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BIOLOGICAL RESULTS OF THE SNELLIUS EXPEDITION

XXI. BRACHYURA OF THE FAMILIES ATELECYCLIDAE AND XANTHIDAE

(Part I)

by

ALIDA M. BUITENDIJK †

CARD

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With 9 textfigures

INTRODUCTION

(by L. B. Holthuis)

Miss Alida M. Buitendijk, the author of the present paper, passed away 12 September 1950. Her untimely death rudely interrupted her studies on the Indo-West Pacific Xanthid crabs of which she planned to write a monographic treatment. Her studies were based in the first place on the material collected by the Snellius Expedition in the eastern part of the Malay Archipelago, but she included also material from the Siboga Expedition (which explored the same general region as did the Snellius Expedition), from the Rijksmuseum van Natuurlijke Historie at Leiden, the Zoological Museum at Amsterdam, the Zoological Museum at Copenhagen, the U.S. National Museum at Washington, D.C., and the British Museum (Natural History) in London. A very small part of Miss Buitendijk's Xanthid work has already been published (Buitendijk, 1941, Temminckia, vol. 6, pp. 295-312), while at the time of her death a manuscript on the Atelecyclidae and the Xanthid genera *Carpilodes, Neoliomera, Pseudoliomera, Carpilius, Liagore, Atergatis, Atergatopsis, Zosimus, Lophozozymus, Euxanthus* and *Hypocolpus* was ready for the press. Among Miss Buitendijk's papers typed reports of a number of other Xanthid genera were found. These reports were so complete that it was thought advisable to publish them also. Therefore they have been added to the just mentioned parts to form the manuscript for the present paper. The fact that this paper is published posthumously is the cause that it does not contain a larger number of illustrations. Though Miss Buitendijk left several drawings of the male pleopods of various species, other figures are very few. Though we clearly realise that this paper would have been far more valuable had Miss Buitendijk been able to prepare the whole of it for the press herself, it was thought unadvisable not to publish the information she had brought together.

ATELECYCLIDAE Ortmann

Kraussia Dana

Kraussia integra (De Haan) (fig. 1a)

Cancer (Xantho) integer De Haan, 1837, p. 66, pl. 18 fig. 6.

Kraussia integra Alcock, 1899, p. 97 (with older literature and synonymy); Gordon, 1931, p. 527; Sakai, 1934, p. 304, textfig. 17a.

Kraussia integer Balss, 1922, p. 97; Ward, 1934, p. 10.

Snellius Expedition

Kera, near Timor; November 22-23, 1929. — 1 ♀ with only one cheliped.

Museum Copenhagen

Canonniers Point, Mauritius; reef; October 1929; Dr. Th. Mortensen's Java-South Africa Exp., 1929-1930. — 1 ♂.

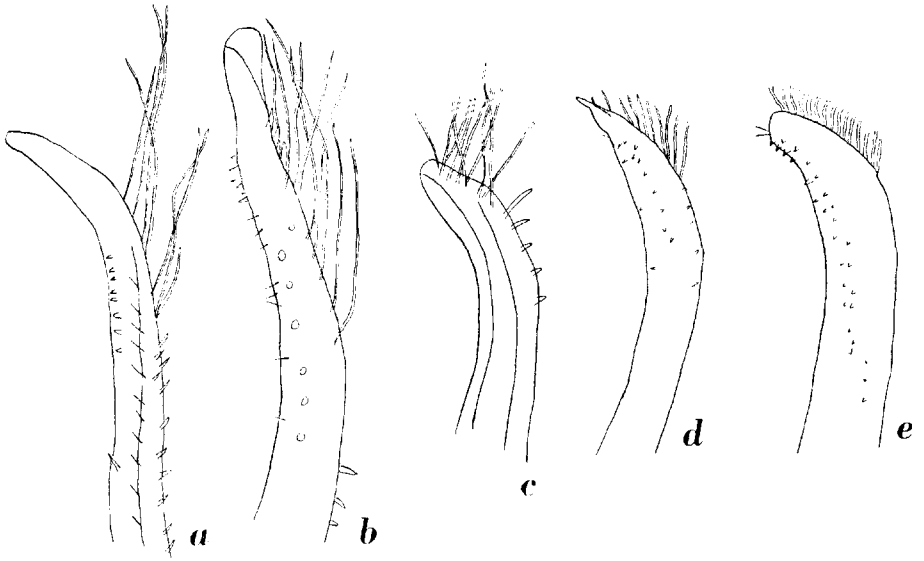

Fig. 1. a, *Kraussia integra* (De Haan), apex first pleopod, ♂ from Canonniers Point; b, *Kraussia rugulosa* (Krauss), apex first pleopod, ♂ from Nagasaki; c, *Carpilodes tristis* Dana, apex first pleopod, ♂ from Wotap; d, *Carpilodes monticulosus* A. Milne Edwards, apex first pleopod, ♂ from Sta. 209, Siboga Exp.; e, *Carpilodes guttatus* (De Man), apex first pleopod, ♂ from Koepang. × 50.

Kraussia rugulosa (Krauss) (fig. 1b)

Platyonichus rugulosus Krauss, 1843, p. 26, pl. 1 fig. 5.

Kraussia rugulosa Balss, 1922, p. 98 (with older literature); Urita, 1926, p. 11; Sakai, 1934, p. 305, textfig. 17b; Ward, 1934, p. 10.

Snellius Expedition

Kera, near Timor; 0-1 m; November 11-13, 1929. — 1 young specimen.

Museum Copenhagen

Nagasaki, Japan; July 1, 1911; James Jordan. — 1 ♂.

Sakai (1934) figures, slightly magnified, the ♂ pleopods of *Kraussia integra* and *K. rugulosa,* and remarks "proves not to be essential in distinguishing the species". If we compare the figures 1a and b in the present paper, showing the more highly magnified apices of these pleopods, they prove to present some differences, the most striking of which is that of the distance over which the long hairs are inserted.

XANTHIDAE Alcock

Carpilodes Dana

I here publish figures of the ♂ pleopods; a key, the literature, and remarks on the species of this genus as well as on those belonging to *Neoliomera* were published by Odhner (1925).

Carpilodes tristis Dana (fig. 1c)

Carpilodes tristis Dana, 1852, p. 77.

Snellius Expedition

Mamoedjoe, Celebes; shore and reef; August 4, 5, 1929. — 1 ♂, 3 ♀♀.
Kafal, Misool Group; shore or reef; October 3, 5, 1929. — 1 ♀.
Wotap, Tenimber Islands; shore and reef; October 20-23, 1929. — 3 ♂♂, 5 ♀♀.
Kera, near Timor; November 15, 16, 22, 23, 1929. — 1 ♂, 2 ♀♀.
Koepang, Timor; shore and reef; December 5, 1929. — 2 ♀♀.
Sapoeka Besar, Postiljon Islands; shore and reef; December 21-23, 1929. — 2 ♂♂, 2 ♀♀.
Haroekoe; shore or reef; May 3-7, 1930. — 1 ♀.

Museum Leiden

West Java; 1894; J. F. van Bemmelen. — 1 ♀.
Banda; 1881; J. Semmelink. — 1 ♀.
Fiji Islands; 1887; Mus. Godeffroy. — 1 ♂, 1 ♀.
Tahiti; 1887; Mus. Godeffroy. — 1 ♂.
New Caledonia. — 1 ♀ and dorsal part of carapace in the dry collection.

Siboga Expedition

Sta. 125, off Sawan, Siaoe Island; reef; July 18, 19, 1899. — 1 ♀.
Sta. 169, off Atjatuning, New Guinea; reef; August 23-25, 1899. — 1 badly damaged specimen.
Sta. 172, Kisar, near Timor; reef; August 26-28, 1899. — 1 ♂.
Sta. 193, Sanana Bay, Soela Islands; reef; September 13, 14, 1899. — 3 ♂♂, 4 ♀♀.
Sta. 225, anchorage south of Lucipara Group, Banda Sea; November 8-10, 1899. — 2 ♂♂.

Sta. 252, west side of Taam, Kei Islands; reef; December 8, 9, 1899. — 1 ♀.
Koer Island, W. of Kei Islands; reef; December 6, 7, 1899. — 2 ♂♂.

Museum Amsterdam

Nias, W. of Sumatra; J. P. Kleiweg de Zwaan. — 2 ♂♂.
Locality unknown. — 1 ♂.

United States National Museum

Makaluva, Fiji Islands; reef; June 8, 1922. — 2 ♂♂.
Apia, Samoa; outer reef; June 27, 1902; U.S. Fish Commission. — 1 ♀.
Apia, Samoa; coral reef; July 1902; U.S. Fish Commission. — 1 ♂, 2 ♀♀.
Pago Pago, Samoa; August 1902; U.S. Fish Commission. — 1 ♀.
Suruvan Islands?; Kingsley. — 1 ♀.

Museum Copenhagen

Mallekule, New Hebrides; July 15, 1934. — 1 ♀.

The dry specimens from New Caledonia were labelled *Xantho bidentatus* A. M. Edw., but this identification is erroneous. They belong without doubt in the genus *Carpilodes* and the only difference from *tristis* is that the carapace is slightly granular, but a ♂ from unknown locality in the unnamed collection of the Amsterdam Museum is even more distinctly granular. Now *granulatus* Heller differs from *tristis* only by the granulation and therefore Odhner, who has seen no granular specimens, regards the two names as synonyms; the pleopod of the granular ♂ agrees completely with that of our *tristis* ♂♂ in the Snellius material; because the types of *granulatus* (as stated by Odhner) are not to be found, on account of the similar pleopods in my opinion we may conclude that the two are synonyms.

Carpilodes edwardsi (Kossmann)

Liomera Edwardsi Kossmann, 1877, p. 28.

Siboga Expedition

Sta. 322, 1½ mile south of Tandjong Lajar, Bawean; dredge, coral, 32 m; February 24, 1900. — 1 ♂.

Carpilodes caelatus Odhner

Carpilodes caelatus Odhner, 1925, p. 21, pl. 1 fig. 19.

Siboga Expedition

Sta. 49a, Sapeh Strait, Soembawa; dredge, 70 m; April 14, 1899. — 1 ♀.
Sta. 96, south-east side of Pearl-Bank, Sulu Archipelago; dredge, townet, 15 m; June 27, 1899. — 1 ♂, 1 ♀.

Museum Copenhagen

Doe Roa Strait, Kei Islands; 40 m; sand, trawl; April 23, 1922; Danish Exp. Kei Islands, Sta. 37. — 1 specimen with Sacculinid.

Carpilodes monticulosus A. Milne Edwards (fig. 1d)

Carpilodes monticulosus A. Milne Edwards, 1873, p. 181, pl. 5 fig. 1.

Siboga Expedition

Sta. 99, off North Ubian, Sulu Archipelago; dredge, townet; 16-23 m; June 28-30, 1899. — 1 ♀.

Sta. 133, off Lirung, Salebaboe, Talaud Islands; reef; July 25-27, 1899. — 1 ♂, 2 ♀♀.

Sta. 209, off the south point of Kabaena Island, S. E. Celebes; reef; September 23, 1899. — 1 ♂.

Museum Copenhagen

Off Waling, Banda; sand, 10 m, diver; February 15, 1922; Danish Exp. Kei Islands. — 1 small ♂.

Carpilodes guttatus (De Man) (fig. 1e)

Liomera guttata De Man, 1888, p. 239, pl. 8 fig. 2.

Snellius Expedition

Kafal, Misool Group; shore and reef; October 3, 5, 1929. — 2 ♂♂, 1 ♀.
Wotap, Tenimber Islands; shore and reef; October 20-23, 1929. — 2 ♀♀.
Kera, near Timor; November 15, 16, 1929. — 1 ♀.
Near Koepang, Timor; November 18-20, 1929. — 1 ♂.
Koepang, Timor; shore or reef; December 5, 1929. — 1 ♂.
Morotai; June 3-10, 1929. — 1 ♂, 2 ♀♀.
Beo, Karakelong, Talaud Islands; shore and reef; June 14-21, 1930. — 2 ♂♂.

Museum Leiden

West Java; J. F. van Bemmelen. — 1 young specimen.

Siboga Expedition

Sta. 131, off Beo, Karakelong, Talaud Islands; reef, mud and sand, 13 m; July 24, 25, 1899. — 1 ♂.

Carpilodes cinctimanus (White) (fig. 2a)

Carpilius cinctimanus White, 1847, p. 336, pl. 2 fig. 3.

Snellius Expedition

Pelokan, Postiljon Islands; shore or reef; December 20, 1929. — 1 ♂.
Obi Latoe; shore and reef; April 23-27, 1930. — 1 ♂, 2 ♀♀.

Museum Leiden

Timor; 1863; G. F. Wienecke. — 1 ♂.
Fiji Islands; 1887; Mus. Godeffroy. — 1 ♂, 1 young specimen.
Samoa; Mus. Godeffroy. — 1 ♂, 1 ♀.

Siboga Expedition

Sta. 79b, Poeloe Kabala-doea, Borneo Bank; shore exploration, coral sand, 22 m; June 12, 13, 1899. — 1 ♀.

Carpilodes semigranosus (De Man)

Liomera semigranosa De Man, 1888, p. 242, pl. 8 fig. 3.

Snellius Expedition

Amboina; pier, 0-1 m; May 6, 1930. — 1 young specimen.

This species seems to be rather rare; as far as I know only the type (from Amboina) and a specimen from the Marshall Islands, mentioned by Odhner, are known. Our young specimen agrees with De Man's description, but for the coloration, which was described by De Man as red with a white margin; our specimen is white with no trace of red.

Carpilodes bellus (Dana) (fig. 2b)

Actaeodes bellus Dana, 1852, p. 78.

Snellius Expedition

Paleleh, Celebes; shore; August 21, 22, 1929. — 1 ♂, 1 ♀.
Tidore; shore; September 24-29, 1929. — 1 ♀.
Kafal, Misool Group; shore and reef; October 3, 5, 1929. — 9 ♂♂, 6 ♀♀ (3 ovigerous).
Waaf, Misool Group; October 5, 1929. — 1 specimen with Sacculinid.
Wotap, Tenimber Islands; shore and reef; October 20-23, 1929. — 1 ♂, 1 ♀.
Kera, near Timor; November 11-13, 15, 16, 22, 23, 1929. — 7 ♂♂, 4 ♀♀.
Near Koepang, Timor; reef; December 8, 1929. — 1 ♂, 2 ovigerous ♀♀.
Koepang, Timor; reef; December 9, 1929. — 2 ♂♂, 3 ♀♀ (1 ovigerous).
Pelokan, Postiljon Islands; shore and reef; December 20, 1929. — 2 ♂♂, 2 ♀♀.
Sapoeka Besar, Postiljon Islands; shore and reef; December 21-23, 1929. — 4 ♂♂, 1 ♀.
Ternate; shore; April 1, 2, 1930. — 1 ♂, 1 ♀.
Obi Latoe; shore or reef; April 23-27, 1930. — 1 ♀.
Morotai; June 3-10, 1930. — 1 ♂, 1 ♀.
Amboina; May 6, October 14, 17, 1930. — 2 ♀♀ (1 ovigerous).
Endeh, Flores; November 5-8, 1930. — 1 ♂.

Museum Leiden

Sinabang, Simaloer, W. of Sumatra; February, 1913; E. Jacobson. — 1 ♀.
Tahiti; Mus. Godeffroy. — 1 ♀.

Siboga Expedition

Sta. 47, near mouth of Bay of Bima; coral shore; April 12, 1899. — 1 ♂.
Sta. 53, Bay of Nangamesi, Soemba; trawl and shore exploration; up to 36 m; April 21-22, 1899. — 1 soft specimen.
Sta. 115, east side of Pajoenga Island, Kwandang Bay, N. Celebes; reef; July 9-11, 1899. — 1 small specimen.
Sta. 129, off Kawean and Kamboling Islands, Karkaralong Islands; reef; July 22, 23, 1899. — 4 ♂♂, 5 ♀♀.
Sta. 225; anchorage south of Lucipara Group, Banda Sea; reef; November 8-10, 1899. — 2 ♂♂, 1 ♀.

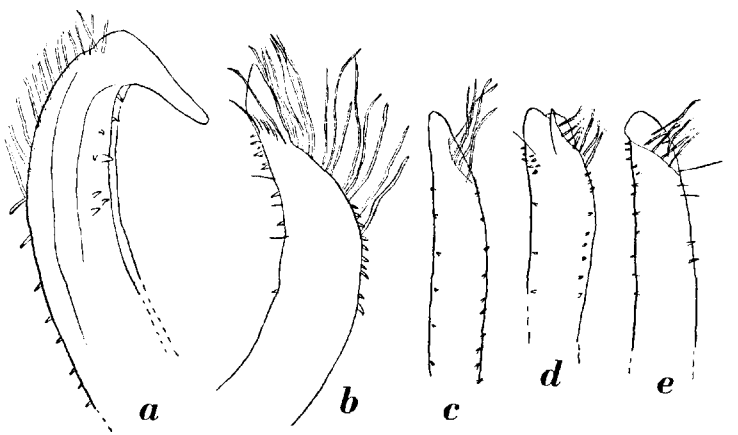

Fig. 2. a, *Carpilodes cinctimanus* (White), apex first pleopod, ♂ from Pelokan; b. *Carpilodes bellus* (Dana), apex first pleopod, ♂ from Sapoeka Besar; c, *Carpilodes stimpsoni* A. Milne Edwards, apex first pleopod, ♂ from Obi Latoe; d, *Carpilodes rugatus* (H. Milne Edwards), apex first pleopod, ♂ from Pelokan; e, *Carpilodes venosus* (H. Milne Edwards), apex first pleopod, ♂ from Koepang. × 50.

United States National Museum

Beach at Kamboanga, Mindanao; March 2, 1914; F. Baker. — 1 ♂.
Apia, Samoa; at mouth of river; June 1902. — 2 ♂♂, 2 ♀♀ (1 ovigerous).
Apia, Samoa; outer coral reef at low tide; July 1, 1902. — 1 ♂.
5 miles southwest of Kapoho, Hawaii; September 25, 1929; O. Degener. — 1 ♀.
Milolii, Hawaii; January, 1930; Pohina. — 3 ♀♀.
Kilauea, Volcano House, Hawaii; O. Degener. — 2 ♀♀.

Museum Copenhagen

Canonniers Point, Mauritius; reef; October, 1929; Th. Mortensen's Java-South Africa Exp., 1929-1930. — 5 ♂♂, 10 ♀♀, 1 young specimen and 1 with Sacculinid.

Suva, Viti Levu, Fiji Islands; 0-0.5 m; reef; May 29, 1934; Monsunen Exp. — 1 small ♂.
Takaroa, Tuamotu Islands; March 16, 1934; Monsunen Exp. — 1 small ♀.

Carpilodes stimpsoni A. Milne Edwards (fig. 2c)

Carpidodes stimpsoni A. Milne Edwards, 1865, p. 232, pl. 11 figs. 2-2c.

Snellius Expedition

Obi Latoe; shore or reef; April 23-27, 1930. — 1 ♂.

United States National Museum

Lembeh Strait, North Celebes; Herre. — 1 ♀.

Carpilodes erythrus (Lanchester)

Actites erythrus Lanchester, 1901, p. 574; was described and figured by Lanchester (1900, p. 741, pl. 45 fig. 6) as *Actaeopsis pallida* (Borradaile).

Siboga Expedition

Sta. 164, off N. W. New Guinea, 1° 42.5′ S, 130° 47.5′ E; dredge, 32 m; August 20, 1899. — 2 ♂♂, 2 ♀♀.
Sta. 204, between Wowoni and Boeton, 4° 20′ S, 122° 58′ E; dredge and townet; sand with dead shells; 75-94 m; September 20, 1899. — 1 ♂.

Museum Amsterdam

Java Sea near Batavia; ottertrawl; April-May, 1907. — 1 young specimen.

Carpilodes rugatus (H. Milne Edwards) (fig. 2d)

Zozymus rugatus H. Milne Edwards, 1834, p. 385.

Snellius Expedition

Pelokan, Postiljon Islands; shore and reef; December 20, 1929. — 10 ♂♂, 9 ♀♀.
Obi Latoe; shore and reef; April 23-27, 1930. — 1 ♂, 1 carapace.

Museum Leiden

Tahiti; 1887; Mus. Godeffroy. — 1 ♂, 1 ♀.

United States National Museum

Honaunau, Hawaii; September 20, 1920; Paul Bartsch. — 1 ♂.
5 miles southwest of Kapoho, Hawaii; September 25, 1929; O. Degener. — 1 ♂.
Milolii, Hawaii; January, 1930; Pohina. — 1 ♂, 1 ♀.
Hawaii; April 3, 1930; O. Degener. — 3 ♂♂, 2 ♀♀, 1 young specimen.

Carpilodes venosus (H. Milne Edwards) (fig. 2e)

Carpilius venosus H. Milne Edwards, 1834, p. 383.

Snellius Expedition

Wotap, Tenimber Islands; shore or reef; October 20-23, 1929. — 1 ♀.
Near Koepang, Timor; November 18-20, 1929. — 1 ♂.

Museum Leiden

Tahiti; 1887; Mus. Godeffroy. — 1 ♀.
Japan. — 1 ♂ in the dry collection, type of *Xantho obtusus* De Haan.

Siboga Expedition

Sta. 43, off Poeloe Sarasa, Postiljon Islands; up to 36 m; April 4-5, 1899. — 1 ♀.
Sta. 78, Loemoeloemoe Shoal, Borneo Bank; reef; June 10-11, 1899. — 1 young specimen.
Sta. 164, off N. W. New Guinea, 1° 42.5′ S. 130° 47.5′ E; dredge, 32 m; August 20, 1899. — 1 ♂.

United States National Museum

Marongas Island, south side, near Jolo, Philippine Islands; shore; from coral head; February 10, 1908; Albatross Philippine Exp. 1907-1908. — 1 ♀.
Tinakta Island, Tawitawi Group, Sulu Archipelago, 5° 11′ 50″ N, 119° 54′ E; 10 fathoms; coral sand; February 21, 1908; Albatross Philippine Exp. 1907-1908, Sta. D. 5159. — 1 ♀, 1 small ♂.
Linao Pt., Gulf of Davao, Philippine Islands, 7° 05′ 42″ N, 125° 39′ 42″ E; 21 fathoms; sand and coral; May 18, 1908; Albatross Philippine Exp. 1907-1908, Sta. D. 5254. — 1 ♂.

Carpilodes ruber A. Milne Edwards

Carpilodes ruber A. Milne Edwards, 1865, p. 228, pl. 12 figs. 4, 4b.

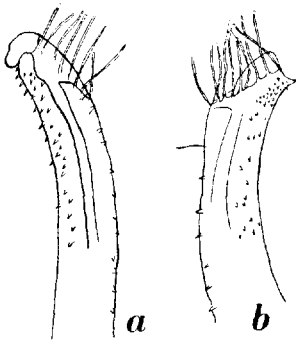

Fig. 3. a, *Carpilodes rugipes* (Heller), apex first pleopod, ♂ from the Red Sea; b, *Carpilodes margaritatus* A. Milne Edwards, apex first pleopod, ♂ from Koepang. × 50.

Siboga Expedition

Sta. 248, off Roemahloesi, north point of Tioor, Watoebela Islands; dredge, townet and reef exploration; up to 54 m; December 4, 5, 1899. — 1 small ♂.

Carpilodes rugipes (Heller) (fig. 3a)

Actaeodes rugipes Heller, 1861, p. 330, pl. 2 fig. 20.

Museum Leiden

Red Sea; R. Kossmann; 1880. — 1 ♂.

Carpilodes margaritatus A. Milne Edwards (fig. 3b)

Carpilodes margaritatus A. Milne Edwards, 1873, p. 182, pl. 5 fig. 2.

Snellius Expedition

Wotap, Tenimber Islands; shore or reef; October 20-23, 1929. — 1 young specimen.
Kera, near Timor; November 15, 16, 1929. — 1 carapace.
Near Koepang, Timor; shore or reef; December 3, 1929. — 1 ♂.
Koepang, Timor; shore or reef; December 5, 1929. — 1 young specimen.

Siboga Expedition

Sta. 213, Salajar; reef; September 26-October 26, 1899. — 1 ♂.

The specimens from Wotap, Kera, and Koepang show the stripes mentioned by De Man (1888) as characteristic for his *striatus*, which is placed by Odhner (1925) among the synonyms of *margaritatus*; in every other respect they agree with this species.

Gravely (1927) figures a *margaritatus* with 5 L absolutely limited; according to Odhner's key this specimen should belong to *erythrus* (Lanch.), but as *erythrus* has crested legs this is not probable.

Carpilodes pediger Alcock

Carpilodes pediger Alcock, 1898, p. 83.

Snellius Expedition

Off Bongao, Tawitawi, Sulu Islands; dredge, 27 m; September 19, 1929. — 1 ♀.

Siboga Expedition

Sta. 96, south-east side of Pearl Bank, Sulu Archipelago; dredge, townet, 15 m; June 27, 1899. — 1 ♂.

Sta. 144, anchorage north of Salomakiee, Damar Island; dredge, townet and reef exploration, 45 m; August 7-9, 1899. — 1 ♀, 1 young specimen.

Neoliomera Odhner

Neoliomera pubescens (H. Milne Edwards)

Zozymus pubescens H. Milne Edwards, 1834, p. 384.

Museum Leiden

Fiji Islands; 1887; Mus. Godeffroy. — parts of carapace.

Neoliomera variolosa (A. Milne Edwards)

Liomera variolosa A. Milne Edwards, 1873a, p. 79, pl. 1 fig. 5.

Museum Leiden

Upolu; Mus. Godeffroy. — 1 young specimen.

Neoliomera sabaea (Nobili)

Actaea sabaea Nobili, 1905a, p. 403.

Museum Leiden

Batjan, Moluccas; H. A. Bernstein. — 1 ♂.

Neoliomera insularis (Adams and White)

Atergatis insularis Adams & White, 1848, p. 38.

Snellius Expedition

Koepang, Timor; shore or reef; December 5, 1929. — 1 ♂.
Obi Latoe; shore or reef; April 23-27, 1930. — 1 ♂.

Neoliomera richtersii (De Man)

Actaecodes richtersii De Man, 1889, p. 412, pl. 9 fig. 2.

Museum Leiden

Jiddah; 1880; J. A. Kruyt. — 1 ♀.
Tahiti; 1887; Mus. Godeffroy. — 1 ♂, 1 ♀.

Pseudoliomera Odhner

Pseudoliomera granosimana (A. Milne Edwards)

Liomera granosimana A. Milne Edwards, 1865, p. 222, pl. 11 figs. 5, 5a.

Museum Leiden

Jiddah; 1880; J. A. Kruyt. — 1 ♂, mentioned by Odhner (1925).

Siboga Expedition

Sta. 250, Koer Island, W. of Kei Islands; reef; December 6, 7, 1899. — 1 ♂.

Carpilius Leach

Carpilius maculatus (Linnaeus) (fig. 4)

Cancer maculatus Linnaeus, 1758, p. 626.
Carpilius maculatus Alcock, 1898, p. 79 (with older literature and synonyms); Nobili, 1899, p. 255; Lenz, 1901, p. 464; Borradaile, 1902, p. 261; Rathbun, 1906, p. 842; Nobili, 1907, p. 386; Stimpson, 1907, p. 37; Pesta, 1913, p. 39, pl. 3 fig. 4; Edmondson, 1923, p. 11; McCulloch & McNeill, 1923, p. 54; McNeill, 1926, p. 312; Urita, 1926, p. 13; Ward, 1932, p. 239; Chen, 1933, p. 100; Sakai, 1934, p. 310; Estampador, 1937, p. 522.

Snellius Expedition

Wotap, Tenimber Islands; shore or reef; October 20-23, 1929. — 1 ♂.
Near Koepang, Timor; November 18-20, December 3, 8, 1929. — 1 ♂ and 4 young specimens.
Koepang, Timor; reef or shore; December 5, 1929. — 1 young specimen.
Amboina; October 4, 17, 1930. — 1 ♂.

Siboga Expedition

Sta. 34, off Laboean Pandan, Lombok; reef; 18 m; March 27, 1899. — 1 ♀ and 1 carapax with chelipeds and some walking legs.

Sta. 131, off Beo, Karakelong, Talaud Islands; reef; July 24, 25, 1899. — 2 ♂♂.

Sta. 133, off Lirung, Salebaboe, Talaud Islands; trawl, dredge and reef exploration, up to 36 m; July 25-27, 1899. — 1 ♂.

Museum Amsterdam

Locality unknown. — 1 ♀.

United States National Museum

Milolii, Hawaii; January, 1930; Pohina. — 1 ♀.

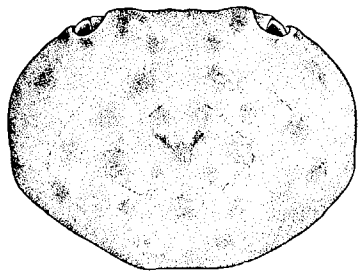

Fig. 4. *Carpilius maculatus* (L.), carapace of young specimen from Koepang. × 4.

