. D. W. Burger.—1 ♂ 200 mm (dry).
 Poeloe Weh, N. Sumatra; leg. P. Buitendijk.—1 ♀ (ovig.) 220 mm.
 Westcoast of Atjeh; June 7, 1895; leg. W. Baerts.—1 ♀ 51 mm.
 West Java; 1894; leg. J. F. van Bemmelen.—1 ♀ 135 mm.
 Bay of Batavia; 1900; leg. P. Buitendijk.—1 ♀ (ovig.) 260 mm.
 Ambon; 1867; leg. D. J. Hoedt.—1 ♂ 94 mm.
 Ambon; 1877; leg. J. E. Teysmann.—1 ♂, 3 ♀ ♀ 111-200 mm.
 Ambon; 1879; leg. Schorel.—1 ♂, 1 ♀ 66 and 181 mm.
 Moluccas; 1895; leg. W. A. Moreaux.—1 ♂ 88 mm.
 Moluccas; leg. C. G. C. Reinwardt.—1 abdomen ♀ 156 mm (dry).
 Locality unknown.—1 ♂ 167 mm.
 Locality unknown.—1 ♂ 61 mm (dry).

Museum Amsterdam:

- Sabang Bay, N. Sumatra; leg. G. Herman.—1 ♂ 155 mm.
 Java and other localities; 1893.—2 ♂ ♂, 1 ♀ 79-154 mm.
 Makassar, S. Celebes; 1888; leg. M. Weber.—1 ♀ 89 mm.
 Ambon; 1913; leg. M. M. Willemsz Geeroms.—1 ♀ 56 mm.
 Dobo, Aroe Islands; 1905; leg. J. W. R. Koch.—1 ♂, 1 ♀ 87 and 69 mm.
 Dutch East Indies; leg. J. A. van de Wetering de Rooij.—1 ♀ 126 mm.
 Locality unknown.—1 ♀ 123 mm, 1 juv. 39 mm.

The present species during the last century mostly was mentioned under the name *Panulirus burgeri*; according to the law of priority, however, it must be named *Panulirus homarus*, as it is identical with *Cancer Homarus* L. (1758). In the tenth edition of his *Systema Naturae* Linnaeus gave the following description of *Cancer Homarus*:

„C. macrourus, thorace antrorsum aculeato, manibus adactylis. *Rumph. mus. t. 1. f. A. Pet. amb. t. 6. f. 1. Habitat in Mari Asiatico.*”

This short diagnosis fits for almost all species of Palinuridae, but the references to the figures of Rumphius and Petiver make it possible to discover which species was meant by Linnaeus. Rumphius's figure, of which that of Petiver is only a copy, represents a Palinurid with long

antennular flagella, therefore belonging to the genus *Panulirus*; furthermore the grooves on the abdominal segments are distinctly crenulate, which only is the case in *Panulirus dasyopus* and *burgeri*; the grooves, however, are not interrupted in the middle and are distinctly crenulate throughout their length, furthermore the carapace is densely covered with spines; these three characters exclude the identity of *Cancer Homarus* with *Panulirus dasyopus*, therefore *homarus* must be the specific name of the species known at present as *Panulirus burgeri*. The suggestion of De Man (1902b) that the species figured in Rumphius's work should be identical with *Palinurus femoristriga* Von Mart. (= *Panulirus japonicus*) is not correct, as *P. japonicus* has the grooves on the abdominal segments straight, and not crenulate, moreover the antennular segment in *P. japonicus* bears two spines only, while the specimen in Rumphius's work is figured with four. The plate in Rumphius's work probably does not represent the species, which was described by Rumphius, as the plate was inserted afterwards by the editor. According to De Man (1902b) the specimen of which Rumphius gave a description belonged to *Panulirus versicolor* (Latr.), but no certainty can be obtained in that respect; the identity of this specimen is of little importance for the synonymy of *Cancer Homarus* L., as Linnaeus only referred to the figure and not to the description.

In 1764 Linnaeus described a specimen under the name *Cancer Homarus*; in his description he stated the specimen to possess a rostrum; as all other characters are typical for a Palinurid, his statement of the rostrum must have been a slip of the pen; less probable is Olivier's (1811, p. 674) suggestion that the specimen was mutilated and badly repaired. Except to Rumphius and Petiver here also a reference was made to Seba, who figured a specimen belonging to *Panulirus guttatus*.

The following authors, Linnaeus (1760, 1767a, b), Fabricius (1775, 1781, 1793, 1798) and Gmelin (1789) mentioned the species as *Cancer*, *Astacus* or *Palinurus homarus*, they also gave the short definition mentioned above, which sometimes was slightly altered or extended, but always fitted for more than one species of Palinuridae, they referred to the following pre-Linnean or non-binomial authors:

Rumphius (1705), Amb. Rariteitkam., pl. 1 fig. A (= *Panulirus burgeri*),

Petiver (1713), Aquat. Anim. Amboin., pl. 6 fig. 1 (= *Panulirus burgeri*),

Marcgraf (1648), Hist. Rer. nat. Bras., p. 185, fig. (= one of the East American *Panulirus* species),

Seba (1761), Thesaurus, vol. 3, pl. 21 fig. 5 (= *Panulirus guttatus*),

Gronovius (1763), Zooph. Gronov., p. 81 (= *Jasus lalandei*).

Many authors (Pennant, 1777 and 1812; Fabricius, 1787; Herbst, 1787; Olivier, 1791; Olivi, 1792; Cuvier, 1797; Bosc, 1801; Leach, 1814 and 1815; Desmarest, 1830; White, 1850) used the specific name *homarus* for the European *Palinurus elephas* (Fabr.). Ekstrand's (1823) *Astacus homarus* to all probability is one of the East American Palinuridae. Houttuyn's (1782) description of *Cancer Homarus* from Japan is too short to identify the species.

More extensive descriptions of *Cancer homarus* are given by:

a. Houttuyn (1769). Except the short definition of Linnaeus, the references to the older authors and the description of some observations made by Rumphius, he gave a very good original figure, which represents *Panulirus argus*.

b. Müller (1775). This author gives an abbreviated German edition of Houttuyn's Dutch work; the plate is a copy of that of Houttuyn. Here no synonyms are given. Müller remarks that he has examined some specimens from Cape of Good Hope from his private collection; one of these specimens is figured in his *Deliciae Naturae*, vol. 2, pl. F6 fig. 1, it belongs to *Jasus lalandei*.

c. Herbst (1793). He extensively described and gave a good figure of the species known at present as *Panulirus ornatus*, under the name *Cancer (Astacus) homarus*. His synonyms, however, deal with the indopacific, mediterranean and east American forms.

Pfeffer (1897, p. 256) thought, on account of Herbst's distinct figure and description, that the name *homarus* had to be given to *P. ornatus*. That this name was already preoccupied by Linnaeus and Fabricius for him is no sufficient reason to reject Herbst's name: „Dieser Name ist von Fabricius und Linné bereits schon früher angewandt worden; doch war er ein Sammelname für viele Arten; von einer Eindeutigkeit der aus wenigen Worten bestehenden, mit den widersprechendsten Fundortsangaben ausgestatteten Beschreibung kann gar nicht die Rede sein." This reason, however, holds not true for the description in the tenth edition of *Systema Naturae*. Nobili (1906) is, as far as I know, the only author who followed Pfeffer.

De Haan (1841) in *Fauna Japonica*, p. 159, mentions *Palinurus guttatus*, with which *P. japonicus* is compared: „Affinis *P. guttatus*, Latr. (*Enc. Méthod.* pl. 315), cujus abdomen, antennae pedesque maculis et punctis creberrimis albis circularibus picti; thorax raro spinosus, interstitiis inter spinas laevibus; sulci abdominales medio interrupti, lateribus recti; femora apice bispinosa, spinis productis; tarsi secundi et tertii apice graciliores:

quarti et quinti apice unispinosi; unguis brevi-setosi." Further Herklots (1861) mentioned a *P. guttatus* from the Moluccas, which is the same specimen as described by De Haan. De Haan's description has puzzled many authors because *P. guttatus* has the abdominal grooves uninterrupted and is not known from the indopacific region; so Von Martens (1872, p. 127) remarks: „Wenn dagegen De Haan von *P. guttatus* sagt, dass die Zwischenräume zwischen den Stacheln auf dem Rückenschild glatt seien, *Fama japonica*, p. 159, so könnte er unseren ostindischen *femoristriga* meinen, dagegen passt auf keinen von beiden, dass die Furchen der Abdominalsegmente unterbrochen sein sollten. Heller Novara-Exp. p. 95. hat die Worte *spatium inter spinas laeve* für *guttatus* vermuthlich von De Haan entlehnt." Pfeffer (1881, p. 32) states: „Auch De Haan giebt von dem Krebs, den er für *P. guttatus* hält, (*Fauna japonica* p. 159) an, dass er unterbrochene Furchen gehabt habe; das scheint freilich nicht sehr ins Gewicht zu fallen, weil er nach der gegebenen Beschreibung keine *P. guttatus* vor sich gehabt haben kann, wie auch v. Martens annimmt. Nach den Verhältnissen der Maxillen jedoch, die er anführt, scheint er wie ebenfalls auch v. Martens ausspricht, den *P. femoristriga* für *P. guttatus* angesehen zu haben, welcher ersterer nach dem mir vorliegenden Exemplar (Männchen) ununterbrochene Furchen hat, sodass immerhin ein, sei es sexuelles, sei es locales Schwanken in diesem Charakter, folglich eine Unverwendbarkeit für Art-Diagnosen, zu constatieren ist." Also Ortmann (1891, p. 24) tries to identify De Haan's specimen: „Zu dieser Art [*Senex femoristriga*] gehört wohl auch — wie schon v. Martens und Pfeffer vermuthen — der *P. guttatus* bei De Haan. Die Angabe von unterbrochenen Furchen auf dem Abdomen bei De Haan wäre dann jedoch unrichtig. Nach Herklots (*Symb. carcinol.*, 1861, p. 30) stammt das von De Haan untersuchte Exemplar von den Molukken." Gruvel (1911) places De Haan's *Palinurus guttatus* among the synonyms of *P. japonicus*. The specimen of De Haan, a dry one, is still present in the collection of the Rijksmuseum van Natuurlijke Historie at Leiden. When studying this specimen it became obvious that it consists of two parts, which belong to two different specimens, the fifth pereopods namely are provided with well developed male copulatory organs, while the pleopods are very broad and biramous, distinctly belonging to a female specimen; studying the other characters, I found the abdomen with crenulated grooves, so belonging to *P. dasypus* or *homarus*, as the crenulations are rather deep, I brought the specimen to *P. homarus*, though the grooves are interrupted. The thorax shows all characteristics of *P. polyphagus*, which was confirmed

by the structure of the oral parts, which were prepared by De Haan and were glued to a piece of cardboard. The two parts probably have been of animals of equal size, as without accurate investigation nothing strange was visible in the proportion. The specimen will be kept as a curiosity in the present state in the Leiden Museum.

The variety *megasculpta* of this species, which was described by Pesta (1915) for a specimen with very distinct crenulations at the abdominal grooves and with distinct sculptations on the rest of the surface of the abdomen, cannot be kept separate. The type specimen of *P. burgeri* agrees in all respects with Pesta's description and figure, which also is shown by De Haan's figure; other specimens at my disposal have the sculptations less distinct than in the type specimen, but the character is so variable, that I think it not justified to base a separate variety on it.

The specimen mentioned by De Man (1896) from Ambon, which is present in the Leiden Museum, is the largest specimen collected by Schorel. The specimen from Sabang Bay was already mentioned by De Man (1924), that from Makassar by the same author (1892, 1916). The specimen from the Aroe Islands was mentioned as *P. dasypus* by Roux (1917).

Distribution. Indopacific. The records in literature are: Red Sea (Nobili, 1906a), Port Elizabeth, S. Africa (Stebbing, 1910), Algoa Bay, S. Africa (Stebbing, 1908, 1910; C. von Bonde & Marchand, 1935), Natal (Calman, 1925; C. von Bonde & Marchand, 1935), Madagascar (Gruvel, 1911b, 1913, 1914; Monod & Petit, 1929), Kischin, S. Arabia (Pesta, 1915), Mascate, S. E. Arabia (Gruvel, 1911b), Ceylon (Heller, 1865), Japan (? Houttuyn, 1782; De Haan, 1841; Herklots, 1861; ? Pesta, 1915), Sagami Bay (Doflein, 1906), East India (Forster, 1795), Sabang Bay, N. Sumatra (De Man, 1924), Padang, W. Sumatra (Pesta, 1915), Borneo (Ortmann, 1897), Makassar (De Man, 1892, 1916), Ambon (De Man, 1896), Aroe Islands (Roux, 1917), Marquesas (Pfeffer, 1897).

***Panulirus dasypus* (H. Milne Edw.)**

Palinurus dasypus H. Milne Edwards, 1837b, Hist. nat. Crust., vol. 2, p. 300.

Palinurus dasypus H. Milne Edwards, 1838b, Ann. Sci. nat. Zool., ser. 2 vol. 10, p. 168

Palinurus dasypus De Haan, 1841, Fauna Japonica, Crust., p. 157, pls. L, M.

Palinurus Dasypus Herklots, 1861, Tijdschr. Ent., vol. 4, p. 143.

non *Palinurus* (*Panulirus*) *dasypus* Heller, 1865, Reise Novara, Zool., vol. 2 pt. 3, p. 100

Senex dasypus Ortmann, 1891, Zool. Jb. Syst., vol. 6, p. 33.

Palinurus dasypus Thallwitz, 1892, Abh. zool.-anthropol. Mus. Dresden, 1890-91 pt. 3, p. 30.

Panulirus dasypus Henderson, 1893, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 5, p. 433.

- Palinurus dasyopus* Casto de Elera, 1895, Catal. Faun. Filip., vol. 2, p. 566.
Panulirus dasyopus Thurston, 1895, Bull. Madras Govt. Mus., vol. 3, p. 120.
 non *Panulirus dasyopus* Ortmann, 1897, Zool. Jb. Syst., vol. 10, p. 262.
Palinurus dasyopus Pfeffer, 1897, Mitt. naturh. Mus. Hamburg, vol. 14, p. 261.
Palinurus dasyopus Nobili, 1899, Ann. Mus. Stor. nat. Genova, vol. 40, p. 243.
Panulirus dasyopus Doflein, 1900, S. B. Akad. Wiss., vol. 30, p. 131.
Palinurus dasyopus Nobili, 1900, Ann. Mus. Stor. nat. Genova, vol. 40, p. 490.
Palinurus dasyopus Pocock, 1903, Nat. Hist. Sokotra, p. 214.
Panulirus dasyopus Bouvier, 1905c, Bull. Mus. océanogr. Monaco, n. 29, p. 2.
Panulirus dasyopus Gruvel, 1911a, C. R. Acad. Sci. Paris, vol. 152, p. 1351.
Panulirus dasyopus Gruvel, 1911b, Ann. Inst. océanogr. Monaco, vol. 3 pt. 4, p. 34, textfig. 15, pl. 2 fig. 5.
Panulirus dasyopus Balss, 1914a, Abh. Bayer. Akad. Wiss., suppl. vol. 2 pt. 10, p. 77.
Panulirus dasyopus Gruvel, 1914, Rev. gén. Sci., vol. 25, p. 714, fig. 4.
Panulirus dasyopus Pesta, 1915, S.B. Akad. Wiss. Wien, vol. 124 pt. 1, p. 6.
 non *Panulirus dasyopus* De Man, 1916, Siboga Exped., mon. 39a2, p. 48.
Panulirus dasyopus Parisi, 1917, Atti Soc. Ital. Sci. nat., vol. 56, p. 8.
 non *Panulirus dasyopus* Roux, 1917, Nova Guinea, vol. 5, p. 602.
Panulirus dasyopus Maki & Tsuchiya, 1923, Rep. Dept. Agric. Formosa, vol. 3, p. 86.
 non *Panulirus dasyopus* De Man, 1924, Arch. Naturgesch., vol. 90 pt. 2, p. 52.
Panulirus dasyopus Gravely, 1927, Bull. Madras Govt. Mus., ser. 2 vol. 1 pt. 1, p. 138.
Panulirus dasyopus Monod & Petit, 1929, Faune Colon. Franç., vol. 3, p. 277, fig. 3.
Panulirus dasyopus Serène, 1937, Notes Inst. océanogr. Indochine, vol. 30, p. 71.

Museum Leiden :

Moluccas ; leg. C. G. C. Reinwardt.—1 ♂ 270 mm (dry).

The present species is closely related to the former, it differs from it in the following characters :

1. The carapace is much less spinulate. De Man (1916) considers the strong spinulation of the carapace to be a juvenile character, but the large specimens of *P. homarus* have the carapace with many spines too.

2. The abdominal grooves in *P. dasyopus* are always interrupted in the middle, in *P. homarus* this is mostly not the case, though many specimens show an indication of an interruption or have it even distinct.

3. In *P. dasyopus* the crenulations of the abdominal grooves are much less distinct than in *P. homarus*.

4. The third pereopod is evidently longer than the second in *P. dasyopus*, they are of about the same length in *P. homarus*.

5. The merus of the second and third pereopod in *P. dasyopus* does not bear an anterodorsal spine, which is present there in *P. homarus*.

