

The Brachyura of the Iranian Gulf

With an Appendix:

The male pleopoda of the Brachyura

BY

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Introductory Remarks

The first author to mention a crab from Iran was Heller 1861 who (*vide* Klunzinger 1913) records *Epixanthus frontalis* (M.-Edw.) as taken in the Iranian Gulf.

The next author was Alcock 1895-1900 who, in his papers on the crabs of India lists 51 (+ 1?) crabs from the "Persian Gulf." Nobili 1906 records 67 species of crabs; but in spite of the title of his paper (Mission J. Bonnier et Ch. Pèrez. Golfe Persique 1901) several of his species are from other seas, especially from the Red Sea (cf. his list of stations, loc. cit., p. 14); in reality only 50 + 2? of his crabs are from the Iranian Gulf.

MacGilchrist 1905 makes mention of 7 species; Klunzinger 1913 and Chopra & Das 1930 record one species each.

The present paper comprises the total fauna of marine Brachyura of Iran, 163 species (+ the fresh water crab *Potamon ibericus*).

The material of the Danish Expeditions was collected by Dr. G. Thorson (18.II.-22.IV. 1937) and by Dr. B. Løppenthin (9.I.-27.IV. 1938) during the fishery investigations carried out for the Iranian Government. Collections of marine animals were made in 156 localities (see map fig. 1), evenly distributed along the Iranian coasts from Bendar Shahpur in the northwest to Baluchistan in the southeast.

Different types of trawls and dredges, seines, the Petersen-grab (about

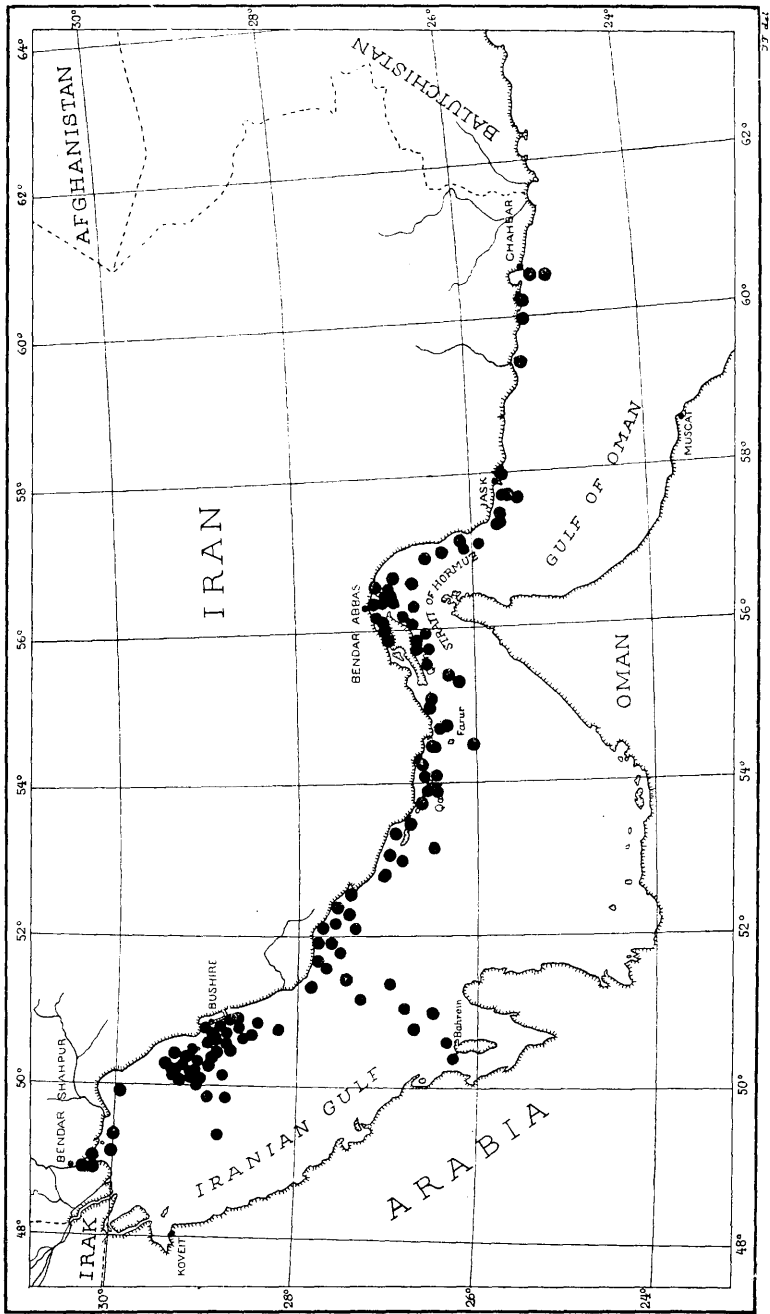


Fig. 1. Map showing the Stations i.e. the intensity of the Danish investigations in the Iranian Gulf.

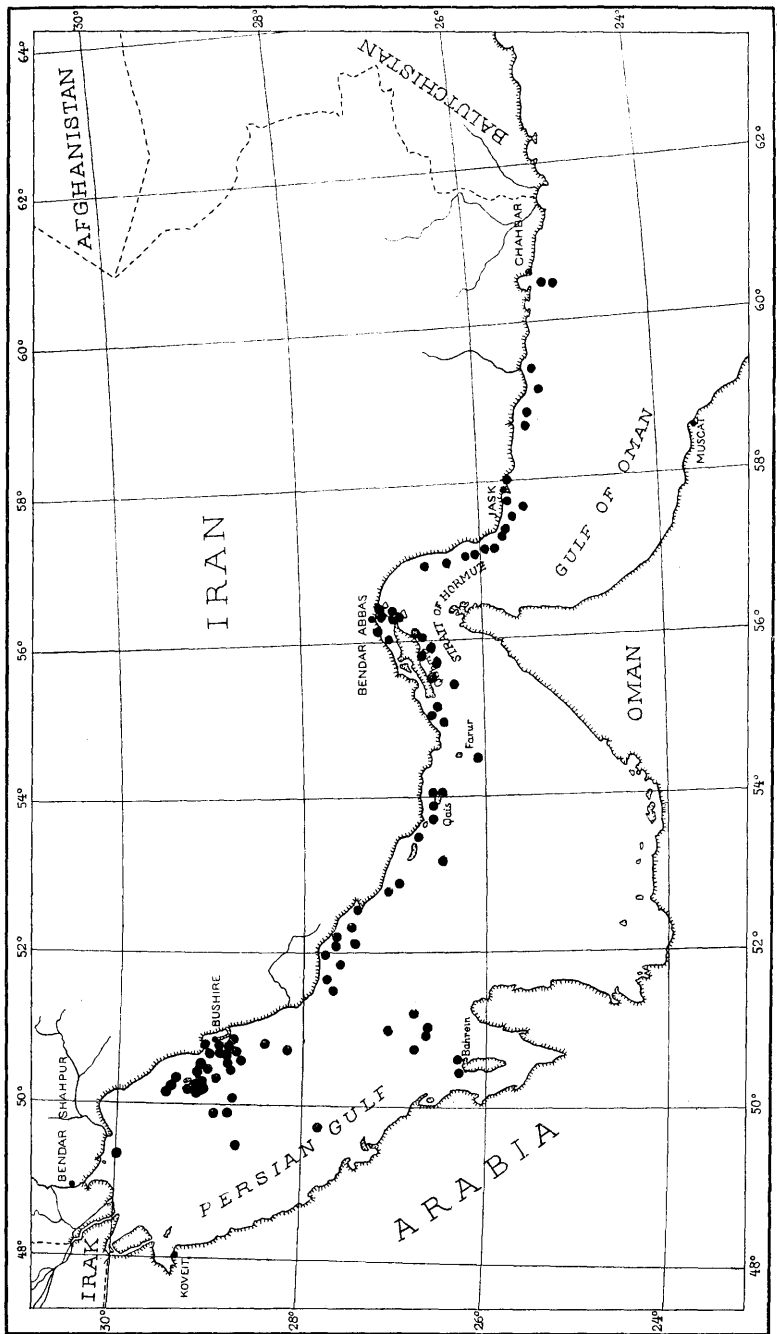


Fig. 2. Stations where the Danish expeditions secured Brachyura.

225 samples) and a dip-net were also used, besides collecting by hand along the whole coast, so that the collections made represent the entire Iranian coast, though those taken on the Arabian coast are limited to the waters round Bahrein.

The result of this most intensive collecting was that crabs are at hand from no less than 107 stations, + several finds from localities without station-number (see map fig. 2).

Much work was done with the Petersen-grab which has yielded a great number of burrowing species, with great quantities of individuals. This applies especially to the fam. *Goneplacidæ* with 16 Iranian species (Nos. 134-149), 10 of which were taken as new to the area.

As stated above the total fauna of marine Brachyura of Iran comprises 163 species. The Danish investigations in 1937-38 have secured no less than 124 species. In the Iranian Gulf 46 species previously taken there and 47 species new to the Gulf were found, in the Strait of Hormuz 34 species were found; previously but one was known from the Strait. In the Gulf of Oman 24 species were secured, all new to the Gulf, only two (three?) species were taken by earlier expeditions.

Three species are described as new to science, viz.,

No. 86: *Thalamita iranica* n. sp.

„ 133: *Dentoxanthus iranicus* n. gen. n. sp.

„ 144: *Typhlocarcinus dentatus* n. sp.

List of Species

Dromiacea

Fam. DROMIIDÆ

1. *Dromia dormia* (L.) (= *D. rumphii* Fabricius) (Fig. 3)

Dromia dormia Ihle 1913, p. 22 (with lit. etc.).

Dromia dormia M. Rathbun: An analysis of "*Dromia dormia* (Linn.)."—
Proc. Biol. Soc. Washington, vol. 36, 1923, p. 67.

Dromidiopsis dormia Sakai 1936 a, p. 11, figs.

Occurrence. 1. Iranian Gulf. St. 24: 29°07' N., 49°56' E., c. 40 m, sandy clay, 13.III.1937, 1 ♂.—St. 25: 63 nautical miles W.¹/₂S. of Buchire, 49 m, sand etc., 13.III.1937, fragments of a specimen, determination not certain.—St. 42 D: 24 nautical miles N.E. of Bahrein, 33 m, shells and gravel, 30.III.1937, 1 ♂.—St. 47: 2 nautical miles W. of Qyanat, 7.5 m, sandy clay, 5.IV.1937, a chela of the left side.—St. 60: 1 nautical mile S.S.W. of Stiffer's Bank 26°23' N., 53°4' E., 83 m, 24.IV.1937 (H. Blegvad coll.), 1 ♂.

2. Gulf of Oman. St. 72 D: 2 nautical miles N.W. by N. of the buoy of Jask, clay, 20.IV.1937, 1 ♂.

The species has been recorded from the Iranian Gulf (Alcock 1901, p. 45, but not by Nobili 1906 a).

Remarks. In the literature there are a few drawings or records of the pleopods 1-2 of the male of *Dromia*, viz., *D. vulgaris* M.-Edw. (Milne-Edwards in Règne Animal, pl. 40 fig. 1 k, and Brocchi 1875, p. 106, pl. 15 figs. 56-58), *D. rumphi*, *D. hirtissima* and *D. nodipes* (?) (regarding the three last-named species, see Brocchi 1875, p. 105, pl. 15 figs. 60-61, p. 105, pl. 15 figs. 62-63, and p. 106, pl. 15 figs. 65-66).

Pleopods 1-2 were examined in a male of the present species from st. 60, cl. c. 65 mm (fig. 3). Plp. 1 agrees fairly well with that of the species listed above, especially with that of *D. vulgaris*, but it is not so hairy; it is rather long, c. 18 mm exclusive of the basal part, and has along the median side an open furrow in which lies the long slender apical joint of plp. 2. Plp. 2 is much longer than plp. 1, c. 28 mm in

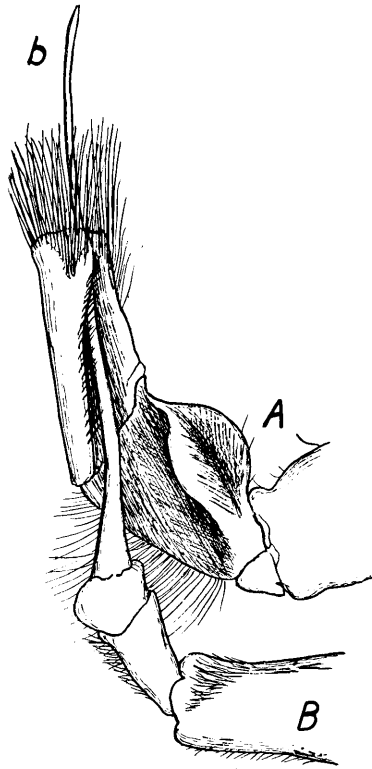


Fig. 3. *Dromia dormia* ♂, length of carapace c. 65 mm, St. 60.
A: pleopod 1, B: pleopod 2, b: apex of pleopod 2.

length exclusive of the basal part; it terminates in a very slender, horny and stiff joint which reaches far beyond the apex of plp. 1 (as shown in my fig. 3; rather similar to the fig. of plp. 1-2 of *D. vulgaris*, Milne-Edwards in: Règne Animal, pl. 40 fig. 1 k). Plp. 2 is much more slender than in any of the species listed above.

Distribution. Widely distributed in the Indo-Pacific Ocean from S.E. Africa, Mauritius and the Red Sea to Japan.

2. *Cryptodromia canaliculata* Stimpson

Cryptodromia canaliculata Ihle 1913, p. 41 (lit. etc.).

Cryptodromia canaliculata Sakai 1936 a, p. 24, pl. 7 fig. 2.

Occurrence. Iranian Gulf. St. 69: Island of Quism (Tavila), tidal zone, 18.IV.1937, 1 ♀, cl.¹ 10 mm.

It has been recorded from the Iranian Gulf by Alcock 1901, p. 51 (but not by Nobili 1906 a).

¹ cl.: length of carapace; cb. = breadth of carapace.

Distribution. From E. Africa and the Red Sea to the Loo-Choo Is.

3. *Dromidia unidentata* (Rüppell)

Dromidia unidentata Ihle 1913, p. 31 (with lit.).

Dromidia unidentata Sakai 1936 a, p. 13, figs.

Occurrence. Iranian Gulf. St. 39 D: 12 nautical miles E.N.E. of the light-ship of Bahrein, 23 m, shells etc., 27.III.1937, 1 ♀.

Recorded from the Iranian Gulf by Alcock 1901, p. 48, and by Nobili 1906 a, p. 92.

Distribution. Very widely distributed: from E. Africa and Red Sea to Mergui and the Gulf of Siam; western New Guinea; Pacific Ocean as far as Kermadec Is. and Japan (Sakai l.c.).

Oxystomata

Fam. DORIPPIDÆ

Subfam. DORIPPINÆ

4. *Dorippe dorsipes* (L.) (Fig. 4, A-B)

Dorippe dorsipes Ihle 1916, p. 148 (with lit.).