The smallest specimen collected by the Snellius Expedition at Koepang, December 8, 1929 (fig. 4), shows more than the usual eleven dark red spots, common for all the specimens I have seen, including the rather large collection of the Leiden Museum, with the exception of a ♀ collected by the Siboga Expedition at Laboean Pandan which shows three additional spots. The form of the front, however, shows that it is *maculatus*, as the anterior margin is very thick and distinctly separated from the rest of the carapace; the median lobe is advanced and bilobulate. In *convexus* the anterior margin is less thick, the median lobe less strongly advanced and less distinctly bilobulate.

Carpilius convexus (Forskål)

Cancer convexus Forskål, 1775, p. 88.

Carpilius convexus Alcock, 1898, p. 80 (with older literature and synonyms); Nobili, 1899, p. 256; Calman, 1900, p. 4; Lenz, 1901, p. 464; Nobili, 1901, p. 12; Borradaile, 1902, p. 261; Lenz, 1905, p. 347; Nobili, 1906a, p. 214; Rathbun, 1906, p. 842; Stimpson, 1907, p. 37; Lenz, 1910, p. 545; Klunzinger, 1913, p. 125; Laurie, 1915, p. 442; Gravier, 1920, p. 465; Balss, 1922, p. 130; Edmondson, 1923, p. 11; Balss, 1924, p. 5; Edmondson, 1925, p. 54; McNeill, 1926, p. 321; Ward, 1932, p. 239; Sakai, 1934, p. 310; Estampador, 1937, p. 523.

Snellius Expedition

Kafal, Misool Group; shore and reef; October 3, 5, 1929. — 5 specimens, probably all young ♂♂.

Wotap, Tenimber Islands; shore and reef; October 20-23, 1929. — 1 ♂, 1 young specimen.

Kera, near Timor; November 11-13, 15, 16, 22, 23, 1929. — 5 ♂♂, 3 ♀♀.

Near Koepang, Timor; November 18-20, December 3, 1929. — 2 ♂♂, 1 ♀ and 5 young specimens.

Koepang, Timor; reef and shore; December 5, 1929. — 1 ♂, 1 ♀, 1 young specimen.

Sapoeka Besar, Postiljon Islands; shore and reef; December 21-23, 1929. — 1 ♂, 1 ♀, 1 young specimen.

Obi Latoe; shore and reef; April 23-27, 1930. — 1 ♀, 3 young specimens.

Boo Islands; October 5, 1930. — 1 ♂.

Batoe Merah, Amboina; October 15, 1930. — 1 young specimen.

Amboina; October 14, 17, 1930. — 5 specimens, probably ♂♂.

Locality unknown. — 1 ♂.

Siboga Expedition

Sta. 58, Seba, Sawoe Island; shore; April 25, 1899. — 3 ♂♂, 4 ♀♀.

Sta. 60, Hainsisi, Semaoe, near Timor; reef; April 27, 28, 1899 or Sta. 303, Hainsisi; Februari 2-5, 1900. — 1 ♂.

Sta. 89, Poeloe Kanioengan-ketjil; reef; June 21, 1899. — 1 ♀.

Sta. 91, Mocaras Reef, east coast of Borneo; inner side; June 22, 1899. — 1 ♀.

Sta. 209, off the south point of Kabaena Island, S. E. Celebes; reef; September 23, 1899. — 1 young specimen.

Sta. 213, Salajar; reef; September 26-October 26, 1899. — 1 small ♂ and 1 young specimen.

Sta. 248, off Roemahloesi, north point of Tioor Island; reef; December 4, 5, 1899. — 1 small ♂ and ♀.

Sta. 250, Koer Island, W. of Kei Islands; reef; December 6, 7, 1899. — 1 small ♂.

Sta. 261, Elat, west coast of Great Kei Island; reef; December 16-18, 1899. — 1 ♂.

Sta. 301, Pepela Bay, east coast of Roti; reef; January 30-February 1, 1900. — 1 ♂.

Waingapoe, Soemba; April 21, 22, 1899. — 1 ♂, 2 ♀♀.

Museum Amsterdam

Banda; May 1921; E. van der Velde. — 1 ♂.

Poeloe Serbete; north of Timor; G. A. J. van der Sande. — 1 ♂.

Locality unknown. — 4 ♂♂ (2 young ones), 1 ♀.

United States National Museum

Makaluva Reef, Fiji Islands; June 1922. — 1 ♂.

Niuafou Island; August 31, 1930; Naval Eclipse Expedition; H. C. Kellers. — 1 ♂.

5 miles southwest of Kapoho, Hawaii; September 25, 1929; O. Degener. — 1 ♂.

Milolii, Hawaii; January, 1930; Pohina. — 1 young specimen.

Museum Copenhagen

Takaroa, Tuamotu Islands; reef, 0-0.5 m; March 16, 1934; Monsunen Exp. — 1 ♂.

Alcock (1898), Klunzinger (1913), and Ward (1932) place *Cancer adspersus* Herbst (1790, Krabben, vol. 1, pt. 8, p. 264, pl. 21 fig. 119) among

the synonyms of *Carpilius convexus*. Herbst, however, compares his specimens with *maculatus* and figures the median frontal lobe strongly bilobulate, just as he figures the front of *maculatus* on the same plate (fig. 118). In some specimens collected by the Snellius Expedition the ground colour of the carapace is reddish, just as described by Herbst for his *adspersus*: "Die Grundfarbe ist blassroth; und überall mit dunkelrothen grössern und kleinern Flecken gesprenkelt . . . ", but in all specimens the front resembles that of the *convexus* material. The coloration of the whole material (including that of the Leiden Museum) varies strongly, but never consists of larger or smaller red dots as characteristic for *maculatus*; see also Klunzinger's remarks on the coloration.

Lachnopodus Stimpson

Lachnopodus subacutus (Stimpson)

Liomera subacuta Stimpson, 1858, p. 32.

Snellius Expedition

Kafal near Misool; shore and reef; October 3, 5, 1929. — 12 ♂♂, 14 ♀♀, 7 juv.
Wotap, Tenimber Islands; shore or reef; October 20-23, 1929. — 1 ♀.
Kera, near Timor; November 15, 16, 1929. — 1 ♂.
Near Koepang, Timor; November 18-20, 1929. — 5 ♂♂, 2 ♀♀.
Koepang; shore and reef; December 5, 1929. — 2 ♂♂, 2 ♀♀.
Near Koepang; reef; December 8, 1929. — 33 ♂♂, 30 ♀♀, 1 juv.
Koepang; reef; December 9, 1929. — 3 ♂♂, 9 ♀♀.
Pelokan, Postiljon Islands; shore and reef; December 20, 1929. — 13 ♂♂, 7 ♀♀, 4 juv.
Ternate; shore; April 1, 2, 1930. — 1 ♀.
Obi Latoe; shore or reef; April 23-27, 1930. — 1 ♂.
Morotai; June 3-10, 1930. — 1 ♂.
Laha, Amboina; September 13, 1930. — 1 ♂.
Amboina; October 14, 17, 1930. — 8 ♂♂, 4 ♀♀.
Roemah Tiga, Amboina; October 17, 1930. — 5 ♂♂, 1 ♀, 2 juv., 1 specimen with Sacculinid.

Museum Leiden

Amboina; D. J. Hoedt. — 2 ♂♂.
Kisar near Timor; K. Schädler. — 1 ♂.

Liagore De Haan

Liagore rubromaculata De Haan (fig. 5a)

Cancer (Liagore) rubromaculata De Haan, 1835, p. 49, pl. 5 fig. 1.
Liagore rubromaculata Alcock, 1898, p. 93 (with older literature and synonymy); Rathbun, 1902a, p. 24; Parisi, 1916, p. 178; Balss, 1922, p. 130; Kemp, 1923, p. 408, pl. 10 fig. 2; Rathbun, 1923, p. 105; Rathbun, 1928, p. 354; Chopra, 1935, pp. 464, 508, fig. 16.

Museum Leiden

Amboina; D. J. Hoedt. — 1 ♂.
Japan. — 1 ♂, cotype.
China. — 2 cotypes without abdomen, probably males, and a set of mouthparts.
Japan and China; D. W. Burger. — 2 ♂♂, 1 ♀. All the cotypes are dry specimens.

Description of the ♂ from Amboina.

Carapace smooth, slightly pitted; convex fore and aft, and slightly so from side to side; only the cardiac region indicated. Front bilobed; the outer angles pronounced and separated from the orbits by a short shallow groove. Orbital margins not thickened, except near the outer angle, which is marked by a small, pimple-like thickening. The antero-lateral margin is entire, with no trace of the blunt lobes Kemp (1923) describes for his material from India and the Persian Gulf. The postero-lateral margin is straight and but little convergent; the posterior margin is long. Pterygostomian region somewhat hairy.

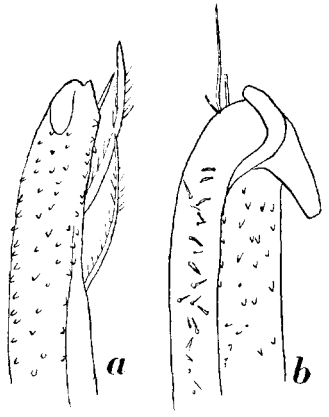

Fig. 5. a, *Liagore rubromaculata* De Haan, apex first pleopod, ♂ from Amboina; b, *Atergatis roseus* (Rüppell), apex first pleopod, ♂ from Lembeh Strait. × 50.

Chelipeds equal, massive; inner border of merus, ischium, and coxa hairy; upper border of merus hairy and moreover armed with some (3) blunt denticles. Outer and inner angle of carpus strongly, but bluntly, pronounced; wrist and palm smooth, pitted; fingers long and pointed; the cutting edges strongly but bluntly toothed. The long and slender walking legs are, except for four rows of hairs on the dactyli, devoid of hairs.

With the exception of the two cotypes from China, in which the red spots are still faintly visible, the whole material is bleached.

The ♂ from Amboina was labelled: "*Carpilius rubromaculata* De Haan (*Liagore rubromaculata* De Haan, *Carpilius praetermissus* Gibbes)". As the description given by Gibbes agrees with our specimens, the two species are probably synonymous, as it was already suggested by Miers (1878).

Distribution. Persian Gulf, Hongkong, China, Japan, Wakanoura (Honshu), Queensland.

Atergatis De Haan

Atergatis dilatatus De Haan

Cancer (*Atergatis*) *dilatatus* De Haan, 1835, p. 46, pl. 14 fig. 2.
Atergatis dilatatus De Man, 1888, p. 245; Alcock, 1898, p. 96 (with older literature); Rathbun, 1910a, p. 351; Balss, 1922, p. 124; Gravely, 1927, p. 144; Ward, 1932, p. 242; Chen, 1933, p. 101.
Atergatis intergerrimus var. *dilatata* Ortmann, 1894a, p. 462.

Museum Leiden

China Sea?. — type, carapace only.

Museum Amsterdam

Zuid Island (probably one of the 4 "Zuid" Islands in the Malay Archipelago). — 1 young specimen.

In the box containing the type there is also another, smaller carapace, less broad and without epibranchial tooth, a typical *A. integerrimus* (Lam.). The young specimen described below was collected at Zuid Island and belongs to the collection of the Zoological Museum at Amsterdam.

Carapace rather broad (cb. 2.4, cl. 1.5 cm) [1]), smooth, no trace of pitting, as shown by the type; sternum granular. Cardiac region bounded by rather faint creases. Frontal margin bilobed; orbital sutures hardly visible, no trace of sutures on the antero-lateral margin, which is rather strongly crested and ends in a small tubercle. The two transversely folded antennulae are separated by a broad septum; basal antennal joint in contact with a down-turned ridge from the frontal margin; second and third joints cylindrical; flagellum slender, lodged in the orbital hiatus. The ridge bordering the epistome in front is rather high; meri and ischia of outer maxillipeds covered with bristles.

Chelipeds subequal; palm strongly crested, smooth, except for a ridge half-way the upper surface, this ridge begins at the articulation with the wrist and ends half-way the palm. Fingers with blunt teeth on their cutting edges, upper margin of movable finger crested, a second crest half-way on the

1) Throughout the present paper the abbreviation cb. is used for carapace breadth, cl. for carapace length.

outer surface. Walking legs flattened; upper border of propodi, carpi, and meri with a strong crest; meri and ischia with a strong crest on the inner border, which, moreover, shows tufts of hairs. The lower border of the meri is crested too, but these crests never reach the posterior end, neither do they join the inner crests.

This species is easiest recognised by its great breadth and its hairy maxillipeds.

Distribution. Ceylon, Andaman Islands, Siam, China Sea, Papua, Queensland, New Caledonia, Samoa.

Atergatis floridus (Linnaeus)

Cancer floridus Linnaeus, 1767, p. 1041.

Atergatis floridus Alcock, 1898, p. 98 (with older literature and synonymy); Nobili, 1899, p. 257; Calman, 1900, p. 5; Borradaile, 1902, p. 285; Nobili, 1906a, p. 229; Nobili, 1907, p. 388; Stimpson, 1907, p. 41; Lenz, 1912, p. 3; Klunzinger, 1913, p. 152; Pesta, 1913, p. 40; Stebbing, 1917a, p. 7, pl. 2; Balss, 1922, p. 123; De Man, 1929, p. 3; Gordon, 1934, p. 25, textfig. 14; Boone, 1934, p. 94, pls. 47, 48; Balss, 1938, p. 36.

Atergatis ocyroe Rathbun, 1902a, p. 25; Rathbun, 1906, p. 229; Rathbun, 1907, p. 37; Rathbun, 1910, p. 310; Rathbun, 1910a, p. 351; Stebbing, 1910, p. 296; Rathbun, 1914, p. 657; Laurie, 1915, p. 413; Parisi, 1916, p. 179; Gee, 1926, p. 162; McNeill, 1926, p. 312; Urita, 1926, p. 12; McNeill & Ward, 1930, p. 382; Ward, 1932, p. 241.

Snellius Expedition

Mamoedjoe, Celebes; reef and shore; August 1, 5, 1929. — 1 small ♂, 2 ♀♀ and 5 specimens each with a Sacculinid.

Maratoea; reef; August 14-18, 1929. — 1 ♂.

Paleleh, Celebes; shore; August 21, 22, 1929. — 2 ♂♂, 1 ♀.

Tidore; shore; September 24-29, 1929. — 1 ♀.

Kafal, Misool Group; reef and shore; October 3, 5, 1929. — 7 ♂♂, 1 ♀, 1 young specimen and 1 specimen with Sacculinid.

Sissie, Misool Group; shore or reef; October 6, 1929. — 1 ♀.

Wotap, Teninber Islands; shore and reef; October 20-23, 1929. — 5 ♂♂, 12 ♀♀, 2 juv.

Kera near Timor; November 11-13, 15, 16, 22, 23, 1929. — 12 ♂♂, 13 ♀♀ (9 ovigerous), 5 juv.

Koepang, Timor; reef and shore; December 5, 1929. — 4 ♂♂, 2 ♀♀ (1 ovigerous), 1 juv. and 4 specimens each with a Sacculinid.

Near Koepang, Timor; reef; December 8, 18-20, 1929. — 4 ♂♂, 2 ♀♀, 2 juv.

Sapoeka Besar, Postiljon Islands; December 21-23, 1929. — 2 ♂♂, 2 ♀♀, 1 juv.

Obi Latoe; shore and reef; April 23-27, 1930. — 1 ♂, 2 ♀♀, 1 juv.

Ake Selaka, Kaoe Bay, Halmahera; shore and reef; May 28, 1930. — 2 ♂♂, 3 ♀♀, 4 juv.

Morotai; June 3-10, October 1, 1930. — 2 ♂♂.

Beo, Karakelong, Talaud Islands; June 14-21, 1930. — 2 ♂♂, 3 juv.

Lembeh Strait; September 25, 1930. — 2 ♂♂, 2 ♀♀.

Boo Islands; October 5, 1930. — 1 ♂, 1 ♀.

Amboina; October 14, 17, 1930. — 3 ♂♂, 3 ♀♀, 1 juv.

Batoe Merah, Amboina; October 15, 1930. — 2 ♂♂, 1 ♀.
Roemah Tiga, Amboina; October 17, 1930. — 1 ♂, 2 ♀♀.
Endeh, Flores; November 5-8, 1930. — 1 ♂, 2 ♀♀.

Museum Leiden

Red Sea. — 1 ♂.
Poeloe Weh, N. Sumatra; November, 1923; P. Buitendijk. — 1 ♀.
Off Atjeh; 1891; H. J. van Rhijn. — 1 ♂, 1 ovigerous ♀, 1 juv.
Padang, Sumatra. — 4 ♀♀, 1 juv.
Bay of Batavia; 1927; W. C. van Heurn. — 1 ♂.
Noordwachter; 1891; A. G. Vorderman. — 2 ♂♂.
West Java; 1894; J. F. van Bemmelen. — 2 ♂♂, 1 ♀.
Java. — 5 ♂♂, 7 ♀♀, 1 juv.
Timor; 1863; G. F. Wienecke. — 2 ♂♂, 1 ♀.
Timor. — 9 ♂♂, 4 ♀♀, 1 juv.
Boeroe, Moluccas. — 1 ♀, 1 ovigerous ♀.
Amboina; 1864; E. W. A. Ludeking. — 10 ♂♂, 4 ♀♀.
Obi Islands; 1862; H. A. Bernstein. — 1 ♀.
Ternate; 1879; Schorel. — 5 ♂♂, 4 ♀♀, 1 juv.
Halmahera; H. A. Bernstein. — 1 juv.
Moluccas; H. C. Macklot. — 1 ♀.
Moluccas; E. A. Forsten. — 2 ♂♂, 1 ♀.
Moluccas. — 5 ♂♂, 6 ♀♀.
Gemien near New Guinea; H. A. Bernstein. — 1 ♂, 1 ♀.
Gebe; 1864; H. A. Bernstein. — 2 ♀♀.
Waigeo; 1864; H. A. Bernstein. — 3 ♀♀, 1 juv.
New Guinea. — 1 ♂.
Fiji Islands; Mus. Godeffroy. — 1 ♂, 1 ♀.
Japan and Moluccas. — 5 ♂♂, 3 ♀♀.
Japan; P. F. von Siebold. — 1 ♀.
Japan. — 1 ♂, 1 ♀, 1 juv.
China. — 1 ♀.

Siboga Expedition

Sta. 58, Seba, Sawoe Island; shore; April 25, 1899. — 1 ♂.
Sta. 78, Loemoeloemoe Shoal, Borneo Bank; shore; June 10, 11, 1899. — 1 ♂.
Sta. 115, east side of Pajoenga Island, Kocandang Bay, N. Celebes; reef; July 9-11, 1899. — 1 ♂
Sta. 125, off Sawan, Siaoe; reef; July 18, 19, 1899. — 2 ♂♂, 1 ♀.
Sta. 131, off Beo, Karakelong, Talaud Islands; reef; July 24, 25, 1899. — 1 ♀.
Sta. 133, off Liroeng, Salebaboe, Talaud Islands; trawl, dredge and reef exploration, up to 36 m; July 25-27, 1899. — 1 ♀, 1 small ♂.
Sta. 169, off Atjatoening, west coast of New Guinea; reef; August 23-25, 1899. — 1 ♂, 1 ♀, 1 juv.
Sta. 172, Kisar; reef; August 26-28, 1899. — 1 ♀.
Sta. 174, Waroe Bay, north coast of Ceram; reef; August 28, 29, 1899. — 1 ♂.
Sta. 213, Salajar; reef; September 26-October 26, 1899. — 2 ♂♂.
Sta. 231, Amboina; reef; November 14-18, 1899. — 1 ♂.
Sta. 250, Koer Island, W. of Kei Islands; reef; December 6, 7, 1899. — 1 ♂, 1 ♀.
Sta. 311, Sape, east coast of Soembawa; reef; February 12, 13, 1900. — 1 ♂.
Sta. 60 or 303; Hainsisi, Semaoe near Timor; reef; April 27, 28, 1899 or February 2-5, 1900. — 1 ♂.
Waingapoe, Soemba; April 21, 22, 1899. — 1 young specimen.

Museum Amsterdam

Nias, W. of Sumatra; 1919; J. P. Kleiweg de Zwaan. — 1 ♂.
Nias; J. P. Kleiweg de Zwaan. — 1 ♂, 1 ♀.
Enkhuizen or Alkmaar Island, Bay of Batavia; May 1, 1906. — 1 ♀.
Banda, Moluccas; E. van der Velde. — 1 ♂.
Solor, Lesser Soenda Islands; December 6, 1908; G. A. J. van der Sande. — 1 ♀.
Near Hainsisi, Semaoe, near Timor; November 2, 1909; H. J. M. Laurense. — 1 ♂.
Lesser Soenda Islands; December 18, 1919; H. J. M. Laurense. — 1 ovigerous ♀.
East Indies; June 26, 1924; H. C. Delsman. — 1 young specimen.

United States National Museum

Koh Chang, Gulf of Siam; July 15, 1926. — 2 ♂♂.
Koh Pipidon, Puket Bay, Siam; March 10, 1925; H. M. Smith. — 1 ♀.
Sriracha, S. E. Siam; June, 1927. — 1 ♀.
Siam. — 1 ♂, 3 ♀♀.
Benkoelen, Sumatra; December 16, 1925; H. C. Kellers. — 1 ♂.
Talisay, Cebu, Philippines; April 17, 1929; H. C. Kellers. — 1 specimen with Sacculinid.
Suva, Fiji Islands; March 14, 1929; Herre. — 1 ♂.
Nukulau Island, Fiji Islands; March 15, 1929; Herre. — 1 ♀.
Makaluva Reef, Fiji Islands; June 8, 10, 1922. — 9 ♂♂, 9 ♀♀.
Pago Pago, Samoa; August, 1902. — 4 ♂♂, 1 ♀.
Apia, Samoa; outer reef; June 22, 1902. — 1 small ♂.
Apia, Samoa; coral reef; July, 1902. — 8 ♂♂, 3 ♀♀.
Society Islands; J. Morgan Clements. — 4 ♂♂, 1 ♀.
Misaki, Sagami, Japan; Albatross Exp. 1906. — 1 ♂, 2 ovigerous ♀♀.

Museum Copenhagen

Santa Cruz Island, Zamboanga, Philippines; reef; March, 1914; Th. Mortensen. — 1 juv.
Mallekule, New Hebrides; July 15, 1934; Monsunen Exp. — 1 ♀.
New Hebrides; July 10, 1934; Monsunen Exp. — 1 ♀.
Suva, Viti Levu, Fiji Islands; reef, 0-0.5 m; May 29, 1934; Monsunen Exp. — 1 ♂.
Locality unknown; Monsunen Exp. — 1 ♂.

Description.

Carapace convex, smooth, with some broad, shallow depressions, which give the specimens a somewhat lumpy appearance. Frontal margin faintly bilobed; outer half of orbital margin with three closed sutures. The crested antero-lateral margin is divided into three successively broader lobes by indications of three sutures; the posterior suture separates the blunt, ridged tubercle at the epibranchial angle from the third antero-lateral lobe. The transversely folded antennulae are separated by a rather broad septum; basal antennal joint broad, its inner angle in contact with the down-turned frontal border; second and third antennal joints cylindrical; flagellum slender, lodged in the orbital hiatus. Except for a brush on their inner margin the external maxillipeds are devoid of hairs.

Chelipeds subequal, upper border of palm strongly crested; outer surface more or less roughened by longitudinal and transverse ridges, which, when strongly developed, form a network (like the veins of a leaf). Propodi, carpi, and meri of walking legs flattened, their upper border with a strong crest; meri moreover with a crest on their under and inner borders, which unite at a short distance from the posterior border. In the fourth and fifth legs this feature is not always distinct, especially in the last pair of legs; here the inner crest is bent downwards, but does not always reach the lower crest. The under border of the propodi is never crested, but provided with a strong bunch of hairs.

Colour and pattern. As already stated by De Man (1929) no two specimens are absolutely alike. Mostly the carapace is covered with groups of white-lined dark spots, separated by uniformly dark patches; sometimes, however, these are missing; in others again the whole carapace is covered with small dark spots, which have no trace left of the white lining.

This species is easiest recognised by its lumpy appearance, by the union of the crests on the under border of the meri and by the absence of crests on the lower border of the propodi.

A typical *floridus* ♂ in the dry collection of the Leiden Museum was labelled Curaçao, coll. Dr. Epp, but this locality is certainly erroneous as *A. floridus* is not known from America.

The two specimens from Beo collected by the Snellius Expedition show a rather abnormal abdomen. In both specimens the abdomen resembles that of a ♀, though one specimen has the normal ♂ pleopods, while the other (larger specimen) has only two badly developed pleopods.

The palm of the chelipeds is sometimes smooth, e.g., in the ♀ and largest ♂ collected by Forsten in the Moluccas, in 2 ♀♀ from Gebe, and in the ♂♂ from Koh Chang.

Distribution. From the east coast of Africa and the Red Sea throughout the whole Indo-Pacific to Hawaii and Tahiti.

Atergatis frontalis De Haan

Cancer (*Atergatis*) *frontalis* De Haan, 1835, p. 46, pl. 14 fig. 3.
Atergatis frontalis A. Milne Edwards, 1865, p. 238; De Man, 1926, p. 205.
Atergatis integerrimus var. *frontalis* Paulson, 1875, p. 14.

Museum Leiden

China Sea: parts of a dry carapace, which probably belonged to De Haan's type. Laboean Badjau, Simaloer, W. of Sumatra; June 1913; E. Jacobson. — 1 ♀.

Not much can be concluded from the parts of the type; still it is plain that the frontal lobes are more prominent than in *Atergatis integerrimus* and

that the emargination between the median lobes as well as that between median and lateral lobes are deeper. It must be stated here that in the ♀ from Laboean Badjau these lobes are still more prominent and the grooves deeper; this specimen agrees more with De Haan's figure than the much damaged carapace.

Description of the ♀ from Laboean Badjau, which was already described by De Man (1926).

Median frontal lobes prominent, separated from each other by a small, but rather deep incision; the lateral frontal lobes are less prominent, and are separated from the median ones by a deep emargination. Outer half of orbital margin with three fissures; crested antero-lateral border divided into four lobes by three fissures. There is a ridge at the epibranchial angle, but no trace of a denticle. Outer maxillipeds covered with short hairs, longer hairs on the upper and inner margins.

Chelipeds and walking legs (the third and fourth left legs are missing) only slightly pitted; thereby appearing rather smooth. Meri of all the legs with a distinctly crested upper border; all the other crests on the legs, including those on the palms, only slightly developed, blunt (difference between this species and our specimen of *A. latissimus* (H. M. Edw.)). The propodi of the walking legs bear the usual tuft of hairs; moreover the carpi of the chelipeds on their inner border are armed with some short bristles; but no tufts of hairs are found on meri or ischia of the walking legs.

This species is probably best characterized by the shape of its front.

Distribution. This species previously was only known from the Japanese and Chinese Seas.

Atergatis latissimus (H. Milne Edwards)

Zozymus latissimus H. Milne Edwards, 1834, p. 384.
Atergatis sinuatifrons White, 1848, p. 284; Adams & White, 1848, p. 38.
Atergatis latissimus A. Milne Edwards, 1865, p. 237, pl. 14 figs. 1, 1a; Paulson, 1875, p. 14; De Man, 1926, p. 206; Balss, 1938, p. 37.

Museum Leiden

Poeloe Weh, N. Sumatra; April 1914; P. Buitendijk. – 1 juv.

This specimen in many particulars resembles *Atergatis integerrimus* (Lam.), but differs from it in the following respects:

1. By the form of the front, the median lobes are separated from the lateral ones by a deeper, rounded incision.

2. Only the upper border of the meri of the outer maxillipeds is armed with stiff hairs; furthermore the ischia and meri of these outer maxillipeds are covered with short hairs.

3. No trace of pectinate hairs on the meri and ischia of the walking legs.

4. Upper surface of carapace not deeply pitted.

5 Antero-lateral and frontal margins are of a light colour.

6. The crests on the inner border of the meri of the first and second walking legs are slightly developed, those on the fourth and fifth legs being better developed.

Odhner examined a photograph of the type of *Atergatis sinuatifrons* White and declared it synonymous with *latissimus*; when in London I examined White's holotype and I cannot but confirm Odhner's opinion.

Distribution. Mauritius, Marshall Islands, Oceania,? Australia.

Atergatis integerrimus (Lamarck)

Cancer integerrimus Lamarck, 1818, p. 272.

Atergatis integerrimus Alcock, 1898, p. 95 (with older literature and synonymy); Nobili, 1899, p. 257; Lanchester, 1901, p. 538; Schenkel, 1902, p. 576; Laurie, 1906, p. 394; Parisi, 1916, p. 178; De Man, 1926, p. 205; Urita, 1926, p. 12; Gravely, 1927, p. 144, pl. 25 fig. 45; De Man, 1929, p. 3; Gordon, 1931, p. 528; Gordon, 1934, p. 25, textfig. 14A[a]; Chopra & Das, 1937, p. 397.