6. The soft portion of the telson in my specimen of *P. dasyopus* is very much broader than the base of the telson, in my specimens of *P. homarus* it is narrower than the basal breadth.

The last two characters were not mentioned in literature before, but are evident in my material ; moreover the photograph of *P. dasyopus* given by Gruvel (1911b) also shows no anterodorsal spines at merus of pereio-

pod 2 and 3. Notwithstanding this it needs confirmation by more material. Abundant material perhaps will show the identity of this species and the previous, as most of the characteristics mentioned above are vague and often variable, for instance the length of the pereopods in the other *Palinurid* species has shown to be of very little worth.

The specimen at my disposal was already mentioned by Herklots (1861). The specimens mentioned by De Man (1916 and 1924) and Roux (1917) as *P. dasyptus*, showed when examined by me to belong in reality to *P. homarus*.

Distribution. Indopacific. Records in literature are: Sokotra (Pocock, 1903), Madagascar (Gruvel, 1914; Monod & Petit, 1929), Indian Seas (H. Milne Edwards, 1837b), Silavaturai, Ceylon (Henderson, 1893; Thurston, 1895), Krusadai Island, Gulf of Manaar (Gravely, 1927), Madras (Henderson, 1893), Japan (Doflein, 1900), Yokohama (Pesta, 1915), Formosa (Balss, 1914a; Pesta, 1915; Parisi, 1917; Maki & Tsuchiya, 1923), Swatow (Pesta, 1915), Hongkong (Pfeffer, 1897), Annam (Serène, 1937), Poeloe Condor, off the E. coast of Cochinchina (Gruvel, 1911b), Luzon (Casto de Elera, 1895), Cebu (Thallwitz, 1892), Sumatra (Balss, 1914a), N. Celebes (Thallwitz, 1892), Moluccas (Herklots, 1861), Andai, New Guinea (Nobili, 1899), New Britain (Balss, 1914a), Southern Seas (Pfeffer, 1897).

***Panulirus polyphagus* (Herbst)**

Cancer (Astacus) polyphagus Herbst, 1793, Vers. Naturg. Krabben Krebse, vol. 2, p. 90, pl. 32.

Palinurus fasciatus Fabricius, 1798, Suppl. Ent. syst., p. 401.

Palinurus fasciatus Bosc, 1801, Hist. nat. Crust., vol. 2, p. 93.

Palinurus polyphagus Bosc, 1801, Hist. nat. Crust., vol. 2, p. 92, 93.

Palinurus fasciatus Latreille, 1802, Hist. nat. Crust. Ins., vol. 6, p. 193.

Palinurus polyphagus Latreille, 1804, Ann. Mus. Hist. nat. Paris, vol. 3, p. 393.

Palinurus fasciatus Olivier, 1811b, Encycl. méth. Hist. nat., vol. 8, p. 673.

Palinurus polyphagus Olivier, 1811b, Encycl. méth. Hist. nat., vol. 8, p. 673.

Palinurus fasciatus Latreille, 1817, Nouv. Dict. Hist. nat., vol. 17, p. 295.

Palinurus polyphagus Latreille, 1817, Nouv. Dict. Hist. nat., vol. 17, p. 295.

Palinurus polyphagus Desmarest, 1823, Dict. Sci. nat., vol. 28, p. 294.

non *Palinurus Fasciatus* Von Siebold, 1824, Spicil. Faun. Japon., p. 15.

Palinurus fasciatus Desmarest, 1830, in Bosc, Man. Hist. nat. Crust., ed. 2 vol. 2, p. 59.

Palinurus fasciatus H. Milne Edwards, 1837b, Hist. nat. Crust., vol. 2, p. 295.

Palinurus fasciatus H. Milne Edwards, 1838b, Ann. Sci. nat. Zool., ser. 2 vol. 10, p. 168.

non *Palinurus fasciatus* De Haan, 1841, Fauna Japonica, Crust., p. 159, pl. 43/44 fig. 2.

non *Palinurus Fasciatus* Herklots, 1861, Tijdschr. Ent., vol. 4, p. 143.

Palinurus (Panulirus) fasciatus Heller, 1865, Reise Novara, Zool., vol. 2 pt. 3, p. 94.

non *Palinurus fasciatus* Hoffmann, 1874, Rech. Faune Madagasc., vol. 5 pt. 2, p. 30.

- non *Palinurus fasciatus* Von Martens, 1878, S.B. Ges. naturf. Fr. Berlin, p. 132.
Palinurus (*Panulirus*) *fasciatus* Miers, 1880a, Ann. Mag. nat. Hist., ser. 5 vol: 5, p. 378.
Palinurus (*Senex*) *brevipes* p.p. Pfeffer, 1881, Verh. naturw. Ver. Hamburg, ser. 2, vol. 5, p. 44.
Palinurus (*Panulirus*) *fasciatus* Parker, 1883, Nature Lond., vol. 29, p. 190.
Panulirus fasciatus Gavino, 1888, Viaggio Circumnav. Caracciolo, p. 6.
Palinurus fasciatus De Man, 1888a, Arch. Naturgesch., vol. 53 pt. 1, p. 486.
Senex ornatus p.p. Ortmann, 1891, Zool. Jb. Syst., vol. 6, p. 34.
non *Palinurus fasciatus* De Man, 1892, Zool. Ergebn. Reise Nied. Ind., vol. 2, p. 354.
non *Palinurus fasciatus* Thallwitz, 1892, Abh. zool.-anthrop. Mus. Dresden, 1890-91, pt. 3, p. 28.
non *Panulirus polyphagus* Ortmann, 1894, Denkschr. med.-naturw. Ges. Jena, vol. 8, p. 19.
Palinurus fasciatus Casto de Elera, 1895, Catal. Faun. Filip., vol. 2, p. 565.
Palinurus polyphagus De Man, 1896, Zool. Jb. Syst., vol. 9, p. 502, vol. 10, pl. 34 fig. 59.
non *Palinurus fasciatus* De Man, 1896, Zool. Jb. Syst., vol. 9, p. 508.
Palinurus polyphagus Pfeffer, 1897, Mitt. naturh. Mus. Hamburg, vol. 14, p. 266.
? *Palinurus Paessleri* p.p. Pfeffer, 1897, Mitt. naturh. Mus. Hamburg, vol. 14, p. 265.
Panulirus polyphagus Ortmann, 1898, Zool. Jb. Syst., vol. 10, p. 266.
Palinurus fasciatus Nobili, 1899, Ann. Mus. Stor. nat. Genova, vol. 40, p. 243.
Panulirus orientalis Doflein, 1900, S. B. Bayer. Akad. Wiss., vol. 30, p. 130.
Palinurus fasciatus Nobili, 1900, Ann. Mus. Stor. nat. Genova, vol. 40, p. 490.
Palinurus poiypphagus Nobili, 1903a, Boll. Mus. Zool. Anat. comp. Torino, vol. 18 n. 452, p. 14.
Palinurus poiypphagus Nobili, 1903b, Boll. Mus. Zool. Anat. comp. Torino, vol. 18 n. 455, p. 12.
non *Panulirus polyphagus* Borradaile, 1904, Fauna Geogr. Mald. Laccad., vol. 2 pt. 3, p. 754.
Panulirus fasciatus Annandale, 1908, Journ. Bombay nat. Hist. Soc., vol. 18, p. 927.
Palinurus Powell, 1908, Journ. Bombay nat. Hist. Soc., vol. 18, p. 360, textfigs. 1-11, pls. A, B.
Panulirus fasciatus Gruvel, 1911a, C. R. Acad. Sci. Paris, vol. 152, p. 1351.
Panulirus fasciatus Gruvel, 1911b, Ann. Inst. océanogr. Monaco, vol. 3, pt. 4, p. 41, textfig. 19, pl. 5 fig. 2.
Panulirus fasciatus Balss, 1914a, Abh. Bayer. Akad. Wiss., suppl. vol. 2 pt. 10, p. 78.
Panulirus fasciatus Pesta, 1915, S. B. Akad. Wiss. Wien, vol. 124 pt. 1, p. 9.
non *Panulirus polyphagus* Roux, 1917, Nova Guinea, vol. 5, p. 602.
Panulirus fasciatus Gruvel, 1922, C. R. Acad. Sci. Paris, vol. 175, p. 652.
non *Palinurus fasciatus* Musgrave, 1926, Aust. Zool., vol. 4, p. 205, pl. 27 fig. 3.
Panulirus polyphagus Monod & Petit, 1929, Faun. Colon. Franç., vol. 3, p. 280, fig. 5.
Panulirus ornatus var. *decoratus* Rai, 1933, Journ. Bombay nat. Hist. Soc., vol. 36, p. 893, pl. 1.
? *Panulirus fasciatus* Rai, 1933, Journ. Bombay nat. Hist. Soc., vol. 36, p. 893.
Panulirus fasciatus C. von Bonde & Marchand, 1935, Fish. Bull. Fish. mar. biol. Surv. S. Afr., vol. 1, p. 7.
Palinurus fasciatus Roughley, 1936, Wonders Great Barrier Reef, p. 272.
Panulirus fasciatus Serène, 1937, Notes Inst. océanogr. Indochine, vol. 30, p. 71.

Museum Leiden:

- Madoera; February, 1913; P. Buitendijk.—1 ♀ 220 m.
Moluccas; leg. C. G. C. Reinwardt.—1 ♂ (thorax only) 85 mm (dry).

Museum Amsterdam:

Dutch East Indies.—1 ♀ 115 m.

As already pointed out under *P. homarus*, the anterior part of the specimen described as *Palinurus guttatus* by De Haan (1841) belongs to *P. polyphagus*.

There is a great deal of confusion in the synonymy of this species and the two following. So *P. fasciatus* Fabr. is identical with *P. polyphagus*, but as De Haan described and figured specimens of *P. versicolor* under the name *P. fasciatus*, and his figure for a long time was the only one of either of those two species, often the specimens quoted later as *P. fasciatus* do not belong to the present species but to *P. versicolor*. As far as possible I have tried to investigate which species was meant by each author, but on account of the present circumstances I was not able to study the specimens themselves, except those preserved in the Dutch Museum, therefore the lists of synonyms of these three species must be considered with some reserve.

Distribution: Throughout the indopacific region. Records in literature are: Natal (C. von Bonde & Marchand, 1935), Mauritius (Ortmann, 1891, 1898), Indian Seas (Fabricius, 1798; Bosc, 1801; Latreille, 1802, 1817; Olivier, 1811b; Desmarest, 1830; H. Milne Edwards, 1837b; Gruvel, 1911b), India (Herbst, 1793), Baluchistan (Balss, 1914a), Bombay (Nobili, 1903a; Powell, 1908; Rai, 1933), Maldives (Borradaile, 1904), Poeloe Penang (Gruvel, 1911b), Singapore (De Man, 1896; Nobili, 1903b; Balss, 1914a), Japan (Doflein, 1900), Amur reef (Pfeffer, 1881, 1897), Annam (Gruvel, 1922; Monod & Petit, 1929), Cochinchina (Gruvel, 1922; Monod & Petit, 1929; Serène, 1937), Luzon (Casto de Elera, 1895), Java (Pesta, 1915), W. Borneo (Miers, 1880a; Nobili, 1900), Ambon (Von Martens, 1878; De Man, 1888a; Nobili, 1899), Great Barrier Reef (Roughley, 1936), Upolu (Ortmann, 1898), Tahiti (Gavino, 1888), ? Panama (Ortmann, 1898).

***Panulirus ornatus* (Fabr.) (Pl. VII fig. i, Pl. IX fig. d)**

Cancer (Astacus) homarus Herbst, 1793, Vers. Naturg. Krabben Krebse, vol. 2, p. 84, pl. 31 fig. 1.

Palinurus ornatus Fabricius, 1798, Suppl. Ent. syst., p. 400.

Palinurus ornatus Bosc, 1801, Hist. nat. Crust., vol. 2, p. 93.

Palinurus ornatus Latreille, 1802, Hist. nat. Crust. Ins., vol. 6, p. 192.

Palinurus ornatus Olivier, 1811, Encycl. méth. Hist. nat., vol. 8, p. 672.

Palinurus ornatus Latreille, 1817, Nouv. Dict. Hist. nat., vol. 17, p. 295.

Palinurus ornatus Lamarck, 1818, Hist. nat. Anim. s. Vert., vol. 5, p. 210.

Palinurus ornatus Latreille, 1818, Tabl. encycl. méth., vol. 24, p. 5, pl. 316.

Palinurus ornatus Desmarest, 1823, Dict. Sci. nat., vol. 28, p. 294.

Palinurus ornatus Desmarest, 1825, Consid. gén. Crust., p. 185.

- Palinurus ornatus* Desmarest, 1830, in Bosc, Man. Hist. nat. Crust., ed. 2 vol. 2, p. 59.
- Palinurus ornatus* H. Milne Edwards, 1837b, Hist. nat. Crust., vol. 2, p. 296.
- Palinurus sulcatus* H. Milne Edwards, 1837b, Hist. nat. Crust., vol. 2, p. 297.
- Palinurus ornatus* H. Milne Edwards, 1838a, in Lamarck, Hist. nat. Anim. s. Vert., ed. 2 vol. 5, p. 372.
- Palinurus ornatus* H. Milne Edwards, 1838b, Ann. Sci. nat. Zool., ser. 2 vol. 10, p. 168.
- Palinurus sulcatus* H. Milne Edwards, 1838b, Ann. Sci. nat. Zool., ser. 2 vol. 10 p. 168.
- Palinurus ornatus* De Haan, 1841, Fauna Japonica, Crust., p. 157, pls. L, M.
- Panulirus ornatus* White, 1847, List Crust. Brit. Mus., p. 69.
- Panulirus sulcatus* White, 1847, List Crust. Brit. Mus., p. 69.
- Palinurus ornatus* Bianconi, 1851, Mem. Accad. Sci. Bologna, vol. 3, p. 110.
- Palinurus ornatus* H. Milne Edwards, 1851, Ann. Sci. nat. Zool., ser. 3 vol. 16, p. 290, pl. 8 fig. 13.
- non Langouste sillonnée H. Milne Edwards, 1851, Ann. Sci. nat. Zool., ser. 3 vol. 16, p. 290, pl. 8 fig. 5.
- non *Palinurus ornatus* Herklots, 1851, Addit. Faun. carc. Afr. occ., p. 15.
- Panulirus ornatus* Stimpson, 1860, Proc. Acad. nat. Sci. Philad., 1860, p. 24.
- Palinurus Ornatus* Herklots, 1861, Tijdschr. Ent., vol. 4, p. 143.
- Palinurus ornatus* Tennent, 1861, Sketch. nat. Hist. Ceylon, p. 486.
- Palinurus ornatus* A. Milne Edwards, 1862b, Note Ile Réunion, Ann. F., p. 14.
- Palinurus* (*Panulirus*) *ornatus* Heller, 1865, Reise Novara, Zool., vol. 2 pt. 3, p. 94.
- Palinurus* (*Panulirus*) *sulcatus* Heller, 1865, Reise Novara, Zool., vol. 2 pt. 3, p. 94.
- Palinurus ornatus* A. Milne Edwards, 1868, Nouv. Arch. Mus. Hist. nat. Paris, vol. 4, p. 72.
- Palinurus ornatus* Hoffman, 1874, Rech. Faune Madagasc., vol. 5 pt. 2, p. 29.
- Palinurus ornatus* Hilgendorf, 1879, Mber. Akad. Wiss. Berlin, 1878, p. 827.
- Palinurus* (*Panulirus*) *ornatus* Miers, 1880a, Ann. Mag. nat. Hist., ser. 5 vol. 5, p. 378.
- Palinurus* (*Senex*) *brevipes* p.p. Pfeffer, 1881, Verh. naturw. Ver. Hamburg, ser. 2 vol. 5, p. 44.
- Palinurus* (*Senex*) *sulcatus* Pfeffer, 1881, Verh. naturw. Ver. Hamburg, ser. 2 vol. 5, p. 43.
- Palinurus ornatus* Lenz & Richters, 1881, Abh. Senckenb. naturf. Ges., vol. 12, p. 426.
- Palinurus ornatus* Haswell, 1882, Catal. Aust. Crust., p. 171.
- Palinurus* (*Panulirus*) *ornatus* Parker, 1884, Trans. Proc. New Zeal. Inst., vol. 16, p. 304.
- Palinurus ornatus* Walker, 1887, Journ. Linn. Soc. Lond. Zool., vol. 20, p. 112.
- Palinurus ornatus* De Man, 1888a, Arch. Naturgesch., vol. 53 pt. 1, p. 486.
- non *Palinurus ornatus* Pocock, 1890, Journ. Linn. Soc. Lond. Zool., vol. 20, p. 516.
- Palinurus ornatus* Thallwitz, 1892, Abh. zool.-anthropol. Mus. Dresden, 1890-91 pt. 3, p. 30.
- Panulirus ornatus* Henderson, 1893, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 5, p. 433.
- Panulirus ornatus* Zehntner, 1894, Rev. Suisse Zool., vol. 2, p. 199.
- Palinurus ornatus* Casto de Elera, 1895, Catal. Faun. Filip., vol. 2, p. 566.
- Palinurus ornatus* De Man, 1896, Zool. Jb. Syst., vol. 9, p. 511.
- Palinurus homarus* Pfeffer, 1897, Mitt. naturh. Mus. Hamburg, vol. 14, p. 263.
- Palinurus ornatus* Nobili, 1899, Ann. Mus. Stor. nat. Genova, vol. 40, p. 243.
- Panulirus polyphagus* Borradaile, 1904, Fauna Geogr. Mald. Laccad., vol. 2 pt. 3, p. 754.