Dorippe dorsipes Sakai 1937, p. 73, pl. 10 fig. 4 (coloured fig.).

Occurrence. 1. Iranian Gulf. St. 78: W. of Kharg $29^{\circ}13\frac{1}{2}'$ N., $50^{\circ}17\frac{1}{2}'$ E., 29 m, soft bottom, 14.II.1938, 1 small specimen.

2. Strait of Hormuz. St. 61 D: 4 nautical miles S.W. of Suzeh, 9-11 m, sand, gravel, shells, 10.IV.1937, 1 small spec.—St. 80 D: 1 nautical mile S.E. of Hormuz, clay, 15 m, 22.IV.1937, 1 large ♂ with Balanidæ, Lepadidæ and Hydroids.—St. 81: 5 nautical miles N.W. by $N.\frac{1}{2}W.$ of the light-buoy of Quism, 18 m, soft clay, 22.IV.1937, 1 ♀.

3. Outside the Iranian Gulf. St. 72 D: 2 nautical miles N.W. by N. of the buoy of Jask, 12 m, clay, 12.IV.1937, 1 big ♀.

It has been recorded from the Iranian Gulf by Alcock 1896, p. 277 (exact locality not noted) and by Nobili 1906, p. 95 (between El Katif and Bushire, 80 m (the deepest place in the Iranian Gulf), and N.E. of the island of Arzana, near the shore).

Remarks. Pleopods 1-2 of the male are described by Ihle, l.c., p. 112, and Brocchi (1875, p. 102, pl. 19 figs. 194-195) has described these appendages of *D. lanata* (L., Herbst).

Pleopod 1 of the big male (cl. 27 mm, from st. 80 D; fig. 4 A) is stout, but tapering towards the apex which has a knife-shaped, horny process. Pleopod 2 is long, slender, not much shorter than plp. 1, apically

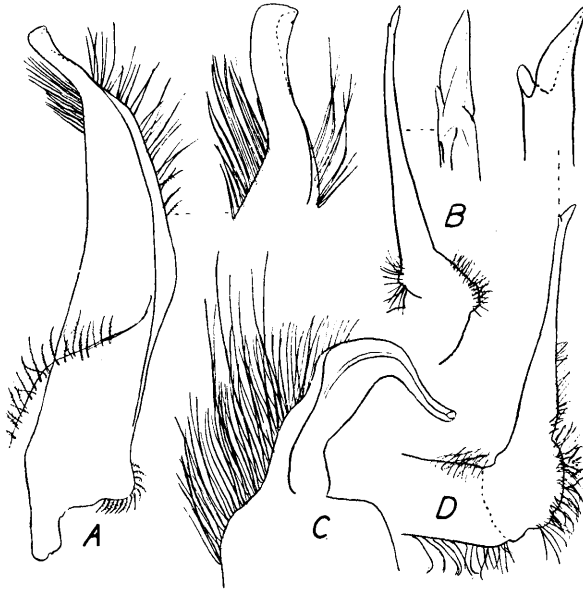


Fig. 4. A-B: *Dorippe dorsipes* ♂, 27 mm, St. 80 D (A: pleopod 1, B: pleopod 2).
C-D: *D. facchino* ?, ♂, 27 mm, St. 72 D (C: apex of pleopod 1, D: pleopod 2).

cleft, with one branch 4-5 times as long as the other; plp. 2 is hairy only in the basal part.

Distribution. Widely distributed in the Indo-Pacific Ocean, from E. Africa and the Red Sea to Japan.

5. *Dorippe (facchino de Haan?)* (Fig. 4, C-D)

Dorippe facchino Alcock 1896, p. 278.

Dorippe facchino Ihle 1916, p. 156.

Dorippe facchino Shen 1931, p. 100, figs.

Occurrence. 1. Iranian Gulf. St. 66 B: 11 nautical miles N.W. of the innermost light-buoy of Buchire, 27 m, 25.I.1938, 1 ♂, 1 ♀.

2. Gulf of Oman. St. 72 D: 2 nautical miles N.W. by N. of the buoy of Jask, clay, 20.IV.1937, 1 ♂, with the right chela much larger than the left.—St. 107: 24 nautical miles W.N.W. of Ras Maidani, hard clay, 1.IV.1938, 1 ♀.

Besides there is a single ♀, date and locality not noted.

The determination of these specimens is not quite certain; i.e. the two distal joints of 2nd and 3rd pairs of walking legs are a little too narrow (compared with a ♀ from Siam, determined by Mary Rathbun). But at all events the species is new to these waters, for neither

Alcock 1896 nor Nobili 1906 a record from the Iranian Gulf other species of *Dorippe* than *D. dorsipes*.

Remarks. Pleopod 1 (fig. 4 C) of the male from st. 72 D (cl. 27 mm) is rather similar to that of *D. dorsipes*, but the stout basal part is rather abruptly cut off, not apically tapering; and the horny distal process is rather long and somewhat hook-shaped. Pleopod 2 (fig. 4 D) is quite similar to that of *D. dorsipes*, but the lateral side is hairy in the proximal half.

Distribution. From Ceylon to Hong Kong and Japan.

Fam. CALAPPIDÆ

Subfam. CALAPPINÆ

6. *Calappa gallus* (Herbst)

Calappa gallus Alcock 1896, p. 146.

Calappa gallus Ihle 1918, p. 181.

Calappa gallus Rathbun 1937, p. 214, figs.

Calappa gallus Sakai 1937, p. 94, pl. 7 fig. 2.

Occurrence. "Persian Gulf" (Alcock, l.c.).

Remarks. Pleopod 2 of the male, see Monod 1928, p. 115, fig. 3.

Distribution. Widely distributed in the Indo-Pacific Ocean from the Seychelles and the Red Sea to the Hawaiian Is.; also the Atlantic: Florida Keys to Bahia, Brazil; Bermuda, and West Africa; beach to 225 m (Rathbun, l.c.).

7. *Calappa hepatica* (Linné)

Calappa hepatica Alcock 1896, p. 142.

Calappa hepatica Ihle 1918, p. 183.

Calappa hepatica Sakai 1937, p. 89, pl. 12 fig. 2 (cold. fig.).

Occurrence. 1. "Persian Gulf" (Alcock l.c.).

2. Strait of Hormuz. No number: Island of Larak, on the beach, 6.IV.1938, 1 ♂, 28 × 45 mm.

Remarks. The pleopods 1-2 were dissected out and are probably not different from those of *C. lophos* (fig. 5 A-B).

Distribution. From E. Africa and the Red Sea to Japan, Australia and the Hawaiian Is.; littoral.

8: *Calappa lophos* (Herbst) (Fig. 5 A-B)

Calappa lophos Alcock 1896, p. 144.

Calappa lophos Ihle 1918, p. 182.

Calappa lophos Sakai 1937, p. 90, pl. 12 fig. 1.

Occurrence. 1. "Persian Gulf" (Alcock l.c.).

2. Gulf of Oman. St. 103: 3 nautical miles W.N.W. of Chahbar, 10 m, sand, 31.III.1938, c. 10 specimens.

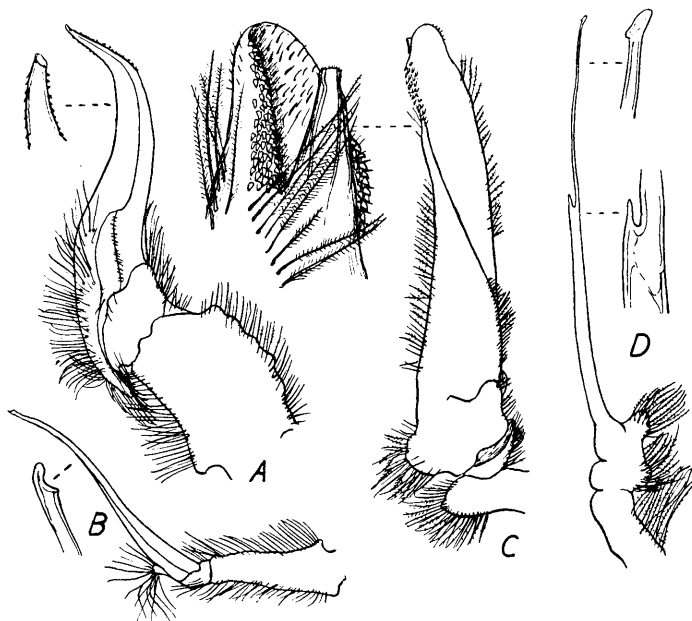


Fig. 5. A-B: *Calappa lophos* ♂, St. 103 (A: pleopod 1, B: pleopod 2).
C-D: *Matuta planipes* ♂, St. 114 (C: pleopod 1, D: pleopod 2).

Remarks. Pleopod 1 of the male (46 mm, st. 103) (fig. 5 A) is $\frac{1}{4}$ the length of abdomen, rather stout, apically much tapering, with some very small spines. Pleopod 2 (fig. 5 B) is a trifle shorter than plp. 1 and much more slender, and terminates in a very small, finger-shaped process.

Brocchi (1875, pp. 100-101, pl. 18 figs. 157-163) has descriptions and figures of pleopods 1-2 ♂ of *Calappa granulata* (L.), *C. tuberculata*, and *C. marmorata* (Fabr.). They agree fairly well with those of *C. lophos*; but *C. granulata* differs by having plp. 2 very long, apically hook-shaped (Brocchi l.c., figs. 158-59). For pleopod 2, see also Monod 1928, p. 115, fig. 13 B.

Distribution. Indo-Pacific Ocean (but not the Red Sea) to Japan; littoral-sublittoral.

9. *Calappa philargius* (Linné)

Calappa philargius Alcock 1896, p. 145.

Calappa philargius Ihle 1918, p. 183.

Calappa philargius Shen 1931, p. 104, figs.

Calappa philargius Sakai 1937, p. 93, pl. 12 fig. 3 (cold. fig.).

Occurrence. "Persian Gulf" (Alcock l.c.).

Distribution. From the Red Sea to Japan and Samoa; littoral.

Subfam. MATUTINÆ

10. *Matuta planipes* Fabricius (Fig. 5, C-D)

Matuta lunaris Alcock 1896, p. 161.

Matuta planipes Ihle 1918, p. 308.

Matuta planipes Shen 1932, p. 35, figs.

Matuta planipes Sakai 1937, p. 101, pl. 13 fig. 4 (cold. fig.).

Occurrence. 1. Iranian Gulf. St. 2: Coral reef 6 nautical miles S. of Bushire, 22/24.III.1937, 1 small specimen, c.l. 10 mm, determination not certain.—Rakat as Safli, Bushire, 0 m (low-tide), 13.II.1938, 1 ♂ c.l. 25 mm.

2. Strait of Hormuz. St. 63: Bender Abbas, beach, 13/14.IV.1937, 3 rather small specimens.—St. 109: 7 nautical miles W. by S. of Kunari, 20 m, 2.IV.1938, 1 spec.—St. 114: 9 nautical miles S.S.E. of the mountain Koh-i-Namak Sar Range, 13 m, sand with some clay, 4.IV.1938, 1 ♂, c.l. 35 mm.

The species is probably new to these waters, but is known from Karachi (Alcock l.c.).

Remarks. The coloured lines on the dorsal surface of the carapaces of all the specimens agree fairly well with Miers 1877, pl. 39 fig. 7 ("*Matuta lineifera* n. sp.").

Pleopod 1 of the male (c.l. 35 mm, st. 114; fig. 5 C) is rather stout, much depressed, and almost not at all tapering toward the apex. Articulation in the basal part could not be traced. The rounded apex has strong but short spines along the margin; in the apical concavity there is a horny tooth.

Pleopod 2 (fig. 5 D) is about as long as plp. 1. The distal piece is very long, still more slender, cylindrical, and terminates in a spine and a long, horny, almost black apical process (—the rest of the limb is white in alcohol—) which is very hard.

In the literature there are no figs. of plp. 1-2 ♂ of this species. But H. Milne-Edwards (in Règne Animal, pl. 7 fig. 1, n-o) and Brocchi (1875, p. 99, pl. 19 figs. 174-175) have figures of pleopods 1-2 of *M. victor*. There seems to be excellent agreement between the two species, except that plp. 2 of *M. victor* has no spine in the middle.

Distribution. From the western Indian Ocean (but not the Red Sea) to Eastern Asia and Australia.

Fam. LEUCOSIIDÆ

Subfam. EBALIINÆ

11. *Oreophorus reticulatus* Adams & White

Oreophorus reticulatus Alcock 1896, p. 174.

Oreophorus reticulatus MacGilchrist 1905, p. 254.

Oreophorus reticulatus Ihle 1918, p. 309.

Occurrence. Iranian Gulf. Exact locality not noted (Alcock, l.c.); St. 291, c. 90 m, 1 ♀, 12 × 15 mm (MacGilchrist l.c.).

Distribution. From western Indian Ocean (Amirante Is.), but not the Red Sea, to Sunda Strait; 50-90 m.

Subfam. ILIINÆ

12. *Nursia abbreviata* Bell (Fig. 6 A)

Nursia abbreviata Alcock 1896, p. 184.

Occurrence. 1. Iranian Gulf. St. 47 D: 2 nautical miles W. of Qyanat, 7.5 m, sandy clay, 5.IV.1937, 1 ♂, 1 ♀, 7 mm.

2. Strait of Hormuz. St. 61 D: 4 nautical miles S.W. of

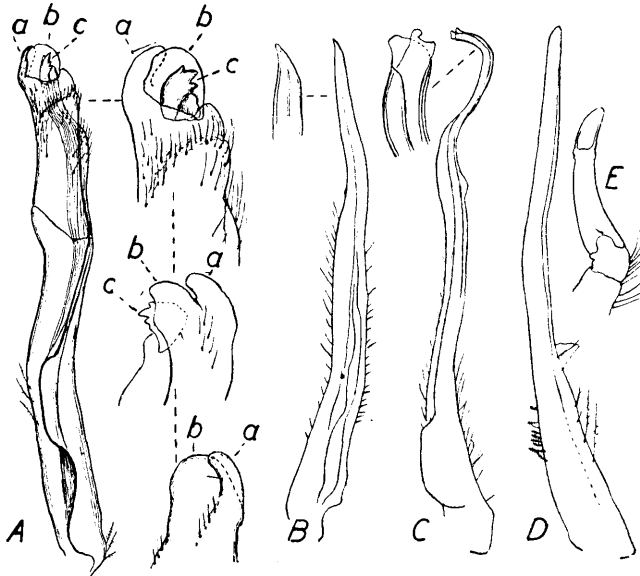


Fig. 6. A: *Nursia abbreviata* ♂, St. 61 D, pleopod 1 (a, b, c are the three apical processes).

B: *N. persica* ?, ♂, St. 61 D, pleopod 1.

C: *N. plicata* ♂, St. 15, pleopod 1.

D-E: *Iphiculus spongiosus* ♂. D: from Thailand, pleopod 1; E: from Porto Bonga, pleopod 2.

the city of Suzeh, 9-11 m, sand, gravel, shells, 10.IV.1937, 1 ♂, 1 ♀, 7 mm.