Atergatis integerrimus typicus Balss, 1922, p. 124.

Snellius Expedition

Ake Selaka; shore and reef; May 28, 1930. — 6 ♂♂, 2 ♀♀, 16 juv.

Museum Leiden

Padang, Sumatra. — 1 ♀.
Bay of Batavia; 1027; W. C. van Heurn. — 1 ♂.
Bohol, Philippines; C. Semper. — 2 ♂♂.
Japan; P. F. von Siebold. — 1 ♀.

Siboga Expedition

Sta. 78, Loemoeloemoe Shoal, Borneo Bank; reef; June 10, 11, 1899. — 1 very small specimen.

Sta. 115, east side of Pajoenga Island, Kocandang Bay; reef; July 9-11, 1899. — 1 young specimen.

Sta. 169, off Atjatoening, west coast of New Guinea; reef; August 23-25, 1899. — 1 young specimen.

Museum Amsterdam

4 miles north of Klampis, E. Java; January 4, 1908; Gier VI, Exp. 2. — 1 ♀.

Near Tandjoengpandan, Billiton; September 30, 1909; S.S. "Pharus". — 1 young specimen.

United States National Museum

Sriracha, S. E. Siam; February 5, June, 1927. — 2 ♂♂.
Misaki, Sagami, Japan; 1916; Albatross. — 1 ♂.

Museum Copenhagen

Malay Peninsula or Sumatra; 1901; M. Jensen. — 1 ♂.
Onrust, Java Sea; reef; April, 1929; Th. Mortensen. — 1 ♂, 2 ♀♀, 3 juv.
Onrust, Java Sea; May 1929; Th. Mortensen. — 1 ♂.

Description based on the ♂♂ from Bohol.

Carapace without traces of regional divisions, except for two creases which indicate the cardiac region. Anterior and antero-lateral parts of the carapace rather distinctly pitted. Front bilobed; orbit with three faint sutures; crested antero-lateral margin with traces of three fissures. The typical specimens show no trace of an epibranchial spine, which is present in the variety *subdentatus*; a ridge, however, is always visible at this angle. Antennulae and antennae as usual for the genus. The maxillipeds are rather hairy, as was already remarked by De Man (1929); generally there is a fringe of hairs along the upper border and some strong hairs on the inner and upper halves of the meri; inner border of ischia hairy.

Chelipeds as a rule equal (unequal in 1 ♂ from Bohol and 1 ♂ from Ake Selaka); the outer surface of the palm somewhat roughened and pitted; crest on the upper border not so sharp as is usual for the genus; a ridge on the outer surface is not always distinct. Meri and ischia of the walking legs mostly with tufts of hairs; meri with crests on upper, inner, and lower borders; these crests never unite. Under margin of propodi crested too, and armed with the usual tuft of hairs; under margin of carpi never crested.

In small specimens the sternum is granular; in the smaller specimens (e.g., in those from Ake Selaka with cb. of 1 cm) the epibranchial ridge is so poorly developed that often no trace of it is left; then the specimens strongly resemble *roseus*. In fact we are unable to separate them and the only reason that, e.g., all the young specimens from Ake Selaka are placed in *integerrimus* is that no adult specimens of *roseus* were collected here. Seven of these young specimens have a white margined carapace; they are all more or less pitted, the smallest, however, is not pitted at all; the antero-lateral fissures are more or less distinct, sometimes scarcely so. I have compared a pleopod of a ♂ from Ake Selaka with the figure given by Gordon (1934), they agree closely, but for the fact that the spine placed before the three long hairs is lacking and that the four hairs following these three are longer.

Distribution. From Zanzibar, Mauritius, Ceylon, and the Mergui Archipelago to the Philippines, Hongkong, and Japan.

Atergatis integerrimus var. **subdentatus** De Haan

Cancer (Atergatis) subdentatus De Haan, 1935, p. 46, pl. 3 fig. 1.
Atergatis subdentatus A. Milne Edwards, 1865, p. 236.
Atergatis integerrimus var. *subdentatus* Ortmann, 1894a, p. 462; Balss, 1922, p. 124.

Museum Leiden

Japan; D. W. Burger. — 1 ♂, type.
Moluccas?. — 1 ♂.

Both dried specimens strongly resemble *integerrimus*. The points of difference between the present form and *A. integerrimus* are, as already remarked by Ortmann (1894), of minor importance, and therefore Ortmann regards *A. subdentatus* as a variety of *A. integerrimus*. The differences are:

1. The upper border of the palm is rounded, with only a slight trace of a crest at the base.

2. The dentiform epibranchial tubercle is weakly developed; but a ♀ from the Amsterdam Museum ("Gier" material) belonging to *integerrimus* has the tubercle, especially that on the right side, as strongly developed as in our type specimen of *subdentatus*.

3. No hairs on meri and ischia of the walking legs.

Atergatis reticulatus De Haan

Cancer (Atergatis) reticulatus De Haan, 1835, p. 47, pl. 3 fig. 4.
Atergatis reticulatus A. Milne Edwards, 1865, p. 239; Paulson, 1875, p. 15; Ortmann, 1894a, p. 463; Klunzinger, 1913, p. 150; Balss, 1922, p. 124; De Man, 1926, p. 207; Gordon, 1931, p. 528; Gordon, 1934, p. 25, textfig. 14Ab.

Museum Leiden

Japan; P. F. von Siebold. — 2 ♀♀, cotypes.
Japan. — 1 ♂.
Amoy, China; G. Schlegel. — 1 ♂.

Description.

Regions of the carapace delimited by rather deep grooves; upper surface irregularly pitted; larger part of 3 M smooth (in De Haan's cotypes, however, this region too is pitted). The pits are of different sizes; groups of them are situated in depressions, separated from each other by small ridges; thereby the whole carapace shows a somewhat reticulated appearance, especially near the antero-lateral and frontal borders; small granules give a rugose appearance to the surface near the posterior and postero-lateral borders. This rugosity is not distinctly visible in the types.

The sternum is, except in its anterior part, pitted and finely granular; furthermore it possesses small hairs near the bases of the legs; the abdomen is pitted.

Frontal margin bilobed; outer part of orbital margin with the usual three sutures, while the strongly crested antero-lateral margin shows traces of two sutures. At the epibranchial angle there is a ridge, but there is no tubercle. Meri and ischia of outer maxillipeds with short hairs.

The legs show the same pitted, slightly rugose appearance as the carapace. Meri of chelipeds sharply crested; the crest on the upper border of the palm is rather blunt. The walking legs have the upper border of propodi, carpi, and meri crested; the lower borders of propodi and ischia are sharply crested too, as is the inner border of the meri; the crests on the meri never unite. Ischia with some tufts of hairs; in the types traces of these tufts are found on the meri too.

In one of the ♂♂ from Bohol the outer surface of the carpi of the walking legs is provided with a rather strong median crest; in the other ♂, however, this crest is less strongly developed; but generally, also in the other specimens, a ridge is visible.

This species is recognised at once by its rugulose appearance.

Distribution. Japan and China.

Atergatis roseus (Rüppell) (fig. 5b)

Carpilius roseus Rüppell, 1830, p. 13, pl. 3 fig. 3.

Atergatis roseus Alcock, 1898, p. 97 (with older literature and synonymy); Lanchester, 1900, p. 730; Nobili, 1901, p. 12; Nobili, 1906a, p. 229; Stebbing, 1910, p. 207; Lenz, 1912, p. 3; Klunzinger, 1913, p. 148; Laurie, 1915, p. 443; Stebbing, 1917, p. 437; Stebbing, 1920, p. 267; Balss, 1924, p. 6; Gravely, 1927, p. 144.

Snellius Expedition

Kafal, Misool Group; shore and reef; October 3, 5, 1929. — 1 ♂, 1 ♀, 1 juv.
Sapoeka Besar, Postiljon Islands; December 21-23, 1929. — 4 ♀♀, 1 young specimen.
Lembeh Strait; September 25, 1930. — 1 ♂.

Museum Leiden

Red Sea; 1880; R. Kossmann. — 1 small ♀, 1 juv.
Red Sea; E. Rüppell. — 1 ♂, 1 ♀.
Bay of Batavia; 1927; W. C. van Heurn. — 1 young specimen.

United States National Museum

Apia, Samoa; outer coral reef at low tide; July 1, 1902. — 1 ♂.
Apia, Samoa; July, 1902. — 1 ♂, 1 ♀.

Description.

Dorsal surface of carapace irregularly pitted, especially near the frontal and antero-lateral margins; only the cardiac region indicated by faint creases. Frontal margin with a slight incision; not divided in median and lateral lobes, but distinctly separated from the orbit; outer part of orbit with three closed sutures. Crest on the antero-lateral margin blunt and without any traces of fissures; the epibranchial angle without tooth or ridge. Antennae and antennulae typical for the genus. External maxillipeds on the upper and inner borders of meri and ischia with a brush of hairs, moreover the outer surface of these joints shows some long hairs. Sternum with small granules between the bases of the legs and the abdomen.

Chelipeds subequal, pitted; without ridges, with blunt upper border of palm. Propodi, carpi, and meri of walking legs with a crest on their upper border; lower border of propodi as well as lower and inner border of meri also crested; the crests of the meri never unite; meri and ischia with pectinate hairs.

♂ pleopod as in fig. 5b.

Colour uniformly brownish-red.

This species is easily recognised by the absence of a tooth or a ridge at the epibranchial angle; the young specimens, however, are not always easily separated from those belonging to *A. integerrimus* (Lam.). In some young specimens the fissures on the antero-lateral margin are still visible (e.g., in the specimens from the Red Sea, Kafal, Sapoeka Besar), if, moreover, the carapace is smooth (specimen from Kafal), they resemble *integerrimus*. The small specimens from Kafal and Sapoeka Besar show the white margin characteristic for the variety *marginatus* Rüppell.

The ♀ from the Red Sea collected by Kossmann bears a label "var. *rüppellii* Kossmann", which is Kossmann's name for the typical specimens; it agrees with the described ♂ from Lembeh Strait, but the crest on the palm is sharper. The young specimen from the same locality and collector was identified as *scrobiculatus* Heller; there is, however, not a striking difference between this specimen and the ♀ named *rüppellii*; the punctation is perhaps slightly less deep and the interspaces larger, but the specimen is much smaller; on the left side the antero-lateral margin shows two rather distinct sutures, on the right side these are practically invisible. In my opinion the specimen is only a young *A. roseus*.

Distribution. Natal, Mauritius, Red Sea, Persian Gulf, Karachi, coast of Madras, Singapore, Penang, Sulu Sea, Torres Strait, New Caledonia, Fiji Islands.

Atergatis tweediei Ward

Atergatis tweedici Ward, 1934, p. 13, pl. 1 figs. 3, 3a.

Ward's holotype of this species preserved at the British Museum distinctly is no *Atergatis* but probably a juvenile *Atergatopsis*.

The antero-lateral border of the smooth carapace is divided into four lobes, the posterior of these lobes is smallest, only tuberculiform. The slightly down-turned frontal border is very indistinctly four-lobed; there is only a very slight notch in the median, and each half is feebly concave and thereby divided into a large median and a much smaller lateral lobe. The carapace is only very faintly areolated.

The chelipeds and walking legs are smooth; chelipeds subequal. Near the upper margin of the movable finger there is a groove accompanied by a ridge, the cutting edge of this finger with four very small teeth; the cutting edge of the immovable finger with three larger teeth.

In the collection of the Leiden Museum there are some specimens labelled *Atergatis* which do not even belong to the genus:

A ♂ and a small ♀ from the Fiji Islands, coll. Mus. Godeffroy, which were labelled *Atergatis nitidus* A. M. Edw. (1865), by reexamination proved to belong to *Carpilodes cinctimanus* (White).

A ♂ in the dry collection labelled *Cancer* (*Atergatis*) *asperatus* De Haan (a description of this species is nowhere to be found), belongs to *Atergatopsis germanii* A. M. Edw.

Key to the here mentioned species

1. No ridge or tooth at the epibranchial angle . . . . . *roseus* (Rüppell)
1a. A tooth or at least a ridge at this angle 2
2. Upper surface of carapace with a raised reticulate pattern . *reticulatus* De Haan
2a. Upper surface without a raised pattern 3
3. Lower border of propodi not crested . . . . . *floridus* (L.)
3a. This border is crested 4
4. Meri and ischia of outer maxillipeds with numerous hairs. . *dilatatus* De Haan
4a. No thick layer of hairs on the external maxillipeds, but sometimes short and more scattered hairs are present 5
5. Median frontal lobes prominent, separated from the lateral ones by a deep emargination . . . . . *frontalis* De Haan
5a. These lobes are not so prominent and not so deeply separated from the lateral ones 6
6. No deep pits on the upper surface of the carapace; an emargination between median and lateral frontal lobes . . . . . *latissimus* (H. M. Edw.)
6a. Upper surface of carapace with deep pits; only a slight emargination between median and lateral frontal lobes; meri and ischia of walking legs with pectinate hairs . . *integerrimus* (Lam.)

Atergatopsis A. Milne Edwards

Atergatopsis germanii A. Milne Edwards

Atergatopsis germanii A. Milne Edwards, 1865, p. 257, pl. 11 figs. 1, 1b.

Museum Leiden

Condore, Indo-China. — 1 ♂, probably one of Milne Edwards's types.

New Guinea; S. Müller. — 1 ♂, and a set of mouthparts under the name of *Cancer (Atergatis) asperatus* De Haan.

Museum Copenhagen

Jolo, Philippines; 20-30 fathoms, sand, coral, scraper; March 19, 1914; Th. Mortensen. — 1 young specimen.

Description of ♂ from New Guinea.

Median lobes of the front smooth, broad, separated by a groove; the lateral lobes are much smaller and less projecting, separated from the orbital margin by a groove. Orbital margin granular, with the usual three fissures near the outer angle; infra-orbital angle tuberculiform. Of the four lobes of the antero-lateral margin the posterior is small, tuberculiform, and separated from the rather confluent others by a distinct incision; the whole margin is armed with somewhat sharp-pointed granules. The furrows on the upper surface of the carapace, especially those surrounding 3 M, are less distinct than in *granulatus* A. M. Edw.; near the antero-lateral border the upper surface of the carapace is covered with rather blunt tubercles, which give it a more roughened than granular appearance; short hairs too are implanted here. When seen under a lens the pterygostomian regions and the sternum are granular, the abdomen slightly pitted. Inner angle of basal antennal joint rather broadly in contact with the down-turned edge of the front.

Chelipeds equal; outer surface of meri with small tubercles; upper margin with a granular crest, which ends in a tubercle; wrist with larger tubercles, still larger and sharper are those on the upper outer surface of the palm; the lower part of this surface is smooth; the cutting edges of the channelled fingers are provided with a row of teeth. Palm and wrist hairy, just as the antero-lateral part of the carapace. Meri, carpi and propodi of the walking legs rather flattened, upper border slightly cristate; outer surface of carpi and propodi granular.

This species differs from *granulatus* among other things by the row of teeth on the cutting edges of the fingers; from *lucasii* (Montrouzier) by the smooth front and the smooth half of the outer surface of the palm. A. Milne Edwards describes his specimens as devoid of pubescence, but when seen under a lens, however, our ♂ from Condore, which is varnished, shows hairs.

Distribution. This species is only known from the here cited localities.

Atergatopsis lucasii Montrouzier

Atergatopsis Lucasii Montrouzier, 1865, p. 160.

Atergatopsis lucasii A. Milne Edwards, 1865, p. 256, pl. 13 figs. 1, 1a; A. Milne Edwards, 1873, p. 190; Balss, 1935, p. 137.

Description of a ♂ from Aor Island, South China Sea, 6. 1939.

The broad and granular median lobes of the front are separated from each other by a rather narrow groove; the lateral lobes are much smaller, blunt and also granular; they are practically fused with the supra-orbital margin. Upper and lower orbital margins granular; the inner lower orbital angle slightly tuberculiform. The beaded antero-lateral margin is very indistinctly four-lobed. The grooves on the upper surface of the carapace are rather shallow; practically the whole surface is covered with brown hairs and with granules, which are rather small on the posterior part of the carapace; the posterior part of 3 M is devoid of granules; there are very few hairs present, and this small part of the carapace is pitted. Pterygostomian region as well as sternum are granular and hairy; the ♂ abdomen is smooth with a few short hairs. The basal antennal joint slightly clasps the down-turned edge of the front.

The chelipeds are slightly unequal; the outer surface of the meri is hairy and granular near its upper margin, on the upper margin the granules are larger. The granules on the outer surface of the wrist and the palm are much larger; both surfaces are hairy too, apart from the distal end of the palm which is smooth; a large part of the inner surface of the palm is smooth too. Of the dark coloured fingers the movable one is deeply channelled, and has three small teeth on its cutting edge; the cutting edge of the immovable finger also bears three white-topped teeth, and this finger too is channelled near its lower margin. The walking legs are granular and hairy; long yellow hairs are implanted near the upper margin of the joints.

Distribution. This species seems to be very rare. It was described by Montrouzier from Art Island, New Caledonia; A. Milne Edwards only mentions the same specimens; Balss states having seen a ♂ from Palau, but gives no description. The here described ♂ was found at Aor Island by Mr. M. W. F. Tweedie of Singapore. During his European leave Mr. Tweedie brought the specimen over and kindly offered me the opportunity of describing it. The specimen is incorporated in the collection of the Raffles Museum.

Atergatopsis signatus (Adams and White)

Carpilius signatus Adams & White, 1848, p. 37, pl. 10 fig. 1.

Atergatopsis frauenfeldi Heller, 1861, p. 311, pl. 1 fig. 10; A. Milne Edwards, 1865, p. 258; Nobili, 1906a, p. 234.

Atergatopsis signatus A. Milne Edwards, 1865, p. 253; Hilgendorf, 1878, p. 787; Klunzinger, 1913, p. 154, pl. 5 figs. 8a, b; Bouvier, 1915, p. 114; Stebbing, 1920, p. 267.

Atergatopsis flavo-maculatus A. Milne Edwards, 1865, p. 254, pl. 12 figs. 1, 1b; Lenz, 1905, p. 340, pl. 47 fig. 7; Lenz, 1910, p. 546.

Atergatopsis signata Rathbun, 1911, p. 214, pl. 17 fig. 7; Balss, 1924, p. 6; Balss, 1935, p. 137.

Snellius Expedition

Kera near Timor; November 15, 16, 1929. — 1 ♂.

Siboga Expedition

Sta. 33, Bay of Pidjot, Lombok; trawl, dredge and shore exploration, 22 m and less; March 24-26, 1899. — 1 young specimen.

Sta. 133, off Liroeng, Salebaboe, Takaud Islands; trawl, dredge and reef exploration, up to 36 m; July 25-27, 1899. — 1 ♂.

Sta. 248, off Roemahloesi, north point of Tioor; reef; December 4, 5, 1899. — 1 young specimen.

Description.

Front with a rather deep and broad median incision. Median lobes broad, slightly projecting, the lateral ones much smaller and still less projecting, separated from the upper orbital border by a small notch. Orbital margin with three fissures near the outer angle; infra-orbital angle rather strongly projecting, tuberculiform. Antero-lateral margin with four lobes; the anterior two of about equal length, the third much longer, and the fourth smallest of all, a small tubercle ending in a short ridge on the carapace. Upper surface of carapace smooth, not granulated, only slightly pitted when seen under a lens. The furrows delimiting the regions are shallow and faint. Under surface of carapace pitted too. Basal antennal joint rather hollowed out for the implantation of the second segment; the inner lobe clasping the down-turned edge of the front; the outer lobe not reaching to the top of the infra-orbital tubercle.

Chelipeds unequal, the left larger than the right; both have the upper part of the outer surface of the palm roughened and the lower part smooth; in the larger cheliped these two parts are separated by a ridge which is placed just below the middle of the outer surface of the palm. Carpi pitted, with a tubercle at the inner angle; meri smooth. Fingers channelled; immovable finger with three teeth on the cutting edge; the index with four smaller ones (the anterior is very small). Walking legs not cristate, pitted; dactyli covered with a felt and some longer hairs.

Distribution. Until now this species was only known from the western part of the Indo-Pacific; the here cited localities are the first records from the Malay Archipelago.

Atergatopsis tweediei Balss

Atergatopsis granulatus Miers, 1884, p. 529, parte; Miers, 1886, p. 123.
Atergatopsis tweediei Balss, 1938a, p. 55, pl. 3 figs. 1, 2.

Museum Leiden

Between Sumatra and Borneo, 1° 41′ 30″ S, 108° 16′ E; from cable; 23 fath.; 1938; coll. R. F. Young. — 1 ♂.

W. of Sarawak, 4° 21′ 3″ N, 111° 58′ 50″ E; from cable; 43 fath.; 1938; coll. R. F. Young. — 1 small ♂.

Museum Amsterdam

Java Sea, 3° 58′ S, 109° 2′ 5″ E; October 27, 1907; Gier III, Exp. 24. — 1 ♂, 1 ♀.

Java Sea, 4° 4′ S, 113° 2′ E; 15½-17½ fath.; October 8, 1908; Gier XII, Exp. 5. — 1 ovigerous ♀.

Java Sea, 5° S, 111° 49′ E; 35 fath.; October 19, 1908; Gier XII, Exp. 15. — 1 ♂.

Description of ♂ from 3° 58′ S, 109° 2′ 5″ E.

The broad, granular median lobes of the front are separated by a narrow groove; the lateral lobes are much smaller, granular too, blunt, tuberculiform, and separated from the supra-orbital margin by a groove. Upper and lower orbital margins granulated; the upper margin with the usual three fissures; the infra-orbital angle rounded. Of the four lobes of the antero-lateral border, the posterior is smallest, being merely a granulated tubercle. The granules on this margin are rather sharply pointed. The upper surface of the carapace is granular near the antero- and postero-lateral borders; the rest of the upper surface is perfectly smooth and distinctly lobulated; 3 M is quite distinct; 2 M is fused with 1 M, and delimited by a distinct groove, a trace of a groove is found in the anterior part of 2 M. From the antero-lateral margin 2 grooves can be traced inwards delimiting 4 L; a very shallow groove separates 5 L from 6 L, these lobes are not delimited posteriorly. The pterygostomian regions and the sternum are granular and hairy; the abdomen is smooth and hairy. The basal antennal joint is hollowed and the inner angle slightly clasps the down-turned edge of the front.

The chelipeds are equal; the outer surface of the merus is hairy and covered with small granules; the granules on the outer surface of wrist and palm are much larger; those on the inner surface of the palm smaller again, while the anterior part of this surface is smooth. Fingers channelled; dactyli with 2 small teeth, and a broad flattened part; the immovable finger with a three-tipped molar-like tooth. Palm and wrist hairy as is the lateral part of the carapace. Walking legs granular and hairy.

These specimens differ from *granulatus* A. M. Edw. by the large smooth part of the carapace, which is also devoid of hairs. Miers's specimens from the "Alert", kept in the dry collection of the British Museum (Natural History), without doubt belong to this species; two smaller specimens in the same collection labelled Java Sea probably belong here too. Miers (1884, p. 123) mentions a small ♀ collected south of New Guinea; now this spirit

specimen in the collection of the above mentioned Museum is not a ♀ but a ♂ with broken abdomen and without pleopods, and probably belongs in this species; but here the lobulation of the carapace is obsolete and the anterior part of the palm is smooth.

The specimen from Marie Louise Island (Miers, 1884, p. 529) is no *Atergatopsis* at all.

Atergatopsis granulatus A. Milne Edwards

Atergatopsis granulatus A. Milne Edwards, 1865, p. 255, pl. 13 figs. 2, 2b; A. Milne Edwards, 1868, p. 70; Kossmann, 1877, p. 22; Nobili, 1906a, p. 235; Klunzinger, 1913, p. 156; Balss, 1924, p. 6; Monod, 1938, p. 122, fig. 14.

nec *Atergatopsis granulatus* Miers, 1884, p. 529; Miers, 1886, p. 123.

Description of ♀ from Macclesfield Bank.

Front 4-lobed; the median lobes rather broad, granular, and separated from each other by a rather narrow groove; the lateral frontal lobes are much smaller, granular too and separated from the upper orbital margin by a groove which is very indistinct in this specimen, but more distinct in a larger ♀ from Karachi. The whole upper and lower orbital margins are granular; their lower inner angle slightly tuberculiform. The granular antero-lateral margin is, just as in the other species, very indistinctly four-lobed, the posterior lobe is smallest, tuberculiform. The whole upper surface of the carapace is granular, the granules being largest near the lateral margin; shorter and longer dark brown hairs are implanted all over the carapace. The lobulation of the carapace is distinct; 3 M is quite distinct, 1 and 2 M are fused, surrounded by a groove, and there is a trace of a groove anteriorly on its median part. From the antero-lateral margin a groove can be traced delimiting 4 L anteriorly and reaching the groove surrounding 1 and 2 M; a much shorter groove, also departing from the antero-lateral margin, delimits 4 L posteriorly; this groove becomes very indistinct while running upwards and separating 4 and 5 L. The pterygostomian region is granular and hairy; the abdomen smooth and hairy. The basal antennal joint is hollowed; its inner angle just clasps the down-turned edge of the front.

The equal chelipeds have the outer surface of the meri granular (the granules are largest near the upper and lower margins) and hairy; the granules on the outer surface of wrist and palm are much larger, those on the inner surface of the palm smaller again, and here the anterior part is smooth. Both palm and wrist are hairy with longer and shorter hairs, just as on the carapace. The fingers are channelled; the movable finger with two small teeth and a larger one, the immovable finger with only one molar-like

tooth; the fingers of the chelipeds are light coloured. The outer surface of the joints of the walking legs is granular and hairy.

The differences between *granulatus* and *tweedici* are the following: the carapace and walking legs of *granulatus* are far more granular and hairy than those of *tweedici*; the fingers of *granulatus* are of a light coloration, those of *tweedici* are dark. Much as I regret I cannot point out the differences between the pleopods of the ♂♂ of both species as no *granulatus* ♂ has been examined.

The here described ♀ is preserved in the collection of the British Museum (Natural History), it was identified by A. Milne Edwards, as already stated by Balss (1938, p. 55); moreover I examined in the said collection an ovigerous ♀ from Kurrachee, leg. James A. Murray, which belongs in this species; the young specimen from Marie Louise Island which is no *Altergatopsis*, and the very young specimen collected by the Challenger Expedition south of New Guinea which probably is a *tweedici*.

Key to the East Indian species of *Altergatopsis*

1. Cutting edge of the immovable finger with one molar-like tooth 5
1a. Cutting edge of the immovable finger with 3 small teeth 2
2. Front strongly projecting . . . . . *globosa* Balss
2a. Front not so strongly projecting 3
3. Upper surface of carapace perfectly smooth, without hairs or granules . . . . . *signatus* Adams & White
3a. At least part of the upper surface of the carapace granular 4
4. The whole upper surface of the carapace non-hairy; the antero-lateral part granular, the median and anterior parts smooth or slightly pitted *germanii* A. Milne Edwards
4a. The whole upper surface of the carapace hairy and granular, except the hinder part of 3 M . . . . . *lucasii* Montrouzier
5. The whole upper surface of the carapace granular and hairy . . . . . *granulatus* A. Milne Edwards
5a. Only the antero-lateral part of the carapace is granular and hairy . . *tweedici* Balss

Balss provisionally places *globosa* in this genus, stating that it is very similar to *Actaea* (*Banareia*) *inconspicua* Miers; I have seen no material of either species, and am unable to decide this question.

Zosimus Leach

Zosimus aeneus (Linnaeus) (fig. 6a)

Cancer aeneus Linnaeus, 1758, p. 630.

Zozymus aeneus Alcock, 1898, p. 104 (with older literature and synonymy); Nobili, 1906a, p. 235; Stimpson, 1907, p. 42; Lenz, 1910, p. 546; Odhner, 1925, p. 83; André, 1931, p. 649; Ward, 1932, p. 243; Chen, 1935, p. 101.

Zosimus aeneus Boone, 1934, p. 99, pls. 50-53 (with older literature).

Zozymus äneus Klunzinger, 1913, p. 164, pl. 5 fig. 12.

Zoozymus aeneus Balss, 1922, p. 124; Balss, 1938, p. 38.

Snellius Expedition

Wotap, Tenimber Islands; shore or reef; October 20-23, 1929. — 1 small ♂.
Boo Islands; October 5, 1930. — 1 ♂.

Museum Leiden

Jiddah; 1881; J. A. Kruyt. — 3 ♀♀.
Laboean Badjau, Simaloer, W. of Sumatra; June 1913; E. Jacobson. — 7 ♂♂, 18 ♀♀.
Noordwachter Island, Java Sea; 1891; A. G. Vorderman. — 1 ♀.
Java. — 1 ♂, 1 ♀.
Timor; 1863; G. F. Wienecke. — 1 ♀.
Timor; H. C. Macklot — 4 ♂♂, 1 ♀, 1 specimen with Sacculinid and 3 carapaces.
Kisar, near Timor; 1898; K. Schädler. — 1 ♂.
Wahai, Ceram; E. W. A. Ludeking. — 1 ♂.
South coast of Ceram; 1864; D. J. Hoedt. — 3 ♀♀.
Amboina; 1864; E. W. A. Ludeking. — 3 ♂♂.
Moluccas. — 1 ♂, 1 ♀, 1 carapace.
New Caledonia; Frank. — 1 ♂.