- ? *Senex ornatus* Lanchester, 1900, Ann. Mag. nat. Hist., ser. 7 vol. 6, p. 262.
Panulirus homarus Nobili, 1906a, Ann. Sci. nat. Zool., ser. 9 vol. 4, p. 90.
Panulirus ornatus Bedot, 1909, Rev. Suisse Zool., vol. 17, p. 166.
 non *Palinurus ornatus* Rathbun, 1910a, Bull. Mus. comp. Zoöl. Harvard, vol. 52, p. 315.
 non *Panulirus ornatus* Rathbun, 1910b, Proc. U. S. Nat. Mus., vol. 38, p. 560, pl. 52 fig. 1.
Panulirus ornatus p.p. Gruvel, 1911a, C. R. Acad. Sci. Paris, vol. 152, p. 1351.
Panulirus ornatus Gruvel, 1911b, Ann. Inst. océanogr. Monaco, vol. 3 pt. 4, p. 47, textfig. 22, pl. 6 fig. 2.
Palinurus ornatus p.p. Gruvel, 1913, C. R. Acad. Sci. Paris, vol. 157, p. 603.
Panulirus ornatus p.p. Balss, 1914a, Abh. Bayer. Akad. Wiss., suppl. vol. 2 pt. 10, p. 78.
Panulirus ornatus Gruvel, 1914, Rev. gén. Sci., vol. 25, p. 712, fig. 1.
Panulirus ornatus p.p. Pesta, 1915, S. B. Akad. Wiss. Wien, vol. 124 pt. 1, p. 10.
Panulirus ornatus De Man, 1916, Siboga Exped., mon. 39a2, p. 51, pl. 2 fig. 7b, c.
Panulirus ornatus Stebbing, 1918, Ann. Durban Mus., vol. 2, p. 59.
Panulirus ornatus Balss, 1921b, K. Svenska Vetensk. Akad. Handl., vol. 61 pt. 10, p. 17.
Panulirus ornatus Gruvel, 1922, C. R. Acad. Sci. Paris, vol. 175, p. 651.
Panulirus ornatus Maki & Tsuchiya, 1923, Rep. Dept. Agric. Formosa, vol. 3, p. 84, pl. 11 fig. 4.
Palinurus ornatus Sendler, 1923, Abh. Senckenb. naturf. Ges., vol. 38, p. 45.
Palinurus ornatus Kellogg, 1928, Lingnan Sci. Journ. vol. 5, p. 352.
Panulirus ornatus Monod & Petit, 1929, Faun. Colon. Franç., vol. 3, p. 281, fig. 6.
Panulirus ornatus C. von Bonde & Marchand, 1935, Fish. Bull. Fish. mar. biol. Surv. S. Afr., vol. 1, p. 7.
 non *Panulirus ornatus* Boone, 1935, Bull. Vanderbilt mar. Mus., vol. 6, p. 63, pl. 16, textfig. 1.
Panulirus ornatus Estampador, 1937, Philipp. Journ. Sci., vol. 62, p. 496.
Panulirus ornatus Serène, 1937, Notes Inst. océanogr. Indochine, vol. 30, p. 71.

Museum Leiden:

- Jidda; 1882; leg. J. A. Kruyt.—2 ♂♂, 1 ♀ 109-144 mm.
 Nossy Bé, near Madagascar; 1866; leg. F. P. L. Pollen & D. C. van Dam.—1 ♂ 145 mm.
 Makassar, S. Celebes; leg. D. M. Piller.—2 ♀♀ 74 and 124 mm.
 Ambon; 1863; leg. D. J. Hoedt.—1 ♂ 105 mm, 1 juv. 49 mm.
 Ambon; 1863; leg. E. W. A. Ludeking.—1 ♂, 1 ♀, 2 juv. 44-127 mm.
 Ambon; 1879; leg. Schorel.—4 ♂♂, 1 ♀ 57-82 mm.
 Moluccas; 1895; leg. W. A. Moreaux.—2 ♂♂, 7 juv. 35-167 mm.
 Locality unknown.—1 ♀ 74 mm.
 Locality unknown.—1 ♂ 112 mm (dry).

Museum Amsterdam:

- Sabang Bay; leg. G. Herman.—1 ♂ 115 mm.
 Bay of Batavia; leg. C. P. Sluiter.—1 ♂ 85 mm.
 Ambon; 1913; leg. M. M. Willemsz Geeroms.—1 ♂ 54 mm.
 Moluccas and other localities.—2 ♂♂, 1 juv. 41-98 mm.

This species and the following were considered by Gruvel to form one species. De Man (1916) separated them again and gave some points of difference. The character, which he thinks most important, viz., the presence

of one or more segments of the flagellum of the exopod of the second maxillipede in *P. versicolor* and the total absence of a flagellum in *P. ornatus*, is rather variable in the former species, where it sometimes is absent too. When comparing my specimens of both species I found the following differences, which were not mentioned by De Man:

1. The groove along the posterior margin of the carapace in *P. ornatus* is everywhere of the same breadth, while in *P. versicolor* it widens in the median part (Pl. IX figs. d and b).

2. The pleopods of *P. ornatus* are much shorter and broader than those of *P. versicolor*, which are slenderer. For comparison I give here figures of the fifth pleopods of two males of about equal size (Pl. VII figs. i and j).

The most constant and obvious character, however, remains the colour pattern. The difference between the two species in this respect is clearly shown by Gruvel's (1911) beautiful photographs (pl. 6 fig. 2 represents *P. ornatus* and fig. 3 *P. versicolor*).

The specimen mentioned by Herklots is still present in the collection of the Leiden Museum. The specimen from Nossy Bé was already mentioned by Hoffmann (1874).

Distribution. Indopacific. The records in literature are: Obock (Nobili, 1906a), Moçambique (Bianconi, 1851; Hilgendorf, 1879), Zanzibar (A. Milne Edwards, 1868; Pfeffer, 1881, 1897), Durban (Stebbing, 1918), Natal (C. von Bonde & Marchand, 1935), Madagascar (Lenz & Richters, 1881; Gruvel, 1914, 1922; Monod & Petit, 1929), Nossy Bé (Hoffmann, 1874), Réunion (A. Milne Edwards, 1862b), Mauritius (Olivier, 1811b; Latreille, 1817; Lamarck, 1818; Desmarest, 1823, 1825; H. Milne Edwards, 1837b, 1838a; White 1847), Indian Ocean (Fabricius, 1798; Latreille, 1802; Desmarest, 1830; H. Milne Edwards, 1837, 1838b) Ceylon (Tennent, 1861; Henderson, 1893), Bengal (Pfeffer, 1897), Singapore (Walker, 1887; Pfeffer, 1897), Formosa (Maki & Tsuchiya, 1923), Amoy (Kellogg, 1928), Swatow (Kellogg, 1928), Hongkong (Stimpson, 1860; Kellogg, 1928), Annam (Gruvel, 1922; Serène, 1937), Luzon (Pfeffer, 1881, 1897; Casto de Elera, 1895; Estampador, 1937), Mindoro (Estampador, 1937), Poeloe Satang¹⁾ (Lanchester, 1900), Sangihe Islands (Thallwitz, 1892), Makassar, S. Celebes (De Man, 1916), Postiljon Islands, Java Sea (De Man, 1916), Ambon (Hilgendorf, 1879; Miers, 1880a; De Man, 1888a, 1896, 1916; Zehntner, 1894; Bedot, 1909), New Guinea (Miers, 1880a; Nobili, 1899), N. Australia (Haswell, 1882), Cape Jaubert,

1) This island is unknown to me.

N. Australia (Balss, 1921b), Pipon Islands, near Cape Melville, N. Queensland (Miers, 1880a), Southern Seas (Pfeffer, 1897), Nissan Atoll (Sender, 1923). The record Sitka, N. America (White, 1847) probably is an error. The records of Gruvel (1911b, 1913), Balss (1914a) and Pesta (1915) are not included as these records undoubtedly include two species, viz., *P. ornatus* and *P. versicolor*.

Panulirus versicolor (Latr.) (Pl. VII fig. j, Pl. IX fig. b, Pl. XI figs. e, f, m)

- Locusta marina peregrina*, seu *Squilla versicolor* Clusius, 1611, Curae post., p. 48, 1 textfig.
- Palinurus versicolor* Latreille, 1804, Ann. Mus. Hist. nat. Paris, vol. 3, p. 394.
- Palinurus versicolor* Latreille, 1817, Nouv. Dict. Hist. nat., vol. 17, p. 295.
- Palinurus taeniatus* Lamarck, 1818, Hist. nat. Anim. s. Vert., vol. 5, p. 211.
- non *Palinurus versicolor* Lamarck, 1818, Hist. nat. Anim. s. Vert., vol. 5, p. 211.
- Palinurus Fasciatus* Von Siebold, 1824, Spicil. Faun. Japon., p. 15.
- Palinurus taeniatus* H. Milne Edwards, 1838a, in Lamarck, Hist. nat. Anim. s. Vert., ed. 2 vol. 5, p. 372.
- non *Palinurus versicolor* H. Milne Edwards, 1838a, in Lamarck, Hist. nat. Anim. s. Vert., ed. 2 vol. 5, p. 372.
- Palinurus fasciatus* De Haan, 1841, Fauna Japonica, Crust., p. 159, pl. 43/44 fig. 2.
- Panulirus taeniatus* White, 1847, List Crust. Brit. Mus., p. 69.
- Palinurus* (*Panulirus*) *ornatus* var. *decoratus* Heller, 1865, Reise Novara, Zool., vol. 2 pt. 3, p. 99.
- Palinurus fasciatus* Hoffmann, 1874, Rech. Faune Madagasc., vol. 5 pt. 2, p. 30.
- Palinurus fasciatus* Von Martens, 1878, S. B. Ges. naturf. Fr. Berlin, 1878, p. 132.
- Palinurus* (*Panulirus*) *versicolor* Miers, 1880a, Ann. Mag. nat. Hist., ser. 5 vol. 5, p. 379.
- Palinurus fasciatus* Thallwitz, 1892, Abh. zool.-anthropol. Mus. Dresden, 1890-91 pt. 3, p. 28.
- Palinurus fasciatus* De Man, 1892, Zool. Ergebn. Reise Nied. Ind., vol. 2, p. 354.
- Panulirus polyphagus* Ortmann, 1894, Denkschr. med.-naturw. Ges. Jena, vol. 8, p. 19.
- Puer spiniger* Ortmann, 1894, Denkschr. med.-naturw. Ges. Jena, vol. 8, p. 19, pl. 2 fig. 2.
- Palinurus* sp. De Man, 1896, Zool. Jb. Syst., vol. 9, p. 507.
- Panulirus dasyptus* Ortmann, 1897, Zool. Jb. Syst., vol. 10, p. 262.
- Palinurus versicolor* Pfeffer, 1897, Mitt. naturh. Mus. Hamburg, vol. 14, p. 262.
- Palinurus versicolor* Nobili 1899, Ann. Mus. Stor. nat. Genova, vol. 40, p. 243.
- Panulirus demani* Borradaile, 1899, Willey's Zool. Results, vol. 4, p. 418.
- Senex ornatus* var. *laevis* Lanchester, 1901, Proc. zool. Soc. Lond., 1901, p. 557.
- Palinurus versicolor* De Man, 1902b, Abh. Senckenb. naturf. Ges., vol. 25, p. 760.
- Puer spiniger* Bouvier, 1905d, Bull. Mus. océanogr. Monaco, n. 28, p. 2.
- Panulirus versicolor* Nobili, 1906b, Bull. sci. France Belg., vol. 40, p. 59.
- Panulirus versicolor* Calman, 1909b, Proc. zool. Soc. Lond., 1909, p. 706.
- Puerulus spiniger* Calman, 1909c, Ann. Mag. nat. Hist., ser. 8 vol. 3, p. 442.
- Panulirus versicolor* Calman, 1909c, Ann. Mag. nat. Hist., ser. 8 vol. 3, p. 443.
- Panulirus versicolor* Borradaile, 1910, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 13, p. 261.
- Palinurus ornatus* Rathbun, 1910a, Bull. Mus. comp. Zoöl. Harvard, vol. 52, p. 315.
- Panulirus ornatus* Rathbun, 1910b, Proc. U.S. Nat. Mus., vol. 38, pl. 52 fig. 1, non p. 560.

- Panulirus ornatus* p.p. Gruvel, 1911a, C. R. Acad. Sci. Paris, vol. 152, p. 1351.
Panulirus ornatus var. *taeniatus* Gruvel, 1911b, Ann. Inst. océanogr. Monaco, vol. 3 pt. 4, p. 48, pl. 6 fig. 3.
Palinurus ornatus p.p. Gruvel, 1913, C. R. Acad. Sci. Paris, vol. 157, p. 603.
Panulirus ornatus p.p. Balss, 1914a, Abh. Bayer. Akad. Wiss., suppl. vol. 2 pt. 10, p. 78.
Panulirus ornatus p.p. Pesta, 1915, S.B. Akad. Wiss. Wien, vol. 124 pt. 1, p. 10.
Panulirus versicolor De Man, 1916, Siboga Exped., mon. 39a2, p. 55, pl. 2 fig. 7.
Palinurus ornatus var. *decoratus* De Man, 1916, Siboga Exped., mon. 39a2, p. 54.
Panulirus ornatus var. *laevis* De Man, 1916, Siboga Exped., mon. 39a2, p. 55.
Panulirus ornatus var. *taeniatus* Gruvel, 1922, C. R. Acad. Sci. Paris, vol. 175, p. 651.
Panulirus versicolor Maki & Tsuchiya, 1923, Rep. Dept. Agric. Formosa, vol. 3, p. 83.
Palinurus fasciatus Musgrave, 1926, Aust. Zool., vol. 4, p. 205, pl. 27 fig. 3.
Palinurus versicolor McNeill, 1926, Aust. Zool., vol. 4, p. 302.
Palinurus versicolor Ward, 1928, Aust. Zool., vol. 5, pl. 29 fig. 1.
Panulirus versicolor De Man, 1929, Misc. zool. Sumatrana, vol. 36, p. 3.
Panulirus versicolor Monod & Petit, 1929, Faune Colon. Franç., vol. 3, p. 284, fig. 7.
Panulirus versicolor Roxas, 1930, Puerto Galera mar. biol. Lab., p. 19.
Panulirus versicolor Estampador, 1937, Philipp. Journ. Sci., vol. 62, p. 497.
Panulirus ornatus var. *taeniatus* Serène, 1937, Notes Inst. océanogr. Indochine, vol. 30, p. 71.

Snellius Expedition:

- Near Koepang, Timor; November 18-20, 1929.—1 juv. 25 mm.
 Kera near Koepang; November 22-23, 1929.—1 juv. 23 mm.
 Koepang; reef; November, 1929.—1 juv. (*puerulus* stage) 23 mm.
 Near Koepang; shore or reef; December 3, 1929.—1 juv. 24 mm.
 Koepang; reef or shore; December 5, 1929.—1 juv. 24 mm.
 Morotai; June 3-7, 1930.—1 juv. (*puerulus* stage) 25 mm.
 Kaledoepea; August 27, 1930.—1 juv. 45 mm.

Museum Leiden:

- Cape of Good Hope; leg. H. B. van Horstok.—1 ♀ 75 mm (dry).
 Nossy Bé; 1866; leg. F. P. L. Pollen & D. C. van Dam.—1 ♀ 91 mm.
 Japan; leg. P. F. von Siebold.—3 juv. 68-73 mm (dry).
 Hongkong; February, 1918; leg. P. Buitendijk.—1 ♀ 163 mm.
 Coast of Atjeh; 1879; leg. Walraven.—1 ♂ 109 mm.
 Sinabang Bay, Simaloer Island, W. of Sumatra; February, 1913; leg. E. Jacobson.—1 ♂ 302 mm.
 Sinabang, Simaloer Island; February, 1913; leg. E. Jacobson.—1 ♂ 253 mm.
 Sumatra; 1902; leg. G. A. J. van der Sande.—3 juv. 51-73 mm.
 Off Panaroekan, E. Java; August, 1910; leg. P. Buitendijk.—1 juv. (*puerulus* stage) 22 mm.
 Java; ± 1824; leg. H. Kuhl & J. C. van Hasselt.—2 ♀ ♀ 223-316 mm (dry).
 Celebes; 1918; leg. W. Kaudern.—1 juv. 43 mm (dry).
 Ternate; ± 1860; leg. H. A. Bernstein.—1 ♂ 58 mm.
 Ternate; leg. W. Kükenenthal.—1 ♂ 53 mm.
 South coast of Ceram; 1864; leg. D. J. Hoedt.—1 ♂ 40 mm, 1 juv. 24 mm.
 Ambon; 1863; leg. E. W. A. Ludeking.—1 ♂, 1 ♀, 6 juv. 17-80 mm.
 Ambon; 1867; leg. D. J. Hoedt.—5 ♂ ♂, 3 ♀ ♀ 32-104 mm.
 Ambon; 1877; leg. J. E. Teysmann.—1 ♀ (ovig.) 310 mm.
 Ambon; 1877; leg. J. E. Teysmann.—1 ♀ 296 mm (dry).
 Ambon; 1879; leg. Schorel.—8 juv. (including 1 *puerulus* stage) 21-25 mm.
 Bandanaira; 1881; leg. J. Semmelink.—2 juv. 23 and 32 mm.