It is new to these waters.

Remarks. Pleopod 1 of the male (fig. 6 A) is somewhat cylindrical; the distal third is abruptly much more soft than the proximal part, horny, pellucid, while the proximal two thirds are almost bony and not pellucid. The longitudinal furrow terminates distally in a process with 4 teeth (c in the fig.). Several details cannot be ascertained with certainty; but the distal end has a short, hard, somewhat cylindrical process (a in the fig.); then follows a larger, thin, soft plate (b in the fig.), the edges of which are somewhat bent together and partly enclosing in their concavity the dentate process (c in the fig.). Pleopod 2 was very damaged and could not be drawn.

Distribution. Previously known only from India (Karachi, Gulf of Manaar, Coromandel Coast, Gulf of Martaban).

13. *Nursia blanfordi* Alcock

Nursia blanfordi Alcock 1896, p. 182, pl. 7 fig. 5.

Occurrence. "Persian Gulf", 100 m (Alcock, l.c.).

Distribution. Mekran coast, India.

14. *Nursia persica* Alcock (Fig. 6 B)

Nursia persica Alcock 1896, p. 183, pl. 7 fig. 7.

Occurrence. 1. Iranian Gulf. Exact locality not noted (type-locality; 1 ♀; Alcock l.c.).

2. Strait of Hormuz. St. 61 D: 4 nautical miles S.W. of the city of Suzeh, 9-11 m, sand, gravel, shells, 10.IV.1937, 1 ♂, 4.5 mm, determination not certain.

Remarks. The present specimen from St. 61 D agrees rather well with Alcock's description and figure of the single specimen (♀ with eggs, 9 mm) previously known, except that the front is about 1½ times as long, with the two frontal teeth not so acute. In the chelipeds both the arms and the hands are somewhat longer, so that the whole of the cheliped is about 1½ times as long as the carapace. Abdomen is evenly tapering in breadth toward the apex; as far as could be ascertained it consists of 3 pieces, only the two distal segments being free; in the middle of the penultimate segment there is a rather large denticle.

Pleopod 1 of the male (fig. 6 B) is evenly tapering toward the apex; probably it terminates in a simple apex without special details. The distal third is glabrous, the proximal two thirds somewhat hairy.

Distribution. Not known from other localities than the two listed above.

15. *Nursia plicata* (Herbst) (Fig. 6 C)

Nursia plicata Alcock 1896, p. 180.

Nursia plicata Ihle 1918, p. 311.

Occurrence. Iranian Gulf. St. 15: Bushire, in the roadstead, 3-5 m, sand with clay and stones, 8.III.1937, 4 ♂, 1 ♀, c. 9 mm.

Exact locality not noted (Alcock l.c.).

Remarks. Pleopod 1 of the male (fig. 6 C) terminates in a thin, horny, somewhat curved process consisting of two leaves which are folded partly round each other thus forming a tube. Pleopod 2 is quite like that of *Iphiculus spongiosus* (Species No. 17, see below), but a trifle more slender.

Distribution. India (several localities); Hong Kong.

16. *Nursia* sp.

Occurrence. Iranian Gulf. St. 25 (bottom-sampler): 63 nautical miles W.¹/₄S. of Bushire, 49 m, sand, some clay, 14.III.1937, 1 (♂ juv.?) 3.5 mm.—St. 88: Off Nabyiu Farur, sand etc., 6-31 m, 22.III.1938, 1 ♀, 5 mm.

Remarks. The present species bears a close similarity to *N. blanfordi* Alcock (Species No. 13, above), but differs essentially by the much protruding front being abruptly truncate, with the corners almost rectangular, not apically acute. But the ♂ from St. 25 is so small and probably not adult, so that a certain determination is not possible.

Since the issue of Ihle 1918 the following species of *Nursia* have been established (according to Zoological Record 1918-1938):

N. scandens (n. sp., S. Africa) Stebbing, Ann. S. Afr. Mus., vol. 17, 1920, p. 247, figs.

N. postulans (n. sp., S. Africa) Stebbing, ibid., vol. 18, 1921, p. 461, figs.

N. elegans japonica (n. subsp., Japan) Sakai, Sci. Rep. Tokyo, Bunrika 2, No. 32, 1935, p. 66, fig.

N. sinica (n. sp., China) Shen, 1937 b, p. 279, figs.

I have not had access to Shen 1937 b; but the specimens from the Iranian Gulf cannot at any rate be referred to any of the other species.

17. *Iphiculus spongiosus* Adams & White (Fig. 6 D-E)

Iphiculus spongiosus Adams & White 1848, p. 57, pl. 13 fig. 5.

Iphiculus spongiosus Ihle 1918, p. 252 (lit., etc.).

Occurrence. Gulf of Oman. St. 95, 29.III.1938. 6 nautical miles W. by S. of Jask, 35 m, clay and sand. Petersen-grab. 1 ♀, 14.5 mm.
Not known from the Iranian Gulf.

Remarks. As there is no male in the Iranian material, I have examined the pleopods of a male, 11.5 mm in length, from Thailand (S. of Koh Kat, 34-40 m; M. Rathbun determ.).

Pleopod 1 (fig. 6 D) is evenly tapering toward the apex; there are some setae in the basal third; the rest of the appendage is quite naked. Pleopod 2 (fig. 6 E) could not be found in this specimen, but another male of similar size (from 16 nautical miles N.E. of Port Banga, 75 m; T. Odhner determ.) was examined. It is $\frac{1}{4}$ the length of plp. 1 and of the ordinary form; the distal end is very distinctly hollow, spoon-shaped.

Distribution. Known from the Red Sea to the Philippine Is. and Hong Kong; sublittoral.

18. *Myra affinis* Bell (Fig. 7 A)

Myra affinis Alcock 1896, p. 205.

Myra affinis Ihle 1918, p. 257.

Occurrence. Iranian Gulf. Exact locality not noted (Al-

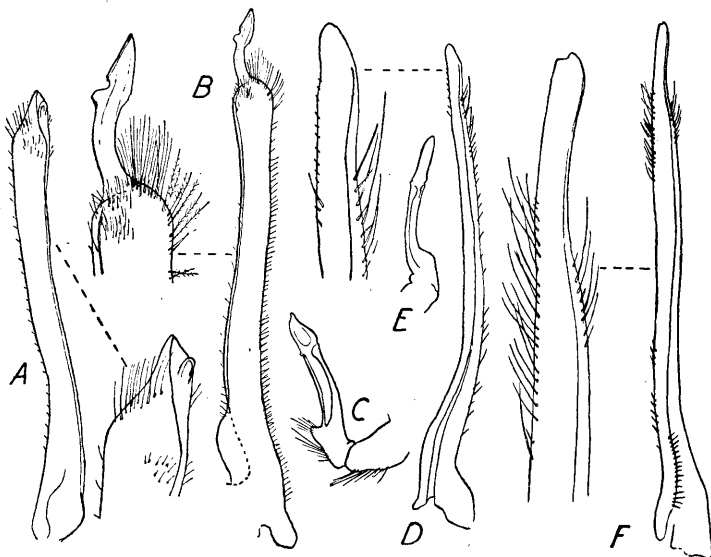


Fig. 7. A: *Myra affinis* ♂, 17 mm, Thailand, pleopod 1.

B-C: *Myra fugax* ♂, 34 mm, St. 60, pleopods 1-2.

D-E: *Arcania quinquespinosa* ♂, 15 mm, St. 95, pleopods 1-2.

F: *Arcania septemspinosa* ♂, 24, Sandheads, pleopod 1.

cock l.c.).—Bank of pearl-oysters c. 25° N., 55° E., 20-30 m (Nobili 1906 a, p. 95).

Remarks. Pleopod 1 (fig. 7 A) was examined in a male, 17 mm, from between Koh Mesan and Koh Chuen (Thailand), 30 m (M. Rathbun determ.). The length of the acute apical part is not essentially greater than the breadth of the proximal part. Near the base of the acute apex there are some setæ; and in the concave part of the apex which is formed by the two sides of the tube being bent toward each other, there is a small oval process which seems to be very soft. But the whole of the pleopod is rather soft, at any rate not horny as in many other species of *Leucosiidæ*.

Pleopod 2 could not be found.

Distribution. From the Red Sea and the Iranian Gulf to Japan and Australia; down to 113 m.

19. *Myra fugax* (Fabricius) (Fig. 7 B-C)

Myra fugax Alcock 1896, p. 202.

Myra fugax Ihle 1918, p. 256.

Myra fugax Sakai 1937, p. 134, with cold. fig.

Occurrence. Iranian Gulf. St. 60. 23.IV.1937. $26^{\circ}23'$ N., $53^{\circ}4'$ E., 83 m. 1 ♂, length (incl. of spine) 34 mm.—St. 10. 5.III.1937. E. of the island of Kharg, 16-17 m. Sand. 1 ♂.—St. 24. 13.III.1937. $29^{\circ}7'$ N., $49^{\circ}56'$ E. c. 40 m. Sandy clay. 1 ♂.—St. 26. 15.III.1937. Off the east point of the island of Kharg. 18 m. Sand, shells. 1 ♂.—St. 47 D. 5.IV.1937. 2 nautical miles N. of Quanat. 5.5 m. Sandy clay. 2 ♂.—St. 53 D. 8.IV.1937. 2 nautical miles E. by S. of the northeastern point of the island of Qais. 27 m. Sand, clay. 5 specimens.—St. 78. 14.II.1938. W. of Kharg $29^{\circ}13\frac{1}{2}'$ N., $50^{\circ}17\frac{1}{2}'$ E. 29 m. Soft bottom. 1 young specimen.—St. 86. 16.II.1938. 6 nautical miles N.E. of the light-ship of Bahrein $26^{\circ}38'$ N., $51^{\circ}3'$ E. 20 m. 1 ♂, defective, determination not certain.

Recorded from the Iranian Gulf (exact locality not noted) by Alcock l.c.

Remarks. Pleopod 1 of the male (fig. 7 B) terminates in a peculiar process formed like a knife. Pleopod 2 (fig. 7 C) in length $\frac{1}{4}$ of plp. 1, slender, and apically acute.

Distribution. Very widely distributed in the Indo-Pacific Ocean, from the Red Sea and East Africa to Japan and New Caledonia. Recently it has been recorded from the eastern Mediterranean, viz., Jaffa, Palestine, 40-50 m, 3 ♂ (Th. Monod 1930, p. 140, with fig.).

20. *Arcania quinquespinosa* Alcock & Anderson (Fig. 7 D-E)

Arcania quinquespinosa Alcock 1896, p. 266.

Arcania quinquespinosa Ihle 1918, p. 266.

Occurrence. 1. Iranian Gulf. Exact locality not noted (Alcock l.c.).

2. Gulf of Oman. St. 95. 29.III.1938. 6 nautical miles W. by S. of Jask. 35 m. Clay with sand. 1 ♂. C.l. incl. of median spine 15 mm, c.b. incl. of lateral spines 23.5 mm.

Remarks. Pleopod 1 of the male (fig. 7 D) is slender, cylindrical; the very apex which is quite devoid of setæ, is not essentially narrower than the remaining part of the appendage. Pleopod 2 (fig. 7 E) in length $\frac{1}{3}$ of plp. 1; nothing special to remark.

Distribution. Widely distributed from the Red Sea to Japan.

21. *Arcania septemspinosa* (Fabricius) (Fig. 7 F)

Arcania septemspinosa Alcock 1896, p. 262.

Arcania septemspinosa Ihle 1918, p. 265.

Occurrence. 1. Iranian Gulf. Exact locality not noted (Alcock l.c.).

2. Strait of Hormuz. St. 59 D. 10.IV.1937. 8 nautical miles W. by S. of the island of Henjam. 31 m. Green clay. 1 ♀. C.l. incl. of median spine 32 mm, c.b. incl. of lateral spines 62 mm.

Remarks. From the Iranian waters only the ♀ recorded above is at hand, but no ♂. Therefore I have examined the pleopoda of a ♂ from Sandheads, Ganges Delta, 24 × 48 mm, given by the Indian Museum, Calcutta, and no doubt determined by Alcock.

The distal seventh of pleopod 1 (fig. 7 F) is only half as broad as the rest of the limb and quite devoid of setæ; but more proximally there is, on both edges, a portion of long and short setæ, and on the median edge this setiferous portion is somewhat longer than the narrow apex (on the lateral edge it is shorter). Pleopod 2 is quite similar to that of *A. quinquespinosa*.

Distribution. From Cape of Good Hope and the Red Sea to Hong Kong; littoral.

22. *Ixa edwardsi* Lucas

Ixa edwardsi Ihle 1918, p. 314.

Occurrence. Gulf of Oman. St. 106. 1.IV.1938. 8 nautical miles W. by S. of Ras Maidani. 18 m. Sandy clay. 1 ♀ juv., 13.5 × 41.5 mm.

The species (and genus) is new to Iranian waters.

Remarks. The present specimen was compared with the descriptions and figures of *I. inermis* Leach 1817 and *I. edwardsi* Lucas 1858 cited by Ihle 1918, p. 314. It agrees excellently with the fig. in

Milne-Edwards (Ann. Soc. Entomol. France, (4) vol. 5, 1865, pl. 6 fig. 1), except that the lateral processes of the carapace have their apices pointed like an awl, not evenly tapering as in the fig. of Milne-Edwards. The figures of Leach 1817 (*I. inermis*) and Lucas 1858 (*I. edwardsi*) are a little more different. The buccal cavern is distinctly quadrangular.

Ixa inermis Leach 1817 (lit. see Ihle 1918, p. 314; see also Chopra, Rec. Ind. Mus., vol. 35, 1933, p. 48, and p. 80, with figs.) and *I. edwardsi* are closely related species and possibly synonymous; regarding the differences, see Nobili 1906b, p. 172. Both species seem to be very rare, they are at any rate found only very few times.

Distribution. (*I. edwardsi* Lucas). Zanzibar, depth? (Milne-Edwards l.c. 1865). The locality of the type which was found in a shop of natural objects in Marseille, is not known (see Milne-Edwards l.c.).

(*I. inermis* Leach). The locality of the type is not known (*vide* Leach).—Massawa, Red Sea (Nobili 1906b, p. 171).—? Orissa Coast, India, 45 m. (Alcock 1896, p. 273).—Cape Grenville, northern Australia (Haweswell, Catalogue Austral. Crust., Sydney 1882, p. 132).

23. *Ixoides cornutus* MacGilchrist

Ixoides cornutus MacGilchrist 1905, p. 255.

Ixoides cornutus Illustr. Zool. "Investigator," Crust., 1907, pl. 73 fig. 2.

Ixoides cornutus Sakai 1937, p. 137, pl. 19 figs. 1-4.

Occurrence. Iranian Gulf. "Investigator" St. 292, 95 m, mud bottom, 3 specimens (type-locality; MacGilchrist l.c.).

Remarks. Pleopod 1 of the male is figured by Gordon in 1931, fig. 7, p. 532.

Distribution. Hong Kong? (Gordon 1931, p. 530). Japan, several localities, 100-200 m (Sakai l.c.).