Siboga Expedition

Sta. 133, off Liroeng, Salebaboe, Talaud Islands; trawl, dredge and reef exploration, up to 36 m; July 25-27, 1899. — 4 ♂♂, 2 ♀♀.
Sta. 144, anchorage north of Damar Island; reef; August 7-9, 1899. — 1 ♂.
Sta. 193, Sanana Bay, Soela Islands; reef; September 13, 14, 1899. — 3 ♂♂.
Sta. 213, Salajar; reef; September 26-October 26, 1899. — 1 ♀.
Sta. 225, anchorage south of Lucipara Islands; reef; November 8-10, 1899. — 1 young specimen, 2 ovigerous ♀♀, 2 ♂♂.
Sta. 248, off Roemaloesi, north point of Tioor Island; reef exploration, dredge and townet; December 4, 5, 1899. — 1 ♂.
Sta. 282, anchorage between Noesa Besi and the N. E. point of Timor; reef; January 15-17, 1900.

Museum Amsterdam

Mauritius. — 1 ♂, 1 ♀.
West Nias, W. of Sumatra; J. P. Kleiweg de Zwaan. — 1 ♀.
Leksoela, Boeroe, Moluccas; January, 1921; L. J. Toxopeus. — 1 ♀.

United States National Museum

Niuafou Islands; October 5, 1930; H. C. Kellers, Naval Eclipse Exp. — 1 ♀
Apia, Samoa; coral reef; July 1902; U. S. Fish Comm. — 1 ♀.
Apia, Samoa; 1902; U. S. Fish Comm. — 2 ♂♂.
Society Islands; G. Morgan Clements. — 3 ♂♂, 4 ♀♀.
Okinawa, Japan; 1906; Albatross. — 1 ♀.

Museum Copenhagen

Canonniers Point, Mauritius; reef; October 1929; Th. Mortensen's Java-South Africa Exp., 1929-1930. — 1 ♂.
Loyalty Islands; 1-2 m; June 26, 1934; Monsunen Exp. — 1 ♀.

Description.

Carapace convex in both directions; regions well indicated and separated by rather deep furrows; in the furrows short, brown hairs, which in some specimens are only scantily developed, but the furrows are never devoid of hairs. The regions of the posterior part are distinctly lobulated, lobules in the form of rounded smooth tubercles, symmetrically disposed. On the anterior and antero-lateral part the lobulation is only faintly indicated, e.g., on 2 M. Front bilobed, hardly projecting beyond the level of the orbit; tumid orbital margin with four sutures; infra-orbital angle tuberculiform. Antero-lateral border crest-like, divided into four lobules; the posterior is smallest, dentiform, and the third broadest. The transversely folded antennulae are separated by a rather broad septum; basal antennal joint rather broadly in contact with the down-turned edge of the front. Under surface of carapace smooth; hairy near the antero-lateral border and granular near this border and on the sternum between anterior margin and apex of abdomen.

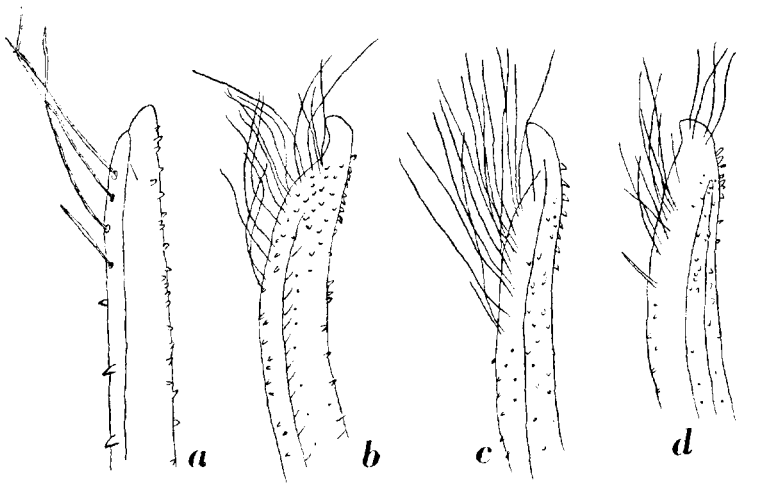

Fig. 6. a, *Zosimus aeneus* (L.), apex first pleopod, ♂ from Wotap; b, *Zosimus demani* (Odhner), apex first pleopod, ♂ from Madoera Strait; c, *Zosimus gemmula* (Dana), apex first pleopod, ♂ from Koepang; d, *Zosimus pilosus* (A. Milne Edwards), apex first pleopod, ♂ from New Caledonia. × 50.

Upper border of arm of chelipeds crested; that of the wrist blunt, and ending in a spine; at the base of this spine the outer surface of the wrist is granular and hairy; a longitudinal furrow divides this surface into an upper and a larger lower part, the latter with many transverse furrows, which give it a lobulated, rugose appearance; on the upper part the furrows

are less deep, the lobules more tuberculiform. Upper border of palm crested; small part of the outer surface rugose and the larger part with tubercles in nearly linear arrangement; the furrows again are hairy. Fingers channelled; with strong molar-like teeth and tufts of hairs on their cutting edges; tips hollowed. Upper border of meri, carpi, and propodi of walking legs crested; inner surface of these crests with a thick fringe of hairs; outer surface of these joints more or less rugose and hairy; under margin of propodi with many short and some longer hairs; dactyli, except a small longitudinal smooth part, hairy up to the claw.

♂ pleopod as in fig. 6a.

In some specimens (from Jiddah, Labocan Badjau, and Canonniers Point, the more western localities), the carapace is far more distinctly lobulated in the anterior part of the carapace, especially on 2 M.

Distribution. From the Red Sea to Hawaii and Polynesia.

Zosimus demani Odhner (fig. 6b)

Zozymus pumilus De Man, 1888, p. 275, pl. 10 fig. 5.
Zozymus demani Odhner, 1925, p. 83.

Museum Leiden

Madoera Strait; January 1917; P. Buitendijk. — 2 ♂♂, 1 ♀.

Description.

Regions of carapace granular except the cardiac, which is nearly smooth, and the posterior part of 3 M, which is less distinctly granular than the rest; posterior part of carapace not divided into regions. A longitudinal groove divides the anterior part of 2 M into two lobules. Groves smooth, not hairy. Front with a rather broad median incision; sinuous, separated from the orbit by a groove. Upper orbital border not very tumid, granular; with two fissures near the outer angle; lower border granular, with one fissure; inner angle only slightly tuberculiform. Antero-lateral margin divided into four granular lobes by three grooves. The nearly transversely folded antennules are separated by a rather broad septum; basal antennal joint granular, in contact with the down-turned edge of the front. Pterygostomian region granular.

Chelipeds equal; anterior part of upper border of merus crested and granular; outer surface of wrist with granules in groups, separated by small grooves; inner surface of wrist and palm with small granules, which on the lower part of the outer surface tend to a linear arrangement; on the upper part of this surface of the palm they are placed in groups just as on

the wrist; those near the proximal end of the upper border are somewhat tuberculiform. Meri, carpi, and propodi of walking legs with crested upper border; outer surface of these joints granular, carpi and propodi moreover somewhat hairy; the granular and hairy dactyli with a short claw.

♂ pleopod as in fig. 6b.

Odhner (1925) states that *Zozymus pumilus* Jacquinot and Lucas is a *Zozymodes*, and that therefore the species De Man has described as *Z. pumilus* Jacquinot & Lucas, and which really belongs in the genus *Zosimus*, must be renamed. De Man described this species from the island Edam, Bay of Batavia; our specimens agree with his description.

Zosimus gemmula (Dana) (fig. 6c)

Zozymus gemmula Dana, 1852, p. 77; Miers, 1886, p. 134; De Man, 1902, p. 588, pl. 21 fig. 20.

nec *Zozymus gemmula* De Man, 1888, p. 273, pl. 10 fig. 4.

Snellius Expedition

Kafal, Misool Group; shore or reef; October 3, 5, 1920. — 1 ♂.

Koepang, Timor; reef and shore; December 5, 1929. — 2 ♂♂, 1 ♀.

Pasih Ipah, near Soela Mangoli and Taliaboe; shore; March 19, 1930. — 1 young specimen.

Obi Latoe; shore and reef; April 23-27, 1930. — 3 ♀♀ (2 ovigerous).

Ake Selaka, Kaoe Bay, Halmahera; shore and reef; May 28, 1930. — 2 ♂♂, 3 ♀♀ (1 ovigerous), 1 young specimen.

Siboga Expedition

Sta. 115, east coast of Pajoenga Island, Koeandang Bay, N. Celebes; reef; July 9-11, 1899. — 2 ♀♀.

Sta. 213, Salajar; reef; September 26-October 26, 1899. — 1 ovigerous ♀.

Sta. 311, Sape, east coast of Soembawa; reef; February 12, 13, 1900. — 1 small ♂.

Waingapoe, Soemba; April 21, 22, 1899. — 1 ♂, 1 ♀.

Museum Amsterdam

Zuid Island (probably one of the 4 "Zuid" Islands in the Malay Archipelago); reef. — 1 ♀.

Description.

Regions of the carapace well delimited, separated by rather broad and deep, smooth grooves; in some of these grooves, especially in the anterior part of the carapace, short dark hairs. Regions somewhat granular, some of them, e.g., 2 and 3 L at their apex, resemble granular tubercles. 2 M divided by a longitudinal groove into two parts, the outer being the larger; 2 L with a transverse rather indistinct groove. Regions of the posterior part flattened, less distinct and less granular. Front with a small median groove; mostly

more or less sinuous; nearly straight in the ♀ from Koepang; in the smallest ♂ from this locality the outer lobe is more distinct. Orbit with the usual three fissures, granular upper border, and tuberculiform inner angle. Antero-lateral margin flattened, crest-like; divided by three fissures into four lobes; the margin of the first lobe is straight near the orbit. Antennules folded transversely; separated by a rather broad septum; basal antennal joint granular, in contact with the down-turned edge of the front and prolonged into the orbital hiatus. Pterygostomian region granular and hairy; with a distinct line of granules near the pleural suture. Sternum and abdomen smooth; near the segmental sutures some hairs on the sternum.

Chelipeds equal, no crest on the upper border of the palm; palm as well as wrist lobulated and granular on the outer surface; the lobules separated by deep, well cut grooves, and surrounded by a fringe of short hairs at their base. In the middle of the palm the granules become linear in arrangement; each lobule consisting of a large, sharp, dentiform granule surrounded by smaller ones at their base; the lower part is only granular. Fingers channelled; the ridges with some granules near the base of the fingers; fingers blunt, hollowed; cutting edges with a row of teeth and some tufts of hairs. Meri short, granular and hairy on the anterior upper part of the outer surface; crest on the upper border divided into two by a rather broad incision; anterior part far smaller than the posterior. Outer surface of meri, carpi and propodi of walking legs granular; a longitudinal and some transverse grooves divide this surface into some flat lobules; all these grooves, of which only one is present on the meri, are hairy. Upper border of all these joints crested, but the crest on the propodi never reaches the anterior margin, the anterior third is not crested; an incision divides the crest on the carpi into a smaller distal and a much larger proximal part. On the merus of the fourth leg the crest is divided in the same way; on the other legs, a second rather broad lobe often follows the first, while the rest of the crest is formed by a row of spines.

♂ pleopod as in fig. 6c.

The ♂♂ from Koepang and Kafal and the smaller specimens from Ake Selaka have the upper surface less granular, and, especially in the posterior part, more pitted, while those from Kafal and Ake Selaka moreover are less hairy; the ♂ from Kafal has the crest on the meri of the fourth walking leg with a row of small spines. The young specimen from Pasih Ipah is only slightly granular and nearly devoid of hairs, while the young specimen from Ake Selaka has the carapace not yet distinctly divided into regions, nearly smooth and with only a few hairs.

There is a young specimen from Obi Latoe which probably belongs here;

the chelipeds agree with the given description and the crests on the walking legs too; the outer surfaces of the dactyli and propodi of these legs are provided with spines; the carapace with no distinct regions, smooth and devoid of hairs.

Distribution. Sulu Islands, Moluccas.

Zosimus gemmula var. **ceylonica** Laurie

Zozymus gemmula var. *ceylonica* Laurie, 1906, p. 395, pl. 1 fig. 7.

During my stay at the British Museum (Natural History) I compared Laurie's types of this variety with the 2 ♂♂ and the ♀ of *Zosimus gemmula* from Koepang brought in by the Snellius Expedition and described in the present paper. Of Laurie's types the largest specimen (a ♂) is intermediate between the two just mentioned ♂♂, the middle sized (a ♀) is of about the same size as our small ♂, while Laurie's third specimen (a ♂ again) is only slightly smaller than this ♀.

In our specimens from Koepang a distinct notch, continued as a distinct and hairy groove, separates front and orbit, while in Laurie's specimens at the utmost a very slight depression is left. This is probably the most striking difference between the typical species and the variety. Laurie enumerated the differences of the legs of the species and the variety, and for completeness' sake I will give here those between our specimens from Koepang and Laurie's types:

In Laurie's types the upper border of the meri of the fourth pair of walking legs is denticulated, the Koepang specimens have this border crested and the crest divided into two parts by a suture; the meri of the other legs are denticulated in the variety, while in the material from Koepang they are partly spinous, while the anterior part consists of two small lobes. In the variety the crests on carpi and propodi are continuous, while in the specimens from Koepang the carpal lobe is only small, not reaching the anterior end of the joint, thereby leaving a rather large gap between carpal and propodal crests. In the variety the fissure of the carpal crest is situated in the middle, while in the Koepang specimens this fissure is placed far more distally.

The palm of the chelipeds provides us with still another difference between species and variety; the upper border of the palm near its articulation with the wrist bears a granular tubercle. Now while in the species this tubercle is distinctly granular, not very prominent and with rounded borders, in the variety it attracts much more the attention, projecting backwards and inwards, being sharp-edged, flattened, and much less distinctly granular. In-

deed this tubercle provides us with probably the most conspicuous difference between species and variety.

Zosimus pilosus (A. Milne Edwards) (fig. 6d)

Zozymus pilosus A. Milne Edwards, 1867, p. 271; A. Milne Edwards, 1873, p. 208, pl. 7 fig. 2; Miers, 1886, p. 134; Alcock, 1898, p. 105.

Snellius Expedition

Tanah Djampea; diving hood, 2-3 m; February 21-22, 1930. — 1 ♂.

Museum Leiden

New Caledonia; A. Milne Edwards. — 1 ♂, probably one of the types.

Museum Amsterdam

New Caledonia; A. Milne Edwards. - - 1 ♂, probably one of the types.

Description taken from the ♂ from New Caledonia (Leiden Museum).

Regions of the carapace well defined, separated by distinct grooves; some of the regions lobulated; the anterior margins of regions and lobules always marked by a row of short, stiff, dark hairs; especially on the anterior two thirds of the carapace the lateral margins of the lobules too show such a fringe of hairs; in this part the lobules are slightly granular near their anterior margin. Front nearly straight with a median incision and separated from the not very tumid and slightly granular upper orbital margin by a small groove. Orbit with three sutures; on the left side a fourth is visible on the upper border, just behind the fringe of hairs. Antero-lateral margin with four granular, rounded lobes; the anterior practically not projecting. The nearly transversely folded antennulae are separated by a septum; the projecting inner angle of the basal antennal joint reaching the down-turned edge of the front; on the ventral side the antero-lateral lobes are granular, their lateral borders are marked by short hairs.

Chelipeds equal; wrist and palm lobulated; the lobules granular and separated by hairy grooves. Fingers fluted; basal parts of the ridges with some granules; cutting edges with some strong teeth; tips blunt and hollowed out; upper border of palm not crested. Upper border of meri, carpi, and propodi of walking legs strongly crested; the crest of meri and carpi notched at the distal end; outer surface of propodi and carpi nodular; the nodules flat and granular; the grooves that separate them filled with short hairs. Dactyli hairy and armed with a strong claw. Some longer yellow hairs along the inner surface of the crests and along the under margins.

♂ pleopod as in fig. 6d.

The ♂ from Tanah Djampea has the front not so straight and more distinctly four-lobed; the carapace more granular than in the here described ♂. The ♂ preserved in the collections of the Museum in Amsterdam too is more granular than the described ♂, while the front is more distinctly bilobed. In these points it resembles more the ♂ from Tanah Djampea than the here described ♂; in every other respect the specimen agrees with the here given description.

Distribution. Malabar coast, Andaman Islands, New Caledonia.

Key to the East Indian species of *Zosimus*

1. Upper border of palm crested . . . . . *aeneus* (L.)
1a. No crest on the upper border of the palm 2
2. Lobes of the antero-lateral margin not separated by distinct grooves; their upper surface smooth . . . . . *gemmula* (Dana)
2a. Lobes of the antero-lateral margin separated by grooves; their upper surface granular 3
3. Upper surface of carapace hairy. 4
3a. No hairs on the upper surface of the carapace . . . . . *demani* (Odhner)
4. Carapace lobulated; every lobe with a fringe of hairs on its anterior margin; upper surface of carapace slightly granular . . . . . *pilosus* (A. M. Edw.)
4a. Carapace less lobulated and less hairy; upper surface of carapace pitted . . . . *kükenthali* (De Man)

Lophozozymus A. Milne Edwards

Lophozozymus cristatus A. Milne Edwards (fig. 7a)

Lophozozymus cristatus A. Milne Edwards, 1867, p. 272; Alcock, 1898, p. 107 (with older literature).

Lophozozymus dentatus Doflein, 1900, p. 138.

United States National Museum

Society Islands; J. Morgan Clements. — 1 ♂.

Description.

Carapace rather broad; flat from side to side; anterior margin of regions marked by granules; grooves on the anterior and antero-lateral parts broad and hairy; 1, 2, 3, and 4 M fused; also 2 and 5 L, 1 and 3 L; 4 L distinct; no trace of 2 F, 1, 2, and 3 R, and 1 and 2 P. Front with a median groove and with distinct median lobes; the lateral lobes are less prominent. Orbit with the two usual fissures near the outer angle. Antero-lateral border cristiform; divided by three fissures into four lobes; the first two broad, the posterior ones smaller, more pointed and with a ridge on their upper surface. No distinct gap between this margin and the orbit. Pterygostomian region hairy; sternum and abdomen with some patches of longer and shorter hairs. Basal antennal joint smooth, broadly in contact with the down-turned edge of the front.

Chelipeds equal; meri with a high, sharp crest on the upper margin; near the anterior angle this crest is divided into two parts by a fissure; lower margin with a row of granules; near the upper border the outer surface is hairy. Outer surface of wrist for the larger, lower part granular and hairy; inner anterior border with a row of granules and two teeth, which are united at their base; upper margin of palm crested; upper part of outer surface granular and hairy; on the lower part of this surface some rows of granules. Meri, carpi, and propodi of walking legs with a broad, sharp crest on their

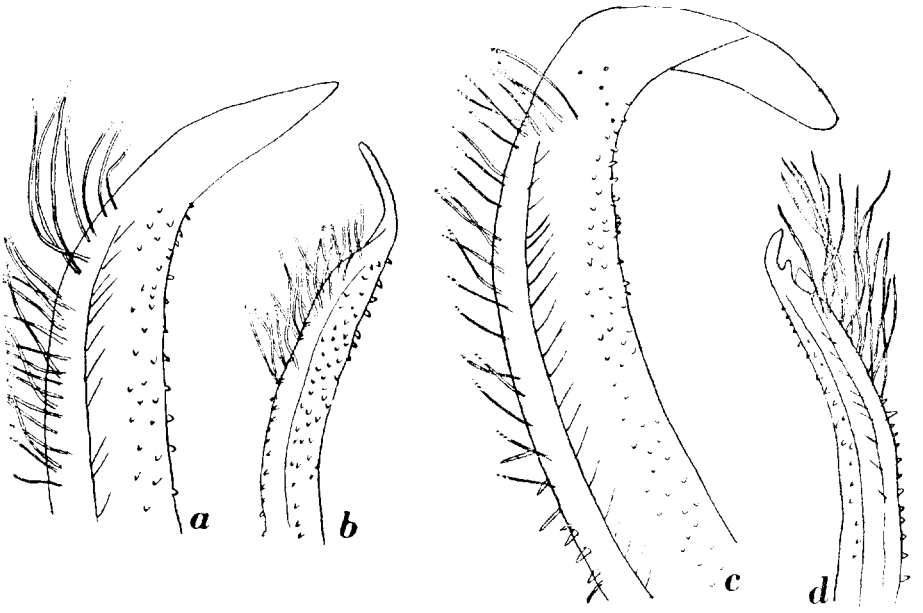

Fig. 7. a, *Lophozozymus cristatus* A. Milne Edwards, apex first pleopod, ♂ from Society Islands; b, *Lophozozymus dodone* (Herbst), apex first pleopod, ♂ from Upolu; c, *Lophozozymus pictor* (Fabr.), apex first pleopod, ♂ from Amboina; d, *Lophozozymus pulchellus* A. Milne Edwards, apex first pleopod, ♂ from Kilauea. × 50.

upper margin; meri crested on their lower and inner margins too; inner surface of these joints hairy and some tufts of stiff hairs near their upper margins; a large part of outer surface of propodi hairy. Dactyli with a sharp claw and hairy on their upper and lower surfaces.

♂ pleopod as in fig. 7a.

This ♂ agrees with A. Milne Edwards's original description, but for his remark on the chelipeds: "en dehors elles sont couvertes de grosses granulations"; in his figure, however, the lower part of the palm is smooth.

Ortmann's male and female, according to his own remarks, differ from Milne Edwards's description by the smaller first two antero-lateral teeth

and by their smooth palms; is this perhaps *octodentatus?* Alcock gives the differences between *cristatus* and *octodentatus,* but he makes no mention of the gap separating antero-lateral margin and orbit in *octodentatus,* a gap which is missing in *cristatus.* In Doflein's specimen the chelipeds are not hairy and it has a "feineres Netz der Thorakalfärbung".

Distribution. Ceylon, Queensland (when Ortmann's identification proves to be correct), New Caledonia.

Lophozozymus dodone (Herbst) (fig. 7b)

Cancer dodone Herbst, 1801, p. 37, pl. 52 fig. 5.

Lophozozymus dodone Alcock, 1898, p. 108 (with older literature and synonymy); Borradaile, 1902, p. 258; Rathbun, 1907, p. 39; Rathbun, 1911, p. 214; Edmondson, 1925, p. 52; Balss, 1938, p. 39.

Snellius Expedition

Wotap, Tenimber Islands; shore or reef; October 20-23, 1929. — 1 ♂.
Near Koepang, Timor; November 18-20, 1929. — 1 small ♂.
Kera, near Timor; November 22, 23, 1929. — 1 small ♀.
Near Koepang, Timor; shore and reef; December 3, 1929. — 2 ♂♂.
Obi Latoe; shore and reef; April 23-27, 1930. — 2 ♂♂, 3 ♀♀ (1 ovigerous) and 1 young specimen.

Museum Leiden

Upolu; Mus. Godeffroy. — 1 ♂ labelled as *Xantho nitidus* Dana.

Siboga Expedition

Sta. 93, Poeloe Sanguisiapo, Tawi tawi Islands, Sulu Archipelago; reef; June 24, 25, 1899. — 1 ♀.

United States National Museum

Keei, Hawaii; September 22, 1929; O. Degener. — 1 ♂.
Kilauea, Volcano House, Hawaii; O. Degener. — 1 ♀.
Hawaii; April 3, 1930; O. Degener. — 1 ♂.
Milolii, Hawaii; January, 1930; Pohina. — 2 ♀♀.

Description.

Carapace smooth, not hairy. Regions faintly indicated with only a few and faint traces of lobulation. Front faintly bilobed; only a short median incision present. Orbital margin with the usual but faint sutures; inner angle of the lower border tuberculiform. Antero-lateral margin four-lobed; first lobe confluent with the orbit; the second only slightly acuminate; the third and fourth more acuminate and moreover keeled. Basal antennal segment not very broad, and in contact with the down-turned edge of the front. Pterygostomian and sub-hepatic region smooth and not hairy.

Chelipeds equal; upper border of meri with a bilobed crest; upper border of wrist rounded, anterior border crested and with a fringe of hairs; upper and lower borders of the rather high palm crested; outer surface of palm and wrist roughened. Fingers short, pointed, only slightly channelled; with a row of teeth on their cutting edges.

♂ pleopod as in fig. 7b.

Some specimens (e.g., most specimens collected by the Snellius Expedition) have the palm and wrist granular; this probably is the var. *glabra* Ortmann. The ♂ from Keei probably belongs to *L. dodone,* but it differs in some respects:

1. The crest on the upper border of the palm only reaches half-way, and the lower border is not crested at all.
2. The outer surface of the palm is rough, pitted; that of the wrist less pitted.

In these respects it resembles *L. pictor,* but it differs from that species by the shape of the antero-lateral margin.

Distribution. Common throughout the Indo-Pacific, from East Africa to Hawaii.

Lophozozymus incisus (H. Milne Edwards)

Xantho incisus H. Milne Edwards, 1834, p. 397.
Lophozozymus incisus Alcock, 1898, p. 107 (with older literature and synonymy); Lenz, 1901, p. 461.

Snellius Expedition

Kera, near Timor; November 11-13, 1929. — 1 young specimen.

Museum Leiden

Timor; 1866; E. W. A. Ludeking. — 1 ♀.

Siboga Expedition

Sta. 213, Salajar; reef; September 26-October 26, 1899. — 1 ♀.

Description.

Carapace broad, slightly pitted; 1 M fused with 2 M, anterior border crested and bordered by a fringe of hairs; 1, 2, and 3 L are fused, somewhat heightened as is also the case with 4 L; their anterior margins are rather steep and accentuated by hairs; anterior margin of 5 L slightly heightened, uneven; 5 L itself is separated from 6 L by a shallow groove; cardiac region surrounded by grooves; the well defined intestinal region shows a median furrow. All the grooves of the carapace densely beset with hairs.

Front distinctly bilobed; fused with the orbit. Orbital border sharp, with the usual sutures; under margin concave, outer angle not tuberculiform. Antero-lateral margin four-lobed; the first two lobes are rounded; the others sharp, tooth-like and keeled; the keel prolonged on the dorsal surface of the carapace. Btsal antennal joint broad, with a few small granules, in contact with the down-turned edge of the front. Pterygostomian and sub-hepatic region with long hairs; a bundle of the same hairs at the outer angle of the external maxillipeds.

Chelipeds equal; upper border of merus crested, the crest divided into two by a fissure; near this crest the outer surface is hairy; whole outer surface with small granules; under margin granular; wrist without crest on the upper margin, surface hairy and granular; anterior margin crest-like. Upper border of palm crested; outer surface hairy in its upper part and furthermore provided with rather sharp granules which tend to a linear arrangement; under margin rounded. Fingers brown; channelled, sharply pointed and slightly crossed when closed; their cutting edges granular. Joints of the walking legs crested on their upper margins; with long hairs behind these crests. Lower and inner margins of meri crested too and inner margin hairy; large part of the outer surface of propodi covered with short hairs, mixed with longer ones; dactyli hairy too.

The here described ♀ from Timor agrees with Milne Edwards's description, but there are more than "quelques poils" on the carapace and especially on the legs; it agrees in every respect with the descriptions given by De Man and Alcock, with De Man's figure and with the figure of *superbus* as given by Dana. Lenz (1901), however, describes a large ♀ from Laysan with smooth palms, which thereby differs from our specimens and from those described by other authors; I am not sure that it really belongs here.

Our young specimen from Kera has the anterior margin of the gastric region and 5 L crested.

Distribution. India (Orissa and Malabar coasts), Moluccas, Laysan.

Lophozozymus intonsus (Randall)

Xantho intonsus Randall, 1839, p. 113.
Lophozozymus infosus Miers, 1884, p. 528.
Lophozozymus intonsus Rathbun, 1906, p. 846, pl. 8 fig. 8; Edmondson, 1925, p. 52.

United States National Museum

Hookena, Hawaii; reef; March 31, 1930; O. Degener, Pohina and Y. Iwasaki. — 1 ♂.
Kilauea, Volcano House, Hawaii; O. Degener. — 1 ♂.

Both specimens agree with Rathbun's description; the palm and the wrist, however, are roughened, not granular. According to Rathbun the species

comes near *pictor*, and according to Miers it is possible that it must be united with *dodone*.

Distribution. Hawaiian Islands.

Lophozozymus pictor (Fabricius) (fig. 7c)

Cancer pictor Fabricius, 1798, p. 335.

Lophozozymus superbus A. Milne Edwards, 1873, p. 205; De Man, 1888, p. 269; De Man, 1890, p. 53; Nobili, 1907, p. 388; Pesta, 1913, p. 42, pl. 3 fig. 2.