- Banda Sea; 1881; leg. J. Semmelink.—1 ♂, 9 juv. (4 of which *puerulus* stages) 23-108 mm.
 Moluccas; 1895; leg. W. A. Moreaux.—2 ♀ ♀ 95 and 207 mm.
 Aroe Islands; 1863; leg. E. W. A. Ludeking.—3 ♂ ♂ 59-85 mm.
 Eastcoast of Flores; leg. J. Semmelink.—1 ♀ 52 mm.
 Kissar; 1898; leg. K. Schädler.—1 juv. 52 mm.
 Dutch East Indies; July 6, 1938; from Rotterdam Zool. Garden.—1 ♀ 117 mm.
 Tahiti; 1887; Mus. Godeffroy.—2 juv. 81 and 95 mm.
 Locality unknown; October 18, 1937; from Rotterdam Zool. Garden.—2 ♀ ♀ 166 and 172 mm.
 Locality unknown; September 8, 1938; from Rotterdam Zool. Garden.—1 ♀ 118 mm.
 Locality unknown.—2 ♀ ♀ (ovig.) 250 and 280 mm.

Museum Amsterdam:

- Indian Ocean; don. Vorster.—1 ♀ 232 mm.
 Sabang; May, 1928; leg. J. A. van de Wetering de Rooij.—1 juv. 54 mm.
 Sabang, Poeloe Weh; 1920; leg. G. Herman.—1 juv. 33 mm.
 Sabang Bay; leg. G. Herman.—1 ♂ 72 mm.
 Nias Island, W. of Sumatra; leg. J. P. Kleiweg de Zwaan.—3 juv. 23-32 mm.
 Poeloe Berhala, E. of Sumatra; coll. J. G. de Man.—1 ♀ 130 mm (dry).
 Bay of Batavia; leg. C. P. Sluiter.—4 juv. 33-46 mm.
 Batoe, probably N. Java.—1 juv. 37 mm.
 Ambon; 1913; leg. M. M. Willemsz Geerrooms.—3 ♂ ♂, 2 ♀ ♀, 8 juv. (3 of which *puerulus* stage) 23-105 mm.
 Moluccas and other localities.—3 ♂ ♂, 2 ♀ ♀, 2 juv. 20-168 mm.
 Dobo, Aroe Islands; 1905; leg. J. W. R. Koch.—1 ♂, 1 juv. 54 and 45 mm.
 Bay of Bima, Soembawa; leg. M. Weber.—2 ♂ ♂ 54 and 96 mm.
 Larantoea, Flores; shore; leg. G. A. J. van der Sande.—1 ♀, 1 juv. 79 and 29 mm.
 Larantoea, Flores.—2 juv. (included 1 *puerulus* stage) 25 and 29 mm.
 Maoemere, Flores; reef; 1889; leg. M. Weber.—3 juv. (all *puerulus*) 23-25 mm.
 South coast of Flores; 122° 38' E; collected with electric light, 16 fathoms; January 19, 1909; leg. G. A. J. van der Sande.—1 juv. 20 mm.
 Cocos Island, Indian Ocean.—1 ♂ 49 mm.
 Dutch East Indies; September, 1934; don. Gaudelius.—1 ♂ 114 mm.
 Locality unknown.—1 juv. (*puerulus* stage) 24 mm.

The differences between this species and the preceding have already been mentioned on p. 141.

De Man (1916) again doubted the identity of *Palinurus ornatus* var. *decoratus* Heller with the present species, as specimens in the Vienna Museum, which were brought by Pesta to Heller's form, did not bear any segment of the flagellum of the second maxillipede. As I already pointed out (p. 141) that character is not constant in *P. versicolor*; in my material many specimens, which on account of their colour pattern distinctly belong to *P. versicolor*, do not have any segments of the flagellum.

Rathbun (1910b) includes *Panulirus inflatus* and *P. versicolor* in *P. ornatus*. The specimen recorded from Peru probably is *P. inflatus*. Rathbun's figure is a reproduction of De Haan's pl. 43/44 fig. 2 representing *P. versicolor*.

The specimen from Nossy Bé was already mentioned by Hoffmann (1874) under the name *P. fasciatus*, under which name also the specimens from Japan are mentioned by Von Siebold (1824) and figured by De Haan (1841). The specimens from Simaloer and Nias were already mentioned by De Man (1916), of those from Ternate, collected by Bernstein, Banda Sea, collected by Semmelink, and Aroe Islands, collected by Ludeking, some specimens were mentioned by De Man (1896), the specimen from Soembawa by De Man (1892), that from Ternate collected by Kükenthal by De Man (1902b) and that from Poeloe Berhala by De Man (1929).

Distribution. This common species is known throughout the indopacific region. The records in literature are: Persian Gulf (Nobili, 1906b), Nossy Bé (Hoffmann, 1874; Gruvel, 1922; Monod & Petit, 1929), Madagascar (Monod & Petit, 1929), Mauritius (White, 1847), Seychelles Bank (Borradaile, 1910), Indian Ocean (White, 1847), Ceylon (Ortmann, 1897), Singora (Lanchester, 1901), Japan (Von Siebold, 1824; De Haan, 1841), Formosa (Maki & Tsuchiya, 1923), Annam (Serène, 1937), Philippines (White, 1847), Mindoro (Roxas, 1930; Estampador, 1937), Nias (De Man, 1916), Simaloer (De Man, 1916), Poeloe Berhala (De Man, 1929), Java (Heller, 1865), Java Sea (De Man, 1896), N. Celebes (Thallwitz, 1892), Kabaena Island, S. Celebes (De Man, 1916), Beo, Talaud Islands (De Man, 1916), Ternate (De Man, 1896, 1902b, 1916), Soela Sanana (De Man, 1916), Ambon (Von Martens, 1878; Ortmann, 1894; De Man, 1916), Noesa Laut, S. of Ceram (De Man, 1916), Banda Sea (De Man, 1896), Lucipara Islands, Banda Sea (De Man, 1916), Kai Islands (De Man, 1916), Aroe Islands (Miers, 1880a; De Man, 1896), Soembawa (De Man, 1892), Lantaoeka, Flores (Thallwitz, 1892), Sawoe (De Man, 1916), Roti (De Man, 1916), North of Timor (De Man, 1916), Timor (De Man, 1916), Christmas Island, Indian Ocean (Calman, 1909b), New Guinea (Ortmann, 1894; Nobili, 1899; Rathbun, 1910a), New Britain (Pfeffer, 1897; Borradaile, 1899), Solomon Islands (Pfeffer, 1897), Matupi¹⁾ (Pfeffer, 1897), Australia (Latreille, 1817; Lamarck, 1818; H. Milne Edwards, 1838a), Thursday Island, N. Queensland (Ortmann, 1894), Capricorn Group, Queensland (Musgrave, 1926; McNeill, 1926), Fiji (Pfeffer, 1897), Samoa (Pfeffer, 1897).

Palinurus Fabr.

In his Mantissa Insectorum, vol. 1, p. 331 Fabricius (1787) gives a very short diagnosis of a new species *Astacus Elephas*, which undoubtedly belongs to the Palinuridae. Fabricius's remark that the supraorbital spines

1) This locality is not known to me.

are dentate, shows that his species belongs to *Palinurus*, *Palinustus* or to *Justitia*. His reference to the (at that time not yet published) figure of Herbst points to the identity of *Astacus Elephas* with *Palinurus vulgaris*, his statement that the species originates from South America, however, is in contradiction with that supposition. In his *Supplementum Entomologiae Systematicae*, p. 401, Fabricius (1798) gives a rather extensive description of *Palinurus quadricornis*. Among the synonyms of this species he gives his *Astacus Elephas* and also the *Cancer Elephas* of Herbst. The description and figure of the latter are published by Herbst in 1793 and undoubtedly that species is identical with *Palinurus vulgaris* as is shown by the extensive description and beautiful figure; Herbst also correctly states the species to inhabit the Mediterranean. In his description of *Palinurus quadricornis* Fabricius states that the supraorbital spines are dentate at the lower margin, which excludes the possibility of the identity of his species with either *Palinustus* or *Justitia*, which two genera both have the supraorbital spines serrate on either side. The description of Fabricius's *Palinurus quadricornis* entirely agrees with *Palinurus vulgaris*, but for the remark that the species originates from South America. This latter statement therefore obviously is an error. As now both *Astacus Elephas* and *Palinurus quadricornis* are identical with *Palinurus vulgaris*, the name *elephas* must be used for the species, because that name is the oldest. The changing of the well known name *vulgaris* into *elephas* will cause some confusion, but the retention of Latreille's name only can make the confusion much larger. In that case namely both the names *elephas* and *quadricornis* must be rejected and then not one species included by Fabricius in the genus *Palinurus* in the original description of that genus will be referred to the genus *Palinurus* of our present conception; this should make it necessary that either *Palinurus Homarus*, *ornatus* or *fasciatus* of Fabricius should become the real type of the genus *Palinurus*, which then should be identical with the genus *Panulirus* of our present conception and a new name should be needed for the present genus *Palinurus*. I think it therefore most logic and correct to change the name *Palinurus vulgaris* Latr. into *Palinurus elephas* (Fabr.).

Jasus Parker

Jasus lalandei (H. Milne Edw.)

Astacus thorace aculeato Gronovius, 1763, Zoophyl. Gronov., p. 229.

Homarus Müller, 1766, Deliciae Nat., ed. 1 vol. 2, pp. ..., pl. F6 fig. 1.

Homarus Müller, 1771, Deliciae Nat., Dutch ed., vol. 2, pp. 13, 67, pl. F6 fig. 1.

Cancer Homarus p.p. Müller, 1775, Linn. Natursyst., vol. 5 pt. 2, p. 1129. (non pl. 35 fig. 1).

- Homarus* Müller, 1778, *Deliciae Nat.*, ed. 2, pp. ..., pl. F6 fig. 1.
- Palinurus Lalandii* H. Milne Edwards, 1837b, *Hist. nat. Crust.*, vol. 2, p. 293.
- Palinurus Lalandii* H. Milne Edwards, 1838b, *Ann. Sci. nat. Zool.*, ser. 2 vol. 10, p. 168.
- Palinurus Lalandii* De Haan, 1841, *Fauna Japonica*, Crust., p. 157, pls. L, M.
- Palinurus Lalandii* Krauss, 1843, *Südafr. Crust.*, p. 53.
- Palinurus Lalandii* p.p. White, 1847, *List Crust. Brit. Mus.*, p. 69.
- Palinurus Lalandi* H. Milne Edwards, 1851, *Ann. Sci. nat. Zool.*, ser. 3 vol. 16, p. 290, pl. 9 figs. 1, 2.
- Palinurus Lalandii* Dana, 1852b, *U.S. Explor. Exped.*, vol. 13, p. 519.
- Palinurus Lalandei* Stimpson, 1860, *Proc. Acad. nat. Sci. Philad.*, 1860, p. 24.
- Palinurus Lalandii* Herklots, 1861, *Tijdschr. Ent.*, vol. 4, p. 143.
- Palinurus lalandii* Miers, 1876, *Catal. Crust. New Zeal.*, p. 74.
- Palinurus Lalandii* Boas, 1880, *K. Danske Vidensk. Selsk. Skr.*, ser. 6 vol. 1, p. 82.
- Palinurus Lalandii* Pfeffer, 1881, *Verh. naturw. Ver. Hamburg*, ser. 2 vol. 5, p. 29.
- Palinurus Lalandii* Haswell, 1882, *Catal. Aust. Crust.*, p. 171.
- Palinurus (Jasus) lalandii* Parker, 1883, *Nature Lond.*, vol. 29, p. 190.
- Palinurus (Jasus) lalandii* Parker, 1884, *Trans. Proc. New Zeal. Inst.*, vol. 16, p. 304.
- Palinurus lalandii* Parker, 1887, *Trans. Proc. New Zeal. Inst.*, vol. 19, p. 150, pl. 10 figs. 3, 4, 10, 11, 13.
- Palinurus Lalandi* McCoy, 1890, *Nat. Hist. Victoria*, vol. 2, p. 189, pls. 149, 150.
- Palinurus Lelandii* Whitelegge, 1890, *Journ. Roy. Soc. New S. Wales*, vol. 23, p. 223.
- Jasus lalandii* Ortmann, 1891, *Zool. Jb. Syst.*, vol. 6, p. 16.
- Palinosytus Lalandii* p.p. Stebbing, 1893, *Hist. Crust.*, p. 196.
- Jasus lalandii* Stebbing, 1900, *Mar. Invest. S. Afr.*, vol. 1, p. 30.
- Jasus lalandii* Stebbing, 1902, *Mar. Invest. S. Afr.*, vol. 2, p. 38.
- Palinurus lalandi* Kershaw, 1906, *Victoria Nat.*, vol. 22, p. 206.
- Jasus lalandii* Stebbing, 1910, *Ann. S. Afr. Mus.*, vol. 6, p. 374.
- Jasus Lalandei* Gruvel, 1910, *C. R. Acad. Sci. Paris*, vol. 151, p. 1001.
- Jasus Lalandei* p.p. Gruvel, 1911a, *C. R. Acad. Sci. Paris*, vol. 152, p. 1350.
- Jasus Lalandei* p.p. Gruvel, 1911b, *Ann. Inst. océanogr. Monaco*, vol. 3 pt. 4, p. 10, textfig. 4, pl. 2 fig. 1.
- Jasus Lalandei* Gruvel, 1911c, *Rev. zool. Afr.*, vol. 1, p. 144.
- Jasus lalandii* Balss, 1913, *Denkschr. med.-naturw. Ges. Jena*, vol. 17, p. 108.
- Palinurus (Jasus) lalandii* Gilchrist, 1913a, *Mar. Biol. Rep. S. Afr.*, vol. 1, p. 1, pl. 1.
- Palinurus (Jasus) lalandii* Gilchrist, 1913b, *Journ. Linn. Soc. Lond. Zool.*, vol. 32, p. 225, fig. 1.
- Jasus lalandii* Stebbing, 1914, *Trans. Roy. Soc. Edinb.*, vol. 50 pt. 2, p. 282.
- Jasus lalandei* p.p. Pesta, 1915, *S. B. Akad. Wiss. Wien*, vol. 124 pt. 1, p. 5.
- Jasus Lalandei* Balss, 1916, *Beitr. Meeresfauna Westafr.*, p. 31.
- Jasus lalandii* Gilchrist, 1916, *Journ. Linn. Soc. Lond. Zool.*, vol. 33, p. 101, textfigs. 22-44, pls. 12-17.
- Jasus Lalandii* p.p. De Man, 1916, *Siboga Exped.*, mon. 39a2, p. 31.
- Jasus lalandii* W. von Bonde, 1918, *Trans. Roy. Soc. S. Afr.*, vol. 7, p. 119, figs. 1, 2.
- Jasus lalandii* Gilchrist, 1918a, *Mar. Biol. Rep. S. Afr.*, vol. 4, p. 1.
- Jasus lalandii* Gilchrist, 1918b, *Mar. Biol. Rep. S. Afr.*, vol. 4, p. 44.
- Jasus lalandii* Gilchrist, 1920, *Journ. Linn. Soc. Lond. Zool.*, vol. 34, p. 189, textfigs. 1-13, pls. 15, 16.
- Jasus lalandii* Odhner, 1923, *Göteborg Vetensk. Samh. Handl.*, vol. 27 pt. 5, p. 24.
- Jasus lalandii* C. von Bonde, 1924, *Trans. Roy. Soc. S. Afr.*, vol. 12, p. lvii.
- Jasus Lalandei* p.p. Balss, 1925a, *Wiss. Ergebn. Valdivia Exped.*, vol. 20, p. 204.
- Crawfish Sibson, 1925, *S. Afr. Journ. Industr.*, vol. 8, p. 350.

- Jasus lalandii* C. von Bonde, 1926, Invest. Rep. Fish. mar. biol. Surv. S. Afr., vol. 6, p. 1, pls. 1-12.
Jasus lalandii Hale, 1927a, Trans. Roy. Soc. S. Aust., vol. 51, p. 309.
Jasus lalandii Hale, 1927b, Crust. S. Aust., vol. 1, p. 65, figs. 63-67.
Jasus lalandii C. von Bonde, 1928, Rep. Fish. mar. biol. Surv. S. Afr., vol. 6 pt. 4, p. 1, textfig. 1, pls. 1, 2.
Jasus lalandii C. von Bonde & Marchand, 1935, Fish. Bull. Fish. mar. biol. Surv. S. Afr., vol. 1, p. 1, pls. 1-8, maps 1-9.
Jasus lalandii Chopra, 1936, Curr. Sci., vol. 4, p. 529.
Jasus lalandii Gurney, 1936, Discovery Rep., vol. 12, p. 420, figs. 28, 29.
Jasus lalandii C. von Bonde, 1937, S. Afr. Journ. Sci., vol. 33, p. 827, pls. 11-14.
Jasus lalandii Tubb, 1937, Proc. Roy. Soc. Victoria, vol. 49, p. 408.
Jasus lalandii Anderson, 1938, Proc. Roy. Soc. Victoria, vol. 50 pt. 2, p. 352.
Jasus lalandii C. von Bonde, 1938, Cape Nat., vol. 1, p. 143, figs. 1-5.