Subfam. LEUCOSIINÆ

24. *Pseudophilyra blanfordi* Alcock (Fig. 8)

Pseudophilyra blanfordi Alcock 1896, p. 252, pl. 6 fig. 7.

Occurrence. 1. Iranian Gulf. St. 22. 13.III.1937. 13 nautical miles W. of the outermost light-buoy at Bushire. 56 m. Sandy clay. 3 ♂ up to 7.5 mm, 2 ♀ c. 7 mm.

2. Gulf of Oman. St. 106. 1.IV.1938. 25°22' N., 58°57' E. 18 m. Clay. Petersen-grab. 1 ♂ 6 mm.

Remarks. The present males agree well with Alcock's description and figure; but as Alcock has no detailed figures, I have drawn some of the appendages. The fingers of the chelæ are different in the two sexes, in the female the proximal half of the opposed edges is rather smooth, without teeth.

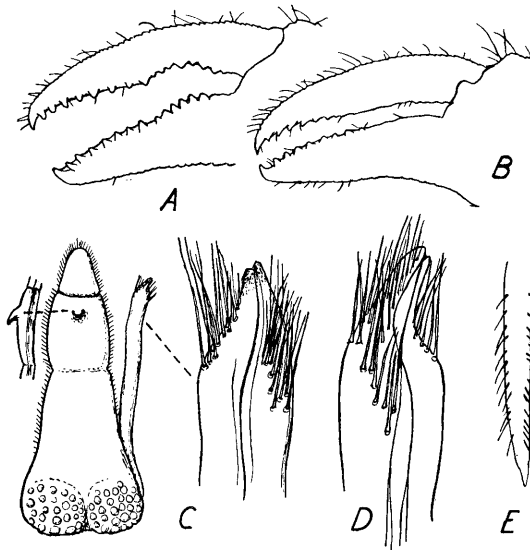


Fig. 8. *Pseudophilyra blanfordi*.

A, C, E: ♂, 6 mm, St. 106; B: ♀, 7 mm, St. 22, chela.
A: ♂, chela; C: abdomen of ♂, with tooth on penultimate segment in lateral view, and pleopod 1; D: ♂, 7 mm, St. 22, pleopod 1, apex; E: dactylus of last pair of walking legs.

The dactyli of all the walking legs have in both sexes along each of the two edges a series of setæ on the convex (dorsal) side of the dactyli, at a small distance from the very edge. Setæ on the dactyli are not recorded in any other species of the genus, and they are not present in any of the species represented in the Zool. Museum of Copenhagen, viz., *P. melita* de Man and *P. tridentata* Miers.

The tooth on the penultimate segment of the abdomen is uncinatè, with the apex turned toward the base of the abdomen.

Pleopod 1 of the male (fig. 8 C-D) is tapering only quite near the apex; the acute piece may vary somewhat in length, but is always very short. On each side of the apex there is a tuft of setæ. Pleopod 2 of the male is similar to that of genus *Philyra* (see below).

Distribution. Previously known only from the Mekrán Coast, India, 50 m (type-locality; Alcock l.c.).

25. *Pseudophilyra melita* de Man (Fig. 9 A-C)

Pseudophilyra melita Alcock 1896, p. 253 (with lit.).

Pseudophilyra melita Rathbun 1910, p. 313, pl. 1 fig. 13 (no description).

Pseudophilyra melita Ihle 1918, p. 314 (with lit.).

Occurrence. This species is neither represented in the material collected by the present expedition nor recorded in the literature from the Iranian Gulf; but in the Zool. Museum, Copenhagen there is a female from the Iranian Gulf, presented by the Indian Museum, Calcutta, in 1899, and so probably determined by Alcock.

Remarks. Of this species there is no figure except a photo of a ♀ from Thailand (Rathbun l.c.). So I give figures of the hands of ♂ and ♀ (in the Zool. Museum, Copenhagen); the specimens are from between Koh Riat and Koh Mesan, Thailand 6-10 m, and the ♀ is the same as that delineated by Rathbun.

I also give a figure of pleopod 1 of the male (fig. 9 A). It is about $\frac{2}{3}$ the length of the abdomen; the apical part is abruptly more slender and somewhat crooked. Thus it bears a certain similarity to that of *Philyra rectangularis* (species No. 30, below); but in this last-named species the slender part is somewhat shorter, in length but c. $\frac{1}{3}$ the more heavy part, and near the base of the slender part there are some long setæ, not

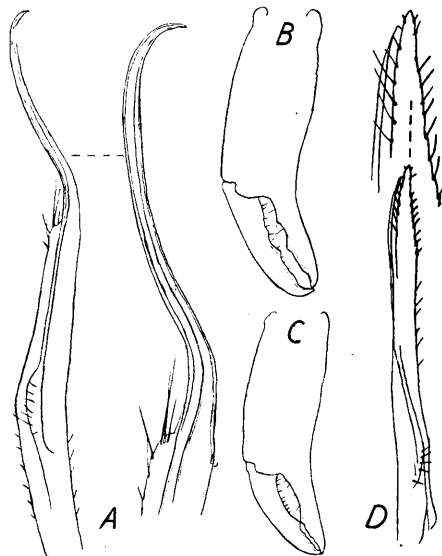


Fig. 9. A-C: *Pseudophilyra melita* (A-B: ♂, 12.5 mm, Thailand; A: pleopod 1, B: chela; C: ♀, 12 mm, Thailand (the same specimen as that in Rathbun 1910, pl. 1 fig. 13), chela of ♀.

D: *P. tridentata*, ♂, 7 mm (the same specimen as that in Rathbun 1910, pl. 1 fig. 2), pleopod 1.

essentially shorter than the slender part (in *Ps. melita* there are only rather few and short setæ).

Distribution. Cargados Carajos Is. (N.E. of Mauritius); sparingly from Ceylon to Thailand. A littoral form.

26. *Pseudophilyra tridentata* Miers (Fig. 9 D)

Pseudophilyra tridentata Alcock 1896, p. 250.

Pseudophilyra tridentata Rathbun 1910, p. 313, pl. 1 fig. 2 (no description).

Pseudophilyra tridentata Ihle 1918, p. 314 (lit., description).

Pseudophilyra tridentata Sakai 1937, p. 151, pl. 14 fig. 7 (cold. fig.; description).

Occurrence. Iranian Gulf. Exact locality not noted (Alcock l.c.). Bank of pearl-oysters c. 25° N., 55° E., 20-30 m (Nobili 1906 a, p. 104).

Remarks. Pleopod 1 (fig. 9 D) was examined in the male (7 mm, from Thailand) delineated by Rathbun l.c. It is $\frac{3}{4}$ the length of the abdomen, apically somewhat tapering and with some setæ along the margin; it is soft, not horny. Pleopod 2 could not be found.

Distribution. Red Sea; Ceylon; Thailand; southern Japan; Torres-Strait.

27. *Philyra globulosa* Milne-Edwards (Figs. 10-11)

Philyra globulosa Alcock 1896, p. 245.

Philyra globulosa Ihle 1918, p. 273.

Occurrence. 1. Iranian Gulf. St. 4. 4.III.1937. 2 nautical miles N.E. by N. of the northeastern point of the island of Kharg. 25-30 m. Soft, gray clay. 1 ♂ 13 mm.—St. 18. 11.III.1937. S. of Bushire. 13 m. Soft clay. 1 ♂ 17 mm.—St. 27. 18.III.1937. Between the red and the white light-buoy at Bushire. 4.5 m. Sand. 1 ♂ 18 mm, 1 defective ♀ 15 mm.—St. 28. 18.III.1937. 2 nautical miles S. by E. of the outermost light-buoy at Bushire. 7 m. 2 ♂, 7 and 10 mm.—St. 32. 23.III.1937. The coast N. of Kharg, 7.5 m. Clay, gravel, shells. 1 defective ♂, c. 7 mm; the determination uncertain.—St. 37 A. 26.III.1937. 41 nautical miles S. $\frac{3}{4}$ E. of the light-buoy at Bushire, 43 m, clay. Petersen-grab. 1 specimen 3 mm, the determination uncertain.—St. 37 C. 26.III.1937. Ibid. Petersen-grab. 1 specimen 3 mm, very defective, the determination uncertain.—St. 66 B. 25.I.1938. 11 nautical miles. N.W. of the innermost light-buoy at Bushire. 27 m. 2 ♂ 15 and 17 mm, 2 ♀ 16 and 17 mm.—Recorded from the Iranian Gulf, exact locality not noted, by Alcock l.c.

2. Strait of Hormuz. St. 78 A. 21.IV.1937. 17 nautical miles N.W. of Kuh-i-Mubarak. 70 m. Grey clay. Petersen-grab. 1 specimen 3 mm, the determination not certain.

3. Gulf of Oman. St. 72 A. 20.IV.1937. 2 nautical miles N.W. by N. of the buoy at Jask. 12 m. Clay. Petersen-grab. 1 ♀ juv. 9 mm.—St. 72 B. 20.IV.1937. Ibid. Petersen-grab. 1 ♀ juv. 8 mm.

The species was recorded from the Iranian Gulf by Alcock (l.c.).

Remarks. In the literature there are only the figures recorded by Alcock l.c., and regarding these the following remarks should be made.

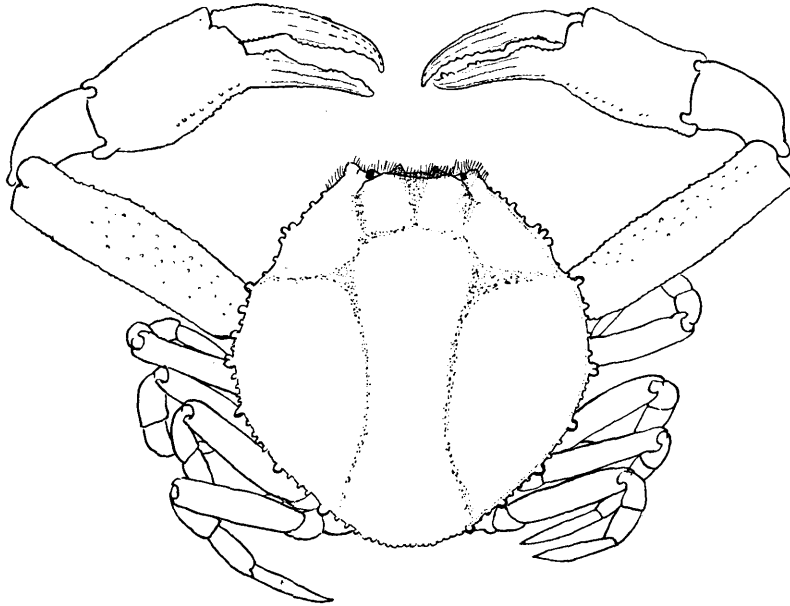


Fig. 10. *Philyra globulosa* ♂ from St. 66 B.

Cancer anatum Herbst 1782, p. 93, pl. 2 fig. 19 is both described and delineated in such a manner that it cannot be recognised with certainty, and possibly it is not synonymous with the present species (see below, p. 82). *P. heterograna* Ortmann 1892 is another species (see below, p. 82). Then only the figure in A. Milne-Edwards (Crust., in *Règne Animal*, pl. 24 fig. 4) remained; and though on the whole the present specimens (fig. 10) agree well with the fig. in Milne-Edwards, they differ i.a. by having the arm of the chelipeds almost quite glabrous, in that the granules are extremely small and not visible to the naked eye, and the granules along the edges of the carapace are not of equal size, in that some of them, at fairly regular intervals, are much enlarged.

The most important descriptions are given by Alcock l.c. and Ihle l.c. Both these authors compare it with *P. globosa* (Fabr.) (species No. 28) and describe the differences between them.

By some happy accident we have in the Zool. Museum, Copenhagen, a couple of specimens of both *P. globulosa* (1 ♂ 30 mm, 1 ♀ 21 mm) and *P. globosa* (1 ♂ 20 mm, 1 ♀ 16 mm), all from India (Orissa Coast) and determined by Alcock, so that it was possible to compare Iranian specimens with specimens of both species, determined with certainty. The most easily perceptible difference is, that in *P. globulosa* there are, along the edge of the carapace (except the front), a line of granules, some of which, at fairly regular intervals, are much enlarged (Alcock l.c.), whereas, in *P. globosa*, they are small and all of equal size. Ihle's characterization (Ihle l.c., p. 274) of *P. globulosa* contra *P. globosa* agrees excellently with the specimens from the Iranian Gulf, and it is to be emphasized, that not only to inner (median) but also the outer (lateral) corner of the pterygostomial region in *P. globulosa* (see fig. 11 B) are much more projecting than in *P. globosa* which has the median corner somewhat rectangular and the lateral corner rounded, so that the fore edge of the front passes rather evenly into the antero-lateral edge of the carapace (see fig. 12 A). In *P. globosa* (fig. 12 A) the pterygostomial region is much broader than in *P. globulosa* (fig. 11 B), in that the exopodite of the external maxilliped is rather broad toward the distal end (see fig. 12 B, or Henderson 1893, pl. 38 fig. 2 (*P. polita*, = *P. globosa*)) which has the median corner fairly rectangular, not evenly rounded. The abdominal groove in *P. globulosa* ♂ extends to the hind margin of the third thoracal-sternit, whereas in *P. globosa* ♂ it covers the hindmost third of the said sternit.

The chelipeds of the Iranian specimens are rather slender, still more slender than described by Ihle in *P. globosa*. The arm of the delineated ♂ (17 mm; St. 66 B) is 12 mm in length along the outer side, the breadth 3 mm; also the hand is slender. The granulations on the arm are so small that they are almost invisible, much smaller than in the typical *P. globulosa*, and the same applies to the row of granulations on the median edge of the hand (Ihle records some "Grübchen" in *P. globosa*, but these I have not been able to find in the specimens determined by Alcock). Otherwise the chelæ of the Iranian specimens agree fairly well with those of the specimens determined by Alcock; but the big teeth in the fingers of the males (—in the fixed finger the tooth is close to the base, in the movable finger the tooth is placed more distally—) are much more rounded in the Indian than in the Iranian specimens; in the females there are no big teeth, either in Indian or in Iranian specimens.

The dactyli of the walking legs are broad, sharp in both edges with the apex dark, horny; they are somewhat broader in *P. globosa* than in *P. globulosa* (and in specimens from the Iranian Gulf).

The abdomen of the male (of *P. globulosa*) has a small, rather acute tooth near the distal end of the penultimate segment; a similar tooth is present also in the Iranian specimens, but not in *P. globosa* (see Henderson 1893, pl. 38 fig. 3 (*P. polita*, = *P. globosa*)).