Lophozozymus octodentatus Alcock, 1898, p. 106 (with older literature and synonymy under the names *saxatilis, rumphii, octodentatus,* and *ephelíticus*); Ward, 1928, p. 29; André, 1931, p. 648; Balss, 1938, p. 40.

Lophozozymus ephelíticus Lanchester, 1900, p. 736.

Lophozozymus pictor Rathbun, 1924, p. 15; Ward, 1932, p. 243.

Lophozozymus edwardsi Odhner, 1925, p. 82.

Lophozozymus superbus (= *Lophozozymus edwardsi* Odhner) Balss, 1938, p. 40

Museum Leiden

Sinabang, Simaloer, W. of Sumatra; February, 1913; E. Jacobson. — 1 small ♀.
Java; H. Kuhl & J. C. van Hasselt. — a dorsal part of carapace.
Amboina; 1864; E. W. A. Ludeking. — 1 ♀.
Amboina; 1879; Schorel. — 1 ♂.
Upolu. — 1 ♂, 1 ♀.
New Caledonia; 1878; A. Milne Edwards. — 1 small ♂.
Philippines; 1880; C. Semper. — 1 ♂.
Condore, Indo-China. — 1 ♂.

Siboga Expedition

Sta. 115, east side of Pajoenga Island, Koeandang Bay, N. Celebes; reef; July 9-11, 1899. — ♂.
Sta. 213, Salajar; reef; September 26-October 26, 1899. — 1 ♀.

Museum Amsterdam

4° 32′ N, 98° 23′ E; N.W. Aroe-Bay, Malacca Strait; 47 m; cable-ship "Telegraaf", captain J. H. R. Schoo. — 1 ♀.
Neighbourhood of "Duizend eilanden", Bay of Batavia; September 26, 1907; Gier Exp. — 1 ♀.
Lesser Soenda Islands; December 18, 1909; H. J. M. Laurense. — 1 young ♀.
Amboina; M. M. Willemsz Geerooms. — 1 ♂.
Aroe Islands; van Stockum. — 1 ♂.
Locality unknown. — 1 ♂.

United States National Museum

Apia, Samoa; June, 1902; at mouth of river. — 1 ♂, 3 ♀♀ (1 ovigerous).
Apia, Samoa; July, 1902; outer coral reef at low tide. — 2 ♀♀.
Pago Pago, Samoa; August, 1902. — 4 ♂♂, 6 ♀♀ (2 ovigerous).

Description.

Carapace rather broad, smooth, with only a few short hairs on the ridge

of the fourth antero-lateral lobe and anterior to this ridge. Gastric region surrounded by grooves; lobe 3 and 4 L separated from each other and from the antero-lateral margin. Front narrowly cleft in the middle, slightly convex to the orbits. Orbital margin with the three usual sutures and separated from the antero-lateral margin by a wide gap. Of the four antero-lateral lobes the third is sharpest; the third and fourth are keeled. Basal antennal joint broad, in contact with the down-turned edge of the front. Sub-hepatic and part of pterygostomian region hairy.

Chelipeds equal; outer surface of the joints smooth; upper border of meri with a strong bilobed crest, the outer surface of the meri somewhat hairy near this crest and near the anterior margin. Wrist with two rather strong tubercles at the inner angle and a furrow in the anterior part of the outer surface; upper border of palm coarsely crested; fingers pointed, with some blunt teeth on their cutting edges. Upper borders of meri, carpi, and propodi of the walking legs strongly crested; on the inner surface some tufts of long hairs just behind the crest; outer surface of all these joints smooth. Lower and inner borders of meri crested and with some tufts of hairs; lower border of propodi hairy; dactyli hairy on upper and lower borders up to the claw.

♂ pleopod as in fig. 7c.

Coloration: on a yellow ground a network of red; gastric and branchial region almost entirely red; on the chelipeds red spots arranged in blotches and separated by white.

Our ♂ from Amboina shows the same differences from *cristatus* as enumerated by A. Milne Edwards; only the lobulation of the carapace is not much weaker, but the lobules are not marked by granules and hairs. In the smaller ♂ from Upolu, which was described by De Man, the palm of the cheliped is far less strongly crested; as these specimens come from the Museum Godeffroy it is probable that A. Milne Edwards has known these specimens; they were labelled *X. nitidus* Dana and show no gap between antero-lateral margin and orbit; this is also the case in the figure given by Pesta, according to Balss this is a juvenile character. The ♂ from New Caledonia named *L. superbus* A. M. Edw., probably one of his types, shows the gap, but here too the upper border of the palm is more rounded than in the described ♂ from Amboina, as it is only crested at the proximal end; all the hairs on carapace and legs are missing.

Distribution. Common in the eastern Indo-Pacific, from Singapore, the Philippines, and the Malay Archipelago through Australia (and there chiefly along the east coast) to Samoa and Marutea.

Lophozozymus pulchellus A. Milne Edwards (fig. 7d)

Lophozozymus pulchellus A. Milne Edwards, 1867, p. 273; A. Milne Edwards, 1873, p. 205, pl. 6 fig. 3; Ortmann, 1894, p. 458; ? Lenz, 1905, p. 348; Laurie, 1906, p. 399; Nobili, 1906a, p. 236; Lenz, 1910, p. 547; Rathbun, 1911, p. 214; Klunzinger, 1913, p. 162, pl. 5 fig. 11; Balss, 1922, p. 125; Edmondson, 1925, p. 52; Montgomery, 1931, p. 435; Balss, 1938, p. 40.

United States National Museum

Kilauea, Volcano House, Hawaii; O. Degener. — 1 small ♂ without legs or chelipeds.

Description of this ♂.

Carapace with distinct regions; lobulated; hepatic and anterior parts of branchial regions granular. A line of granules on 2 M, anterior to this line the proto-gastric lobe is granular; 3 M smooth, also its anterior part. Front bilobed; with a median groove; small outer lobes not separated from the orbit. Orbital margin granular (especially in its outer part), with the three usual, though indistinct sutures. Antero-lateral margin with four lobes; the anterior not separated from the orbit; not crested and granular. The second lobe is small, tooth-like; the third marks the broadest part of the carapace; the third as well as the smaller fourth lobe with a granular ridge. This keel of the fourth lobe is separated by a smooth part from a row of granules on 5 L, which is continued on 2 M by an indistinct row. Ventral surface of carapace granular, with larger granules on the sub-hepatic region. Basal antennal joint broad, in contact with the down-turned edge of the front.

♂ pleopod as in fig. 7d.

No trace of coloration left.

Distribution. From the Red Sea and the East African coast to the Riu Kiu Islands, Samoa, Laysan, and Hawaii.

Key to the East Indian species

1. Edge of antero-lateral margin rounded in the anterior part . . . *pulchellus* A. M. Edw.
1a. This edge is crested 2
2. First lobe of antero-lateral margin confluent and fused with the orbit . . . 3
2a. First lobe separated from the orbit by a gap 4
3. Grooves on carapace hairy; lower margin of palm rounded . . . *incisus* (H. M. Edw.)
3a. Grooves on carapace not hairy; lower margin of palm crested . . . *dodone* (Herbst)
4. Hands externally carinated . . . . . *intonsus* (Randall)
4a. Hands not carinate externally 5
5. Upper border of palm not or slightly crested . . . . . *pictor* (F.)
5a. Upper border of palm crested 6
6. Outer surface of hand granular and hairy . . . . . *cristatus* A. M. Edw.
6a. Outer surface of hand smooth . . . . . *simplex* De Man

Euxanthus Dana

Euxanthus exsculptus (Herbst) (fig. 8a)

Cancer exsculptus Herbst, 1790, p. 265, pl. 21 fig. 121.

Euxanthus melissa Alcock, 1898, p. 110 (with synonymy and the older literature);

Stimpson, 1907, p. 48, pl. 6 fig. 2; De Man, 1929, p. 3; Boone, 1934, p. 104, pl. 56.
Euxanthus exsculptus Urita, 1926, p. 13; Ward, 1932, p. 243; Balss, 1938, p. 41.

Snellius Expedition

Mamoedjoe; reef or shore; August 4, 5, 1929. — 1 specimen with Sacculinid.
Paleleh, Celebes; shore; August 21, 22, 1929. — 1 ♀.
Sissie, Misool Group; shore or reef; October 6, 1929. — 1 ♀.
Wotap, Tenimber Islands; shore or reef; October 20-23, 1929. — 2 young specimens.
Kera, near Timor; November 15, 16, 22, 23, 1929. — 1 small ♂, 1 ♀.
Beo, Karakelong, Talaud Islands; shore or reef; June 14-21, 1930. — 1 ♀.

Museum Leiden

Padang, Sumatra. — 1 ♂.
Java. — 1 ♂.
Timor; H. C. Macklot. — 2 ♀♀.
Amboina; 1864; E. W. A. Ludeking. — 1 ♀.
Moluccas. — 1 ♀.
Skroë, New Guinea; May, 1897; K. Schädler. — 1 ♂, 1 ♀.
New Guinea; S. Müller. — 1 ♀.
New Guinea; H. C. Macklot. — 1 ♂, 1 ♀.
Locality unknown; 1887; Mus. Godeffroy. — 2 ♀♀.

Siboga Expedition

Sta. 79b, Poeloe Kabala Doea, Borneo Bank; shore exploration; June 12, 13, 1899. — 1 ♂.
Sta. 131, off Beo, Karakelong, Talaud Islands; reef; July 24, 25, 1899. — 1 ♂.

Museum Amsterdam

Goenoeng Sitoli, Nias; J. P. Kleiweg de Zwaan. — 1 young specimen.

United States National Museum

Pago Pago, Samoa; August 1902. — 1 ♂.
Apia, Samoa; June 27, 1902; outer reef. — 1 ♂.
Apia, Samoa; coral reef; July, 1902. — 2 ♂♂, 1 ♀.

Description of ♂ from Java.

Carapace broad, convex in both directions; regions well marked and subdivided into smooth lobes. 1 and 2 F confluent; 2 M over its whole length divided into two lobes by a longitudinal groove; 3 M with a median part extending between the two inner lobes of 2 M; 1, 2, 3, 4, and 5 L distinctly separated; 2 and 3 R subdivided into many small lobules. Front prominent, bilobed; with a groove in the median, and separated from the orbit by a notch. Upper border of orbit tumid, but smooth; the rest of the margin forming an unbroken, slightly granular ridge; inner angle tuberculiform. Antero-lateral margin prolonged beneath the orbit; cut into five lobes; the anterior distinctly tuberculiform, the second lowest of all, the third more

pronounced, the fourth and fifth again distinctly tuberculiform; between the third and the fifth teeth the margin is granular and half-way between the fourth and fifth teeth there is on the right side a trace of a small sixth tubercle. Postero-lateral margin concave. Larger part of sub-hepatic region granular, anteriorly with a small, granular tubercle; pterygostomian and sub-branchial regions granular. The transversely folded antennulae with a rudimentary flagellum and a large tuft of hairs; the antennulae are separated by a rather broad septum with a median furrow. Basal antennal joint broad, granular, filling the space between the down-turned frontal border and the tuberculiform inner orbital angle. Epistome granular; sternum between maxillipeds and apex of abdomen granular; rest of sternum and abdomen with smooth sunken parts and pitted lobules. Outer maxillipeds broad, hairy along the distal and inner lateral margin; meri granular except for a U-shaped smooth

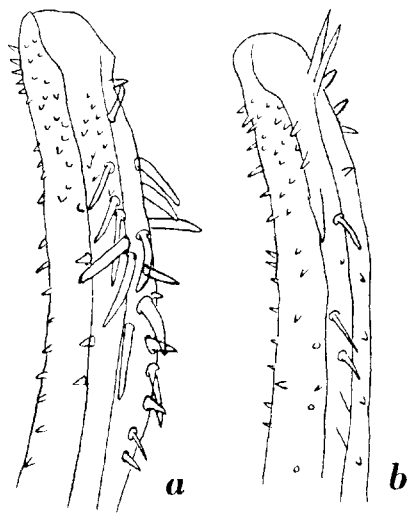

Fig. 8. a, *Euxanthus exsculptus* (Herbst), apex first pleopod, ♂ from Java; b, *Euxanthus sculptilis* Dana, apex first pleopod, ♂ from Kera. × 50.

furrow; ischia with a granular outer margin, rather deep smooth sulcus and the larger part of the inner half granular; exognath granular; palp setose.

Chelipeds equal; meri with a fringe of hairs on the upper border; lower surface and upper half of outer surface granular. Wrist with two tubercles, the posterior being the higher. Inner surface of palm granular; upper border rather sharp; upper part of outer suface with some nodules, one of which is situated at the base of the movable finger, another at the articulation with the wrist; lower part with two longitudinal ridges. Fingers with a row of

teeth at their cutting edges and spoon-shaped tips. Meri of walking legs with granular upper margin; the upper margin of carpi granular and cristate; upper and lower borders of propodi granular; dactyli for the larger part granular and hairy.

♂ pleopod as in fig. 8a.

The dark coloration of the fingers extend on the lower upper and for a larger part on the inner surface of the palm; often only the fingers are coloured.

The number of accessory teeth between the fourth and fifth antero-lateral teeth varies from one to two, it is not always the same on both sides of the carapace; the ♀ from Amboina, e.g., has two tubercles on both sides, the posterior is the larger, while the anterior is smaller on the right than on the left side; on the left side of the ♂ from Padang a very small second accessory tooth, merely an accumulation of granules, is visible.

The small specimens from Wotap, the small ♂ from Kera, and the 2 ♀♀ from unknown locality have the carapace somewhat roughened, it is perhaps possible that they belong to the var. *rugosa* Miers (1884).

Distribution. Indo-Pacific, from Ceylon to Rotuma, the Fiji Islands and Samoa

Euxanthus rugosus Miers

Euxanthus exsculptus var. *rugosus* Miers, 1884, pp. 517, 527; Borradaile, 1902, p. 259, fig. 41c; Bouvier, 1915, p. 288.

Euxanthus exsculptus var. *rugosa* Nobili, 1907, p. 389.

Euxanthus rugosus Rathbun, 1911, p. 215, pl. 18 fig. 1; Balss, 1938, p. 40.

Description of Miers's holotype, a small ovigerous ♀, preserved in the collection of the British Museum (Natural History).

Carapace convex in both directions; with the lobes well indicated and rather convex; 3 M and 1 P pitted, the others roughened by rather low though large granules. Each frontal half rather indistinctly bilobed; upper orbital margin tumid in its upper part at least; no denticle marks its outer angle; its lower inner angle tuberculiform. Antero-lateral margin prolonged to the buccal cavern, cut into 5 teeth and with the margin between the teeth granular.

Chelipeds equal; palm and wrist nodular; lower part of outer surface of palm with two granular ridges; the middle part of this outer surface with 3 granular ridges which are shorter, while the anterior two show a tendency to turn upwards; upper part of the outer surface of the palm with some granular tubercles. The whole palm resembles that of *sculptilis,* but in the latter species the upper part is rounded with some granules, while in ***rugosus***

it is sharper, the granules more numerous but smaller. The fingers too bear resemblance to those of *sculptilis* with their rather sharp ridges, granular in their posterior part.

The dark coloration of the fingers does not extend on the palm. The nodules on the walking legs are smaller and less distinctly granular. Miers's paratype, a larger ♀, too is preserved in the collection in London; furthermore I could examine there some specimens from Madagascar.

All these specimens of *rugosus* agree with *exsculptus* in having only 5 antero-lateral tubercles and by lacking the outer orbital denticle; they resemble *sculptilis* by the granulation of carapace and legs. It seems best to maintain *rugosus* as a separate species.

Euxanthus sculptilis Dana (fig. 8b)

Euxanthus sculptilis Dana, 1852, p. 75; Alcock, 1898, p. 111 (with synonymy and the older literature); Nobili, 1906a, p. 238; Boone, 1934, p. 107, pl. 57; Gordon, 1934, p. 28; Balss, 1938, p. 40.

Euxanthus huonii Lanchester, 1900, p. 735.

Snellius Expedition

Mamoedjoe; shore or reef; August 4, 5, 1929. — 1 ♀.
Maratoea; reef; August 14-18, 1929. — 1 ♂.
Kera, near Timor; November 15, 16, 22, 23, 1929. — 2 ♂♂.
Atapoepoe, Timor; reef; November 19, 1929. — 1 ♂.
Sapoeka Besar, Postiljon Islands; shore and reef; December 21-23, 1929. — 1 small ♂, 1 ♀.
Obi Latoe; shore or reef; April 23-27, 1930. — 1 young specimen.
Ake Selaka, Kaoe Bay, Halmahera; shore or reef; May 28, 1930. — 1 ♂.
Kaledoepa; August 27, 1930. — 1 ♂.

Museum Leiden

Moluccas; C. G. C. Reinwardt. — 2 ♀♀.
South Sea; Mus. Godeffroy. — 1 ♀.

Siboga Expedition

Sta. 172, Kisar; townet, reef exploration; August 26-28, 1899. — 1 ♂.

Description.

Carapace very broad and convex; regions well demarcated and subdivided into lobules by distinct, smooth and rather deep grooves. The lobules themselves covered with berry-like groups of granules. 2 M is over its whole length distinctly divided into two parts. Lobes with some hairs. Front bilobed; inner part of each lobe convex. Proximal part of upper orbital margin tumid and granular to the closed suture; for the rest, the upper and lower margins form an unbroken granular curve, with only a small tubercle

at its outer angle; lower inner angle tuberculiform. Antero-lateral margin prolonged to the buccal cavity; with six granular tubercles, the anterior of these small and situated on a lower plane; the edge between the tubercles granular. Postero-lateral margin concave. Sternum with smooth sunken and granular higher parts; ventral side of carapace granular. Basal antennal joint granular and prolonged into the orbit; the short flagellum is therefore situated in the orbit. Outer maxillipeds granular; ischia each with a smooth longitudinal sulcus; meri with a horseshoe-shaped sulcus. Outer surface hairy and a fringe of hairs along the inner margin.

Meri of chelipeds with a fringe of hairs along their upper border; the margins and the upper part of the outer surface granular. Upper margin of wrist granular, outer surface with granular nodules, the lower parts between the granules to a less marked extent granular too. Inner surface of palm slightly granular; upper part of the outer surface with two granular nodules, one at the articulation with the wrist, the other at the juncture with the movable finger; between these two nodules there are some rather sharp granules; median part with granular nodules; lower part with three granular ridges on a slightly granular surface. Fingers channelled; the ridges granular at their base; cutting edges distinctly toothed; tips hollowed. Propodi and carpi of the walking legs with granular nodules; meri of the last pair of legs granular too; all these joints with fringes of hairs along their margins; dactyli hairy up to the claw.

In the examined specimens of *exsculptus* and *sculptilis* the extent of the coloration of the immovable finger on the outside as well as on the inside shows a rather large variation. In the larger specimens it continues on the palm, in the smaller ones it only reaches the base of the fingers. Therefore this feature can not be used as a specific character, and consequently for the present (I have as yet not been able to examine type specimens of *sculptilis* and *huoni*) it seems best to regard *huoni* as a synonym of *sculptilis*. I agree with Gordon that the concavity of the postero-lateral margin (a character used by Lanchester) cannot be used either, as it varies with age.

Distribution. Persian Gulf, Andaman Islands, Moluccas, Queensland, Australia, Torres Strait, Fiji Islands, Tongatabu, Samoa, Tahiti.

Euxanthus herdmani Laurie

Euxanthus herdmani Laurie, 1906, p. 400, pl. 1 figs. 9, 9a; Rathbun, 1911, p. 215.

Siboga Expedition

Sta. 315, anchorage east of Sailoes Besar, Paternoster Islands; dredge; up to 36 m; February 17, 18, 1900. — 1 small ♀ 14 mm.

Description.

The type specimen preserved in the collection of the British Museum (Natural History) is much larger than the small ♀ collected by the Siboga Expedition; it is after much hesitation that I decided to bring both to the same species.

The front in both specimens protrudes, but much more so in Laurie's types than in the Siboga specimen. In the latter 2 M is not divided at all, while in Laurie's type it is distinctly separated into two lobes by a broad but not very deep longitudinal groove. The groove between 2 and 1 M and that anteriorly of 1 M is rather deep in the type, while in the Siboga specimen the first groove is shallow, of the second no trace even is left.

The upper inner orbital angle of Laurie's type is broad and prominent, much more so than the only slightly tumid upper orbital border in the specimen from Sailoes Besar, where the lower inner angle is by far more tuberculiform; in our specimen the frontal border can be traced to its outer end, while in the type it disappears behind the upper orbital angle.

In both specimens the antero-lateral margin shows 4 tubercles, while the border between the tubercles is granular.

Euxanthus punctatus A. Milne Edwards

Euxanthus punctatus A. Milne Edwards, 1865, p. 294, pl. 16 fig. 6; Balss, 1938, p. 40.

Snellius Expedition

Paleleh, Celebes; shore; August 21-22, 1929. — 1 small ♂.

Description.

The collection of the Snellius Expedition contains one small specimen, a ♂, which resembles *Euxanthus exsculptus,* but differs in the character of the antero-lateral margin. The anterior tubercle is present, but behind it the margin becomes rounded and cristate, while in *E. exsculptus* the second antero-lateral tooth is situated there. The other teeth of the antero-lateral margin all are present in our specimen. The wrists of the chelipeds bear a large posterior tubercle. The upper surface of the carapace is somewhat roughened. That part of the ventral surface that corresponds with the oval cavity of *Hypocolpus* is flat and smooth; in Milne Edwards's figure it is somewhat sharply bordered and probably concave. It is well possible that the specimen is an abnormal young of *exsculptus*; with no larger material at my disposal, I am unable to decide this question. Except for the original description and Balss's mention of it in his enumeration of the valid species of the genus *Euxanthus,* the present species has not been dealt with in the literature.

The dark colour of the fingers does not extend on the palm.

Distribution. "Indes orientales".

Key to the valid species of *Euxanthus*

1. Antero-lateral margin with 4 teeth 2
1a. Antero-lateral margin with more teeth 3
2. The anterior antero-lateral tooth is situated on a lower level than the others and slightly behind the orbit. No tooth at the level of L 1 . . *punctatus* A. M. Edw.
2a. No tooth slightly behind the orbit; the first antero-lateral tooth is situated at the level of L 1 . . . . . *herdmani* Laurie
3. Antero-lateral border with 5 teeth 4
3a. Antero-lateral border with 6 teeth . . . . . *sculptilis* Dana
4. The lobes of the carapace are not tuberculate 5
4a. The lobes of the carapace are covered by tubercles . . . *minutus* Edmondson
5. The surface of the lobes of the carapace is smooth; the 2nd and 3rd antero-lateral teeth are rounded, not sharp . . . . . *exsculptus* (Herbst)
5a. Lobes of the carapace roughened; 2nd and 3rd antero-lateral teeth sharp . . . *rugosus* Miers

This is only a very provisional key. There remains still some doubt as to whether *huoni* is really a synonym of *sculptilis,* and whether *herdmani* ought not to be placed under the synonyms of *punctatus*; *maculatus* Hasweli moreover is not included. The material examined is not large enough to solve these questions and moreover I have not been able to examine all types, if these are still available.

Hypocolpus Rathbun

Hypocolpus diverticulatus (Strahl)

nec *Cancer exsculptus* Herbst, 1790, p. 265, pl. 21 fig. 121.
Without name Savigny, 1809, pl. 6 fig. 3.
Cancer exsculptus Audouin, 1827, p. 268.
Cancer sculptus H. Milne Edwards, 1834, p. 376.
Melissa diverticulata Strahl, 1861, p. 103.
Hypocoelus sculptus Heller, 1861, p. 322; Heller, 1861a, p. 8; A. Milne Edwards, 1865, p. 295; Kossmann, 1877, p. 29; Miers, 1884, p. 206; Ortmann, 1894, p. 51; Bouvier, 1915, p. 288.
Hypocoelus sculptus? Hilgendorf, 1878, p. 788.
Hypocolpus sculptus Nobili, 1906a, p. 239; Klunzinger, 1913, p. 172, pl. 3 fig. 5; Balss, 1924, p. 7.
Hypocolpus diverticulatus Rathbun, 1911, p. 215; Balss, 1934, p. 510.
Hypocolpus exsculptus Stebbing, 1924, p. 236.

Museum Leiden

Red Sea; 1884; R. Kossmann. — 1 ♀.

Description.

Carapace well lobulated, pitted and with some rows of small granules. Front prominent, with a distinct median notch; no trace of lateral frontal lobes is found. Anterior half of the supra-orbital margin is a thickened

ridge, while the rest of the outer and the whole inner border is low, without sutures, formed by a row of granules, ending at the infra-orbital angle with a distinct granular tooth. Antero-lateral margin prolonged beneath the orbit to the end of the buccal frame; this margin can be divided into two parts:

1, a sharp posterior part, beginning at a small granular tubercle and marked by a row of small tooth-like granules; it runs nearly straight to a small double tooth and then becomes slightly concave.

2, the anterior part, forming at the same time part of the margin of the pterygostomian cavity; this part is slightly granular, with a second low and very indistinct tubercle. The first blunt, granular tubercle is situated at the beginning of the rounded pterygostomian cavity.

Postero-lateral border very concave, marked by a row of granules. The transversely folded antennulae are separated by a rather broad septum; basal antennal joint flat, broad, prolonged into the orbital hiatus and in contact with the front; the rest of the antennae is broken off. Outer maxillipeds granular, somewhat hairy, with a smooth groove on ischia and meri. Long axis of pterygostomian cavity not parallel to the antero-lateral margin; the cavity itself rather deep and broad, about as broad at the anterior as at the posterior end; upper, smaller half with a granular margin; the rest of the margin hairy, as is the lower part of the pterygostomian and the whole of the branchial region; upper part of pterygostomian region granular. Thoracic sternum slightly eroded, with small granules; lateral parts and last segment of the abdomen granular.

Chelipeds equal; upper, anterior, and lower margins of arm with some sharp granules; upper part of outer surface granular; wrist with small granules on the tubercles, upper border rounded anteriorly, followed by a thickened ridge with a row of small, sharp granules. Palm crested on the upper border, upper part of outer surface with some granular tubercles, in the lower part the granules show a linear arrangement. Fingers granular too, brown with white tips; cutting edges with a row of teeth. Upper and lower borders of the joints of the walking legs with sharp granules. Outer surface of meri smooth, of carpi and propodi each with two tubercles. Dactyli hairy and granular, armed with a small claw.

Distribution. Red Sea, E. Africa, Mauritius, Cargados Carajos, Tuticorin, Ceylon, Cochinchina, Japan.

Hypocolpus granulatus (De Haan)

Cancer (Xantho) granulatus De Haan, 1837, p. 65, pl. 18 fig. 3.

Hypocoelus granulatus A. Milne Edwards, 1865, p. 296, pl. 16 figs. 6, 6a; Henderson, 1893, p. 358, pl. 36 fig. 12; Ortmann, 1894a, p. 367.

Hypocolpus haanii Rathbun, 1909, p. 114; Rathbun, 1910a, p. 358.

Hypocolpus haani Balss, 1922, p. 131.
Hypocolpus granulatus Balss, 1934, p. 511.

Museum Leiden

Japan; D. W. Burger. — 1 dry ♂. holotype.

Siboga Expedition

Sta. 164, off N.W. New Guinea, 1° 42.5′ S, 130° 47.5′ E; dredge; sand, small stones and shells; 32 m; August 20, 1899. — 2 small ♂♂.

Sta. 213, Salajar; reef; September 26-October 26, 1899. — 1 ♂.

Sta. 282, anchorage between Noesa Besi and the N.E. point of Timor; 27-55 m; January 15-17, 1900. — 1 small specimen.

Sta. 315, anchorage east of Sailoes Besar, Paternoster Islands; dredge; coral and lithothamnion; up to 36 m; February 17, 18, 1900. — 1 ♂.

Museum Amsterdam

Java Sea, 7° 36.5′ S, 113° 14.5′ E; 35-40 fathoms; July 28, 1909; Gier XXII, Exp. 2. — 1 ♀.

Locality unknown. — 1 ♂.

United States National Museum

Jolo Light, Jolo Island, Philippine Islands, 6° 03′ 45″ N, 120° 57′ E; 20 fathoms; coarse sand; March 5, 1908; Albatross Philippine Exp., Sta. 5174. — 1 small specimen.

Museum Copenhagen

Java Sea, 5° 41′ N, 105° 57′ E; stones, 35 m; July 28, 1922; Danish Exp. Kei Islands, Sta. 72. — 2 ♂♂.

Description of the holotype.