Museum Leiden:

- Cape of Good Hope.—1 ♂, 1 ♀ 131 and 153 mm.
 Cape of Good Hope; leg. H. Kuhl, J. C. van Hasselt and H. B. van Horstok.—3 ♂♂, 6 ♀♀ 81-276 mm (dry).
 Locality unknown.—1 ♂, 1 ♀ 443 and 237 mm, 1 carapace 136 mm (dry).

Museum Amsterdam:

- Table Bay, Cape of Good Hope; July, 1894; leg. M. Weber.—1 ♀ (ovigerous) 283 mm, 7 juv. 26-39 mm.
 Table Bay, Cape of Good Hope; leg. M. Weber. — W. Africa; 1906; leg. F. P. Vermeulen.—1 ♂, 2 ♀♀ 198-260 mm.

Of the genus *Jasus* the following species have been described: *Jasus lalandei* (H. Milne Edw.), *J. frontalis* (H. Milne Edw.), *J. edwardsii* (Hutton), *J. paulensis* (Heller), *J. verreauxi* (H. Milne Edw.), *J. hügelii* (Heller), *J. tumidus* (Kirk), and *J. parkeri* Stebbing. The last species is no *Jasus* at all but belongs to the genus *Puerulus*, as is distinctly shown by the description and figure; it has, for instance, a distinct stridulating organ, which is entirely absent in the genus *Jasus*. The species differs from all other known species of *Puerulus* by having a double median row of tubercles on the carapace.

J. verreauxi, *J. hügelii* and *J. tumidus* at present are united to one species, *J. verreauxi*. About the remaining four species the opinions differ; Ortmann (1891) and Grüvel (1911b) unite them to one species, while Lenz (1902) and Lenz & Strunck (1914) think *J. frontalis* distinct from *J. lalandei*, and Parker (1887) regards *J. edwardsii* as a distinct variety of *J. lalandei*, while *J. paulensis* is united with *J. lalandei* by its author some years after the publication of the description. In an important paper Parker (1887) shows that the characteristics, which Hutton used to distinguish *J. edwardsii* from *J. lalandei*, are very variable in both species and must be considered of no systematic value. But when comparing extensive material from Cape of Good Hope and from New Zealand, he found one constant

difference, viz., that in all specimens from the Cape the abdominal segments are sculptured over their entire surface, even the anterior part of the first segment, and that in all specimens from New Zealand a broad smooth region is present along anterior and posterior margin of each segment, furthermore the entire anterior half of the first abdominal segment is smooth also. The specimens from Cape of Good Hope and New Zealand at my disposal too show these differences, so that I agree with Parker's opinion to regard the New Zealand form as a distinct variety of *J. lalandei*, the character is of too little importance to be of specific value. H. Milne Edwards (1837b) described the differences between *J. lalandei* and *J. frontalis* as follows: „*P. frontalis*. Espèce extrêmement voisine de la précédente [*Jasus lalandei*], dont elle ne diffère guère qu'en ce que la carapace est armée d'épines plus grosses et plus nombreuses, et ne présente pas de tubercules ovalaires déprimés, et en ce que l'abdomen n'est sculpté que vers le milieu de chaque anneau; en avant et en arrière ces segments étant tout-à-fait lisses.” These differences are also stated by Lenz (1902), who, however, mentions some variability in the shape of the spines caused by age. The only constant character here seems also to be that the segments have a smooth region along the anterior and posterior margin. The specimen recorded by Bate (1888) from Tristan da Cunha also shows this character, as well as *J. paulensis*. I therefore think it justified to unite all these forms to one variety of *J. lalandei*, namely var. *frontalis*, differing only in the sculpture of the abdomen. Comparison of material from the different localities is, however, needed to obtain final certainty.

Distribution. The main species is known only from the southern coasts of the African and Australian continent. In South Africa the species is abundant on the westcoast and scarcer on the eastcoast (Gilchrist, 1913, 1916; C. von Bonde & Marchand, 1935), on the westcoast it extends as far northward as Cape Cross (some distance north of Walvisbay); eastward it reaches Algoa Bay; an extensive review of the fishing grounds of the species along the South African westcoast may be found in the report of C. von Bonde & Marchand (1935). Other references in literature are: Cape of Good Hope (Gronovius, 1763; Müller, 1766, 1771, 1775, 1778; H. Milne Edwards, 1837b, 1838b; White, 1847; Dana, 1852b; Stimpson, 1860; Herklots, 1861; Pfeffer, 1881; Parker, 1887; Ortmann, 1891; Stebbing, 1893), Lüderitz Bay (Pesta, 1915; Balss, 1916), Possession Island, S. W. Africa (Balss, 1913), Saldanha Bay (Stebbing, 1914), Capetown (Pesta, 1915; Balss, 1925a), Table Bay (Krauss, 1843; Gilchrist, 1916, 1920), False Bay (Stebbing, 1902, 1910; C. von Bonde, 1936; C. von Bonde & Marchand, 1935), Kalk Bay (C. von Bonde & Marchand, 1935;

C. von Bonde, 1938), Cape Infanta (Odhner, 1923), Agulhas Bank (C. von Bonde, 1938), Algoa Bay (C. von Bonde & Marchand, 1935; C. von Bonde, 1938), Port Stephen, New S. Wales (Gruvel, 1911b), Port Jackson (Whitelegge, 1890), Eden, New S. Wales (Gruvel, 1911b), Wilson's Promontory (Kershaw, 1906), Lady Julia Percy Island (Tubb, 1937), Victoria (McCoy, 1890; Gruvel, 1911b), Kingston (Hale, 1927b), Victor Harbour (Hale, 1927b), St. Vincent Gulf (Hale, 1927b), Vivonne Bay, Kangaroo Island (Hale, 1927a), Reevesby Island, S. Australia (Anderson, 1938).

Jasus lalandei* var. *frontalis (H. Milne Edw.) (Pl. XI figs. a, b)

- Palinurus frontalis* H. Milne Edwards, 1837b, Hist. nat. Crust., vol. 2, p. 294.
Palinurus Lalandii p.p. White, 1847, List Crust. Brit. Mus., p. 69.
Palinurus frontalis White, 1847, List Crust. Brit. Mus., p. 69.
Palinurus frontalis H. Milne Edwards, 1851, Ann. Sci. nat. Zool., ser. 3 vol. 16, p. 290, pl. 8 figs. 16, 17.
Palinurus frontalis Nicolet, 1853, in Gay, Hist. fis. pol. Chile, Zool., vol. 5 pt. 3, p. 205.
Palinurus Paulensis Heller, 1862b, Verh. zool.-bot. Ges. Wien, vol. 12, p. 525.
Palinurus Lalandii Heller, 1865, Reise Novara, Zool., vol. 2 pt. 3, p. 97.
Palinurus Edwardsii Hutton, 1875a, Ann. Mag. nat. Hist., ser. 4 vol. 15, p. 42.
Palinurus Edwardsii Hutton, 1875b, Trans. Proc. New Zeal. Inst., vol. 7, p. 279.
Palinurus edwardsii Miers, 1876, Catal. Crust. New Zeal., p. 75.
Palinurus frontalis Boas, 1880, K. Danske Vidensk. Selsk. Skr., ser. 6 vol. 1, p. 92.
Palinurus Edwardsii Haswell, 1882, Catal. Aust. Crust., p. 171.
Palinurus (Jasus) edwardsii Parker, 1883, Nature Lond., vol. 29, p. 190.
Palinurus (Jasus) edwardsii Parker, 1884, Trans. Proc. New Zeal. Inst., vol. 16, p. 304, pl. 25 figs. 1, 4.
Palinurus Edwardsii Filhol, 1885, Bibl. Éc. haut. Étud., vol. 30 pt. 2, p. 51.
Palinurus Lalandii Filhol, 1885, Bibl. Éc. haut. Étud., vol. 30 pt. 2, p. 51.
Palinurus Edwardsii Filhol, 1886, Miss. Ile Campbell, vol. 3 pt. 2, p. 429.
Palinurus Lalandii Filhol, 1886, Miss. Ile Campbell, vol. 3 pt. 2, p. 429.
Palinurus edwardsii Parker, 1887, Trans. Proc. New Zeal. Inst., vol. 19, p. 150, pl. 10 figs. 1, 2, 5-9, 12, 14.
Palinostus lalandii Bate, 1888, Rep. Voy. Challenger, Zool., vol. 24, p. 86, pl. 11 fig. 1, pl. 11A, pl. 12 fig. 1.
Palinosytus lalandii p.p. Stebbing, 1893, Hist. Crust., p. 196.
Palinurus frontalis Albert, 1898, Rev. Chil. Hist. nat., vol. 2, pp. 5, 17, 29, 1 map.
Jasus edwardsii Thompson, 1901, Catal. Crust. Mus. Dundee, p. 18.
Palinostus frontalis Lenz, 1902, Zool. Jb. Suppl., vol. 5, p. 736.
Palinurus Lalandei Chun, 1903, Tiefen Weltmeeres, ed. 2, p. 299.
Jasus lalandii Hutton, 1904, Index Faun. Nov. Zeal., p. 253.
Jasus edwardsii Hutton, 1904, Index Faun. Nov. Zeal., p. 253.
Palinurus edwardsii Anderson, 1906, Trans. Proc. New Zeal. Inst., vol. 39, p. 483.
Palinurus edwardsii Thomson, 1906, Trans. Proc. New Zeal. Inst., vol. 39, p. 484, pl. 20.
Palinurus frontalis Quijada, 1910, Bol. Mus. Nac. Chile, vol. 2, p. 127, figs.
Palinostus frontalis Rathbun, 1910b, Proc. U.S. Nat. Mus., vol. 38, p. 603.
Jasus Lalandei p.p. Gruvel, 1911a, C. R. Acad. Sci. Paris, vol. 152, p. 1350.
Jasus Lalandei p.p. Gruvel, 1911b, Ann. Inst. océanogr. Monaco, vol. 3 pt. 4, p. 10.

- Jasus edwardsii* Chilton, 1911b, Rec. Canterbury (New Zeal.) Mus. vol. 1, p. 303.
Jasus edwardsii Thomson, 1913, Trans. Proc. New Zeal. Inst., vol. 45, p. 240.
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Jasus lalandei p.p. Pesta, 1915, S. B. Akad. Wiss. Wien, vol. 124 pt. 1, p. 5.
Jasus Lalandii var. *Edwardsii* De Man, 1916, Siboga Exped., mon. 39a2, p. 32.
Jasus Lalandii p.p. De Man, 1916, Siboga Exped., mon. 39a2, p. 31.
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Jasus lalandei Balss, 1924a, Nat. Hist. Juan Fernandez, vol. 3, p. 333.
Jasus Lalandei p.p. Balss, 1925a, Wiss. Ergebn. Valdivia Exped. vol. 20, p. 204.
Jasus lalandii Young, 1926, New Zeal. Journ. Sci., vol. 8, p. 282.
Jasus edwardsii Young, 1929, Trans. Proc. New Zeal. Inst., vol. 60, pp. 153, 166.

Museum Leiden:

New Zealand; January 15, 1897; leg. H. Suter.—1 ♂, 1 ♀ 295 and 260 mm.

The two specimens mentioned above very distinctly show the character, which separates this form from *Jasus lalandei* s.s.

Distribution: The variety is known from several islands between 30° and 50° S. latitude. Records in literature are: Tristan da Cunha (Bate, 1888; Stebbing, 1893), St. Paul Island (Heller, 1862b, 1865; Chun, 1903; Lenz & Strunck, 1914; Pesta, 1915; Balss, 1925a), Tasmania (Haswell, 1882; McCoy, 1890; Gruvel, 1911b), New Zealand (White, 1847; Filhol, 1885, 1886; Parker, 1887; Thompson, 1901; Hutton, 1904; Archey, 1916), Otago (Hutton, 1875; Filhol, 1885, 1886; Gruvel, 1911b; Thomson, 1913), Stewart Island (Filhol, 1885, 1886), Chatham Islands (Chilton, 1911b; Young, 1929), Juan Fernandez (Albert, 1898; Bürger, 1902; Lenz, 1902; Rathbun, 1910b; Gruvel, 1911b; Balss, 1924a), St. Felix and St. Ambrosius Islands (Bürger, 1902), ?Easter Islands (Bürger, 1902). The specimens recorded from "Chile" by H. Milne Edwards (1837b) and White (1847) according to Gruvel (1911b) probably originate from Juan Fernandez, as the species in Chile is found only at this and the two neighbouring islands, St. Felix and St. Ambrosius.

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1) This article undoubtedly is written by P. F. von Siebold, as also is stated by himself in the preface of *Fauna Japonica*, Crust., p. xi; the initials G.T. in the present article probably are due to misprinting.

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The papers marked with an asterisk (*) were not available to me.

EXPLANATION OF THE PLATES

PLATE I

- Fig. a. *Stenopus hispidus* (Oliv.) from Ambon, leg. Ludeking. Rostrum in lateral view.
- Fig. b. Same specimen. Eye.
- Fig. c. *Stenopus hispidus* (Oliv.), Siboga Exped., St. 53. Eye.
- Fig. d. *Stenopus hispidus* (Oliv.) from Ambon, leg. Ludeking. Antennular peduncle in dorsal view.
- Fig. e. *Stenopus hispidus* (Oliv.) from Tambelan Islands. Abdominal segments 3, 4, and 5 in dorsal view.
- Fig. f. *Stenopus hispidus* (Oliv.) from Ambon, leg. Ludeking. Scaphocerite in dorsal view.
- Fig. g. Same specimen. Telson and uropods in dorsal view.
- All figures $\times 6$.

PLATE II

- Fig. a. *Stenopus spinosus* Risso from the Mediterranean, leg. P. Antiga. Rostrum in lateral view.
- Fig. b. Same specimen. Scaphocerite in dorsal view.
- Fig. c. Same specimen. Antennular peduncle in dorsal view.
- Fig. d. *Stenopus spinosus* Risso from Naples. Third, fourth, and fifth abdominal segment in dorsal view.
- Fig. e. *Stenopus spinosus* Risso from the Mediterranean, leg. P. Antiga. Mandible.
- Fig. f. Same specimen. Maxillula.
- Fig. g. Same specimen. Maxilla.

- Fig. h. Same specimen. First maxillipede.
Fig. i. Same specimen. Second maxillipede.
a-c, e-i, $\times 6$; d, $\times 3$.

PLATE III

- Fig. a. *Stenopus scutellatus* Rankin from St. Martin. Rostrum in lateral view.
Fig. b. Same specimen. Scaphocerite in dorsal view.
Fig. c. *Stenopus tenuirostris* De Man, Siboga Exped., St. 225. Eye in dorsal view.
Fig. d. Same specimen. Rostrum in lateral view.
Fig. e. Same specimen. Scaphocerite in dorsal view.
Fig. f. *Odontozona sculpticaudata* nov. spec., type. Scaphocerite in dorsal view. (By error the dorsal spinules of the scaphocerite have been omitted in this figure).
Fig. g. *Microprosthema scabricaudatum* (Richt.) from Boo Islands. Scaphocerite in dorsal view.
Fig. h. *Microprosthema validum* Stimps., Siboga Exped., St. 49a. Antennular peduncle in dorsal view.
Fig. i. *Microprosthema semilaeve* (Von Mart.) from Aruba. Scaphocerite in dorsal view.
Fig. j. *Spongicola venusta* De Haan from Cebu. Dactylus of fourth pereopod.
a-f, $\times 20$; g, $\times 45$; h and j, $\times 15$; i, $\times 10$.

PLATE IV

- Fig. a. *Engystenopus spinulatus* nov. spec., type. Anterior part of body in dorsal view.
Fig. b. Same specimen. Lateral view.
Fig. c. *Odontozona sculpticaudata* nov. spec., type. Lateral view.
Fig. d. *Odontozona ensifera* (Dana), Siboga Exped. St. 115. Third pereopod.
a, $\times 4.5$; b, $\times 3$; c, $\times 9$; d, $\times 7.5$.

PLATE V

- Fig. a. *Enoplometopus occidentalis* (Randall) from Ambon, leg. D. J. Hoedt. Carapace in dorsal view.
Fig. b. *Enoplometopus antillensis* Lützk., female from Banda. Carapace in dorsal view.

- Fig. c. *Enoplometopus occidentalis* (Randall) from Ambon, leg. D. J. Hoedt. Abdomen in lateral view.
 Fig. d. *Enoplometopus antillensis* Lützk., female from Banda. Abdomen in lateral view.
 Fig. e. Same specimen. First pereopod.
 Fig. f. *Enoplometopus occidentalis* (Randall) from Ambon, leg. D. J. Hoedt. Telson and uropods in dorsal view.
 Fig. g. *Enoplometopus antillensis* Lützk., female from Banda. Telson and uropods in dorsal view.
 Fig. h. *Enoplometopus antillensis* Lützk., type. Telson and uropods in dorsal view.
 Fig. i. *Enoplometopus occidentalis* (Randall) from Ambon, leg. D. J. Hoedt. First pleopod of male.
 Fig. j. *Enoplometopus antillensis* Lützk., male from Banda. First pleopod.
 Fig. k. Same specimen. Second pleopod.
 Fig. l. *Enoplometopus antillensis* Lützk., female from Banda. Chela of third pereopod.
 a-d, natural size; e, $\times 0.7$; f and g, $\times 1.5$; i-k, $\times 3.5$; l, $\times 3$.