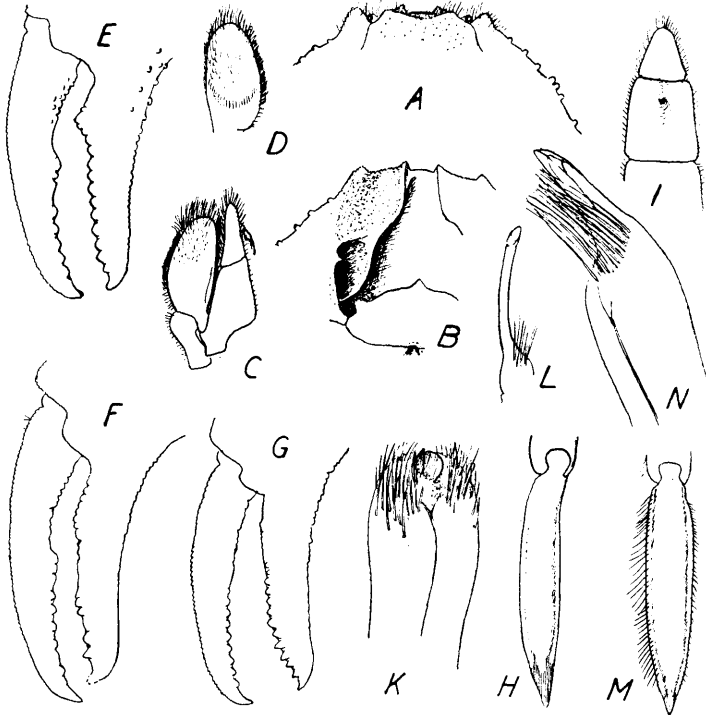


Fig. 11. A-L: *Philyra globulosa*. A-B: fore end of ♂, in dorsal and in ventral view; C: outer maxilliped, ♂; D: outer maxilliped, ♂, exopodite; E: ♂, 30 mm, chela; F: ♂, 17 mm, chela; G: ♀, chela; H, ♀, dactylus of pereopod 5; I: ♂, apex of abdomen; K: ♂, apex of pleopod 1; L: ♂, pleopod 2 (A-D and H-L were taken from a ♂, 17 mm, St. 66 B; E: ♂, 30 mm, Orissa Coast; F: ♂, 17 mm, St. 66 B; G: ♀, 17.5 mm, St. 66 B.

M-N: *Philyra anatum*, ♂, 13 mm, from West of Koh Chang, Thailand. M: dactylus of pereopod 5; N: apex of pleopod 1.

Pleopod 1 ♂ of *P. globulosa* (fig. 11 K) is not described in the literature. In the male determined by Alcock it is quite similar to that of the Iranian specimens; it is long, slender, somewhat curved, and apically provided with a short, horny process which does not extend beyond the hairs on the apex of the pleopod. Pleopod 2 (fig. 11 L) is of the usual type.

Nor in *P. globosa* has pleopod 1 ♂ been described; it has a very peculiar form (fig. 12 D-F). It is slender, about as long as abdomen, and tapering distally. In the distal end there is an elliptical leaf, dentate

along one margin and the distal half of the other; the proximal half of this other margin takes up a row of spines, extending in any case through the distal third of the appendage. Off the flat side of the leaf is a horny process, the distal part of which has a longitudinal groove; one edge of this groove is even, the other has in its proximal half 7-8 acute teeth; proximally of the furrow there is a process.

Finally are given some measures of length and breadth of the carapace in mm

	length	breadth
<i>P. globulosa</i> ♂, India	30	29.5
" ♂, Iran St. 66 B	17	16
" ♀, India	21	22.5
" ♀, Iran St. 66 B	17	16
<i>P. globosa</i> ♂, India	19.5	19
" ♀, "	16	16

So the length and breadth are seen to be somewhat alike.

The specimens from the Iranian Gulf are much smaller than the Indian specimens measured by A l c o c k (♂ 29-30 mm, ♀ 22-24 mm); both ♂ and ♀ from Iran are only c. 17 mm, and, as noted above, the arms of the chelipeds are much more even, and the big teeth on the fingers of the chelæ of ♂ are not so sharp.

Of the colour nothing can be stated with certainty, but the Iranian specimens which at the present moment as this is written, have been preserved in alcohol for three years, have still the walking legs light yellowish-brown, and the carapace with a bluish tinge, almost as described by A l c o c k for specimens in alcohol.

S u m m a r y. *P. globulosa* is easily recognizable from *P. globosa*. The most important characters are: 1) the granulations along the margin of the carapace are, at fairly regular intervals, much enlarged, but there is no large granule at the middle of the hind margin (in *P. globosa* all the marginal granules are small, and of equal size).—2) the quite different shape of the pterygostomial region and of the exopodite of the external maxillipeds (see fig. 11 B-C and fig. 12 A-B).—3) the quite different shape of pleopod 1 ♂ (fig. 11 K and fig. 12 D-F).—4) ♂ of *P. globulosa* (but not *P. globosa*) has a median denticle on the penultimate segment of abdomen (fig. 11 I).

D i s t r i b u t i o n. The species has been recorded as taken from the Iranian Gulf (but not the Red Sea) and from India to Malakka, East-Indies and the Gulf of Thailand. But at all events the specimens of *P. anatum* recorded by Miss R a t h b u n in 1910 from Thailand do not

belong to *P. globulosa*, though she considers the two species synonymous; see further below under Appendix.

Appendix on *P. anatum* (Herbst 1782) and *P. heterograna*
Ortmann 1892

Cancer anatum Herbst is listed by Alcock in 1896, p. 245 with ?? as synonymous with *P. globulosa*, but Alcock has no mention of the species. On basis of Herbst's description and figure it cannot be decided, whether the two species are synonymous, or not.

Rathbun (1910, p. 312) records *P. anatum*; she has no morphological or taxonomic notes on the species, but lists *P. globulosa* Milne-Edwards as a synonym. Her material (a few specimens, from Thailand) is in the Zoological Museum, Copenhagen, and I have examined the biggest ♂ (13 mm, from the small islands west of Koh Chang, 8-10 m). It agrees with *P. globulosa* in having, like this species, some of the granules along the margin of the carapace much enlarged, and there are also other agreements between the two species, i.e. the front and the pterygostomial region and the external maxillipeds are rather alike, and the dentition of the fingers of the chelipeds agrees fairly with my fig. 11 (♂ of *P. globulosa* from Orissa Coast), though the big tooth at the proximal end of the fixed finger covers $\frac{1}{3}$ - $\frac{1}{4}$ of the whole length of the finger, and the big tooth on the movable finger is very sharp, with the proximal edge vertical and the distal edge rather oblique. There is a denticle on the penultimate segment of abdomen.

But there are at least two very important differences from *P. globulosa*: the dactyli of the walking legs have, though in shape rather similar to those of *P. globulosa* (fig. 11 H), setæ along the margins (fig. 11 M) (in the male they are longer on the hind margin than on the anterior; in the young specimens they are rather sparse; there is no female in the material);—and pleopod 1 ♂ (fig. 11 N) terminates in a long, horny process, probably similar to that of *P. peitaihoensis* (Shen 1932, fig. 16 b-b¹, and p. 18), but pleopod 2 does not differ from that of *P. globulosa*.

In the literature are described at least three other south- and east-Asiatic species of *Philyra* with the margins of the carapace beaded with distant granules, some of which being at regular intervals enlarged; the posterior margin has three granules, viz., one at the middle and one on each side. These species are: *P. heterograna* Ortmann 1892 (for lit. see Sakai 1937, p. 158, with fig.), *P. peitaihoensis* Shen 1932, p. 18, figs., and *P. yangmatoensis* Shen (incl. forma *chefooensis* Shen) Shen 1932, p. 27, figs. *P. yangmatoensis* is probably a valid

species, characterized i.a. by having no process on the inner margin of the movable finger of the male. But such a process is present both in *P. heterograna*, *P. peitaihoensis*, and in Rathbun's specimens of "*P. anatum*" (it is not visible in Herbst's fig.). On the whole Rathbun's specimens agree well with the descriptions and figures of *P. heterograna* (Ortmann 1892, Sakai 1937), and like this species they have an enlarged granule at the middle of the hind margin of the carapace. The most important difference is that the dactyli of all the walking legs are setose along the margins, a character not described in any other species. Pleopod 1 of the male is probably alike in *P. heterograna* (Sakai 1937, fig. 33 b-b¹) and *P. peitaihoensis* (Shen 1932, fig. 16 b-b¹). As furthermore Sakai (1937, p. 160) is of opinion that *P. peitaihoensis* and *P. heterograna* are synonymous, Rathbun's specimens of "*P. anatum*" belong probably to the same species, the name of which should then, according to the rule of priority, be *P. heterograna* Ortmann.

P. heterograna is recorded from Japan (type-locality: Tokyo Bay), *P. peitaihoensis* from North China (type-locality: Peichihli Bay), and *P. anatum* Rathbun from Thailand.

28. *Philyra globosa* (Fabricius) (Fig. 12)

Philyra globosa Alcock 1896, p. 243.

Philyra globosa Ihle 1918, p. 274.

Philyra polita Henderson 1893, p. 401, pl. 38 figs. 1-3.

Occurrence. Iranian Gulf. St. 49 D. 6.IV.1937. 2.5 nautical miles E.S.E. of Bustani. 5-6 m. Algæ, sand. Dredge. 10 ♂ c. 8-14 mm, 10 ♀ juv. c. 8-9 mm.

It is new to the Iranian waters.

Remarks. On the characters of the species, see above under *P. globulosa* (pp. 78-81).

The present specimens are rather small and so do not quite agree with the characters noted above p. 81. But the disagreements are so small, that they probably are due to the difference in size. When the specimens are referred to the present species, it is because of the shape of pleopod 1 in the males which seems to represent younger stages of the form in specimens from Orissa Coast (fig. 12 D-F). The biggest Iranian male specimen is 14 mm, so not half as long as the biggest specimen from Orissa (which is 30 mm). In this Iranian specimen pleopod 1 is filiform and very soft (which is probably a juvenile character; in the large ♂ from Orissa it is very stiff, almost horny); along the whole of the appendage there is a longitudinal wing, apically formed like a leaf with 5-6 teeth along the margin, whereas the filiform part of the appendage

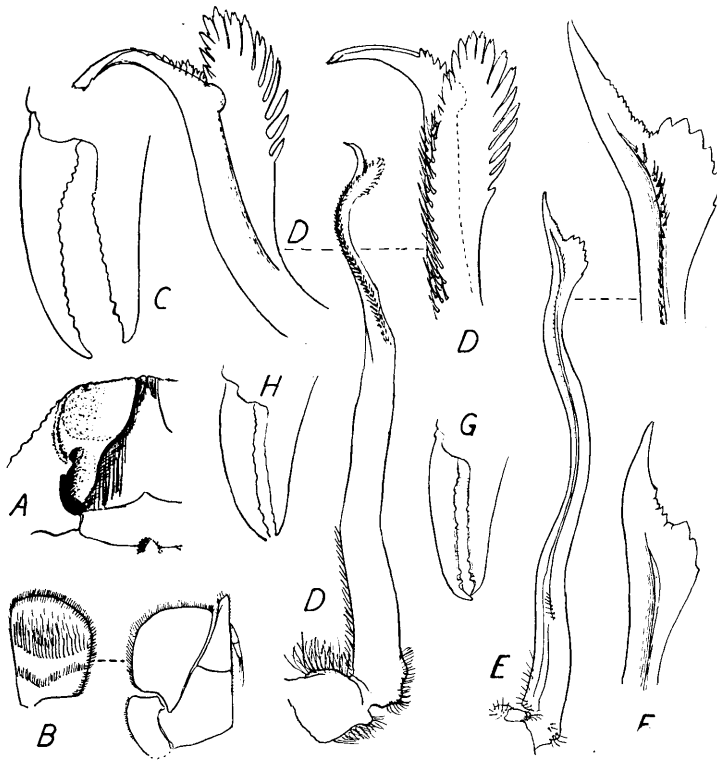


Fig. 12. *Philyra globosa*. A-D: ♂, 20 mm, Orissa Coast. A: fore end, ventral view; B: outer maxilliped, with its exopodite seen from the inner side; C: chela; D: pleopod 1.—E, G: ♂ juv., 14 mm, St. 49 D; E: pleopod 1; G: chela.—F: ♂ juv., 9 mm, St. 49 D, apex of pleopod 1.—H: ♀, 16 mm, Orissa Coast, chela.

terminates in a flat process with a few, fine, irregular teeth on one side. In one of the smaller males (length 9 mm) the appendage was examined, and here it has a similar shape, but is of a more "juvenile" form, with still fewer teeth on the apical process and on the "leaf". No doubt these appendages represent young stages of the appendage of *P. globosa* described above (fig. 12 D). I was not able to find pleopod 2.

The most important other differences are, that in the Iranian specimens the exopodite of the external maxilliped is rather narrow, and that the fingers in the chelæ of the male have rather few teeth, in that in the distal half of the fingers there is a rather sharp edge between the teeth, and besides some hairs. In the female the chelæ are rather similar to those of the male, whereas the chelæ of the females from Orissa are more stout, but, like the Iranian specimens, with very few teeth.

Distribution. *P. globosa* is known from India (Karachi; east coast from Hooghly to Madras (Alcock l.c.); Madras (Henderson l.c.)); other localities are uncertain.

29. *Philyra granigera* Nobili (Figs. 13-14)

Philyra granigera Nobili 1906 a, p. 102, pl. 6 fig. 30.

Philyra granigera Ihle 1918, p. 315 (no new record).

Occurrence. 1. Iranian Gulf. St. 49 A. 6.IV.1937. 2¹/₂ nautical miles E.S.E. of Bustani. 5-6 m. Sand. Dredge. 1 ♀ 8 mm.—St. 49 C. Ibid. Sand. 2 ♀ 8 mm.—St. 49 D. Ibid. Algæ, sand. Dredge. 520 specimens (405 ♂ up to 11 mm, 115 ♀ up to c. 9 mm).—St. 51 D. 7.IV.1937. Stiffe's Bank. Shells, coral-gravel. 33 m. 1 ♀ 6 mm.—The type-locality was: c. 25° N., 55° E., 20-30 m, bank of pearl-oysters, 4 spec. (Nobili l.c.).

2. Strait of Hormuz. St. 66 A. 16.IV.1937. Anchoring-place of the north side of Larak. 5 m. Yellow coarse sand. 1 ♀ 6 mm.—St. 66 C. Ibid. ♀ 6 mm.

Remarks. Hitherto this species was described only by Nobili l.c., with a photo of a male in only 1¹/₂ times natural size, but without detail figures.