Lobes of the carapace more strongly defined and more strongly convex than in *H. diverticulatus*; covered with large granules and short hairs; furrows smooth. Front prominent, with a distinct median notch, which is prolonged on the carapace as a furrow. Anterior half of orbital margin a thickened, granular ridge; the rest of the outer and the whole of the inner margin marked by a row of granules, ending in a small, granular tubercle at the infra-orbital angle. The entire antero-lateral margin sharp; in its anterior half it forms the upper margin of the pterygostomian cavity; its posterior half is formed by the epibranchial tubercle and one lobe. Postero-lateral margin very concave, granular. The transversely folded antennulae separated by a rather broad, granular septum. The basal antennal joint broad, granular, in contact with the front. Outer maxillipeds granular and hairy, with a smooth groove on the ischia and a deep one on the meri. Long axis of pterygostomian cavity parallel with the antero-lateral margin; the groove itself smooth and far less deep than in *diverticulatus*, pointed at its posterior end; the whole margin granular, and the pterygostomian and sub-

hepatic regions granular and hairy. Thoracic sternum and abdomen hairy, with groups of granules separated by smooth sunken parts.

Chelipeds equal; upper, anterior, and lower margin of arm granular, the granules extending on a small part of the outer surface, rest of this surface smooth and pitted; upper border of wrist rounded, outer surface granular; outer surface of palm granular too, upper surface flattened with some rows of granules. Fingers dark with white tips, granular and with a row of teeth on their cutting edges. Outer surface of the joints of the walking legs granular; dactyli hairy and with a short claw.

The material that I have examined (including the rather large material from the Amsterdam Museum) shows much variation with regard to the upper border and upper surface of the palm of the chelipeds. The upper margin of the palm as well as the anterior part of the anterior margin of the wrist are sometimes sharp; the upper surface of the palm is practically always flattened, but sometimes (in the young?) not distinctly so; it is not always granular; outer surface of wrist sometimes tubercular.

Spirit specimens with six tufts of longer hairs on the dorsal surface: one on 1 M, one on the outer lobe of 2 M, and one on 5 L; sometimes two accessory tufts on the cardiac region.

Distribution. Madagascar, Siam, Japan.

Hypocolpus rugosus (Henderson)

Hypocoelus rugosus Henderson, 1893, p. 358, pl. 36 figs. 9-11; Balss, 1934, p. 510.
Hypocolpus rugosus Laurie, 1906, p. 401; Balss, 1922, p. 131.

Description of Henderson's largest type specimen (a ♀) from Tuticorin.

Carapace well lobulated; the lobules pitted, granular and hairy; the grooves smooth. Front bilobed, both lobes separated in the median by a distinct notch, which is continued on the carapace as a groove. Anterior part of the orbital margin rather tumid with transversal rows of small granules; the rest of the orbital margin far less thickened; its lower inner angle tuberculiform. Antero-lateral margin with a distinct epibranchial tubercle; its posterior part is granular; the granules forming small clusters, half-way there is a larger cluster; the outstanding anterior part forms at the same time the upper margin of the pterygostomian cavity. The postero-lateral border is very concave and granular. The antennulae are folded transversely, separated by a rather broad septum; the basal antennal joint is rather broad, in contact with the front, and the flagellum is situated in the orbital hiatus. Outer maxillipeds granular and hairy, with a smooth groove on meri and ischia. Pterygostomian cavity with granular upper, and rounded as well as

granular anterior border. Its lower border is rather sharp; while in *granulatus* it bends upwards at about half its length, here it runs almost straight; therefore here the posterior end of the pterygostomian cavity is open, while in *granulatus* it is closed. Pterygostomian region hairy; the sub-branchial and sub-hepatic regions granular and hairy; between the top of the pterygostomian cavity and the buccal frame the granules are larger, clustering together and separated by rather deep smooth parts. Thoracic sternum eroded and granular; abdomen granular.

Chelipeds equal; lower margin of arm granular, the granules on the upper margin as well as those on the upper outer surface much smaller; those near the anterior border much larger again. Outer surface of palm and wrist with groups of granules; the upper border of the wrist with a row of large granules, the upper border of the palm with three rather large granules; fingers with granular ridges and a row of teeth on their cutting edges. All the joints of the walking legs with clusters of granules separated by smooth parts; the dactyli granular and hairy, armed with a small claw.

Herdman's specimens from Ceylon have the carapace and legs much less granular than the here described types.

H. rugosus is without doubt different from *diverticulatus*; Balss placed it in 1934 (p. 510) with a question mark under the synonyms of the latter species, but the form of the pterygostomian region is quite different, and shows much more resemblance to that of De Haan's *granulatus*, as in both the longitudinal axis runs about parallel with the antero-lateral margin; in *rugosus* the cavity is open in its posterior end, its lower margin not being bent upwards; while in *granulatus* the cavity is closed, for here the lower border turns upwards and reaches the antero-lateral margin, therefore the longitudinal axis of the cavity here runs not absolutely parallel to the antero-lateral margin. This difference is shown also by the 2 smaller *granulatus* ♀♀ from Macclesfield Bank, which are of about the same size as Herdman's ovigerous ♀ from Ceylon brought to *rugosus*. De Haan's type specimen is much larger.

Hypocolpus punctatus (Miers)

Hypocoelus punctatus Miers, 1884, p. 206, pl. 19 fig. b.

Description of Miers's holotype from Thursday Island collected by the "Alert" and preserved in the collections of the British Museum (Natural History).

The rather convex lobules of the carapace are granular, but, especially on 1 P, there are some large round pits too. The rather prominent front is distinctly bilobed; the lobes are separated in the median by a distinct notch.

The front gradually slopes down to the orbit, no distinct lateral lobe is present. The anterior part of the upper orbital border is thickened, hairy and granular, distinctly outstanding from the rest of the orbital margin which is low, formed by a row of granules. It ends at its lower inner angle in a granular tubercle. The antero-lateral margin forms in its anterior part the upper border of the pterygostomian cavity; here the margin is rounded and granular, while in its posterior part it is sharp, and granular too. Here the granules form small clusters in three places. The epibranchial tubercle is granular too. The postero-lateral margin is very concave. The antennules are folded transversely and separated by a rather broad septum. The basal antennal joint is broad, and in contact with a down-turned part of the front; the flagellum is situated in the orbital hiatus. The outer maxillipeds are granular and slightly hairy, with a small groove on the ischia and meri. Longitudinal axis of pterygostomian cavity parallel to the antero-lateral margin; its anterior margin rounded, hairy and granular; this rounded part ends rather abruptly in a smooth ridge which runs more or less parallel with the anterior margin, and a second ridge which divides the deepest part of the pterygostomian cavity in two. Ventrally of the first mentioned ridge there is a small smooth sunken part bordered ventrally by a row of granules. It is questionable whether or not this part belongs to the pterygostomian cavity. At their posterior ends both cavities terminate rather abruptly, continuing without a distinct ridge or other border in the slightly convex, hairy branchial region. Pterygostomian region slightly eroded, granular and hairy; thoracic sternum much more eroded, its higher parts granular and hairy; abdomen granular too.

Chelipeds equal; outer surface of arm granular and hairy with larger granules and longer hairs near its upper margin; eroded near its articulation with the wrist. Outer surface of palm and wrist eroded, granular, and hairy; the granules sometimes clustered together to form small tubercles. Sharp pointed fingers with granular ridges and a row of teeth on their cutting edges. The outer surfaces of all the joints of the walking legs are eroded, granular and hairy; the dactyli are granular and hairy, armed with a small claw.

The question arises whether *punctatus* shows two ridges in its pterygostomian cavity just as *abbotti* Rathbun, or only one; this depends on the question whether the small smooth sunken part is considered to belong to the cavity or to form part of the pterygostomian region. For the present I feel inclined to place *punctatus* with the forms with a double pterygostomian cavity. In *abbotti* the posterior ridge probably is shorter, and does not reach the outer margin. This question can only be solved after comparison

of the two types. In the figure of *H. abbotti* given by Balss (1934, p. 512(, the pterygostomian cavity certainly bears no resemblance to that of *punctatus*.

Key to the species

1. No ridge in the pterygostomian cavity 2
1a. Pterygostomian cavity divided 4
2. Upper border of pterygostomian cavity over its whole length formed by the sharp antero-lateral margin. 3
2a. Only anterior part of the outer margin of pterygostomian cavity formed by the antero-lateral margin; posterior end of this cavity rounded . *diverticulatus* (Strahl)
3. Posterior end of the cavity closed; its lower border bent upwards . . . . . *granulatus* (De Haan)
3a. Posterior end of the cavity open; its lower border not bent upwards . . . . . *rugosus* (Henderson)
4. One ridge in the pterygostomian cavity . . . . . *punctatus* (Miers)
4a. Pterygostonian cavity with a double ridge . . . . . *abbotti* (Rathbun)

Xantho Leach

Xantho danae Odhner (fig. 9a)

Chlorodius nudipes Dana, 1852, p. 79.
nec *Xantho nudipes* A. Milne Edwards, 1867, p. 266.
Xantho (*Leptodius*) *nudipes* Alcock, 1898, p. 121 (with older literature and synonymy).
Leptodius nudipes Borradaile, 1902, p. 252; Rathbun, 1906, p. 848, pl. 9 fig. 3; Lenz, 1910, p. 548; Rathbun, 1911, p. 216; Gravier, 1920, p. 466; Sendler, 1923, p. 37.
Xantho danae Odhner, 1925, p. 80.

Snellius Expedition

Kafal, Misool Group; shore and reef; October 3, 5, 1929. — 23 ♂♂, 12 ♀♀.
Sissie, Misool Group; shore and reef; October 6, 1929. — 2 ♂♂, 3 ♀♀ (1 ovigerous).
Dobo, Aroe Islands; shore; October 10, 1929. — 1 ♂, 3 ♀♀ (1 ovigerous).
Wotap, Tenimber Islands; shore and reef; October 20-23, 1929. — 6 ♂♂, 1 ♀.
Kera, near Timor; November 15, 16, 22, 23, 1929. — 8 ♂♂, 3 ♀♀.
Near Koepang; reef; December 8, 1929. — 4 ♂♂, 1 ovigerous ♀.
Koepang; reef; December 9, 1929. — 4 ♂♂, 7 ♀♀ (6 ovigerous).
Pelokan, Postiljon Islands; shore and reef; December 20, 1929. — 5 ♂♂, 6 ♀♀ (1 ovigerous).
Pasih Ipah, Soela Islands; shore; March 19, 1930. — 16 ♂♂, 29 ♀♀ (25 ovigerous).
Merampi, Nenoesa Islands; shore; May 20, 1930. — 2 ♂♂, 3 ♀♀, 1 juv.
Amboina; May 6, October 14, 17, 1930. — 13 ♂♂, 2 specimens with Sacculinids.
Morotai; June 3-10, October 1, 1930. — 8 ♂♂, 5 ♀♀ (4 ovigerous).
Roemah Tiga, Amboina; October 17, 1930. — 23 ♂♂, 26 ♀♀ (18 ovigerous), 2 specimens with Sacculinids.
Locality unknown. — 5 ♂♂, 5 ♀♀.

Museum Leiden

Poeloe Weh, N. Sumatra; December, 1909; P. Buitendijk. — 1 ♂ without legs.
Padang, W. Sumatra. — 1 ♂ without chelipeds.
South coast Madoera, near Java; January, 1917; P. Buitendijk. — 1 ♀.
Batjan, Moluccas; 1862; H. A. Bernstein. — 1 ♂.
Ponapé, Caroline Islands; 1887; Mus. Godeffroy. — 2 ♂♂, 1 ♀.

Siboga Expedition

Sta. 37, Sailoes Ketjil, Paternoster Islands; shore; March 30, 31, 1899. — 3 ♂♂.
Sta. 47, Bay of Bima, near south fort; coral shore; April 12, 1899. — 4 ♂♂, 4 ♀♀, 2 juv.
Sta. 81, Poeloe Sebangkatan, Borneo Bank; reef; June 14, 1899. — 1 ♂, 1 juv.
Sta. 125, off Sawan, Siaoe Island; reef; July 18, 19, 1899. — 1 ovigerous ♀, 1 carapace.
Sta. 129, anchorage off Kamio and Kamboling Islands; reef; July 22, 23, 1899. — 1 ♂, 1 ovigerous ♀, 1 juv.
Sta. 142, anchorage off Liawoei, Obi Major; reef; August 5-7, 1899. — 2 ♀♀.
Sta. 193, Sanana Bay, Soela Islands; reef; September 13, 14, 1899. — 1 ♂, 1 ovigerous ♀.

United States National Museum

Apia, Samoa; at mouth of river; June, 1902; U.S. Fish Commission. — 3 ♂♂, 1 ♀.
Apia, Samoa; at mouth of river; July 1902. — 1 ♂.
Apia, Samoa; coral reef; July, 1902. — 1 ♂.
Pago Pago, Samoa; August, 1902. — 2 ♂♂.

Museum Copenhagen

Canonniers Point, Mauritius; reef; October, 1929; Th. Mortensen's Java-S. Africa Exp., 1929-1930. — 1 ♂, 4 ♀♀ (1 ovigerous).
Mallicollo, New Hebrides; July 5, 1934; Monsunen Exp. — 7 ♂♂, 6 ♀♀ (4 ovigerous).

Discription of the ♂ from Kafal.

Carapace well areolated; the lobes separated by rather deep, well cut grooves. Upper surface of carapace, as well as outer surface of wrist and upper part of outer surface of palm pitted. Fronto-orbital border more than half the greatest breadth of the carapace. Front with a wide, rather deep notch in the median line; each half bilobed, and both lobes separated by a distinct concavity; the inner lobe broader than the outer, but both of the same height. The outer lobe separated from the produced upper inner orbital angle by a notch. The rather tumid, pitted upper orbital margin with the usual fissures; the upper outer as well as the lower outer and inner angle tuberculiform. The antero-lateral margin is divided into 4 tuberculiform lobes; but each tubercle bears at its base 1 or 2 accessory small tubercles; while the accessory tubercle of the fourth antero-lateral tooth is separated from this tubercle by a concavity and thereby appears as a separate fifth tubercle, situated apparently on the postero-lateral margin. An oblique groove runs over the cephalothorax to the middle of the postero-lateral margin. Ventral surface of carapace, outer maxillipeds, sternum and ♂ abdomen smooth; pterygostomian region hairy. Antennules folded transversely; basal antennal point broadly in contact with the short down-turned edge of the front.

Chelipeds unequal, in the present specimen the right is the larger. Upper border of ischia and meri in both chelipeds hairy; proximal part of the lower border of these joints hairy too. Upper border of wrists with some hairs; its inner angle tuberculiform; its outer and upper surfaces pitted and its upper surface slightly granular. Upper part of the outer surface of the palm roughened and pitted too; while the lower part of this surface is smooth, with only small pits. Both chelipeds with blunt-hoofed fingertips; the fingers of both chelipeds with pits; those of the larger gaping, with one tooth at the base of the cutting edge of the movable finger; the gap between the fingers of the smaller cheliped is exceedingly small; here the movable finger bears one small tooth, a mere tubercle, while the immovable finger bears a larger tooth half-way on its cutting edge. Outer surface of the joints of the walking legs pitted, and, especially in their upper parts, roughened by granules. The granules on the upper part of the dactyli are rather sharp. Some longer hairs are implanted on the lower margin of the dactyli, one on the lower margin of the carpi, while the proximal parts of the upper borders of the meri are hairy too.

♂ pleopod as in fig. 9a.

The most striking differences between the here described ♂ from Kafal and the ♂ from the South Seas belonging to *Medeaus nudipes* (*Xantho nudipes* A. Milne Edwards) are:

1. The carapace is more swollen in *nudipes* than in *danae*.

2. The fronto-orbital border in *danae* is more, in *nudipes* less than half the greatest breadth of the carapace; the concavity between outer and inner frontal lobes is deeper, and the lobes are more tuberculiform in *danae* than in *nudipes*.

3. The antero-lateral border of *danae* is not, as in *nudipes*, prolonged beneath the orbit towards the edge of the buccal cavity.

4. The shape of the palm of the chelipeds is different (more rounded in *danae*) and the upper part of the palm, which is very strongly and deeply pitted in *nudipes*, shows more, but smaller and less deep pits in *danae*. The longitudinal furrow mentioned for *nudipes* is absent in *danae*.

5. With closed tips the fingers of the larger chelipeds in *danae* leave a wide gap between them, while the fingers of *nudipes* meet when closed.

This species, which is best recognised by its large number of antero-lateral teeth, shows a rather large variability in the shape of the chelipeds. Mostly they are less unequal in the ♀ than in the ♂, while the dark colour of the immovable finger is less strongly developed on the palm of the ♀, reaching less high. Sometimes the smaller ♂♂ have the whole outer surface of the palm pitted; moreover some of the smaller ♂♂ as well as the ♀♀, bear a

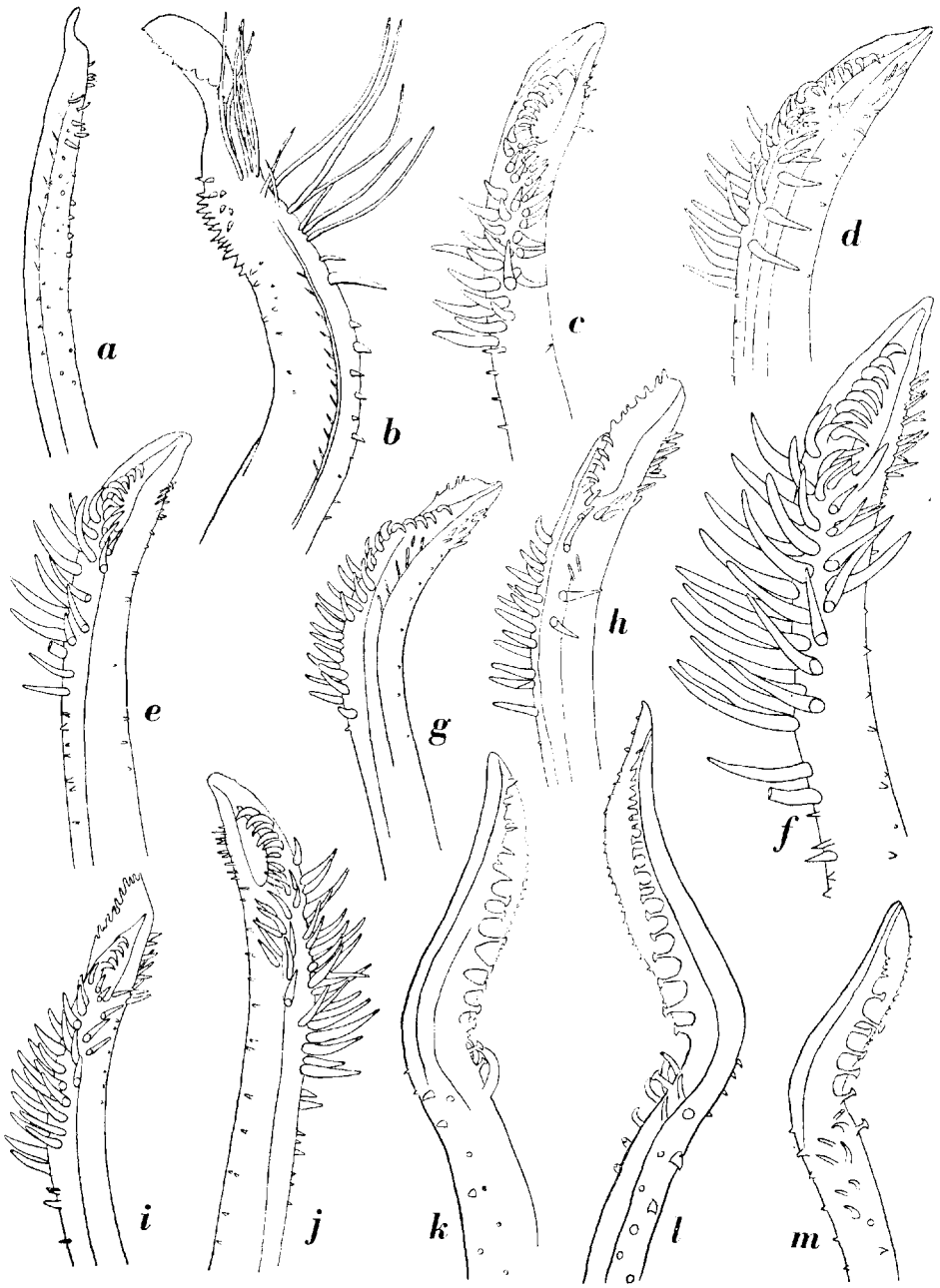

Fig. 9. a, *Xantho danae* Odhner, apex first pleopod, ♂ from Kafal; b, *Xantho cavipes* (Dana), apex first pleopod, ♂ from Tidore; c-f, *Xantho crassimanus* A. Milne Edwards, apex first pleopod. c, ♂ from Pelokan (cb. 30 mm); d, ♂ from Sissie (cb. 23 mm); e, ♂ from Endeh (cb. 21 mm); f, ♂ from Padang (cb. 46 mm); g-i, *Xantho quinquedentatus* Krauss, apex first pleopod. g, ♂ from Endeh (cb. 14½ mm); h, ♂ from Durban (cb. 22 mm); i, ♂ from Endeh (cb. 17 mm); j, *Xantho demani* Odhner, apex first pleopod, ♂ from Tidore; k-m, *Xantho exaratus* (H. Milne Edwards), apex first pleopod. k, ♂ from Makassar (Museum Leiden); l, ♂ from Bay of Bima; m, ♂ from Amoy. × 50.

rather large tooth in the middle of the cutting edge of the immovable finger. Others again (♂♂ as well as ♀♀) have the fingers more curved and more strongly hoofed than usual; there is a larger gap between the fingers, while a large tooth is developed on the cutting edges of the immovable finger, especially of the larger cheliped. The pleopod of a ♂ with such fingers, however, agrees with a pleopod of a ♂ with more slender fingers; as, moreover, no other differences are present, such specimens undoubtedly belong in the same species.

Some specimens collected by the Siboga Expedition at Bima, differ from all the other specimens examined. They nearly all are very small specimens; the largest ♂ (cb. 13 mm) has the chelipeds, the outer surface of the walking legs, and the antero-lateral part of the cephalothorax granular; in another, smaller ♂ nearly the whole surface of the cephalothorax (except perhaps only 2 M) is roughened with small granules, while the first two abdominal segments are granular too; some of the ♀♀ too have the carapace more granular than is usual in this species.

When Odhner in 1925 placed *Chlorodius nudipes* Dana in *Xantho* there was already a *nudipes* in this genus (*X. nudipes* A. Milne Edwards). Odhner renamed *X. nudipes* (Dana), remarking in a footnote that this is done "auf Grund von *X. nudipes* A. M.-Edw. 1867", but he makes no further mention of A. Milne Edwards's species, which is not among the enumerated species of *Medaeus*, in which genus it belongs (Odhner, 1925, p. 81).

Distribution. This species is known from the entire Indo-Pacific from Madagascar to Australia; the record from New Zealand is doubtful.

Xantho cavipes (Dana) (fig. 9b)

Chlorodius cavipes Dana, 1852, p. 79; Stimpson, 1907, p. 57.

Xantho (Leptodius) cavipes Alcock, 1898, p. 122 (with older literature and synonymy); Calman, 1909, p. 704; Balss, 1935, p. 132.

Leptodius cavipes Lanchester, 1901, p. 540; Lenz, 1905, p. 351; Nobili, 1906a, p. 243; Rathbun, 1911, p. 216, pl. 18 fig. 10; Balss, 1938, p. 42.

Xantho cavipes Odhner, 1925, p. 80.

Snellius Expedition

Tidore; shore; September 24-29, 1929. — 1 ♂.
Near Tjobo, Tidore; September 24-29, 1929. — 1 ♂, 1 ♀.
Ternate; September 29, 1929. — 2 ♂♂, 3 ♀♀ (2 ovigerous).
Kafal, Misool Group; shore or reef; October 3, 5, 1929. — 1 ♀.
Kambang, near Timor; reef and shore; November 26, 28, 1929. — 2 ♂♂, 1 ♀.
Gonto Soca, Spermonde Archipelago; shore; March 1, 1930. — 1 ♂.
Sarappo, Spermonde Archipelago; shore; March 1, 1930. — 1 ♀.
Pasih Ipah, Sulu Archipelago; shore; March 19, 1930. — 2 ♂♂, 1 ♀.
Morotai; June 3-10, 1930. — 1 ♂, 4 ♀♀ (2 ovigerous).

Flores; August 18, 19, 1930. — 1 ♂.
Ternate; September 29, 1930. — 1 specimen with Sacculinid.
Morotai; October 1, 1930. — 1 ♀.

Museum Leiden

Reunion Rocks, Isipingo near Durban; October 28, 1938; H. Engel. — 1 young specimen.

Siboga Expedition

Sta. 33, Bay of Pidjot, Lombok; trawl, dredge and shore exploration; 22 m and less; March 24-26, 1899. — 2 ♂♂, 1 ovigerous ♀.
Sta. 37, Sailoes Ketjil, Paternoster Islands; shore; March 30, 31, 1899. — 1 ♂, 1 ♀.
Sta. 231, Amboina; reef; November 14-18, 1899. — 1 ♂, 1 ovigerous ♀.

United States National Museum

Pago Pago, Samoa; August, 1902. — 2 ♂♂.

Description of ♂ from Tidore.

Carapace convex anteriorly; flat in its posterior part; the regions well indicated and surrounded by smooth grooves; deepest are the grooves bordering the gastric region laterally as well as the grooves surrounding the anterior part of lobe 3 M; the carapace is covered with granules, which on the gastric region tend to a linear arrangement. Fronto-orbital border more than half the greatest breadth of the carapace. Front granular, bilaminar, with a shallow median notch. Each half only indistinctly bilobed; the outer lobe separated from the granular upper orbital margin by a distinct notch. Orbital margin with the usual fissures; angles not very distinctly produced, only the lower inner angle indicated by a slightly tuberculiform group of granules; the eyestalk too is granular. Antero-lateral margin divided into 4 granular lobes; the middle of each lobe marked by a tuberculiform group of granules; postero-lateral margin slightly convex; posterior margin marked by a row of granules. Antennules folded transversely; the granular basal antennal joint in contact with the equally granular down-turned edge of the front; flagellum lodged in the orbital hiatus. Ventral surface of carapace granular and hairy; sternum and ♂ abdomen as well as outer maxillipeds hairy.

Chelipeds unequal, in this specimen the right is the larger; upper and inner borders as well as outer surface of the meri granular and hairy; upper and outer surfaces of wrist and palm granular and, especially the outer surface of the palm, with some longer hairs implanted between the granules; basal part of the channelled fingers with rows of granules; their cutting edges with a row of teeth of which the tips are blunt, but not hoofed. Outer surface of the walking legs rough, but not very hairy; only the dactyli

are covered with a short fur with longer hairs in between; the lower anterior part of the propodi granular and hairy; upper margin of propodi granular, a second row of granules situated slightly lower down on the outer surface. Between the granules of these two rows some long hairs are implanted. Upper margin of the carpi with a granular crest, a row of granules lower down on the outer surface; between the crest and the row of granules a smooth, trough-like space. On the ventral surface a third row of granules; especially on the first two legs the granules of this row are rather sharp. Outer surface of meri granular; their upper margin denticulated and sharply notched anteriorly; ischia granular.

Male pleopod as in fig. 9b; when more highly magnified the setae near the apex of this pleopod show to be serrate.

The crests on the carpi of the walking legs sometimes are low and granular, sometimes high and smooth. This is not correlated with sex or size (♂♂ of 10, 11.5, 13, 17, 19, and 20 mm cb., and ♀♀ of 8, 10, 11.5, 12, 13, 15, 16, and 16.5 mm cb. have high crests while I have examined ♂♂ with cb. 7, 8, 11, 12.5, 22, and ♀♀ of 8, 16, and 17 mm cb. with low and granular crests). Often the carapace is more granular than in the described ♂ and the granules between the antero-lateral tubercles are sometimes sharp, spine-like (as in the described ♂) far oftener less pronounced and blunt.

The row of spines on the outer surface of the propodi is more or less distinctly developed, sometimes (e.g., in the largest ♂ and a ♀ from Ternate) a rather high, smooth crest takes its place.

Very often the fingers are of a dark brown colour, but this coloration never extends on the palm.

Distribution. From Zanzibar and the Red Sea to the Bonin Islands.

Xantho crassimanus A. Milne Edwards (fig. 9c-f)

Xantho crassimanus A. Milne Edwards, 1867, p. 267; Odhner, 1925, p. 80.

Xantho (*Leptodius*) *crassimanus* Alcock, 1898, p. 120 (with older literature and synonymy).

nec *Leptodius crassimanus* De Man, 1893, p. 284.

Snellius Expedition

Paleleh, Celebes; shore; August 21, 22, 1929. — 3 ♂♂, cb. 10, 13.5, and 14 mm.

Kafal, Misool Group; shore or reef; October 3, 5, 1929. — 1 ♂, cb. 33 mm.

Sissie, Misool Group; shore and reef; October 6, 1929. — 2 ♂♂, cb. 13.5 and 23 mm.

Near Manoembai, Aroe Islands; October 11-14, 1929. — 1 ♂, cb. 11.5 mm.

Wotap, Tenimber Islands; shore or reef; October 20-23, 1929. — 1 young specimen, cb. 11.5 mm.

Kera, near Timor; November 15, 16, 22, 23, 1929. — 1 ♂, 1 ♀, cb. ♂ 27, ♀ 21 mm.