PLATE VI

- Fig. a. *Enoplometopus antillensis* Lützk., male from Banda. Mandible.
 Fig. b. Same specimen. Maxillula.
 Fig. c. Same specimen. Maxilla.
 Fig. d. Same specimen. First maxillipede.
 Fig. e. Same specimen. Second maxillipede.
 Fig. f. *Palinustus mossambicus* Barn., male, Snellius Exped., St. 60*. Mandible.
 Fig. g. Same specimen. Maxillula.
 Fig. h. Same specimen. Maxilla.
 Fig. i. Same specimen. First maxillipede.
 Fig. j. Same specimen. Second maxillipede.
 All figures $\times 3.2$.

PLATE VII

- Fig. a. *Enoplometopus antillensis* Lützk., female from Banda. Sternum in ventral view.
 Fig. b. *Enoplometopus antillensis* Lützk., type. Sternum in ventral view.
 Fig. c. *Scyllarus rugosus* H. Milne Edw. Chela of fifth pereopod in female.

- Fig. d. *Scyllarus demani* nov. spec., type. Chela of fifth pereiopod in female.
- Fig. e. *Scyllarus bicuspidatus* (De Man), specimen from Japan. Anterior part of sternum in ventral view.
- Fig. f. *Palinustus mossambicus* Barn., male, Snellius Exped., St. 60*. Anterior part of carapace with ophthalmic segment in dorsal view.
- Fig. g. Same specimen. Epistome in ventral view.
- Fig. h. Same specimen. First three abdominal segments in lateral view.
- Fig. i. *Panulirus ornatus* (Fabr.), male from Sabang Bay. Fifth pleopod.
- Fig. j. *Panulirus versicolor* (Latr.), male from Dutch East Indies, leg. Gaudelius. Fifth pleopod.
- a, $\times 1.5$; c, d, i, j, $\times 3.2$; e, $\times 3.5$; f-h, $\times 3.8$.

PLATE VIII

- Fig. a. *Scyllarus rugosus* H. Milne Edw. from Ambon. Sternum in ventral view.
- Fig. b. *Scyllarus demani* nov. spec., type. Sternum in ventral view.
- Fig. c. *Scyllarus cultrifer* (Ortm.), male, Snellius Exped., St. 60*. Lateral view.
- Fig. d. *Scyllarus cultrifer* (Ortm.), female, Snellius Exped., St. 60*. Anterior part of sternum in ventral view.
- Fig. e. Same specimen. Third pereiopod.
- a, b, $\times 3$; c, $\times 2$; d, $\times 2.5$; e, $\times 4$.

PLATE IX

- Fig. a. *Scyllarus demani* nov. spec., type. Posterior part of carapace and anterior part of abdomen in dorsal view.
- Fig. b. *Panulirus versicolor* (Latr.), female from Zool. Garden Rotterdam. Posterior part of carapace in dorsal view.
- Fig. c. *Scyllarus rugosus* H. Milne Edw. Posterior part of carapace and anterior part of abdomen in dorsal view.
- Fig. d. *Panulirus ornatus* (Fabr.), female from Makassar, leg. Piller. Posterior part of carapace in dorsal view.
- a, d, $\times 2.5$; b, $\times 1.5$; c, $\times 2.3$.

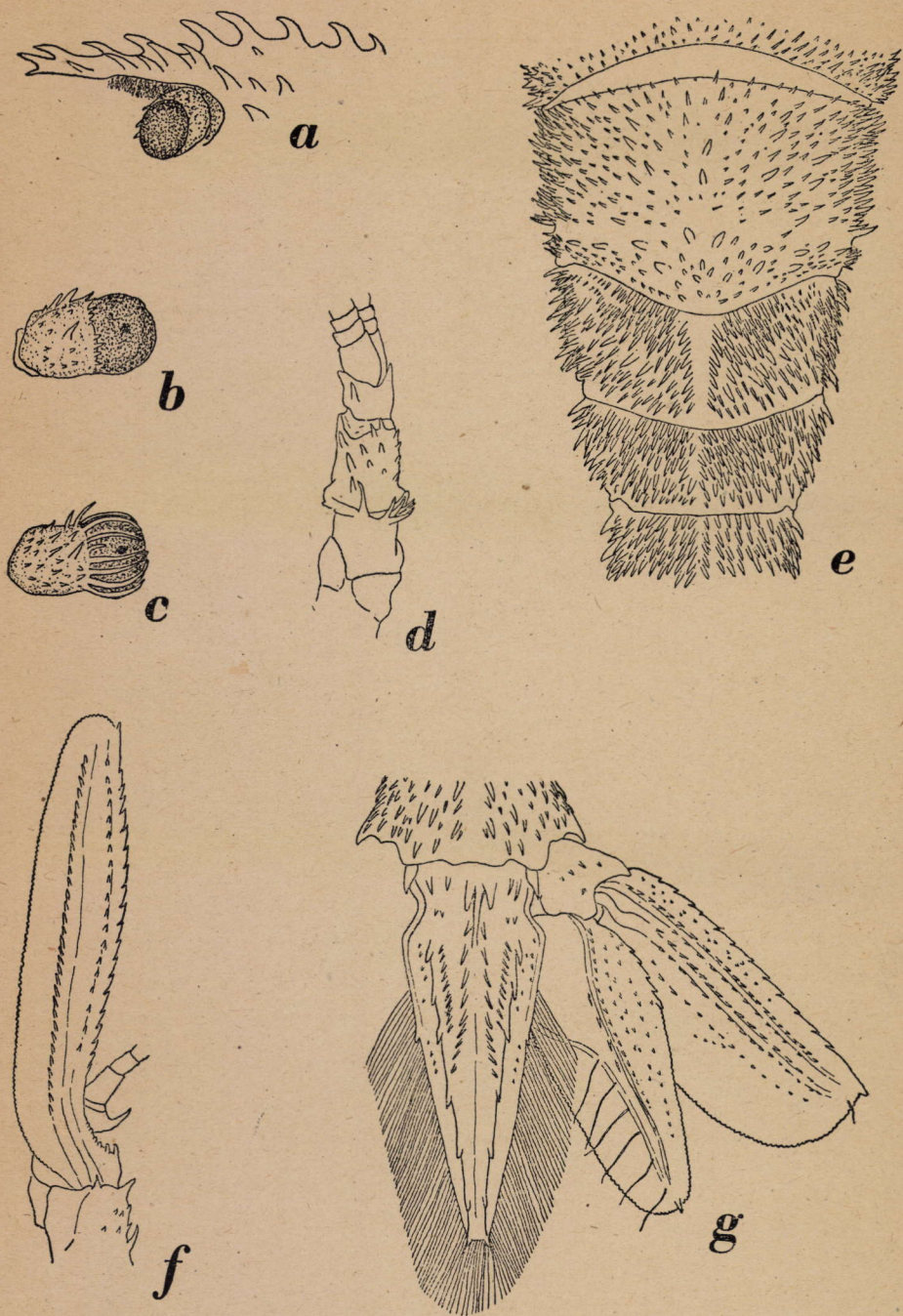
PLATE X

- Fig. a. *Palinustus mossambicus* Barn., female, Snellius Exped., St. 60*. Sternum and anterior part of abdomen in ventral view.

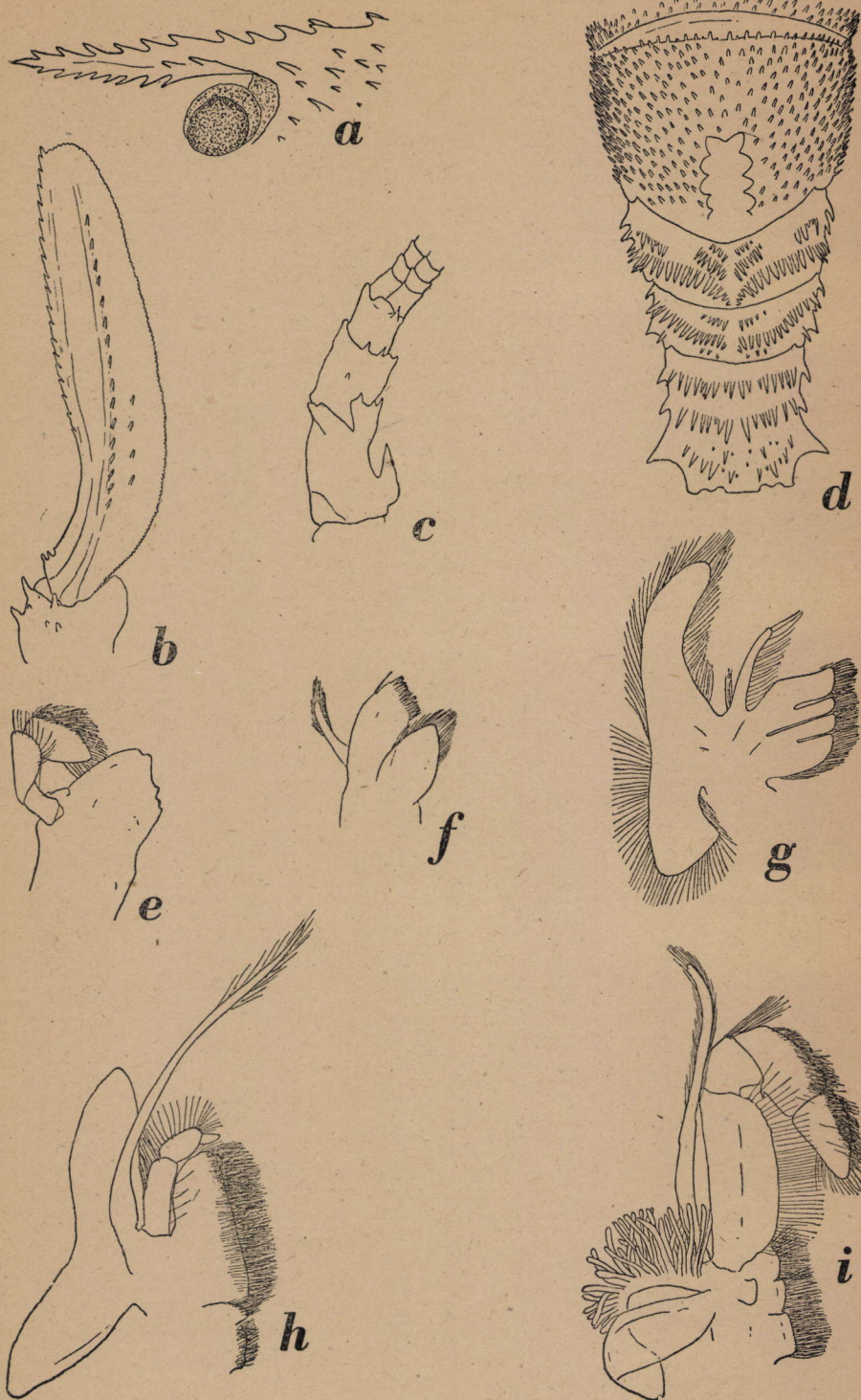
- Fig. b. *Palinustus mossambicus* Barn., male, Snellius Exped., St. 60*.
Sternum and anterior part of abdomen in ventral view.
a, $\times 3$; b, $\times 3.5$.

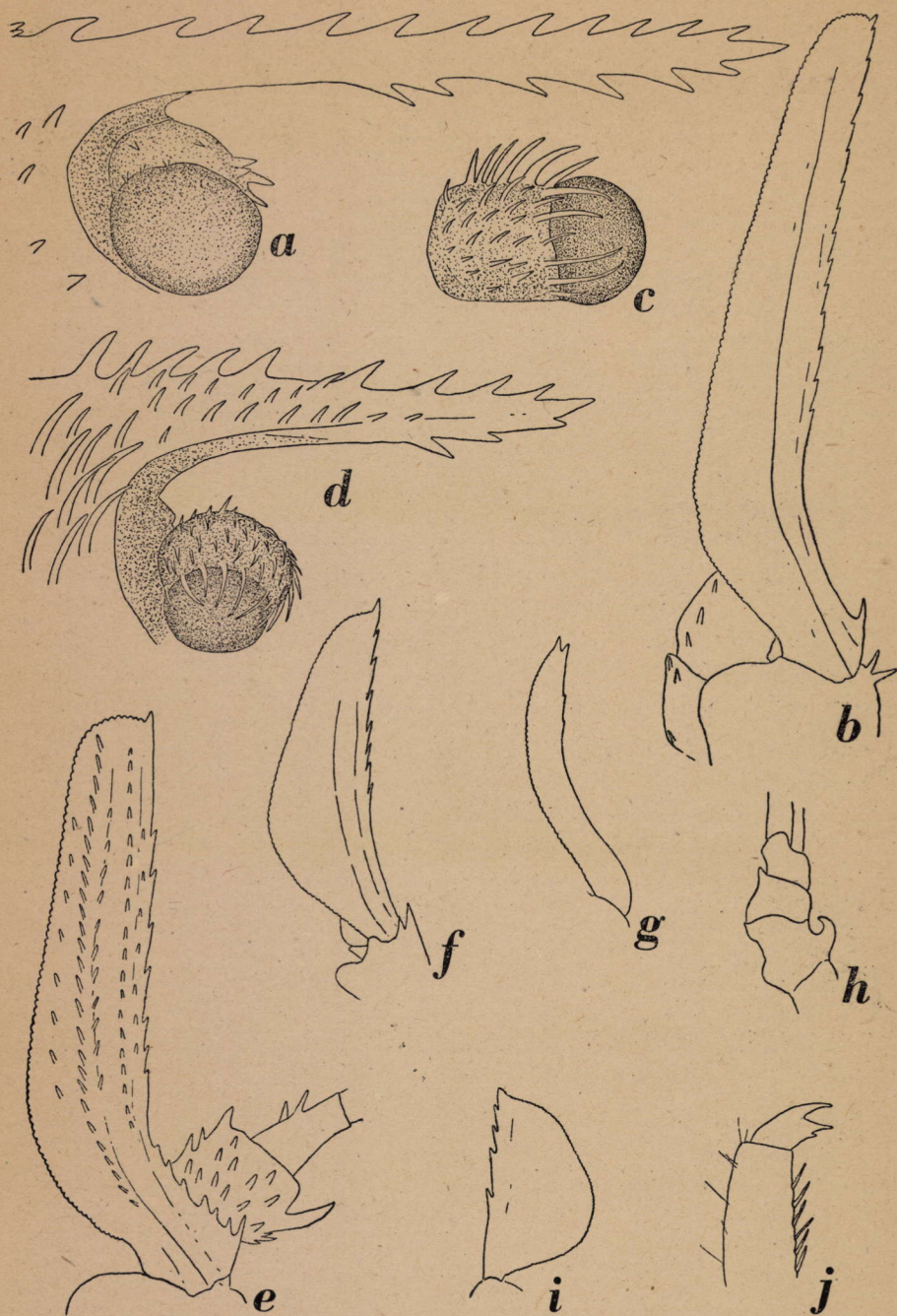
PLATE XI

- Fig. a. *Palinurus elephas* (Fabr.) from Corsica (Zoöl. Mus. Amsterdam).
Pleopod of second abdominal segment in female.
Fig. b. Same specimen. Pleopod of third abdominal segment.
Fig. c. *Jasus lalandei* var. *frontalis* (H. Milne Edw.) from New Zealand.
Pleopod of second abdominal segment in female.
Fig. d. Same specimen. Pleopod of third abdominal segment.
Fig. e. *Panulirus versicolor* (Latr.), female from Moluccas (Zoöl. Mus. Amsterdam). Pleopod of second abdominal segment.
Fig. f. Same specimen. Pleopod of third abdominal segment.
Fig. g. *Palinustus mossambicus* Barn., female, Snellius Exped., St. 60*.
Pleopod of second abdominal segment.
Fig. h. Same specimen. Pleopod of third abdominal segment.
Fig. i. *Linuparus trigonus* (De Haan), female from Japan. Pleopod of second abdominal segment.
Fig. j. Same specimen. Pleopod of third abdominal segment.
Fig. k. *Puerulus angulatus* (Bate), female, Siboga Exped., St. 297. Pleopod of second abdominal segment.
Fig. l. Same specimen. Pleopod of third abdominal segment.
Fig. m. *Panulirus versicolor* (Latr.), male from Dutch East Indies, leg. Gaudelius. Pleopod of second abdominal segment.
Fig. n. *Panulirus japonicus* (Von Sieb.), male cotype from Japan. Pleopod of second abdominal segment.
Fig. o. *Palinurellus gundlachi* var. *wieneckeii* (De Man), type. Pleopod of second abdominal segment in male.
a, b, e, f, n, $\times 1.5$; c, d, i, j, natural size; g, h, $\times 3.2$; k, l, $\times 4$; m, $\times 2$; o, $\times 1.8$.