Though Nobili's description is so elaborate, that the species can be determined with certainty, there is need of some supplementary notes and some detailed figures. In the lateral corner the pterygostomial edge is somewhat rounded, with a notch (fig. 14 A); the fore margin is somewhat concave, and the inner (median) corner somewhat projecting, but rounded. The exopodite of the external maxillipeds (fig. 14 B) has the length three times the breadth, with the median margin almost straight

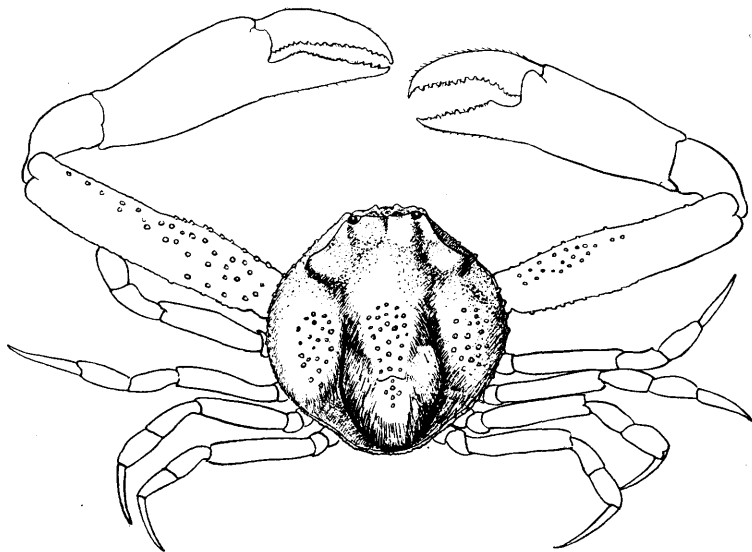


Fig. 13. *Philyra granigera* ♂, St. 49 D.

and the fore corner rounded; it is very unsymmetrical. Merus is fairly broad, the maximal breadth c. $\frac{2}{3}$ the length.

The chelipeds of the male are long; in a male, 11 mm in length, the chelipeds have a span of c. 64 mm. In the female they are much shorter; for instance: length of carapace 8 mm, span of chelipeds 21 mm. In both

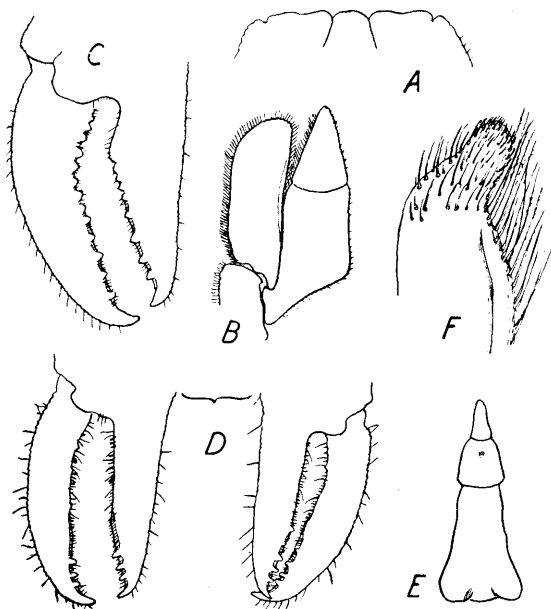


Fig. 14. *Philyra granigera*, St. 49 D, ♂ 11 mm and ♀ 8 mm. A: Fore margin of ♂, ventral view; B: ♂, outer maxilliped; C: chela of ♂, and D: chela of ♀, with fingers open and closed; E: abdomen of ♂; F: apex of pleopod 1, ♂.

sexes the fingers are a trifle shorter than the hand, and the fixed finger is a little shorter than the movable. In the male they are very stout; near the base the fixed finger is concave and quite without teeth; then follow c. 4 small teeth with small intervals, then 4 somewhat bigger teeth with somewhat larger intervals, and at last the crooked terminal tooth. The movable finger is similar to the fixed finger, except that in the proximal end, corresponding to the concave part of the fixed finger, the two fingers do not meet, and there are teeth along the whole of the inner edge. In small males, length up to 5-6 mm, the chelæ are rather similar to those of the females.

In the females the fingers are more slender than in the males and have distinct teeth (c. three + the terminal tooth) only in the distal third or fourth; but in the proximal part of the inner margin there can be traces of very small teeth. And when the fingers are closed, they do not meet in their proximal halves.

Regarding the walking legs nothing especial is to be remarked; the dactyli are of the usual form, rather narrow, and without marginal setæ.

As to the abdomen of the male N o b i l i says that 6th segment is "dépourvu de dent." This is correct regarding the majority of the males, but some of the large males (length c. 11 mm) have a minute tooth (fig. 14 E).

Pleopod 1 of the male was not described by N o b i l i. It is of the usual form, but terminates in a cylindrical process (fig. 14 F), a trifle shorter than the diameter of the appendage and with the length about twice the breadth; it is totally covered with short setæ and seems to be rather hard.

The colour of all the specimens (in alcohol) is dark brown.

Distribution. Mouth of the Red Sea: Perim (B a l s s 1915, p. 15).

30. *Philyra rectangularis* Miers (Fig. 15 A-B)

Philyra rectangularis Miers 1884, p. 546, pl. 49 fig. A.

Philyra rectangularis N o b i l i 1906 b, p. 170.

O c c u r r e n c e. Iranian Gulf. St. 3. 6.III.1937. Bushire, the roads. 6 m. 2 ♂, 4 ♀, c. 5 mm.—St. 30 C. 19.III.1937. Bushire, between the red and the white light-buoy. 6.5 m. Clay. Petersen-grab. 1 ♂ 5 mm.—St. 32. 23.III.1937. The coast N. of Kharg. 7.5 m. Clay, gravel and shells. 1 ♀ 5 mm.

The species is new to the Iranian waters.

R e m a r k s. The specimens from st. 3 and st. 30 C agree rather well with M i e r s's description and figure, but they differ by the following: there is a marked hepatic facet with a triangular tooth on the under margin (the tooth is distinctly visible when the animal is seen in dorsal view), about at the middle of the anterior lateral margin. The anterior lateral corner has a distinct tooth; a somewhat smaller tooth is placed off the anterior fourth of the posterior lateral margin, and the teeth along the hind margin of the carapace are a trifle smaller than shown in M i e r s's fig., but directed just backwards; one ♂ from st. 3 has besides a minute tooth at the middle of the hind margin.

The ♀ from st. 32 differs from the other specimens in that the teeth along the margin (incl. of those at the ends of the hind margin) are very small, so that they may be characterised as sharp corners.

Pleopod 1 of the male (fig. 15 A) terminates in a cylindrical, somewhat curved spine, probably tubular, in length c. $\frac{1}{3}$ the appendage, and surrounded by a number of setæ of varying length. Pleopod 2 could not be found.

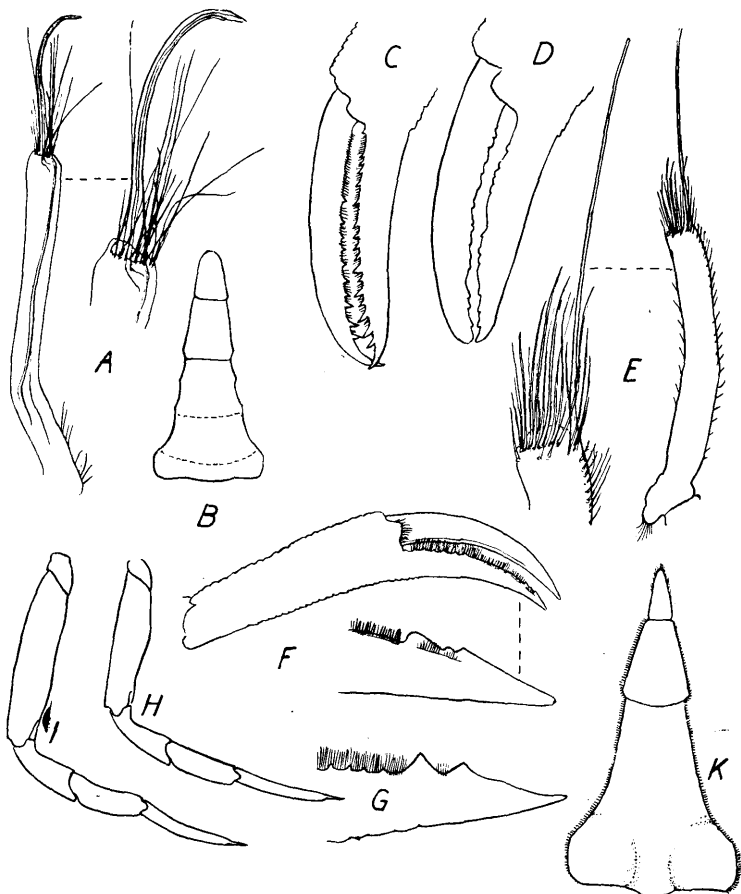


Fig. 15. A-B: *Philyra rectangularis* ♂, 8 mm, St. 30 C. A: pleopod 1; B: abdomen. C-E: *P. scabriuscula*. C: chela of ♂, 7.5 mm, St. 70 C, soft after moulting; D: chela of ♂, 8 mm, St. 70 B; E: pleopod 1, ♂, 7 mm, St. 70 B. F-K: *P. variegata*. F and H-K: ♂, 16 mm, St. 32; G: ♀, 15 mm, St. 10.—F: chela of ♂; G: apex of immovable finger of ♀; H-I: 2nd and 5th legs of ♂; K: abdomen, ♂.

Distribution. Seychelles, 8-24 m (type-locality; Miers l.c.). Djibouti, Gulf of Aden (Nobili l.c.).

31. *Philyra scabriuscula* (Fabricius) (Fig. 15 C-E)

Philyra scabriuscula Targioni-Tozzetti 1877, p. 196, pl. 12 figs. 1, 1 a, 1 b.

Philyra scabriuscula Alcock 1896, p. 239.

Philyra scabriuscula Ihle 1918, p. 275.

Occurrence. 1. Iranian Gulf. St. 49 D. 6.IV.1937. 2.5 nautical miles E.S.E. of Bustani. 5-6 m. Algæ, sand. 1 ♀ 9.5 mm.—Alcock (l.c.) records it from the "Iranian Gulf".

2. Strait of Hormuz. St. 70 B. 19.IV.1937. The anchoring-place at the island of Quism. 4 m. Sand. Petersen-grab. 1 ♂ 8 mm.—St. 70 C. Petersen-grab. 1 ♂ 7.5 mm.

Remarks. In the 2 present males the chelæ are rather different, probably because one (st. 70 C; fig. 15 C) has just moulted, so that the teeth are not yet worn, whereas the other (st. 70 B; fig. 15 D) is hard-shelled and has moulted long ago, so that the teeth are much worn. The chelæ of the female (st. 49 D) are rather like those of the males, but have longer intervals between the teeth. In both the two males the long piece in the abdomen is divided by furrows into three segments (—and most distinct so in the soft male, from st. 70 C—); a similar case was described by Nobili 1906 b, p. 169.

Pleopod 1 of the male (fig. 15 E) is but half as long as the abdomen; apically it is truncate, with numerous stiff setæ; in the median, distal corner there is a long, filiform, almost quite straight tubular process, almost quite as long as the appendage and reaching to the apex of the abdomen. For comparison the pleopod was examined in a specimen from India, and here it has quite the same shape. Pleopod 2 could not be found.

Distribution. Red Sea; E. Africa (Zanzibar); India; Atjeh; Nias; Amboina.

32. *Philyra sexangula* Alcock

Philyra sexangula Alcock 1896, p. 241, pl. 7 fig. 2.

Occurrence. Iranian Gulf. St. 2. 27.II.1937. Coral reef 6 nautical miles S. of Bushire. 1 ♀ juv. 8 mm.

Previously recorded from the "Iranian Gulf" by Alcock l.c.

Distribution. Godávári coast, Sacramento shoal, India, 12 m (Alcock l.c.).

33. *Philyra variegata* (Rüppell) (Figs. 15 F-K, 16)

Myra variegata Rüppell 1830, p. 17, pl. 4 fig. 4.

Philyra variegata Miers 1886, p. 321.

Philyra platychira Paulson 1874, p. 242, pl. 10 fig. 3, 3c.

Philyra platychira Alcock 1896, p. 242 (pars; only the specimens from the Iranian Gulf).

Philyra variegata Nobili 1906 b, p. 169.

Philyra variegata, see under *P. variegata* nov. var. *elegans* Gravier 1920, p. 379, with figs.

P. variegata is possibly synonymous with:

Philyra platycheir de Haan 1850, p. 132, pl. 33 fig. 6.

Philyra platychira Alcock 1896, p. 242 (with lit., etc.).

Philyra platycheira McNeill & Ward 1930, p. 368, with figs.

Philyra platycheira Sakai 1937, p. 156, pl. 15 fig. 6 (cold. fig.).

Occurrence (map fig. 16). 1. Iranian Gulf. St. 5. 4.III. 1937. 8 nautical miles N.E. by E. of the island of Kharg. Clay. 22 m. 1 ♂, 1 ♀, 13 mm.—St. 8 B. 3.III.1937. C. 2 nautical miles S.S.W. of the island of Kharg. Clay. 40 m. Petersen-grab. 1 ♀ juv. 4 mm, 1 ♂ 6 mm.—St. 10. 5.III.1937. East of the island of Kharg. 16-17 m. Sand. 1 (♀ juv.?) 11 mm, 1 ♀ 15 mm.—St. 22. 13.III.1937. 13 nautical miles W. of the outermost light-buoy at Bushire. 56 m. Sandy clay. 2 ♂ 6-10 mm.—St. 26. 15.III.1937. Off the east side of the island of Kharg. 18 m. Sand, shells. 2 ♂ up to 9 mm, 2 ♀ 7 mm.—St. 27. 18.III.1937. Between the red and the white light-buoy at Bushire. 4.5 m. Sand. 1 ♂ 8 mm, 1 ♀ juv. 6 mm.—St. 28. 19.III.1937. 2 nautical miles S. by E. of the outermost light-buoy at Bushire. 7 m. Grayish brown clay. 3 ♂ 10-13 mm, 1 ♀ 12 mm.—St. 32. 23.III.1937. The coast N. of Kharg. 7.5 m. Clay, gravel and shells. 2 ♂ 10-16 mm.—St. 33. 23.III.1937. Ibid. 31 m. Very fine clay. 1 ♂ 10 mm.—St. 33 A. Ibid. Petersen-grab. 1 ♀ juv. 7 mm.—St. 35 A. 24.III.1937. 3 nautical miles N.W. of the island of Kharg. 32 m. Clay. 1 ♂ 10 mm, 1 ♀ juv. 7 mm.—St. 35 B. Ibid. 1 ♂ 10 mm.—St. 37 A. 41 nautical miles S.³/₄E. of the light-buoy at Bushire. 43 m. Fine clay. 1 ♂ 7 mm, 1 ♀ 7 mm.—St. 47 D. 6.IV.1937. 2 nautical miles E.S.E. of Bustani. 5-6 m. Algæ, sand. 1 ♂ 8.5 mm.—St. 49 D. 6.IV.1937. 2½ nautical miles E.S.E. of Bustani. 5-6 m. Algæ, sand. 77 ♂ up to 13 mm, 52 ♀ 7-11 mm.—St. 51 D. 7.IV.1937. Stiffe's bank. 33 m. Shells, coral-gravel. 1 ♂ 6 mm.—St. 85. 15.III.1938. Off Daiyir. 6 m. Clayish sand. 1 spec. 4 mm, determination not certain.—The species was recorded from the "Iranian Gulf" by Alcock l.c.