Near Koepang; November 18-20, December 8, 1929. — 4 ♂♂, 7 ♀♀, cb. ♂♂ 12.5, 13, 16, and 18 mm, cb. ♀♀ 13, 16.5, 17, 18, 19 (2 ×), and 20 mm.

Koepang; reef and shore; December 5, 1929. — 2 ♂♂, 1 ♀, cb. ♂♂ 10 and 16, ♀ 11.5 mm.
Pelokan, Postiljon Islands; shore and reef; December 20, 1929. — 3 ♂♂, 1 ♀, cb. ♂♂ 18, 30, and 34, ♀ 24.5 mm.
Morotai; June 3-10, 1930. — 4 ♂♂, 1 ♀, cb. ♂♂ 11.5, 13, 16, and 33, ♀ 21 mm.
Endeh, Flores; November 5-8, 1930. — 8 ♂♂, 6 ovigerous ♀♀, cb. of 3 ♂♂ 16.5, 18, and 21 mm, cb. of 2 ♀♀ 12 and 12.5 mm.

Museum Leiden

Poeloe Weh, N. Sumatra; August, 1910; P. Buitendijk. — 1 ♂, cb. 30 mm.
Padang, W. Sumatra. — 3 ♂♂, cb. 36, 46, and 48.5 mm.
Celebes; 1844; E. A. Forsten. — 1 ♂, cb. 21 mm.
Batjan, Moluccas; 1862; H. A. Bernstein. — 1 ♂, cb. 25.5 mm.
Tahiti; Mus. Godeffroy. — 1 ♂, 1 ♀, cb. ♂ 43, ♀ 32.5 mm.
Japan. — 2 dry ♂♂, cb. 31 and 33 mm.

United States National Museum

Makaluva, Fiji; reef; June 10, 1922. — 1 ♀, cb. 31 mm.
Pago Pago, Samoa; August, 1902; U.S. Fish Commission. — 1 ♂ cb. 15 mm.

Description of ♂ from Padang, cb. 36 mm.

Carapace rather convex, smooth, pitted. Regions well indicated on its anterior part and the lobes surrounded by distinct, smooth grooves. Fronto-orbital margin far less than half the greatest breadth of the carapace. Front granular with a wide median notch; each half distinctly bilobed; the lobes separated by a deep concavity; the inner lobe slightly more produced than the outer. Front separated by a notch from the rather tumid, pitted upper orbital margin. Upper inner orbital angle tuberculiform and slightly granular; orbital margin with the usual fissures; its upper outer angle not marked; outer and inner angles of the granular lower orbital border slightly tuberculiform. Antero-lateral margin with five blunt tubercles, the posterior is smallest (especially on the left side), a small sixth tubercle is visible, situated more ventrally on the sub-hepatic region, anterior to the first antero-lateral tubercle. The rather short postero-lateral borders are slightly concave, while near its posterior part as well as near the posterior border the carapace is granular. Antennules folded transversely; the short, broad, granular basal antennal joint broadly in contact with the down-turned edge of the equally granular ventral surface of the front. Antennal flagellum lodged in the orbital hiatus. Sub-hepatic region granular; sub-branchial region hairy; outer maxillipeds, thoracic sternum, and ♂ abdomen smooth.

Chelipeds unequal, in the present specimen the right is the larger. Upper border of meri hairy in their posterior part; the outer surface of arm, wrist, and palm smooth; upper surface of wrist roughened with small granules,

that of the palm pitted. Upper and lower angles of the wrist tuberculiform; on the larger cheliped this lower tubercle is obsolete. Fingers smooth; the movable finger pitted; both fingers bluntly tipped and with a row of teeth on their cutting edges. The dark coloration of the immovable finger extending on the outer as well as on the inner surface of the palm. Walking legs strong. Meri with granular and hairy upper border; the outer surface smooth, the posterior part of the inner lower border slightly granular and both lower borders with some hairs anteriorly. Carpi smooth and naked; outer surface of propodi for the larger part smooth, but anteriorly and near its upper and lower margins granular; outer surface of dactyli armed with rather sharp granules, between which sometimes shorter and longer hairs are implanted.

♂ pleopod as in figs. 9c-f.

This species is perhaps best recognized by its narrow distinctly four-lobed front. It shows a rather large variability; the smooth carapace of the larger specimens becoming more convex and more granular in the smaller; sometimes the upper surface of the palm and the wrist is roughened; the orbito-frontal margin is relatively broad (half the greatest breadth of the carapace); the antero-lateral border is always armed with 5 tubercles and is granular in between; the sixth tubercle is always situated ventrally between orbit and anterior tubercle.

The ♂♂ of this species are easily distinguished from those belonging to *quinquedentatus* by the absence of blunt teeth near the apex of the pleopod. The ♀♀ of both species are not so easily characterized; the front of *crassimanus* is less broad (fronto-orbital border less than half the greatest breadth of the carapace) than that of *quinquedentatus* (half that breadth) and the concavity between outer and inner frontal tubercle is less deep in *quinquedentatus* than in *crassimanus*. Moreover the anterior antero-lateral tubercle of *quinquedentatus* is double; a second tubercle is situated just ventrally of it, except in the larger specimens where this sixth tooth is situated anteriorly of the first antero-lateral tooth, just as in *crassimanus*. Moreover there are differences in the roughness of palm and wrist, which may be rough in *crassimanus* but never so nodular as in *quinquedentatus*, while the 2 rows of granules on the lower half of the palm in *quinquedentatus* are always absent in *crassimanus*.

A difficulty in the identification of the smaller ♂ and ♀ (e.g., the ♂ from Manoembai cb. 11, and the ovigerous ♀ from Koepang cb. 13 mm) is that the fronto-orbital border is here relatively broader, attaining half the greatest breadth of the carapace, being thereby of the same breadth as in *quinquedentatus*. In the ♂, however, the first pleopod always provides a

good character, while in the ♀ the roughness of palm and wrist, the concavity of the front, as well as the convexity and number of carapace lobes may help us to distinguish the two species. The difficulties are enlarged by the fact that in these small specimens the palm and wrist as well as the carapace are often granular. Some of the specimens from Endeh have the posterior antero-lateral tubercle indistinct.

It is well possible that in the literature both species are confused and that, e.g., the material described by De Man belongs to both species; for this reason the distribution of neither species is here given.

Xantho quinquedentatus Krauss (figs. 9g-i)

Xantho 5-dentatus Krauss, 1843, p. 30, pl. 1 fig. 3.
Leptodius quinquedentatus Richters, 1880, p. 147.
Xantho (Leptodius) cuglyptus Alcock, 1898, p. 121.
Leptodius cuglyptus Alcock & Anderson, 1899, pl. 36 fig. 1; Chen, 1933, p. 103.
Xantho quinquedentatus Odhner, 1925, p. 80.

Snellius Expedition

Paleleh; shore; August 22, 1929. — 1 ♂.

Kafal,Misool Group; shore and reef; October 3, 5, 1929. — 1 ♂, 3 ovigerous ♀♀, cb. ♂ 19, ♀♀ 20.5, 21.5, and 22 mm.

Near Koepang, Timor; November 18-20, December 3, 1929. — 2 ♂♂, 3 ♀♀ (2 ovigerous), cb. ♂♂ 13 and 16.5, ♀♀ 11, 13, and 15 mm.

Koepang; reef and shore; December 5, 1929. — 2 ♂♂, 1 ♀, cb. ♂♂ 10 and 16, ♀ 11.5 mm.

Koepang; reef; December 9, 1929. — 1 ovigerous ♀.

Taliaboe, Soela Islands; March 18, 19, 1930. — 1 ♀.

Beo, Talaud Islands; shore and reef; June 14-21, 1930. — 14 ♂♂, 10 ♀♀.

Endeh, Flores; November 5-8, 1930. — 5 ♂♂, 5 ♀♀ (2 ovigerous), cb. ♂♂ 13.5, 14.5, 17 (2×), and 19 mm; ♀♀ 12, 12.5, 13, and 14 (2×) mm.

Siboga Expedition

Sta. 169, off Atjatoening, west coast of New Guinea; reef; August 23-25, 1899. — 3 ♂♂.

Museum Copenhagen

Durban; harbour dam; July 10, 1929; Th. Mortensen's Java-S. Africa Exp., 1929-1930. — 1 ♂, 1 ovigerous ♀, cb. 22, ♀ 16.5 mm.

Description of ♂ from Endeh, cb. 13.5 mm.

Carapace convex, slightly pitted. Regions well indicated, the convex lobules surrounded by rather deep, well cut grooves; the regions of the posterior part not indicated; part of the lobules, especially in the lateral, and the anterior part of the carapace, granular. Fronto-orbital margin half the greatest breadth of the carapace; with a rather deep median notch; the granular

front is bilobed, but the concavity between the two tubercles is not so deep as in *crassimanus;* in *crassimanus* the fronto-orbital border is shorter too. Front separated from the rather tumid orbital border by a notch; the upper inner, the lower outer, and inner orbital angles are tuberculifom; the outer upper only very slightly so; the usual fissures are present, though indistinct. Antero-lateral margin with five granular tubercles, stronger developed than those of *crassimanus*; the posterior is smallest and the anterior shortest and blunter than the others. Situated immediately behind (ventrally of) this tubercle is an equally short and blunt, sixth tubercle; moreover the whole antero-lateral border is granular. The postero-lateral border is concave and shorter than the antero-lateral; the lateral parts of the posterior borders are granular. Antennules folded transversely; the short, granular basal antennal joint is rather broadly in contact with the granular down-turned edge of the front; flagellum lodged in the orbital hiatus. Sub-hepatic region granular; sub-branchial region hairy; meri of outer maxillipeds with very small granules; thoracic sternum and abdomen smooth.

Chelipeds unequal, in the present specimen the right is the larger. Upper and inner borders of meri, and upper and inner parts of the anterior border of wrist hairy. Outer surface of meri smooth; outer surface of wrist rough with some granular tubercles in its upper half, these tubercles best developed in the smaller cheliped; the inner angle of the wrist tuberculiform, a group of granules slightly lower down on the anterior border. Inner surface of palm smooth; upper part of the outer surface with the same granular tubercles as in the wrist, the lower part with 2 indistinct rows of groups of small granules. Fingers smooth, slightly hoofed, the movable channelled; the immovable slightly channelled too; a row of teeth on their cutting edges; the dark coloration of the immovable finger extending on the outer and inner surfaces of the palm. Meri of the walking legs with a granular and hairy upper border; upper part of the outer surface of the carpi with a granular ridge, separated by a sunken part from the equally granular upper border of this joint; the anterior part of this border is separated by a small notch from the rest and therefore forms a small, blunt, granular tubercle; upper and lower parts of the outer surface of propodi and dactyli granular; lower border of the propodi and upper and lower borders of the dactyli hairy.

♂ pleopod as in figs. 9g-i.

In the larger specimens (Kafal, cb. 19-22 mm) the sixth antero-lateral tooth is situated not immediately behind the anterior one, but anterior of this tooth, nearer the orbit. The fingers of these large specimens are pitted. The fronto-orbital margin is half the greatest breadth of the carapace and the ♂ pleopod shows two blunt spines near the apex; thereby these specimens

undoubtedly belong in *quinquedentatus*. In the ♀ the dark coloration of the finger never extands on the palm.

This species shows much resemblance to *X. crassimanus* A. Milne Edwards, the ♂♂ are easily recognized by their first pleopods which have some blunt spines near the apex; these spines are absent in *X. crassimanus*. Moreover the fronto-orbital margin is never so narrow here as in *crassimanus*, but always about half the greatest breadth of the carapace. In some specimens the whole posterior border is granular.

Xantho sanguineus (H. Milne Edwards)

Chlorodius sanguineus H. Milne Edwards, 1834, p. 402.

Xantho (*Leptodius*) *sanguineus* Alcock, 1898, p. 119 (with older literature and synonymy); Balss, 1933a, p. 225.

Leptodius sanguineus Lenz, 1905, p. 352; Rathbun, 1906, p. 847; Rathbun, 1907, p. 39; Chen, 1933, p. 102; Balss, 1938, p. 42.

Leptodius exaratus var. *sanguineus* Stimpson, 1907, p. 53.

Xantho sanguineus Odhner, 1925, p. 80.

Snellius Expedition

Mamoedjoe; shore; August 4, 1929. — 1 ♂, 2 ♀♀.
Maratoca; reef; August 14-18, 1929. — 5 ♂♂, 4 ♀♀ (3 ovigerous), 1 juv.
Paleleh; shore; August 21, 22, 1929. — 2 ♂♂, 1 ♀, 3 juv.
Near Tjobo, Tidore; shore; September 24-29, 1929. — 3 ♂♂, 5 ♀♀.
Tidore; shore; September 24-29, 1929. — 4 ♂♂, 3 ♀♀ (2 ovigerous), 1 juv.
Ternate; September 29, 1929. — 17 ♂♂, 20 ♀♀ (10 ovigerous), 5 juv.
Pelee, Misool Group; shore; October 4, 1929. — 3 ♂♂.
Los, near Misool; shore and reef; October 3-6, 1929. — 2 ♂♂, 1 ♀.
Sissie, Misool Group; shore and reef; October 6, 1929. — 2 ♂♂, 1 ♀.
Dobo, Aroe Islands; shore; October 10, 1929. — 4 ♂♂, 1 ♀.
Near Manoembai, Aroe Islands; shore; October 11-14, 1929. — 1 ♂, 1 juv.
Kera near Timor; November 11-13, 15, 16, 1929. — 1 ovigerous ♀.
Atapoepoe, Timor; reef; November 16, 1929. — 1 ♂.
Near Koepang; shore; November 25, 1929. — 5 ♂♂, 10 ♀♀ (6 ovigerous).
Kambang, near Timor; reef and shore; November 26, 28, 1929. — 5 ♂♂, 5 ♀♀.
Near Hainsisi, Semaoe near Timor; shore; November 27, 1929. — 1 ♂.
Near Koepang; shore or reef; December 3, 1929. — 1 very small ♂.
Koepang; reef; December 9, 1929. — 1 ♂, 7 ♀♀ (6 ovigerous), 1 juv.
Sapoeka Besar, Postiljon Islands; shore or reef; December 21-23, 1929. — 1 ♂.
Koedingareng Lompo; shore; February 3, 1930. — 19 ♂♂, 36 ♀♀ (27 ovigerous).
Sailoes Besar, Paternoster Islands; shore or reef; February 9, 10, 1930. — 1 ♀.
Tanah Djampea; shore or reef; February 21-23, 1930. — 1 ♂.
Sarappo, Spermonde Archipelago; shore; March 1, 1930. — 3 ♂♂, 5 ♀♀ (2 ovigerous).
Gonto Soca; shore; March 1, 1930. — 9 ♂♂, 7 ♀♀ (2 ovigerous).
Pasih Ipah; shore; March 19, 1930. — 9 ♂♂, 19 ♀♀ (1 ovigerous), 2 juv.
Ternate; shore; April 1-2, 1930. — 30 ♂♂, 39 ♀♀ (5 ovigerous), 17 juv., 2 specimens with Sacculinids.
Haroekoe; shore and reef; May 3-7, 1930. — 3 ♂♂, 1 ovigerous ♀.
Amboina; shore or reef; 0-2 m; May 6, 1930. — 1 ♂.
Merampi, Xenoesa Islands, shore; May 20, 1930. — 1 ovigerous ♀.

Morotai; June 3-10, 1930. — 52 ♂♂, 75 ♀♀ (30 ovigerous), 7 juv.
Beo, Talaud Islands; shore and reef; June 14-21, 1930. — 23 ♂♂, 4 ♀♀, 5 juv.
Kaledoepa; August 27, 1930. — 23 ♂♂, 46 ♀♀ (31 ovigerous).
Laha, Amboina; September 13, 1930. — 6 ♀♀ (1 ovigerous).
Amboina, September 11-17, 1930. — 1 young ♂.
Lembeh Strait; September 25, 1930. — 1 ♀.
Morotai; October 1, 1930. — 2 ♂♂, 3 ovigerous ♀♀.
Amboina; October 14, 17, 1930. — 86 ♂♂, 45 ♀♀ (8 ovigerous), 6 juv.
Roemah Tiga, Amboina; October 17, 1930. — 1 small ♂.
Leti; October 31, 1930. — 6 ♂♂.
Endeh, Flores; November 5-8, 1930. — 2 ♂♂, 1 ovigerous ♀.
Locality unknown. — 2 ♂♂, 2 ♀♀, 1 juv.

Museum Leiden

Zanzibar; Mus. Godeffroy. — 1 ♂, 1 ♀.
Japan; D. W. Burger. — 1 ♂.
Japan. — 1 ♂, 2 ♀♀.
Poeloe Weh, N. Sumatra; December 1909, August and November 30, 1910, April, 1922, April, 1926; P. Buitendijk. — 8 ♂♂, 1 ♀.
Off Atjeh (= Atchin), N. Sumatra; 1891; H. J. van Rhijn. — 3 ♂♂, 2 ♀♀.
Laboean Badjau, Simaloer, off W. Sumatra; June, 1913; E. Jacobson. — 1 ♂.
Padang, Sumatra. — 3 ♂♂, 3 ♀♀.
Java; C. G. C. Reinwardt. — 1 ♂.
South coast of Madoera; January, 1917; P. Buitendijk. — 3 ♂♂.
Celebes; 1844; E. A. Forsten. — 1 ♂.
Ternate; 1893-1894; W. Kükenthal. — 1 ♂.
Amboina; 1864; E. W. A. Ludeking. — 2 ♂♂.
Timor; H. C. Macklot. — 2 ♂♂.
Timor. — 5 ♂♂.
Samoa; 1891; H. ten Kate. — 1 young ♀.
Locality unknown. — 1 ♂.

Siboga Expedition

Sta. 51, Madoera Bay, Flores; shore; April 19, 1899. — 2 ♂♂, 1 ♀.
Sta. 91, Moearas Reef, Borneo; June 22, 1899. — 1 ♂, 1 ovigerous ♀.
Sta. 125, anchorage off Sawan, Siaoe Island; reef; July 18, 19, 1899. — 1 ♀, 1 specimen with Sacculinid.
Sta. 127, Tahoena Bay, Sangihe Islands; reef; July 20, 21, 1899. — 1 ♂.
Sta. 129, anchorage off Kawio and Kamboling, Karkaralong Islands; reef exploration, dredge, townet; sand; 23-31 m; July 22, 23, 1899. — 1 ♂, 1 juv.
Sta. 131, anchorage off Beo, Karakelong, Talaud Islands; reef exploration; mud and sand; 13 m; July 24, 25, 1899. — 3 ♂♂, 1 ♀ and 1 specimen with Sacculinid.
Sta. 133, anchorage off Liroeng, Salebaboe, Talaud Islands; trawl, dredge and reef exploration; mud and hard sand; up to 36 m; July 25-27, 1899. — 2 ♂♂ (1 poorly preserved), 1 ♀.
Sta. 142, anchorage off Laiwoei, Obi Major; reef; August 5-7, 1899. — 2 ♀♀.
Sta. 193, Sanana Bay, Soela Islands; reef exploration; mud; 22 m; September 13, 14, 1899. — 2 ♂♂, 1 young ♀.

Museum Amsterdam

Nias, off W. Sumatra; J. P. Kleiweg de Zwaan. — 3 ♂♂, 4 ♀♀.
Goenoeng Sitoli, Nias; J. P. Kleiweg de Zwaan. — 14 ♂♂, 11 ♀♀ (5 ovigerous), 2 juv.

Poeloe Naka; J. P. Kleiweg de Zwaan. — 1 ♂.
Padang, W. Sumatra; 1925; H. D. Onnes. — 1 ♀.
Noesa Kembangan, S. Java; shore; June 2, 1906. — 1 ♂.
Banda, Moluccas; E. van der Velde. — 1 ♂.
Java Sea, December 15, 1907 or Romang, Leti Islands, South Moluccas, October 1907; Gier Exp. (2 labels in the jar). — 1 ♀.
Locality unknown. 1 ♂, 3 ♀♀ (2 ovigerous).

United States National Museum

Gulf of Siam; April 20, 1934; H. M. Smith. — 6 ♂♂, 3 ♀♀.
Benkoelen, Sumatra; November, 1925; H. C. Kellers. — 1 ♂.
Java; Owen Bryant. — 1 ♂.
Grand Island, Subic Bay, Luzon; October, 1907; J. C. Thompson. — 1 ♂.
Bushman's Bay, Malekula, New Hebrides; March 28, 1929; Herre. — 1 ♂.
Makalava, Fiji Islands; reef; June 19, 1922. — 1 ♂.
Niuafou Island; October 5, 12, 27, 1930; Naval Eclipse Exp.; H. C. Kellers. — 2 ♂♂, 2 ♀♀.
Apia, Samoa; outer reef; June 27, 1902. — 2 ♂♂.
Apia, Samoa; outer coral reef at low tide; July, 1922. — 1 ♂.
Apia, Samoa; holes along Vailele River, above low tide; July, 1902. — 1 ovigerous ♀.
Apia, Samoa; at mouth of river; July, 1902. — 1 ♂, 5 ♀♀ (1 ovigerous).
Pago Pago, Samoa; August, 1902. — 10 ♂♂, 3 ♀♀ (2 ovigerous).
Society Islands; J. Morgan Clements. — 1 ♀.
Mohigan Reef, Rangiroa Island; September 21, 1899; U.S. Fish Commission Steamer Albatross. — 2 ♂♂.
Nuka Hiva, Marquesas; February 5, 1929; Herre. — 1 ♀.
Fanning Island; inner lagoon; December 16, 1935; F. & Ch. Baker. — 1 ♀.
Volcano House, Kilauea, Hawaii; O. Degener. — 11 ♂♂, 17 ♀♀ (4 ovigerous).
Volcano House, Kilauea, Hawaii; on beach or reef; April 1, 1930; O. Degener & Y. Ywasaki. — 1 ♂.
Volcano House, Kilauea, Hawaii; April 28, 1930; O. Degener. — 1 ♂.
Milolii, Hawaii; January, 1930; Pohina. — 17 ♂♂, 17 ♀♀ (7 ovigerous), 1 juv. and 1 specimen without abdomen.
Keei, Hawaii; September 22, 1929. — 3 ♂♂, 4 ♀♀ (1 ovigerous).
Honaunau, Hawaii; September, 1920; P. Bartsch. — 1 ♂, 2 ♀♀.
Waikiki Key, Oahu; September, 1930; P. Bartsch. — 2 ♂♂, 1 juv.

Museum Copenhagen

Durban; July 10, 1929; Dr. Th. Mortensen's Java-S. Africa Exp., 1929-1930. — 1 ♂.
Canonniers Point, Mauritius; reef; October, 1929; Dr. Th. Mortensen's Java-S. Africa Exp., 1929-1930. — 4 ♂♂, 2 ♀♀ (1 ovigerous).
Flat Island, Mauritius; October 17, 1929; Dr. Th. Mortensen's Java-S. Africa Exp., 1929-1930. — 2 ♀♀.
Palatea, Oahu; Reinhardt. — 1 ♀.

Description of ♂ from Leti.

Carapace rather convex; regions well indicated in the anterior part, the posterior third, however, is nearly flat and not lobulated. In this rather large specimen the carapace is nearly smooth, except for the outer lateral part which is granular. In smaller specimens the whole anterior lobulated

part of the carapace may be slightly granular, but the flat posterior part is always smooth or very slightly pitted. Fronto-orbital breadth very slightly more than half the greatest carapace breadth, but always distinctly less than its length. The median notch is shallow and far less broad than in *crassimanus* and *quinquedentatus*, with a closed but broad fissure extending from the notch backwards. The granular frontal edge is only emarginate and not so deeply concave as in the two preceding species; this makes that the front does not consist of four separated teeth. The tumid orbital region shows the usual fissures and tuberculiform corners and is separated from the front by a notch. Antero-lateral border with five lobes, the second is broadest and the fifth smallest, being merely a short blunt tubercle. Between orbit and first antero-lateral tubercle a more ventrally situated tubercle is visible. The postero-lateral border is shorter than the cord of the antero-lateral. Antennules folded transversely; basal antennal joint broadly in contact with the down-turned edge of the front; flagellum lodged in the orbital hiatus. With the exception of the granular pterygostomian region and the anterior part of the sub-hepatic region, the ventral surface of the carapace is hairy. On the naked part of the sub-hepatic region stands the above mentioned tubercle which is visible in dorsal view. Outer maxillipeds, especially the merus, with small granules; sternum pitted, abdomen smooth.

The left cheliped is somewhat smaller than the right; the outer surface of wrist and palm of both chelipeds is roughened; the wrist moreovers bears a short conical tooth at the inner angle; the upper part of the inner anterior border of the wrist is hairy; the upper inner and the outer border of the merus too are hairy. Cutting edges of the fingers of both chelipeds with some teeth; fingers broadly spooned; dark colour of immovable finger extending on palm.

The edges of all the joints of the walking legs hairy, especially the upper edges of the meri.

In this species there are always 5 antero-lateral lobes; but sometimes the posterior tubercle is very small; in some specimens the carapace is more granular than in the described ♂. The fronto-orbital breadth is not always more than half the carapace breadth, sometimes it is equal to half that breadth or even slightly less, but even in these specimens the fronto-orbital breadth is less than the carapace length. This together with the shape of the front (the short median notch and the emarginate, not deeply concave, anterior margin) are the most conspicuous differences from *crassimanus* and *quinquedentatus*); the ♂♂ of the three species are easily separated by the shape of the pleopod.

Distribution. From the east coast of Africa to Hawaii and Polynesia.

Xantho demani Odhner (fig. 9j)

Xantho bidentatus Alcock, 1898, p. 114.
Xantho subacutus De Man, 1902, p. 595, pl. 21 fig. 21.
Xantho demani Odhner, 1925, p. 83; Ward, 1932, p. 244; Balss, 1938a, p. 52.

Snellius Expedition

Tidore; shore; September 24-29, 1929. — 20 ♂♂, 20 ♀♀.
Near Tjobo, Tidore; shore; September 24-29, 1929. — 11 ♂♂, 13 ♀♀ (2 ovigerous), 1 juv.
Ternate; shore; September 25-27, 1929, April 1-2, 1930. — 5 ♂♂, 4 ♀♀.
Amboina; October 14, 17, 1930. — 1 ♂.
Endeh, Flores; November 6-8, 1930. — 23 ♂♂, 38 ♀♀ (24 ovigerous).

Description of ♂ from Tidore, cb. 26 mm.

Carapace flat, slightly concave anteriorly towards the front; whole upper surface slightly pitted, with larger pits in the anterior and antero-lateral parts. Only some regions are indicated and these are surrounded by narrow and shallow grooves; from the median notch such a groove extends and, bifurcating, surrounds lobe 3 M; another groove extends from the notch between front and orbit, and separates the anterior part of the orbital margin from the protogastric region; the cervical groove is present too; while from the small notch between the second and third antero-lateral lobes a shallow groove runs inwards and afterwards slightly downwards; the groove extending from the notch between third and fourth antero-lateral lobes is far shorter and straighter. Fronto-orbital border less than half the greatest breadth of the carapace. Front thick, pitted, with a median notch, slightly concave and with the small blunt outer tubercle separated from the orbit by a notch. Orbital margin with the usual fissures, only the lower outer angle slightly tuberculiform. Antero-lateral margin rounded, longer than the postero-lateral; this last mentioned part of the lateral margin runs first straight backwards and then it bends inwards, becoming thereby concave in the middle. The first two antero-lateral lobes are nearly fused; the second lobe is marked by a small tubercle in the middle; the third is separated from the second and from the tuberculiform fourth lobe by a short notch; the tubercle of this third lobe is better developed than that of the second. Antennules folded transversely; the inner angle of the broad, short, and pitted basal antennal joint in contact with the equally short and pitted, down-turned edge of the front. The outer angle of the basal joint not reaching the apex of the slightly tuberculiform lower inner orbital angle. The antennal flagellum is lodged in the orbital hiatus. The sub-hepatic region is roughened by small granules; a row of larger granules separates this part from the smooth pterygostomian region; the sub-branchial region is densely

hairy; the second antero-lateral groove is ventrally surrounded by two grooves which nearly unite. Ischia of outer maxillipeds with a longitudinal furrow and with rather large pits near the margins; the upper margin of the meri is straight with a small triangular gap near its inner angle.

Chelipeds unequal, in the present specimen the right is the larger; upper border of all the joints rounded, their outer surface pitted. The furrow on the upper part of the outer surface of the palm nearly invisible; the dark colour of the immovable finger continuing on the outer as well as on the inner surface of the palm. Fingers of both chelipeds bluntly tipped, even a little hollowed; the cutting edge of the immovable finger of the smaller cheliped with four large teeth; the teeth on the cutting edge of the movable finger are very small; the cutting edge of the movable finger of the larger cheliped is armed with two molar-like teeth, and with two much smaller ones near the tip; that of the immovable finger is armed with three large teeth. Walking legs nearly smooth; upper border of the meri with small granules, hairy in its proximal half; the lower border of the propodi with many short and some longer hairs; while the upper and lower parts of the outer surface of the dactyli are covered with a rather thick fur; on the lower part moreover longer hairs are implanted.