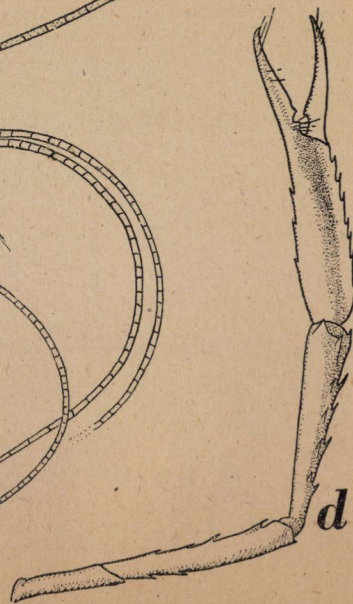
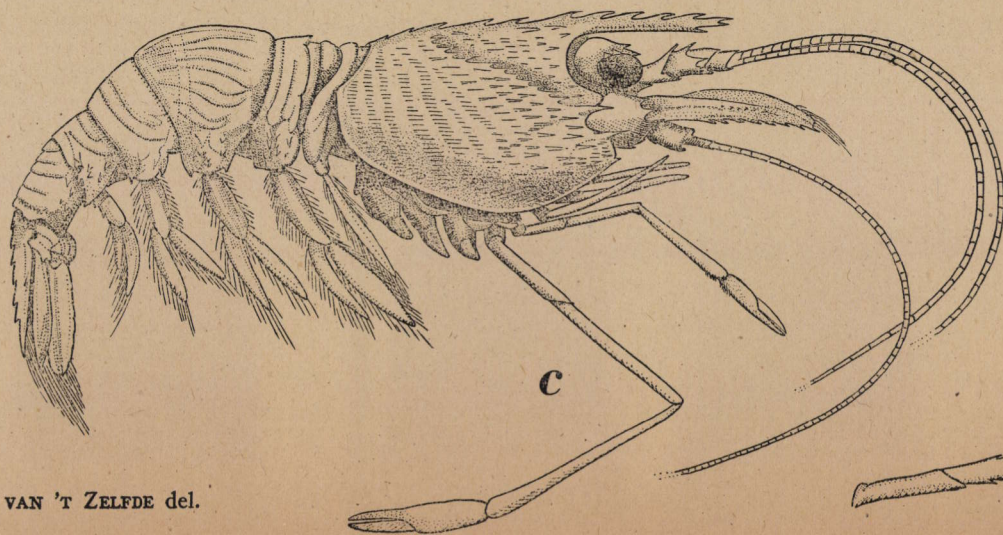
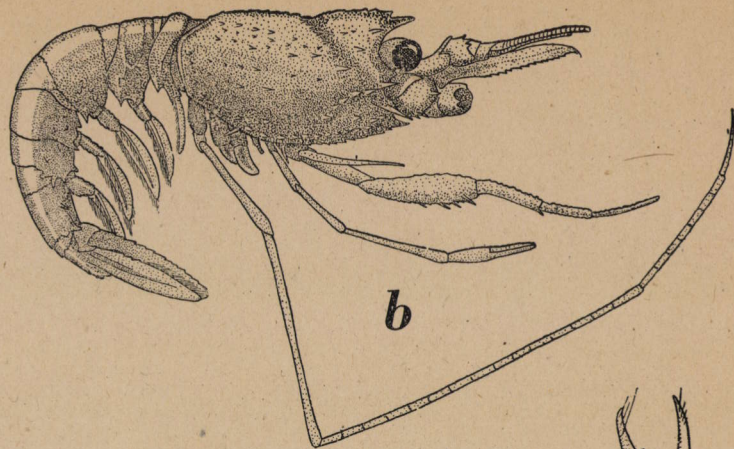
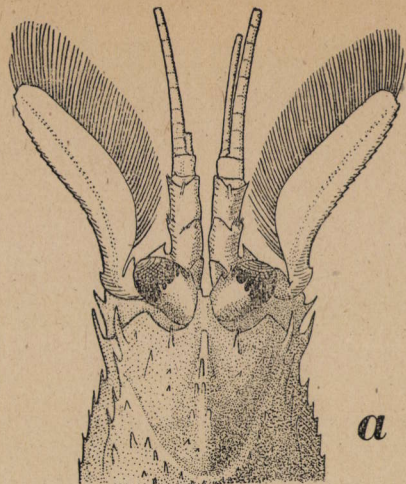


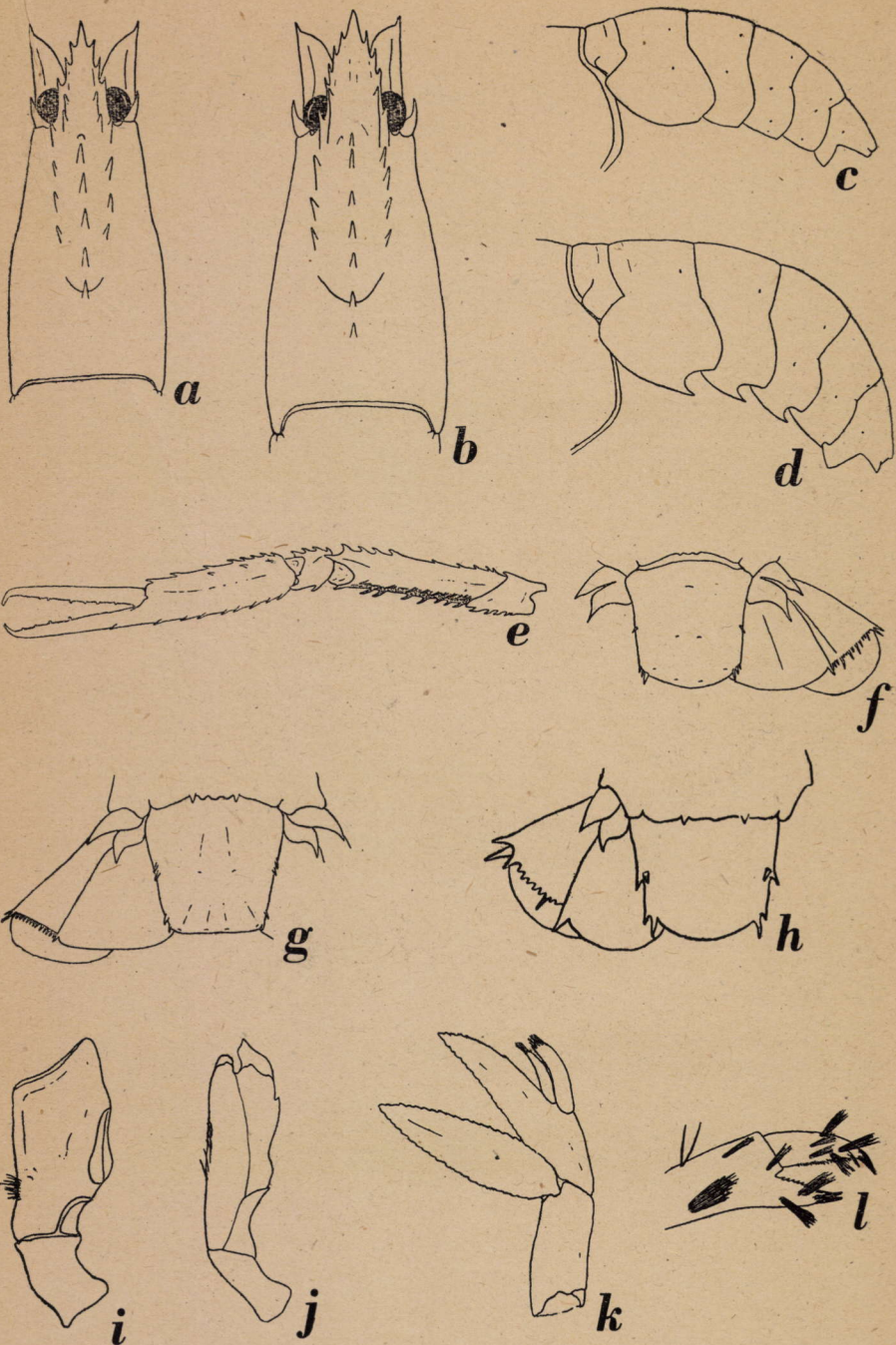
L. B. HOLTHUIS del.



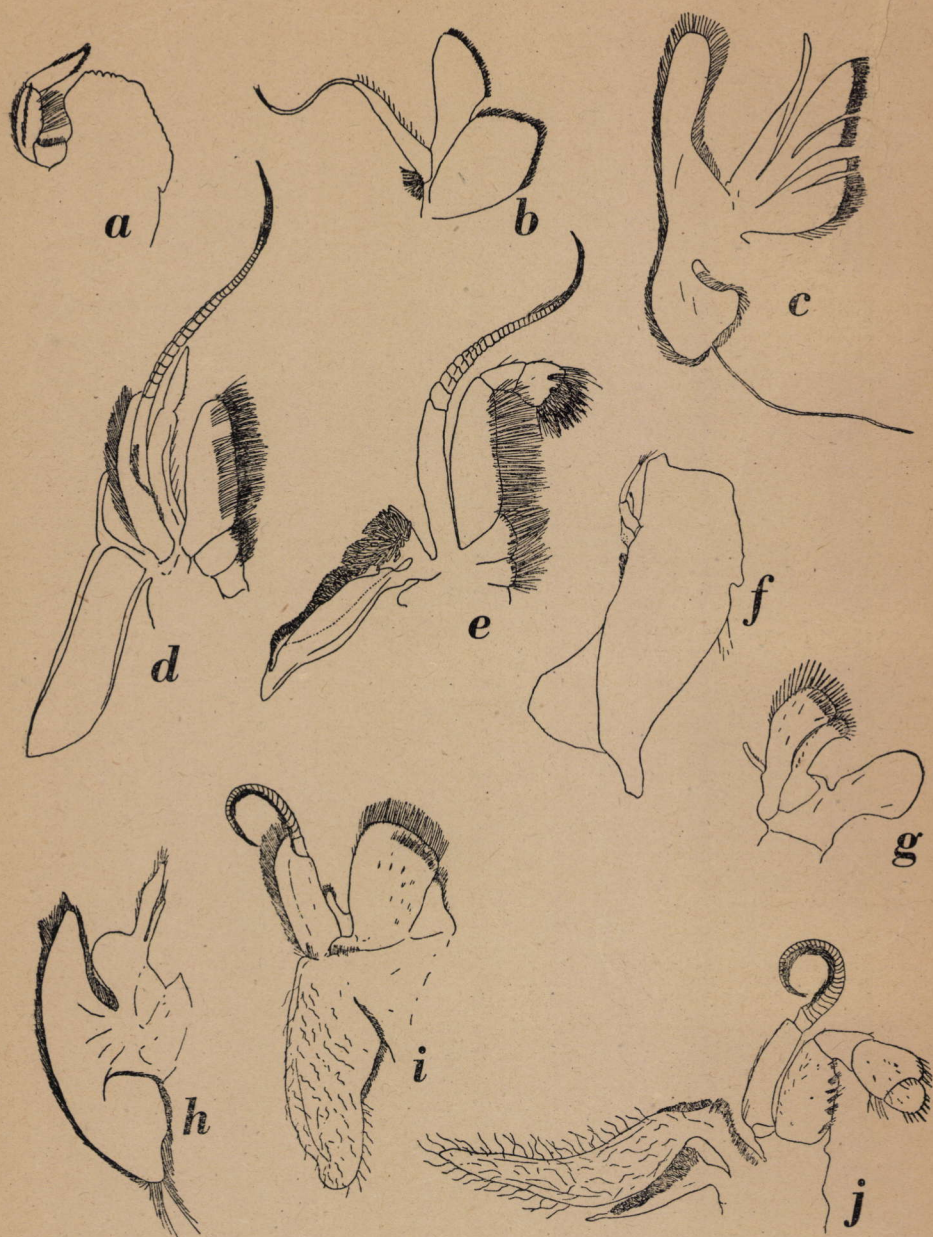


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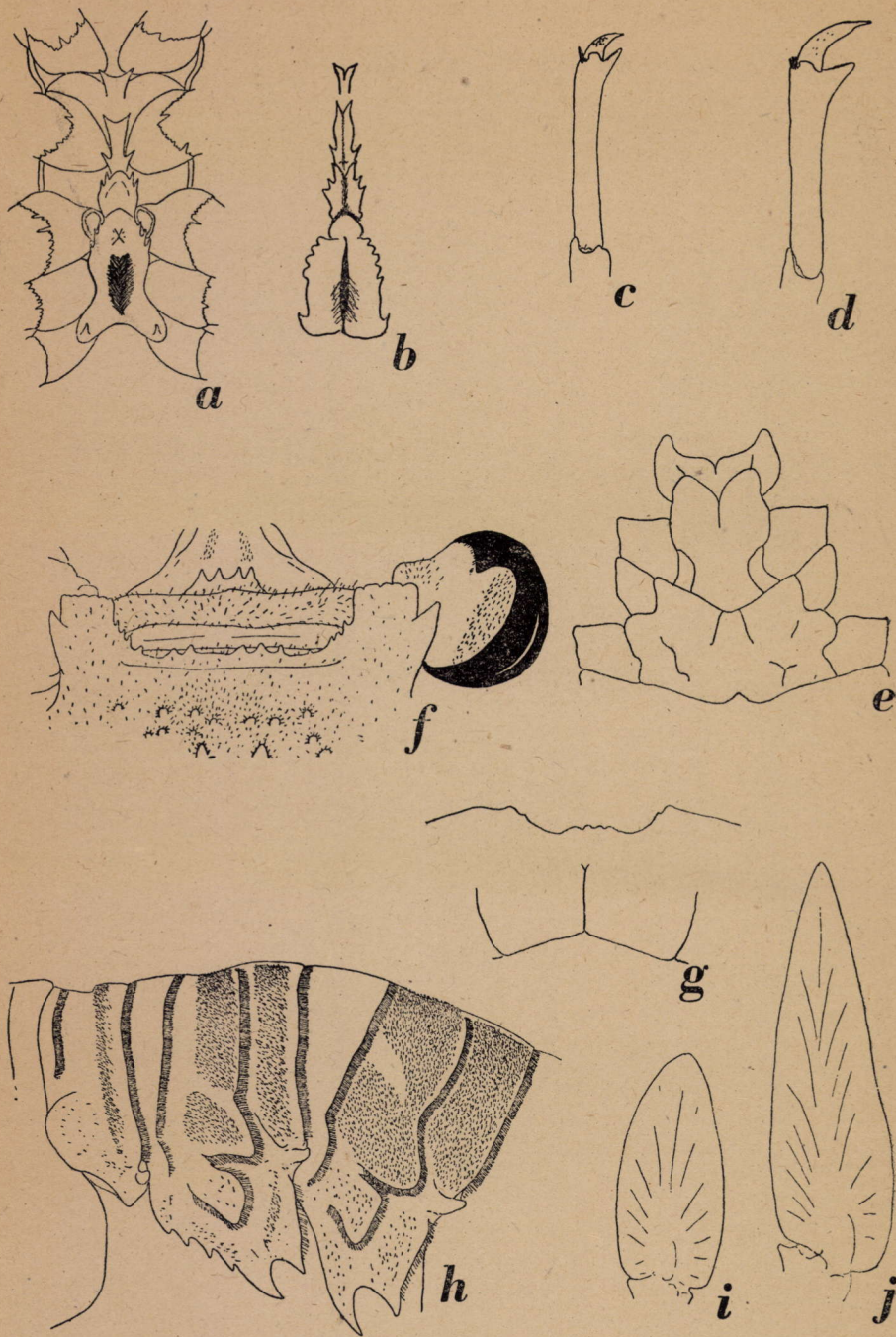




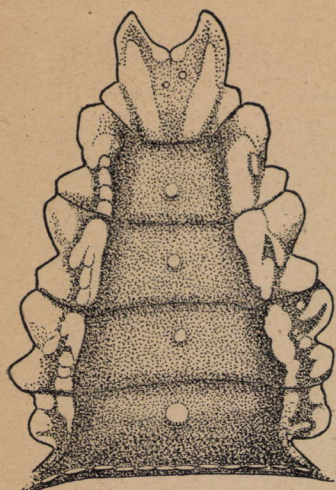
h, K. STEPHENSEN, cet. L. B. HOLTHUIS del.



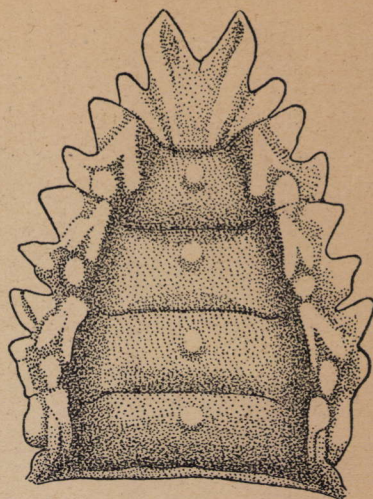
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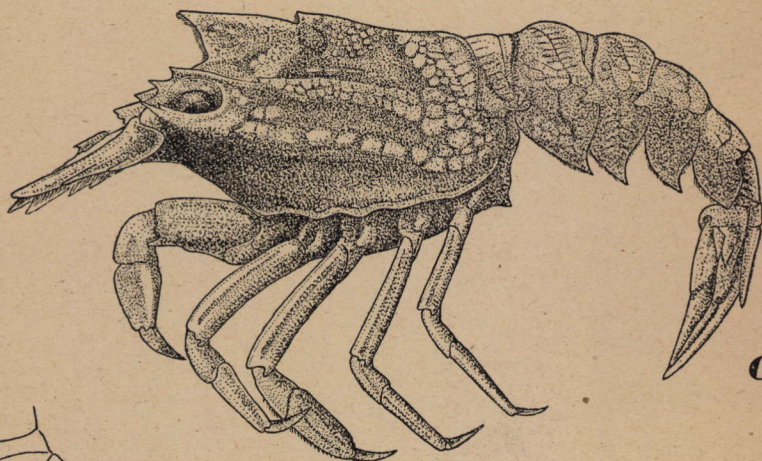
b, K. STEPHENSEN, cet. L. B. HOLTHUIS del.