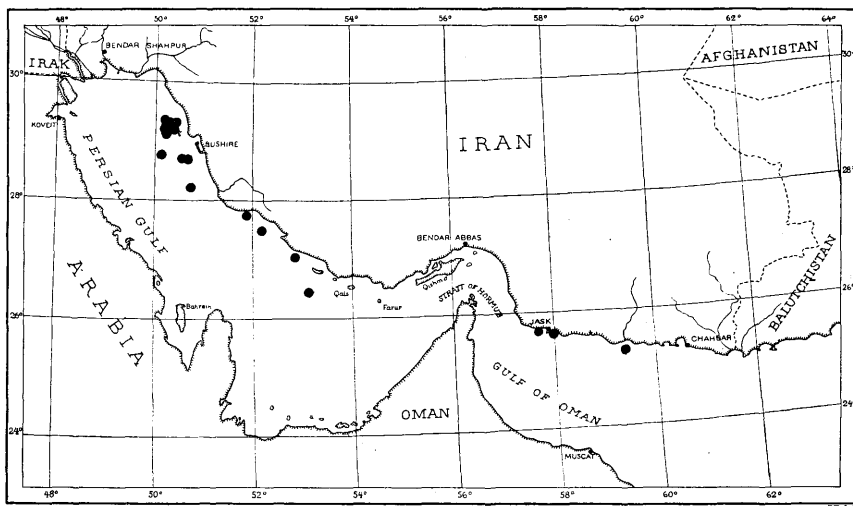


Fig. 16. Occurrence of *Philyra variegata*.

2. Gulf of Oman. St. 73. 20.IV.1937. Jask. The tidal zone. 32 specimens: 14 ♂ 6-10 mm, 3 ♀ ad. 9-11 mm, 15 ♀ juv. 6-8 mm.—St. 74 A. 21.IV.1937. Jask, the roads. 3.5 m. Dark grey sand. Petersen-grab. 1 ♂ 8 mm, 2 ♀ juv. c. 5 mm.—St. 74 B. Ibid. Petersen-grab. 1 ♀ juv. 7 mm.—St. 74 C. Ibid. Petersen-grab 1 ♀ 9 mm.—St. 105. 1.IV.1938. 25°25' N., 59°28' E. 14 m. Sand etc. Petersen-grab. 1 ♂ 8 mm.

Remarks. In the literature there are the following figures of *P. variegata* and *P. platycheir*:

♂ in dorsal view: R ü p p e l l 1830, pl. 4 fig. 4 (*P. varieg.*); de H a a n 1850, pl. 33 fig. 6 (*P. plat.*); Gravier 1920, fig. 1 (*P. varieg.* var. *elegans*).

♂, carapace in dorsal and lateral view, showing the well developed hepatic facet: M c N e i l l & W a r d 1930, fig. 1, a-b (*P. plat.*).

Epistome: P a u l s o n 1874, pl. 10 fig. 3 b (*P. plat.*); M a c N e i l l & W a r d 1930, fig. 1 d (*P. plat.*).

♂, sternum: M a c N e i l l & W a r d 1930, fig. 1 c (*P. plat.*).

♂, abdomen: R ü p p e l l 1830, pl. 4 fig. 4 (*P. varieg.*); de H a a n 1850, pl. 33 fig. 6 (*P. plat.*); Gravier 1920 fig. 6 (*P. varieg.* var. *elegans*).

♀, abdomen: de H a a n 1850, pl. 33 fig. 6 (*P. plat.*).

Mandible and maxillipeds: P a u l s o n 1874, pl. 10 figs. 3 a, 3 c (*P. plat.*).

♂, chela: P a u l s o n 1874, pl. 10 fig. 3 (*P. plat.*); Gravier 1920, figs. 2-5 (*P. varieg.* var. *elegans*); see also de H a a n 1850, pl. 33 fig. 6 (*P. plat.*).

♂, pleopod 1: Gravier 1920, fig. 7 (*P. varieg.* var. *elegans*).

It is not quite certain, whether *P. variegata* R ü p p e l l and *P. platycheir* de Haan are different species or synonymous. Most authors consider them different species, but N o b i l i (1906 b, p. 169) who has compared R ü p p e l l's types of *Myra variegata* with specimens from the Red Sea is of opinion that *P. variegata* "n'est qu'une variété géographique, localisée dans la mer Rouge et le golfe Persique, de la *Ph. platycheira* largement répandue dans la région indopacifique."

Already A l c o c k (1896, p. 243; "*P. platycheira*") has had specimens both from India (with the Andamans) and from the Iranian Gulf and states that the Iranian specimens differ by having "the dorsal surface much mottled with green and brown, and the immobile finger denticulate beyond the line of hair" (according to A l c o c k the colour of the Indian specimens is "in spirit uniform coppery," and the chelipeds have "the cutting edge of the immobile finger rather thickly fringed with hair.")

By comparison with the literature and the Iranian specimens (—the Zoological Museum of Copenhagen had no material of this (these) spe-

cies—) it appears that the specimens agree well with the literature and the figures cited above. There is, however, following to remark. Abdomen of the male agrees fairly well with the figures in de Haan 1850 and Gravier 1920; but the penultimate piece differs by being proximally somewhat broader than the distal end of the preceding piece (the figure in Ruppell differs so much that his specimen probably has been abnormal). There is on the penultimate piece no median tooth, and a tooth is not mentioned in the literature; but in a specimen, otherwise quite normal, from St. 74 A there is a tooth. The chelæ (fig. 15 F) agree well with the figure in de Haan; but his figure is reproduced on so small a scale, that no details are to be seen on it; the fingers are long and slender, a trifle shorter than the hand; the length of the hand is three times the breadth at the base of the fingers (in Paulson's fig. the length is $2\frac{1}{2}$ times the breadth; in Gravier's fig. the fingers are only half as long as the hand). The movable finger has the cutting edge sharp, but quite even, quite devoid of teeth or the like. But the fixed finger has on the cutting edge a fringe of hair, reaching almost to the apex of the finger. Between the hairs there is on the cutting edge a rather long or rather short series of small denticles which are fairly difficult to trace, as they are almost hidden by the hairs; near the apex of the finger and apically of the fringe of hair there are 2 (rarely 3) somewhat larger teeth of a somewhat varying form. So the present specimens differ regarding the teeth somewhat from the existing figures: Paulson shows only 6 (large) teeth, covering almost the whole of the length of the finger from the base to the apex, but with a small interval proximally of the two apical teeth; Gravier's fig. (of *P. varieg.* var. *elegans*) has a long close series of small teeth, reaching almost to the apex of the finger which is said to be devoid of teeth (which is a character typical of the variety *elegans*). But Gravier's figures and description of the hairs on the fixed finger agree excellently with the Iranian specimens.

All the four pairs of walking legs are almost alike (fig. 15 H-I); the dactyli are long, slender, longer than the preceding joint; the apex is dark, very acute.

Pleopod 1 of the male agrees well with Gravier fig. 7, but is a trifle longer in proportion to the breadth. Pleopod 2 (not described by Gravier) is of the usual type. Abdomen ♂, see fig. 15 K.

As all the present specimens have two teeth each at the apex of the fixed finger in the chelipeds, they belong to the same species as that previously taken in the Red Sea and the Iranian Gulf (Ruppell l.c.; Paulson l.c.; Alcock l.c.; Nobili 1906 b, p. 109). The Iranian form is said (Alcock; see above p. 91) to be characterised only by the dorsal side being mottled with green and brown. But as the

present specimens have been kept in alcohol for more than three years, not much is to be said regarding the colour: in many specimens the carapace has lost almost all traces of colour, but some of the specimens from St. 49 D are still mottled with dark brown and light grey, and have so probably originally had the colour mentioned by Alcock as typical of the form from the Iranian Gulf.

Distribution. *P. variegata* is recorded from the Iranian Gulf (Alcock l.c. ("the Persian Gulf specimens" of *P. platycheir*)) and from the Red Sea (Rüppell l.c. (type-loc.); Paulson l.c. (*P. plat.*); Nobili l.c.; Balss 1915, p. 15). The variety *elegans* is known only from Madagascar (Gravier l.c.). *P. platycheir* is known from the whole of the south coast of Asia and right to Japan and Australia (regarding special localities, see McNeill & Ward l.c., and Sakai 1937, p. 156).

Philyra spp. indeterminata.

1. Strait of Hormuz. St. 64 A. 16.IV.1937. Bender Abbas, the roads. 3 m. Clay. Petersen-grab. 1 ♂ 3 m.

2. Gulf of Oman. St. 76 A. 21.IV.1937. 30 nautical miles W. by N. of the buoy at Jask. 110 m. Brown clay. Petersen-grab. 1 ♂ 4 mm.—St. 77 A. 21.IV.1937. 9 nautical miles W. of Kuh-i-Mubarak. 29 m. Clay. Petersen-grab. 1 ♂ 3 mm.—St. 77 B. Ibid. Petersen-grab. 1 ♂ 3 mm.—St. 78 B. 21.IV.1937. 17 nautical miles N.W. of Kuh-i-Mubarak. 70 m. Clay. Petersen-grab. 1 ♂, defective, 3 mm.

34. *Leucosia elata* A. Milne-Edwards

Leucosia elata Alcock 1896, p. 228.

Occurrence. Iranian Gulf, special locality not noted (Alcock l.c.).

Distribution. From Obok (Gulf of Aden) to New Caledonia and Upolu.

35. *Leucosia hilaris* Nobili

Leucosia hilaris Nobili 1906 a, p. 100, pl. 6 fig. 29.

Occurrence. Iranian Gulf. Bank of pearl-oysters c. 25° N., 55° E., 20-30 m (type-locality; Nobili l.c.).

Distribution. Djibouti (Gulf of Aden) and Mauritius.

36. *Leucosia longifrons* de Haan

(= *L. long.* var. *neocaledonica* A. Milne-Edwards, *vide* Ihle 1918, p. 316)

Leucosia longifrons Alcock 1896, p. 217.

Leucosia longifrons Ihle 1918, p. 316.

Leucosia longifrons var. *neocaledonia* Alcock 1896, p. 218.

Leucosia longifrons Sakai 1937a, p. 142, figs.

Occurrence. *L. longifrons* is known from the Iranian Gulf, special locality not noted (Alcock l.c.), and from the island of Arzana (Nobili l.c.).

Distribution. From Mauritius to New Caledonia and Japan; it is known from the Red Sea. Ihle (1918, p. 316) records it from San Francisco; but this record is undoubtedly due to an error, for it is not included in Rathbun's paper on Oxystomatous Crabs of America (Bull. U. S. Nat. Mus. 166, 1937) and is not mentioned in Waldo L. Schmitt: The marine Decapod Crustacea of California (Univ. of California Publ. in Zool., 23, 1921).

37. *Leucosia* (*longifrons* de Haan var.) *pulcherrima* Miers (Fig. 17 C)

Leucosia longifrons var. *pulcherrima* Alcock 1896, p. 219.

Leucosides longifrons pulcherrima Rathbun 1910, p. 309, pl. 1 fig. 14.

Leucosia pulcherrima Ihle 1918, p. 316.

Occurrence. Iranian Gulf. St. 11. 5.III.1937. East of the island of Kharg. 13 m. Sand. 1 ♀ 21 mm.

It has been recorded from the Iranian Gulf, exact locality not noted (Alcock l.c.), and from the island of Arzana and a bank of pearl-oysters c. 25° N., 55° E., 20-30 m (Nobili 1906 a, p. 98).

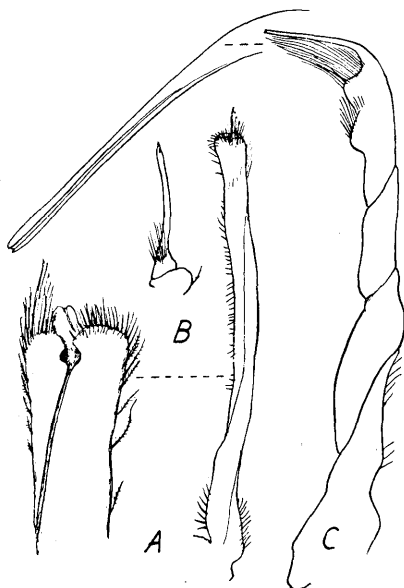


Fig. 17. A-B: *Leucosia pubescens*, ♂, 20 mm, St. 81, pleopods 1-2.
C: *L. pulcherrima*, ♂, 21 mm, Thailand, pleopod 1.

Remarks. The red pattern on the dorsal surface agrees well with Rathbun l.c. fig. 14, except that the double trefoil pattern does not extend so far to the lateral margin of the carapace as shown in Rathbun's photo.

Pleopod 1 of a male (21 mm (fig. 17 C), from Thailand; the specimen delineated by Rathbun l.c.!) is much twisted (c. four pitches), but not markedly tapering till just proximally of the apex that is in length c. $\frac{1}{6}$ the broad part of the appendage, very narrow, and bent in a right-angle toward the middle-line of the abdomen. At the distal end of the broad part there are numerous long setæ. Pleopod 2 is similar to that of *Iphiculus spongiosus* (fig. 6 E, p. 68).

Distribution. Thailand, Torres Strait, Australia.

38. *Leucosia perlata* de Haan

Leucosia pallida + *L. obscura* Bell, Trans. Linn. Soc., vol. 21, 1855, p. 285, pl. 30 figs. 2-3.

Leucosia pallida Alcock 1896, p. 222 (with lit. etc.).

Leucosia perlata Ihle 1918, p. 281.

Leucosia perlata Sakai 1936, p. 157, figs.

Occurrence. 1. Iranian Gulf. St. 26. 15.III.1937. Off the east side of the island of Kharg. 18 m. Sand and shells. 1 ♂ 8 mm (determination not certain).—St. 28. 18.III.1937. 2 nautical miles S. by E. of the outermost light-buoy at Bushire. 7 m. Grayish brown clay. 2 young specimens: 1 ♀ 12 mm, 1 ♂ 9 mm (determination not certain).—Iranian Gulf, exact locality not noted (Alcock l.c.).

2. Strait of Hormuz. St. 61 D. 10.IV.1937. 4 nautical miles S.W. of the city of Suzeh. 9-11 m. Sand, gravel, shells. 1 ♀ 21 mm.

Remarks. The big female from st. 61 agrees well with Bell's figure and Alcock's description, except that the front is not distinctly concave in the mid-dorsal line anteriorly. The males could not be determined with certainty, because of their very small size; but the outer angles of the carapace are dentiform.

Pleopod 1 of the males was not examined, as the specimens could not be determined with certainty; and in the Zoological Museum of Copenhagen we have no other male specimens.

Distribution. From the Iranian Gulf to New Guinea and Palao Isles (Sakai l.c.), possibly to Hong Kong.

39. *Leucosia pubescens* Miers (Fig. 17 A-B)

Leucosia pubescens Alcock 1896, p. 233.

Leucosia pubescens Ihle 1918, p. 282.

Occurrence. 1. Iranian Gulf. St. 10. 5.III.1937. East of the island of Kharg. 16-17 m. Sand. 1 ♂ 18.5 mm, 1 ♀ juv. 12 mm.