♂ pleopod as in fig. 9j.

In the ♀♀ the dark coloration of the immovable finger extends only very slightly on the palm. Some specimens have the carapace more pitted than is usual; the palm of the specimens, especially of the ♀, collected at Ternate in September, is roughened with granules; the fingers of this ♀, which has the carapace soft, are whitish.

In many specimens the outer surface of palm and wrist is not pitted, while in others (material collected at Endeh) the outer surface of the wrist is roughened.

The most striking differences (mostly enumerated by De Man) between this species and *Lachnopodus subacutus* (Stimpson), if we compare specimens of the same cephalothorax breadth (♂ of *Lachnopodus subacutus* collected at Samoa, cb. 26 mm), are:

	L. subacutus	*X. demani*
I.	Upper surface of carapace smooth, not granular and not pitted.	Especially the anterior part of the carapace pitted; the pits mostly small, with larger ones in between.
II.	Front almost straight and granular.	Front thicker, not granular and moreover more concave.

	L. subacutus	*X. demani*
III.	The short side-walls of the front straight.	Slightly outwards directed.
IV.	Upper outer orbital angle slightly tuberculiform. Orbital fissures and also the groove separating orbital and frontal regions not distinct.	Upper outer orbital angle not marked. The fissures and this groove better developed.
V.	Antero-lateral and postero-lateral margin equal or even the antero-lateral one shorter. No grooves surrounding the second antero-lateral lobe ventrally. The postero-lateral margin more equally rounded.	Antero-lateral margin longer than the postero-lateral. Ventrally the second antero-lateral lobe is surrounded by grooves. The postero-lateral margin at first runs straight backwards, then inwards.
VI.	The first two antero-lateral lobes not so equally rounded; no groove between second and third lobes.	The first and second antero-lateral lobe more equally rounded; a grove between second and third lobes.
VII.	The downwards directed frontal lobe less broad than in *demani*; no small triangular gap in the upper margin of the outer maxillipeds, this margin slightly concave. Sub-branchial region less hairy.	The downwards directed frontal lobe broader; upper margin of the meri of the outer maxillipeds straight, but with a small triangular gap. Sub-branchial region densely hairy.
VIII.	Fingers of chelipeds blunt; furrow on the upper part of the outer surface of the palm rather indistinct.	Fingers of chelipeds hoofed; the furrow on the upper part of the outer surface of the palm still more indistinct.
IX.	Upper border of meri of walking legs granular; those of propodi and carpi hairy.	The granules are far smaller; the hairs missing.
X.	Posterior part of carapace convex; anterior part of 3 M slender and acute.	Posterior part of carapace flat; anterior part of 3 M broader and blunter.

Distribution. Andaman Islands, Lesser Soenda Islands (Flores), Moluccas, Queensland.

Xantho distinguendus De Haan

Xantho distinguendus De Haan, 1835, p. 48, pl. 13 fig. 7; Odhner, 1925, p. 81; Gordon, 1931, p. 543, figs. 21, 22c.
Chlorodius distinguendus Stimpson, 1907, p. 56.
Xanthodius distinguendus Balss, 1922, p. 127; Balss, 1922a, p. 6.

Museum Leiden

Japan; coll. D. W. Burger; cotypes. — 2 ♂♂.
Japan; cotypes. 2 ♂♂ and one carapace.

Description of one of De Haan's cotypes, a dry ♂ (cb. 23 mm) collected in Japan by Burger.

Carapace with the regions well indicated and separated by smooth, not very deep grooves. The lobes, especially those of the anterior and postero-lateral parts of the carapace, with granules mostly arranged in transverse series; a row of granules marks the posterior border. Fronto-orbital border half the greatest breadth of the carapace. The granular front with a median notch; each half concave and the blunt inner tubercle more produced than the equally blunt, but smaller, outer one which is separated from the granular upper orbital border by a notch. The lower orbital border and the eyestalk are granular too; the usual fissures are present and the angles tuberculiform, the lower more than the upper angles. Antero-lateral border with four blunt, granular tubercles; the whole margin is granular between the lobes. The postero-lateral margin is granular too. Antennules folded transversely; basal antennal joint in contact with the downturned edge of the front; antennal flagellum broken off. Sub-hepatic region granular; the pterygostomian region was probably hairy, but in the dry specimens the hairs are absent. Third maxillipeds and the anterior and posterior parts of the thoracic sternum granular; the middle part of the sternum pitted and with some granules; abdomen smooth; meri of the outer maxillipeds with a longitudinal furrow.

Chelipeds unequal, in the present specimen the right is the larger; outer surface and upper margin of meri granular; the outer surface with a furrow parallel to the articulation with the wrist. Upper and outer surfaces of the wrist very rough and covered with granules; a blunt tubercle at its inner angle. With the exception of the extreme lower part, which is pitted, the whole outer and the upper part of the inner surfaces of the palm are granular; a row of granular tubercles near the upper margin; a second row of these tubercles somewhat lower down on the outer surface; while on the inner side, near the upper margin, some such tubercles are found too. On this inner surface the granules are arranged on transverse rows. The

blunt topped fingers are pitted, channelled, and have a row of blunt teeth on their cutting edges. The dark coloration of the immovable finger extends on the outer as well as on the inner surface of the palm. Outer surface of all the joints of the walking legs granular: upper border of the meri with a row of sharp granules and that of the carpi anteriorly with two blunt granular tubercles: the posterior part with a granular ridge.

This species is perhaps easiest recognized by the shape of the upper border of the carpi of the walking legs.

The types agree with the description given by Balss in 1922 and with that of Gordon in 1931, where she compares this species with *X. exaratus* and *Medaeus granulosus*. There are, however, two differences from Gordon's points of comparison:

1. The outer surfaces of propodi and carpi, as well as of all the other joints of the walking legs, are granular, while, according to Gordon, there is hardly any trace of granulation.
2. Only on the lower part of the outer surface of the palm of the larger cheliped the granules are absent, while, according to Gordon again, the granulation of the chelipeds is almost obsolete.

In the spirit collection of the Leiden Museum there is, under the name *X. distinguendus* De Haan, a small ♂ from the Mergui Archipelago collected by Prof. J. Anderson and described by De Man as probably belonging in the genus *Medaeus*. It belongs to the species for which Balss created the name *X. neglectus* and belongs with all the material brought together in this species in *M. granulosus* Haswell (see Odhner, 1925). The differences from De Haan's types are:

1. The fingertips of the chelipeds are pointed and not blunt and hollowed.
2. The upper borders of the meri of the walking legs are carinated, not sharp and with spines; the two tubercles on the upper border of the carpi are far less distinct.
3. The outer surfaces of the joints of the walking legs are less granular; the dactyli longer.
4. The upper border of the palm is granular; but those granules are not arranged on nodules.
5. The brown coloration of the fingers does not extend on the palm; the form and number of teeth on the cutting edge of the fingers is different.

Distribution. Japan.

Xantho exaratus (H. Milne Edwards) (figs. 9k-m)

Chlorodius exaratus H. Milne Edwards, 1834, p. 402.
Leptodius exaratus var. Miers, 1879, p. 31.

Leptodius exaratus Nobili, 1906a, p. 240; Parisi, 1916, p. 180; Chen, 1933, p. 102.

Xantho (Leptodius) exaratus Alcock, 1898, p. 118 (with older literature and synonymy); Balss, 1935, p. 133; Balss, 1938, p. 41.

Xantho exaratus Grant & McCulloch, 1906, p. 10; Rathbun, 1906, p. 847; Odhner, 1925, p. 80; Gordon, 1931, p. 543, figs. 20, 22b; Balss, 1935a, p. 40; Monod, 1938, p. 125, fig. 17B.

Snellius Expedition

Maratoca; reef; August 14-18, 1929. — 4 ♂♂, 2 ♀♀.
Paleleh, Celebes; shore; August 21, 22, 1929. — 1 ♂ without chelipeds.
Sipankot; shore; September 10, 11, 1929. — 2 ♂♂, 1 ♀.
Near Tjobo, Tidore; shore; September 24-29, 1929. — 1 ♀.
Ternate; September 29, 1929. — 2 ♂♂, 4 ♀♀ (1 ovigerous).
Dobo; shore; October 10, 1929. — 1 ♂.
Near Koepang; shore; November 25, 1929. — 7 ♂♂, 4 ♀♀ (1 ovigerous).
Kambang, near Timor; shore and reef; November 26, 28, 1929. — 3 ♂♂, 1 ♀.
Near Hainsisi, Semaoe near Timor; shore; November 27, 1929. — 1 ♂, 3 ♀♀.
Near Koepang; reef; December 8, 1929. — 2 ♂♂, 2 ovigerous ♀♀.
Koepang; reef; December 9, 1929. — 2 ♂♂, 9 ♀♀ (7 ovigerous).
Bima, Soembawa; shore; December 25, 1929. — 15 ♂♂, 17 ♀♀ (5 ovigerous).
Kambing, near Bima, Soembawa; December 26, 1929. — 4 ♂♂, 2 ♀♀ (1 ovigerous).
Koedingareng Lompo; shore; February 3, 1930. — 3 ♂♂, 1 ♀, 1 juv.
Ternate; shore; April 1, 2, 1930. — 14 ♂♂, 13 ♀♀, 5 juv.
Amboina; shore; April 21, 1930. — 20 ♂♂, 20 ♀♀ (5 ovigerous), 7 juv.
Amboina; shore and reef, 0-2 m; May 6, 1930. — 3 ♂♂, 3 ♀♀ (2 ovigerous).
Haroekoe; shore and reef; May 3-7, 1930. — 6 ♂♂, 1 ♀.
Morotai; June 3-10, 1930. — 1 ♂, 1 ovigerous ♀.
Beo, Talaud Islands; shore and reef; June 14-21, 1930. — 2 ♂♂.
Kaledoepa; August 27, 1930. — 3 ♂♂, 6 ovigerous ♀♀.
Morotai; October 1, 1930. — 1 ♂.
Amboina; October 14, 17, 1930. — 153 ♂♂, 175 ♀♀ (75 ovigerous), 9 juv.

Museum Leiden

Japan; D. W. Burger. — 1 ♂ (cotype of *Xantho lividus* De Haan).
Japan. — 1 small ♂ (marked type of *Xantho lividus* De Haan).
Japan. — 1 ♀.
Japan; D. W. Burger; and New Guinea; H. C. Macklot (2 labels with this lot). — 1 ♂ (the lot contained also a specimen of *Xantho sanguineus* H. M. Edw.).
Amoy, China; G. Schlegel. — 7 ♂♂, 5 ♀♀.
Poeloe Weh, N. Sumatra; December, 1909; P. Buitendijk. — 1 ♂, 1 ♀.
Java Sea; 1908; P. Buitendijk. — 1 ♂, 1 ♀.
Pontianak, Borneo; capt. Storm. — 2 ♀♀ (1 ovigerous).
Makassar, Celebes; D. M. Piller. — 1 ♂.
Celebes?; April, 1878. — 1 ♂.
Skroë, New Guinea; 1867; K. Schädler. — 1 ♀.
Timor. — 1 ♂.
Upolu; Mus. Godeffroy. — 1 ♂, 1 ♀.
Red Sea or Java. — 1 ♂.

Siboga Expedition

Sta. 33, Bay of Pidjot, Lombok; trawl, dredge and shore exploration; 22 m and less; March 24-26, 1899. — 1 ♀.

Sta. 47, Bay of Binna, near south fort, Soembawa; coral shore; April 8-12, 1899. — 8 ♂♂, 6 ♀♀.
Sta. 86, anchorage off Donggala, Palos Bay, Celebes; reef; June 18, 19, 1899. — 2 ♂♂, 2 ♀♀.

Museum Amsterdam

Makassar, Celebes; G. J. Terwiel. — 1 ♂.
Poeloe Berhala, E. Sumatra; December 26, 1929; J. C. van der Meer Mohr. — 8 ♂♂.
Locality unknown. — 2 ♂♂, 1 ♀.

United States National Museum

Rangoon, Burma; G. E. Gates. — 2 ♀♀ (1 ovigerous).
Liuwutien, China; P. W. Wu. — 1 ♂.
Gulf of Siam; April 20, 1934; H. M. Smith. — 1 ♀, 1 specimen with Sacculinid.
Lem Sing, S. E. Siam; January 8, 1924 and February 22, 1930. — 6 ♂♂.
Iloilo, Panay Island, Philippines; April 15, 1929; H. C. Kellers. — 2 ♂♂, 1 ♀.
Ovalau Island, Fiji Islands; March 18, 1924; Herre. — 1 ovigerous ♀.
Pago Pago, Samoa; August, 1902. — 1 young ♂.
Society Islands; J. Morgan Clements. — 1 ♀.

Museum Copenhagen

Durban, harbour dam; July 10, 1929; Dr. Th. Mortensen's Java-South Africa Exp., 1929-1930. — 1 ♂.
New Caledonia; abt. 25 m; June 15, 1934; Monsunen Exp. — 2 ♂♂, 2 ♀♀.

Description of ♂ from Makassar.

Carapace moderately convex; the regions of the anterior part well indicated; the posterior part, however, is nearly flat and not areolated; this part of the carapace is pitted, the rest and more especially the lateral parts are covered with small granules. Fronto-orbital margin less than half the greatest breadth of the carapace and also less than the carapace length; with a rather deep median notch; the granular front is nearly straight and separated from the rather tumid and granular orbital border by a deep notch; the four orbital corners are tuberculiform and the usual fissures are present. Antero-lateral margin with four lobes; the anterior two rounded, the posterior two sharper, more tooth-like and the posterior smaller than the third lobe; the second lobe broadest. Postero-lateral border as long as the cord of the antero-lateral border. Antennules folded transversely; the short, but rather broad, basal antennal joint rather broadly in contact with the short down-turned, granular edge of the front; flagellum lodged in the orbital hiatus. Ventral surface of carapace hairy, except part of the pterygostomian region which is smooth; outer maxillipeds with very small granules; sternum pitted, abdomen smooth.

Of the unequal chelipeds the right is the smaller; outer surface of meri smooth; outer surface of wrist wrinkled; inner angle with a rather strong

granular tubercle; lower part of outer surface of palm smooth to the naked eye; upper part of this surface with small granules and some low transverse or reticulating wrinkles. The immovable finger of the larger cheliped with two teeth near its base (the second being the larger) and a very small tooth near the tip; the teeth near the base of the movable finger are smaller than those of the immovable finger; the third tooth is larger than the same tooth of the immovable finger. The cutting edge of the immovable finger of the smaller cheliped bears four teeth, while that of the movable finger is armed with a row of denticles; the fingers of both chelipeds only meet at their broadly cut-out tips; the dark coloration of the immovable finger extends slightly on the palm. The edges of all the joints of the walking legs, but especially the upper edges of the meropodites are hairy.

♂ pleopod as in fig. 9k-m.

In the smaller specimens (e.g., the smaller ♀ from Pontianak, one of the specimens mentioned by De Man, 1895) the lobulation of the carapace is sharper, the frontal notch better developed and the first two antero-lateral lobes more tuberculiform. In some specimens the front is more concave and the outer frontal angle is more produced. In some specimens, especially in the smaller ones, the fronto-orbital margin is half or even slightly more than half the greatest breadth of the carapace. The differences between ♀♀ of this species and female specimens of *Xantho gracilis* are very difficult to define; the best characteristic is that of the fronto-orbital breadth, which in *gracilis* is equal to, in *exaratus* less than the carapace length; moreover the carapace is broad and flat in *gracilis*, more convex and less broad in *exaratus*. The ♂♂ are far easier separated by the shape of the pleopod; the apex of which is characteristically bent inwards in this species, while in *gracilis* the apex is bent outwards. In the ♂ from Durban the apex of the pleopod is not so strongly bent inwards, but there is still not the slightest doubt that this specimen actually belongs here.

Xantho lividus De Haan is best placed under the synonyms of *Xantho exaratus*; none of the differences, including those of the ♂ pleopod, affording enough reason to establish a variety *lividus* of the rather variable species *exaratus*. De Haan described and figured his species, but mentioned no locality; the type as well as the cotype in the dry collection of the Leiden Museum are both labelled Japan; the larger ♂ is labelled cotype, but this cotype agrees far better with the measurements given by De Haan than the specimen labelled type; therefore a mistake was probably made in the labels. A mistake was made also with the number of the figure given in the text of De Haan's work. According to the text the specimen described by De Haan as *Cancer (X.) affinis* is larger than that described as *lividus;* the

reproduction of both is 2/4, therefore the larger specimen figured is *affinis* (fig. 8), the smaller *lividus* (fig. 6); the inscription on the plate is right, and the number given in the text incorrect.

Distribution. From East Africa to Polynesia.

Xantho gracilis (Dana)

Chlorodius gracilis Dana, 1852, p. 79; Stimpson, 1858, p. 34; Stimpson, 1907, p. 56.
Leptodius exaratus var. *gracilis* Miers, 1884, pp. 214, 530; Ortmann, 1894a, p. 447.
Leptodius gracilis De Man, 1888, p. 287, pl. 11 fig. 2; De Man, 1890, p. 54; De Man, 1892, p. 278 (under the synonyms of *L. exaratus*); Rathbun, 1906, p. 848, pl. 9 fig. 2; Rathbun, 1907, p. 30; Bouvier, 1915, p. 106, textfig. 32, pl. 6 fig. 7.
Xantho gracilis Odhner, 1925, p. 80.
Xantho (= *Leptodius*) *exaratus* var. Gordon, 1931, p. 29, fig. 16c.
Leptodius planus Ward, 1934, p. 14, pl. 3 fig. 6.
Xantho (*Leptodius*) *gracilis* Balss, 1938a, p. 52.

Snellius Expedition

Mamoedjoe; shore; August 4, 1929. — 2 ♂♂, 1 ovigerous ♀.
Mamoedjoe; reef and shore; August 4, 5, 1929. — 2 small ♂♂.
Maratoea; reef; August 14-18, 1929. — 5 ♂♂, 8 ♀♀ (5 ovigerous), 1 juv.
Paleleh, Celebes; shore; August 21, 1929. — 10 ♂♂, 13 ♀♀ (6 ovigerous).
Bongao, Tawitawi, Sulu Archipelago; shore; September 16, 1929. — 2 ♂♂, 1 ovigerous ♀, 1 juv.
Ternate; September 20, 1929. — 1 ♀.
Kafal, Misool Group; shore and reef; October 3, 5, 1929. — 11 ♂♂, 8 ♀♀ (7 ovigerous).
Dobo; shore; October 10, 1929. — 4 ♂♂, 6 ♀♀ (1 ovigerous), 1 juv.
Near Manoembai, Aroe Islands; shore; October 11-14, 1929. — 31 ♂♂, 22 ♀♀ (18 ovigerous).
Koepang; shore; November 2, 1929. — 4 ♂♂, 3 ♀♀ (2 ovigerous).
Near Koepang; November 18-20, 1929. — 3 ♂♂, 6 ♀♀.
Kambang near Timor; reef and shore; November 26, 28, 1929. — 2 ♂♂, 3 ♀♀ (2 ovigerous).
Hainsisi, Semaoe near Timor; shore; November 27, 1929. — 11 ♂♂, 9 ♀♀ (1 ovigerous).
Tandjong Lelinto, Timor; shore; November 27, 1929. — 11 ♂♂, 13 ♀♀.
Near Koepang; reef; December 8, 1929. — 8 ♂♂, 7 ♀♀ (3 ovigerous).
Koepang; reef; December 9, 1929. — 7 ♂♂.
Pelokan, Postiljon Islands; shore and reef; December 20, 1929. — 4 ♂♂, 1 ♀.
Sambardjaga, Postiljon Islands; shore and reef; December 21, 1929. — 6 ♂♂, 9 ♀♀.
Sapoeka Besar, Postiljon Islands; shore and reef; December 21-23, 1929. — 1 ♂, 1 ♀.
Kambing near Bima; shore; December 26, 1929. — 2 ♂♂, 1 ♀.
Samalona, Spermonde Archipelago; shore; February 3, 1930. — 1 ♂.
Koedingareng Lompo; shore; February 3, 1930. — 2 small ovigerous ♀♀.
Aloang, Paternoster Islands; shore and reef; February 8, 1930. — 126 ♂♂, 123 ♀♀ (121 ovigerous).
Sailoes Besar, Paternoster Islands; shore or reef; February 9 or 10, 1930. — 1 ♀.
Sarappo, Spermonde Archipelago; March 1, 1930. — 1 ♀.
Taliaboe, Soela Islands; shore; March 18, 19, 1930. — 3 ♂♂, 2 ovigerous ♀♀.

Pasih Ipah, Soela Islands; shore; March 19, 1930. — 16 ♂♂, 13 ♀♀ (8 ovigerous), 1 juv.
Ternate; shore; April 1, 2, 1930. — 20 ♂♂, 12 ♀♀.
Amboina; shore; April 21, 1930. — 5 ♂♂, 5 ♀♀ (2 ovigerous).
Haroekoe; shore and reef; May 3-7, 1930. — 85 ♂♂, 66 ♀♀ (19 ovigerous).
Amboina; shore and reef; May 6, 1930. — 4 ♂♂.
Merampi, Nenoesa Islands; shore; May 20, 1930. — 4 ♂♂.
Karaton, Nenoesa Islands; shore; May 20, 21, 1930. — 3 ♂♂.
Ake Selaka, Kaoe Bay, Halmahera; shore and reef; May 28, 1930. — 13 ♂♂, 13 ♀♀ (9 ovigerous).
Morotai; June 3-10, 1930. — 3 ♂♂, 3 ♀♀.
Beo, Talaud Islands; shore and reef; June 14-21, 1930. — 6 ♂♂.
Flores, August 18, 19, 1930. — 1 ♂.
Kaledoepa; August 27, 1930. — 6 ♀♀ (3 ovigerous).
Laha, Amboina; September 13, 1930. — 2 ♂♂, 5 ♀♀ (2 ovigerous).
Ternate; September 29, 1930. — 3 ♂♂, 1 ♀.
Morotai; October 1, 1930. — 1 ♂.
Amboina; October 14, 17, 1930. — 153 ♂♂, 56 ♀♀ (21 ovigerous), 8 juv., 1 with Sacculinid.
Roemah Tiga, Amboina; October 17, 1930. — 7 ♂♂, 3 ♀♀ (2 ovigerous).
Leti; October 31, 1930. — 65 ♂♂, 27 ♀♀ (19 ovigerous).

Museum Leiden

Red Sea; 1881; R. Kossmann. — 1 ♂.
Red Sea or Java. — 1 ♂.
Ponapé, Caroline Islands; Mus. Godeffroy. — 2 ♂♂.
Samoa; Mus. Godeffroy. — 1 ♂, 1 ♀.

Siboga Expedition

Sta. 37, Sailoes Ketjil, Paternoster Islands; shore; March 30, 31, 1899. — 10 ♂♂, 8 ♀♀ (3 ovigerous).
Sta. 172, anchorage between Kisar and Ceram-laut; reef; August 26-28, 1899. — 1 ♂.

United States National Museum

Rangoon, Burma; G. E. Gates. — 1 ♀.
Samoa; D. S. Jordan. — 1 ♂.
Apia, Samoa; at mouth of river; June, 1902. — 3 ♂♂.
Apia, Samoa; outer reef; June 27, 1902. — 3 ♂♂.
Pago Pago, Samoa; August, 1902. — 3 ♂♂, 1 ovigerous ♀.
Rangiroa Island, Mohigan Reef; September 21, 1899; U.S. Fish Commission Steamer Albatross. — 3 ♂♂.
Keei, Hawaii; September 22, 1929; O. Degener. — 3 ♂♂, 1 ovigerous ♀, 1 juv.

Museum Copenhagen

Canonniers Point, Mauritius; reef; October, 1929; Dr. Th. Mortensen's Java-South Africa Exp., 1929-1930. — 1 ♂, 1 ♀.

Description of a ♂ from Tandjong Lelinto, Timor.

Carapace smooth, with small pits, wider than long and only very moderately convex; the impression is given of a carapace which is broader and

flatter than that of *exaratus*; the grooves separating the lobes on the anterior part of the carapace are shallow and certainly less deep than those of *exaratus*. Fronto-orbital margin more than half the greatest breadth of the carapace and equal to its length; therefore longer than in *exaratus*. Front produced with a median notch, each frontal half distinctly bilobed; the outer lobe sharper and less broad than the inner. A deep notch separates the front from the tumid but smooth orbital border; the four angles of this border are tuberculiform, the upper inner angle is sharpest; there are traces of two sutures. Frontal margin very slightly granular. Antero-lateral margin with four lobes; the anterior two are broad and blunt; the third is also broad, but sharper than the preceding two, while the triangular fourth tubercle is much smaller. Postero-lateral margin as long as the cord of the antero-lateral. Antennules folded transversely; basal antennal joint in contact with the down-turned edge of the front as well as with the lower inner orbital angle; the antennal flagellum is lodged in the orbital hiatus. Sub-hepatic region granular, the granules on the pterygostomian region and the outer maxillipeds are much smaller; the sub-branchial region is granular too, but here the granules are covered by a dense coat of rather long, light coloured hairs. Sternum and abdomen smooth, with a few pits.

Chelipeds subequal with small granules; a row of rather long, yellow hairs on the upper border of the merus; the outer upper angle of the wrist slightly tuberculiform; the pitted fingers only meet at their excavated tips; their cutting edges armed with some rather small teeth; the dark coloration of the immovable finger continuing on the palm. The margins of all the joints of the walking legs, with the exception of the lower border of the carpus, hairy; some of these margins are granular; the dactyli more distinctly so.

When with the described ♂ from Tandjong Lelinto we compare a ♂ from Amboina, April 21, 1930, representing the other extreme of this very variable species, the most striking differences are:

1. The anterior part of the carapace is far sharper areolated.
2. The lobes of the antero-lateral border are sharper, tooth-like, and these teeth as well as the whole lateral and anterior part of the carapace are granular.
3. Each frontal half is less distinctly bilobed.
4. The chelipeds are markedly unequal; the upper part of the outer and inner surfaces of the palm as well as the outer surface of the wrist are far more granular; the opening between the fingers of the larger cheliped is wider.

In my opinion it is probable that this ♂ approaches that described by Gordon (1934, p. 29) as *Xantho exaratus* var.; the pleopod figured by Gor-

don as well as those of our ♂♂ from Tandjong Lelinto and Amboina agree, and they differ from those of *exaratus* more than from the pleopod figured by Gordon as belonging to *gracilis*, which without doubt belongs in this species. The pleopod of *gracilis* in general view resembles more that of *sanguineus*. *X. sanguineus* may be distinguished from *X. gracilis* by the presence of a fifth antero-lateral tubercle, which, however, sometimes is obsolete; also the length of the fronto-orbital border is a good characteristic, this length in *X. sanguineus* being less than the carapace length, as in *X. exaratus*.

The ♀♀ of *exaratus* and *gracilis* are not easily separated; the best characteristic is the fronto-orbital length, which in this species is equal to the carapace length, while in *exaratus* it is distinctly shorter.

Distribution. From East Africa and the Red Sea to Hawaii and Polynesia.

Key to the Indo-Pacific species of *Xantho*

1. Carpus (and sometimes propodus) of the walking legs dorsally strongly bicarinate . . . *cavipes* (Dana)
1a. No such double carinae present 2
2. At the base of each antero-lateral lobe 1 or 2 small accessory tubercles . . . . *danae* Odhner
2a. No such tubercles 3
3. Antero-lateral border with 5 lobes 4
3a. Antero-lateral border with 4 lobes 6
4. Front rather broad and not very distinctly four-lobed . . . . . *sanguineus* (H. Milne Edwards)
4a. Front less broad and distinctly four-lobed 5
5. First antero-lateral lobe double; front equal to half the greatest carapace breadth; ♂ pleopod as in fig. 9g-i . . . . . *quinquedentatus* Krauss
5a. No accessory antero-lateral tubercle; front less broad than half the greatest carapace breadth; ♂ pleopod as in fig. 9e-f . . . . . *crassimanus* A. M. Edwards
6. The fifth antero-lateral tooth represented by a short granulated ridge and its complementary groove . . . . . *waialuanus* (Rathbun)
6a. No trace of this fifth antero-lateral lobe is left 7
7. The first two antero-lateral lobes are nearly fused . . . . *demani* Odhner
7a. These antero-lateral lobes are separated 8
8. The first antero-lateral lobe partly fused with the orbital tooth . *efferens* Rathbun
8a. This first antero-lateral lobe not fused with the orbital 9
9. Upper border of the carpi of the walking legs nodular . *distinguendus* De Haan
9a. Upper border of the carpi of the walking legs smooth 10
10. Carapace oval; fronto-orbital breadth equal to carapace length . . *gracilis* Dana
10a. Carapace less broad in proportion to its length; fronto-orbital breadth distinctly less than the carapace length; apex of ♂ pleopod characteristically bent inwards . *exaratus* (H. Milne Edwards)

(To be continued).