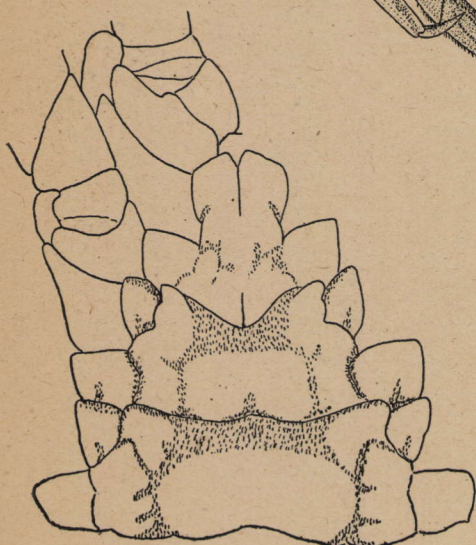
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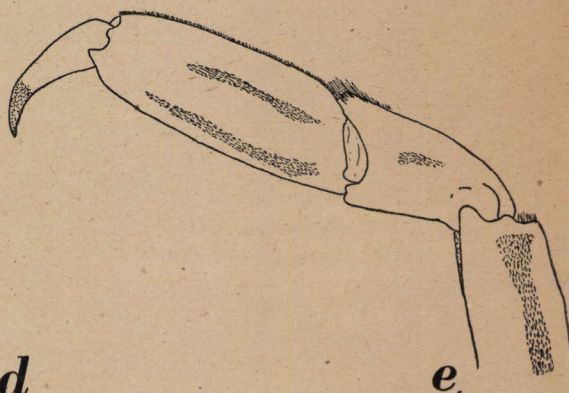
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c

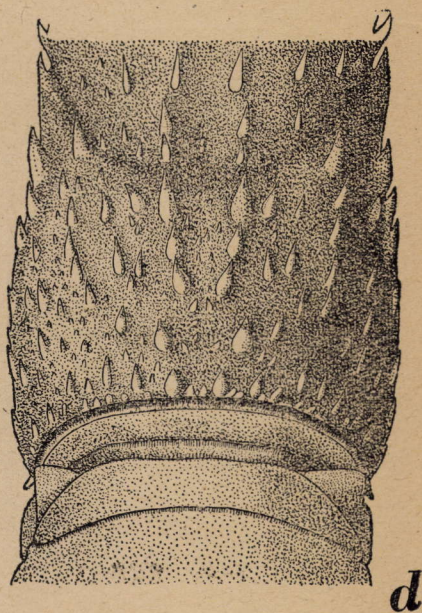
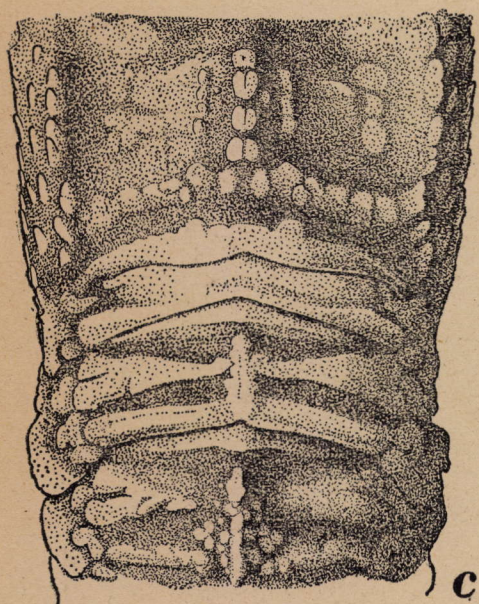
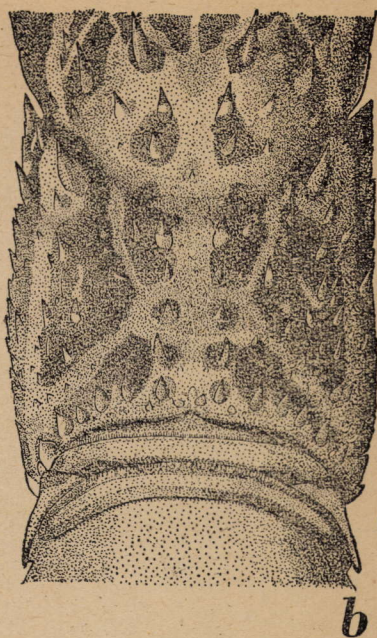
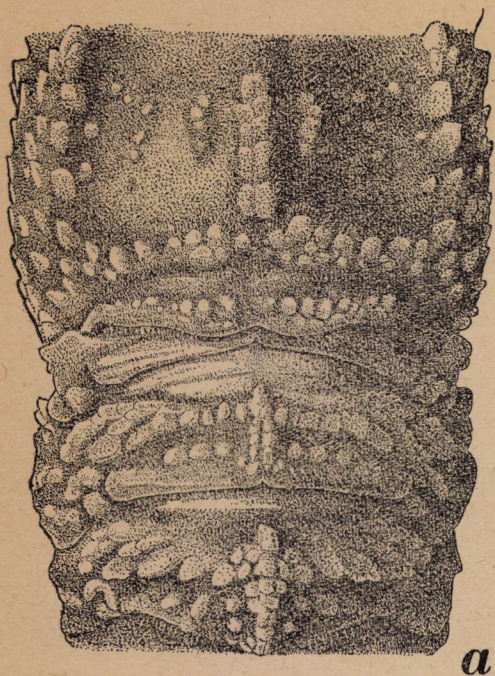


d

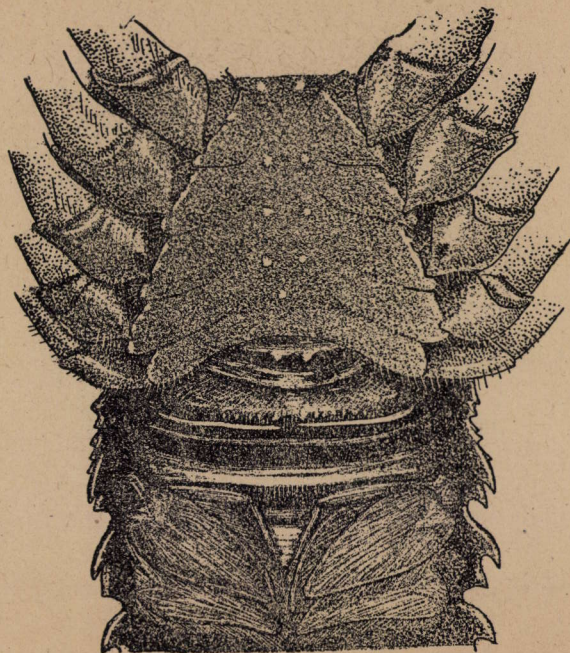


e

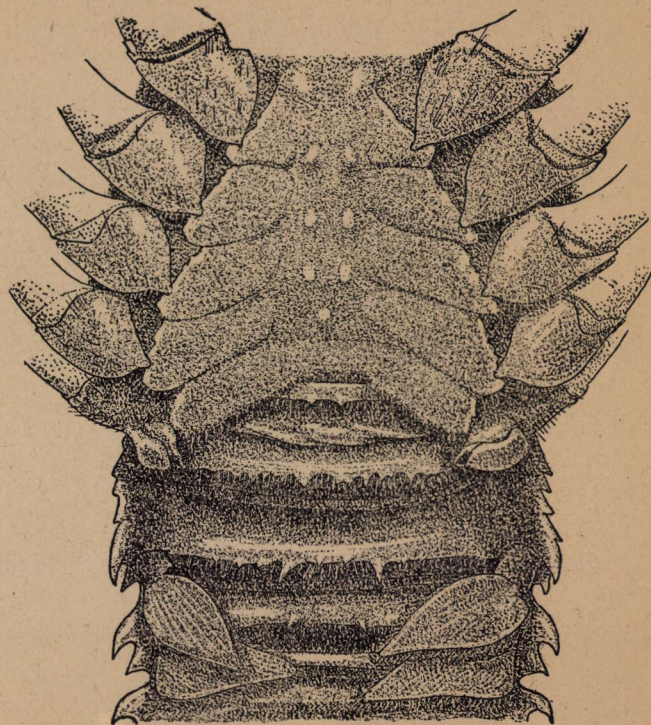
a-c, P. VAN 'T ZELFDE, *d-e*, L. B. HOLTHUIS del.



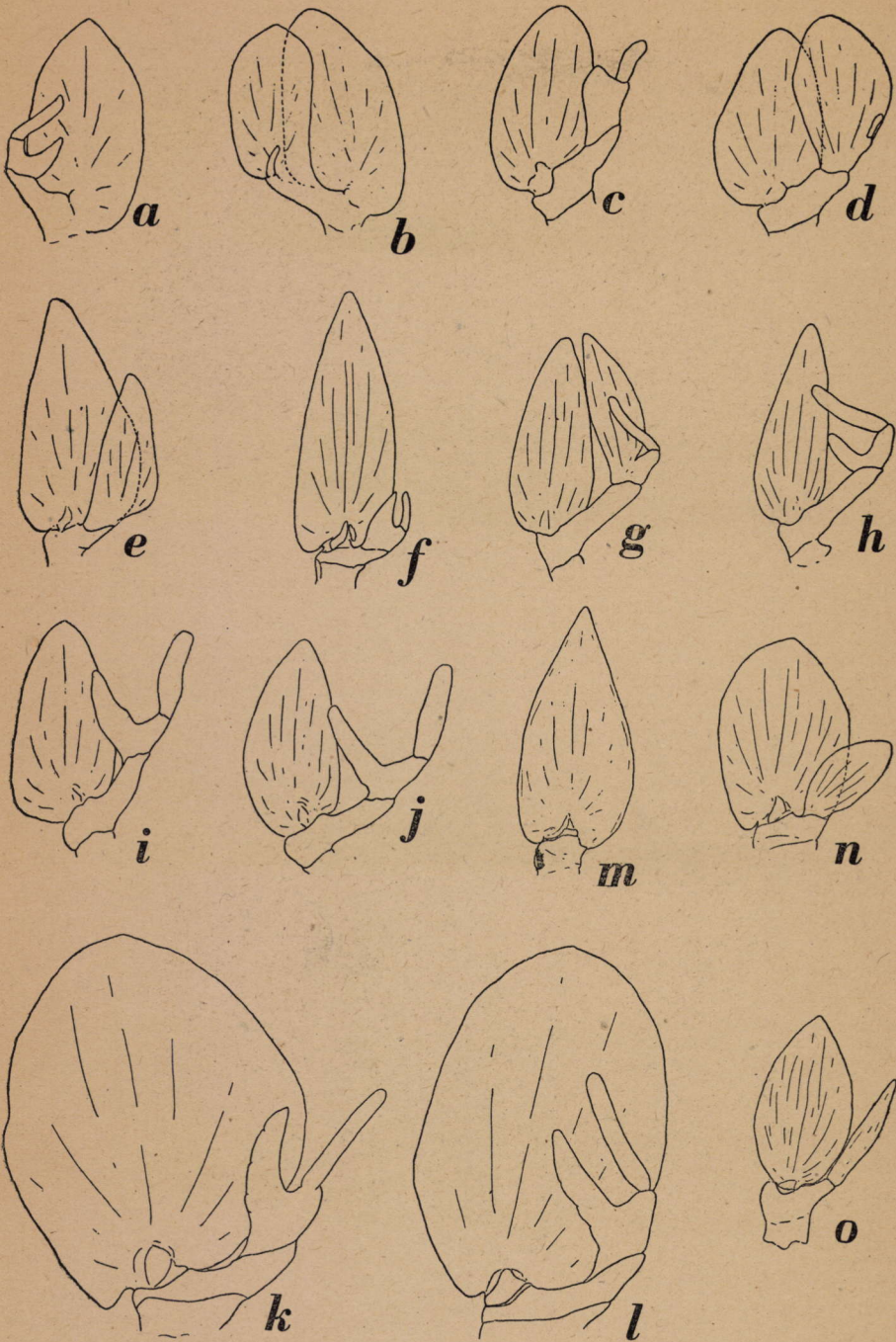
P. VAN 'T ZELFDE del.



a



b



L. B. HOLTHUIS del.

STELLINGEN

I

Het voorstel van Mortensen tot het instellen van subcommissies van specialisten in bepaalde diergroepen om lijsten van nomina conservanda samen te stellen van dieren uit die groepen, verdient aanbeveling.

MORTENSEN, T., 1929. Xe Congr. Int. Zool., pp. 1565-1568.

II

Verschillen in de genitalia van verschillende diersoorten moeten zooveel mogelijk slechts als hulp- en niet als hoofdkenmerk worden gebruikt bij het bepalen der soorten. Men moet trachten de soorten zooveel mogelijk op uitwendige kenmerken, die bij beide geslachten aanwezig zijn, te onderscheiden.

III

De critiek die Heikertinger uitoefent op de methode van Windecker om het al of niet walgelijk smaken van de verschillende stadia (vlinder, pop en rups) van *Euchelia jacobaeae* (L.) na te gaan is grootendeels ongegrond.

HEIKERTINGER, F., 1939. Zeitschr. Morph. Oekol. Tiere, vol. 35, pp. 586-593.

WINDECKER, W., 1939. Zeitschr. Morph. Oekol. Tiere, vol. 35, pp. 84-138, figs. 1-9, tabs. 1-3.

IV

Lophopyxis Maingayi Hook. f., *Combretopsis pentaptera* K. Schum. en *Treubia combretocarpa* Pierre kunnen niet als afzonderlijke plantensoorten worden opgevat.

V

De kennis van vreemde talen is voor een bioloog-systematicus van meer belang dan die van natuur- en scheikunde.

VI

Het zoölogisch en botanisch onderzoek van de Nederlandsche overzeesche gebiedsdeelen dient, zoodra de tijden weer normaal zijn met kracht ter hand genomen te worden. Vooral het oostelijke gedeelte van den Oost-indischen Archipel zal wat de land- en zoetwater fauna en flora betreft belangrijke resultaten opleveren.

VII

Het aantal geslachten (en soorten) in de zoölogie dat op de „Official list” geplaatst is dient aanmerkelijk te worden uitgebreid, dit geldt vooral voor die geslachten (en soorten), die in goed onderzochte gebieden, zooals b.v. West Europa en Noord Amerika, worden aangetroffen.

VIII

De Stomatopoda door Gravier beschreven als *Gonodactylus demani* var. *pruvotae* nov. zijn specifiek van *Gonodactylus demanii* verschillend. Zij behooren tot de groep waarbij Kemp *Gonodactylus spinoso-carinatus* Fukuda onderbrengt en zijn nauw met deze laatste vorm verwant.

GRAVIER, C., 1930. Bull. Mus. Hist. nat. Paris, ser. 2 vol. 2, pp. 214-216.

KEMP, S., 1913. Mem. Indian Mus., vol. 4, p. 148.

IX

De methode van Huber en Schmidt om bij hun thermoelectrische metingen van de snelheid van den sapstroom het beginpunt van den uitslag van den galvanometer en niet zijn grootste uitslag te meten kan zeer misleidende resultaten opleveren.

HUBER, B. & E. SCHMIDT, 1936. Tharandt. forstl. Jb., vol. 87, p. 375.

X

Biogeographische beschouwingen over een bepaald gebied kunnen dan alleen vruchtbaar zijn indien de fauna en flora van dat gebied en van de omliggende streken volkomen bekend zijn. Het is ongewenscht de beschouwingen te baseeren op de verspreiding van slechts enkele vormen.

XI

Opinion 8 van de Internationale Commissie voor zoölogische nomenclatuur, waarbij bepaald wordt dat een soortnaam eindigen moet op i of ii, alnaar de schrijfwijze van den oorspronkelijken auteur, dient gewijzigd te

worden, aangezien een teruggrijpen op den oorspronkelijken auteur, vooral voor niet-systematici te veel bezwaren met zich meebrengt. Het is daarom wenschelijk dat bepaald wordt dat alle soortsnamen die gevormd zijn door de genitief van een mannelijken persoonsnaam op een enkele i eindigen, behalve waar de persoonsnaam zelf op een i uitgaat (b.v. *nobilii*).

XII

De trabeculae cranii moeten, in overeenstemming met de opvatting van De Beer, beschouwd worden als een gedeelte van een visceraal boog en behooren dus niet tot het chordal skelet.

DE BEER, G. R., 1931. Quart. Journ. microsc. Sci., vol. 74., pp. 701-731, textfigs. 1-3, pls. 40-46.