—St. 53 D. 8.IV.1937. 2 nautical miles E. by S. of the northeastern point of the island of Quais. 27 m. Sand, clay. 1 ♂ 17 mm.—Iranian Gulf, exact locality not noted (Alcock l.c.).

2. Strait of Hormuz. St. 81. 22.IV.1937. 5 nautical miles N.W. by N.¹/₂N. of the light-buoy of Quism. 18 m. Soft clay. 1 ♂ 20 mm.

Remarks. Pleopod 1 of the male (21 mm, st. 81; fig. 17 A) is not much twisted, only 1¹/₂ pitches. Apex somewhat truncate; between the hairs there is a small, horny tooth. The hairs around the truncate end are simple; the others are feathery setæ. Pleopod 2 (fig. 17 B) is of the ordinary type, but extremely slender.

Distribution. From Iranian Gulf to West Australia and Hong Kong.

Leucosia sp.

St. 5. 4.III.1937. 8 nautical miles N.E. by S. of the island of Kharg. Clay. 22 m. 1 ♂ juv. 7 mm.

Fam. RANINIDÆ

40. *Cosmonotus grayi* Adams & White

Cosmonotus grayi Alcock 1896, p. 292.

Cosmonotus grayi Ihle 1918, p. 294.

Cosmonotus grayi Sakai 1937, p. 173, pl. 16 fig. 2 (cold. fig.).

Cosmonotus grayi Yokoya 1933, p. 113.

Occurrence. "Iranian Gulf" (Alcock l.c.).

Distribution. From western Indian Ocean (Dar-es-Salâm) to Formosa and Japan, sublittoral?. Red Sea, 212 m (Balss 1915, p. 16).

Brachygnatha Oxyrhynga

Fam. HYMENOSOMATIDÆ

41. *Elamena sindensis* Alcock

Elamena sindensis Alcock 1900, p. 386.

Elamena sindensis Illustr. Zool. Investigator, Crust., 1902, pl. 64 fig. 4.

Elamena sindensis Kemp 1917, p. 274.

Elamena sindensis Gordon, Proc. Linn. Soc. London, 152nd sess., 1939-40 (1940), p. 66, figs.

Occurrence. Iranian Gulf. St. 1. 18-28/II.1937. Bushire, tidal zone, rocky coast. 2 ♀.—St. 3. 3.III.1937. Bushire, the roads. 6 m. 3 specimens.—St. 15. 8.III.1937. Ibid. 3-5 m. Coarse sand etc. 2 specimens.—No No. Iranian Gulf, exact locality not noted. 1 specimen.

The species is not new to these waters, for B. Chopra and K. N. Das (Rec. Ind. Mus., vol. 32, 1930, p. 424) record it from "Koweit Shores, Persian Gulf, 4 ♂♂ and 3 ♀♀."

Remarks. Pleopod 1 of the male is delineated by Gordon l.c. fig. 4 a; but in the specimen examined (from St. 15) it differs by having only 4 (not 5) subterminal setæ. Pleopod 2 is probably rather similar to that of *Phalangipus longipes* (fig. 20 C, p. 106). Gordon l.c. has descriptions and figures of pleopod 1 of the male of several other species of the genus (*E. mathæi* (Desmarest), *E. truncata* (Stimpson), *E. abrolhensis* Gordon, *E. gracilis* Borradaile) and *Halicarcinus whitei* (Miers)).

Distribution. Karachi, India (type-locality; Alcock l.c.); Ceylon.

Fam. MAIIDÆ (= INACHINÆ)

Subfam. INACHINÆ COMPOSCIOIDEA (Bals 1929, p. 3)

42. *Collodes malabaricus* Alcock

Collodes malabaricus Alcock 1895, p. 189, pl. 5 fig. 3.

Occurrence. Iranian Gulf. St. 25. 14.III.1937. 63 nautical miles W.¹/₄S. of Bushire. 49 m. Sand, some clay. Petersen-grab. 1 ♂ 4 mm.

The species is new to Iranian waters.

Remarks. Pleopod 1 of the male is much alike that of *Menæthiops nodulosa* (Fig. 18 D). Pleopod 2 was not examined.

Distribution. Malabar Coast, 50-60 m (type-locality; Alcock l.c.).

43. *Achæus tenuicollis* Miers (Fig. 18 A-B)

Achæus tenuicollis Miers 1886, p. 9, pl. 1 fig. 3.

Achæus tenuicollis Alcock 1895, p. 170.

Occurrence. Iranian Gulf. St. 24. 13.III.1937. 29°07' N., 49°56' E. 40 m. Sandy clay. 4 specimens.—St. 25. 14.III.1937. 63 nautical miles W.¹/₂S. of Bushire. 49 m. Sand with some clay. 3 specimens.

It is probably new to these waters.

Remarks. Pleopod 1 of the male (12 mm, St. 24; fig. 18 A) is tapering toward the apex, almost naked. In the apex there is a depression rather similar to that in pleopod 2. Pleopod 2 (fig. 18 B) in length c. ¹/₄ plp. 1; nothing especial to remark.

Distribution. Port Philip 38°22¹/₂' S., 144°36¹/₂' E., 65 m, and Bass Strait, 75 m (Miers), and probably the Andamans (Alcock l.c.). In the Zoological Museum of Copenhagen are specimens from 37°5' S., 150°5' E., 60-100 m, sand, clay (determined by T. Odhner).

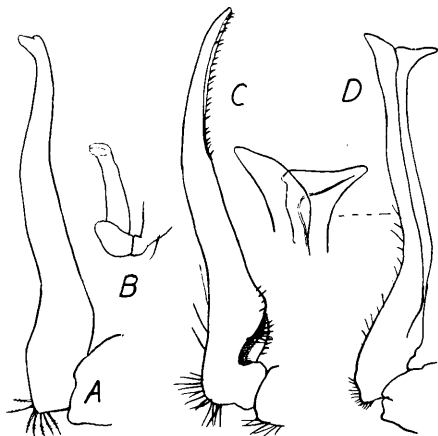


Fig. 18. A-B: *Achæus tenuicollis*, ♂, 12 mm, St. 44, pleopods 1-2.

C: *A. lacertosus*, ♂, 9 mm, St. 15, pleopod 1.

D: *Menæthiops nodulosa*, ♂, 9 mm, St. 56, pleopod 1.

44. *Achæus lacertosus* Stimpson (Fig. 18 C)

Achæus lacertosus Alcock 1895, p. 172 (with lit. etc.).

Achæus lacertosus Stimpson 1907, p. 20, pl. 3 fig. 7.

Occurrence. Iranian Gulf. St. 15. 8.III.1937. Bushire, the roads. 3-5 m. Sand with clay and gravel. C. 10 specimens.

It is new to these waters.

Remarks. Pleopod 1 of the male (9 mm, St. 15; fig. 18 C) is rather similar to that of *A. tenuicollis*, but more evenly tapering right to the very apex, and with a good number of setæ or spines in the apical half. Pleopod 2 fairly well agreeing with that of the said species.

Distribution. Andamans, Palk Strait, Orissa Coast, Thailand, and Port Jackson, Australia.

45. *Achæus spinosus* Miers

Achæus spinosus Miers, Proc. Zool. Soc., London, 1879, p. 25 (no fig.).

Achæus spinosus Alcock 1895, p. 171.

Occurrence. "Iranian Gulf" (Alcock l.c.).

Distribution. 34°10' N., 136°47' E., 55 m (type-locality; Miers l.c.).

Subfam. OPHTHALMIINÆ (Balss 1929, p. 6)

46. *Ophthalmias curvirostris* (A. Milne-Edwards)

Stenocionops curvirostris A. Milne-Edwards 1865, p. 133, pl. 5 figs. 1-1 e.

Stenocionops curvirostris Nobili 1906 a, p. 108.

Ophthalmias curvirostris Balss 1929, p. 6.

Occurrence. Iranian Gulf. Banks of pearl-oysters c. 25° N., 55' E., 20-30 m, and near the island of Arzana (Nobili l.c.).

Distribution. Red Sea (Nobili l.c.).

Subfam. ACANTHONYCHINÆ (Balss 1929, p. 8)

47. *Menæthiops nodulosa* (Nobili) (Fig. 18 D, p. 98)

Parahoplophrys nodulosa Nobili 1906 a, p. 106, fig.

Menæthiops nodulosa Balss 1929, p. 9 (syn., etc.).

Occurrence. Iranian Gulf. St. 49 D. 6.IV.1937. 2¹/₂ nautical miles E.S.E. of Bustani. 5-6 m. Algæ, sand. 1 ♀ ovig. C. 10 mm.—St. 56. 9.IV.1937. Bank of pearl-oysters S.S.E. of the northeastern point of the island of Quais. 3-4 m. 1 ♂ gmm, 1 ♀ ovig. 9 mm.

Recorded from bank of pearl-oysters c. 25° N., 55° E., 20-30 m, and bank N.E. of the Island of Arzana (Nobili l.c.).

Remarks. Pleopod 1 of the male (fig. 18 D) is apically cleft into two equally-sized lobes. Pleopod 2 could not be found.

Distribution. Red Sea, several localities (see Balss l.c.).

On the genera *Acanthonyx* Latreille 1825 and
Dehaania MacLeay 1838

Acanthonyx Latreille, Encycl. Méth. Hist. Nat., Insects, vol. 10, 1825, p. 698.

Acanthonyx H. Milne-Edwards 1834, p. 342.

Acanthonyx Rathbun 1925, p. 141, with lit. etc.

Dehaanius MacLeay 1838, p. 57.

Dehaanius Stebbing 1910, p. 18 (lit.).

The genus *Acanthonyx* was established by Latreille l.c. 1825 for *Maia lunulata* Risso 1816; *Dehaanius* was established by MacLeay 1838 (type-species *D. acanthopus* MacLeay 1838 (= *Acanthonyx dentatus* Milne-Edwards 1834)).

The two genera are very closely allied; the most important difference seems to be the number of segments in the abdomen of the male (*Acanthonyx* has 6 (Stebbing 1910, p. 19) or 5-6 (Rathbun l.c., p. 141), *Dehaanius* has 7 (MacLeay l.c.)). Sometimes, however, it may be extremely difficult to state with certainty the number of segments, for they are not always totally coalesced or quite free. Therefore the two genera are united in the key below; probably *Dehaanius* should be cancelled.

Acanthonyx and *Dehaanius* comprise in all c. 10 species, viz.,

- 1) C. 7 species in the India Ocean (lit. etc. see below, p. 101),
- 2) 2 species in the Pacific Ocean viz., *Acanthonyx simplex* Dana (Dana 1852-55, p. 126, pl. 5 fig. 4; Hawaiian Is.), and *A.*

petiveri H. Milne-Edwards (Rathbun 1925, p. 142, figs.; from California to Chile, and also along the Atlantic coasts of America), and

- 3) 2 species in the Atlantic, viz. *A. petiveri* (see above), and *A. lunulatus* (Risso) (Pesta 1918, p. 334, with fig. and lit.; Mediterranean (and Cape Verde Is.) (= ? *A. brevifrons* A. Milne-Edwards; see A. Milne-Edwards & E. L. Bouvier, Crust. Décap., pt. 1, Brachyures et Anomoures; Exp. Sci. Travailleur et Talisman, 1900, p. 152 (Açores down to 10 m and the Cape Verde Is. 75-180 m)).

Only two of these species seem to be abundant, viz., *A. petiveri* and *A. lunulatus*. Two species (*D. dentatus*, *D. macleayi*) were taken 4-5 times, all the others only once each (or at most twice).

If we compare the existing drawings and descriptions of all the species from the Indo-Pacific Ocean (incl. of South Africa) of the two genera taken together, we may arrange them in a key:

- | | | |
|------|--|---|
| 1 a. | The lateral margins of the carapace (exclusive of the anterior part) almost parallel (posterior pair of marginal teeth very small) (or missing?) | 2 |
| 1 b. | The carapace oval or pear-shaped | 4 |
| 2 a. | The lateral margins (probably?) quite even behind the anterior tooth | <i>D. macleayi</i> (Krauss) |
| 2 b. | The lateral margins have the usual three pairs of lateral teeth (but the two posterior pairs are very small) | 3 |
| 3 a. | The dorsal side quite devoid of spines or tubercles | <i>A. simplex</i> Dana |
| 3 b. | The dorsal side has a few spines or tubercles (viz., three almost obsolete on the gastric region, one on the cardiac and one on the intestinal region) ... | <i>A. petiveri</i> H. Milne-Edwards |
| 4 a. | The carapace oval, with four pairs of small marginal teeth behind the post-ocular tooth | <i>A. consobrinus</i> Milne-Edwards (non Paulson) |
| 4 b. | The carapace pear-shaped or more or less triangular | 5 |
| 5 a. | 2-3 pairs of lateral teeth on the carapace (the median (2nd) pair almost or quite obsolete; the anterior and posterior pairs very prominent) | 6 |
| 5 b. | 3-4 pairs of lateral teeth on the carapace | 7 |
| 6 a. | The post-ocular tooth very prominent | <i>A. dentatus</i> Milne-Edwards |

- 6 b. The post-ocular tooth obsolete *A. elongatus* Miers
and *A. consobrinus* Paulson (non M.-Edw.)
- 7 a. 4 pairs of lateral teeth on the carapace
A. quadridentatus (Krauss)
- 7 b. 3 pairs of lateral teeth on the carapace
D. limbatus (H. Milne-Edwards)
and *A. sp.*, specimen in the present material

Acanthonyx and *Dehaanius*, list of species from Indian Ocean
(incl. of South Africa)

1. *A. consobrinus* A. Milne-Edwards, non Paulson. A. Milne-Edwards 1862, p. 7, pl. 17 figs. 3, 3 b. Alcock 1895, p. 199. Belongs to the genus *Acanthonyx*, for "l'abdomen du mâle composé de cinq articles; les 2, 3 et 4 étant soudés" (A. Milne-Edwards). Length 15 mm.

Réunion (type-locality). Madras (Heller, *vide* Alcock l.c.).

2. *A. consobrinus* Paulson, non Milne-Edwards. Paulson 1875, p. 7, pl. 3 fig. 1.

I am not able to read Paulson's text (in Russian); therefore I cannot state the number of segments in the abdomen, and his fig. represents a female, 14 mm in length.

Paulson considers *A. quadridentatus* Krauss synonymous with *A. consobrinus* Milne-Edwards; but, according to the figures in the literature, the two species are very different and cannot be specifically identic. Paulson's fig. shows a specimen rather similar to Krauss's fig. of *A. quadridentatus*, but very different from Milne-Edwards's drawing of *A. consobrinus*. Nobili 1906 b, p. 173 is inclined to presume that Paulson's species is identic with *A. elongatus* Miers.

3. *Dehaanius dentatus* (H. Milne-Edwards). *Acanthonyx dentatus* H. Milne-Edwards 1834, p. 343. *Dehaanius acanthopus* MacLeay 1838, p. 58, pl. 3 fig. *Deh. dentatus* Stebbing 1900, p. 19; regarding the literature, see Stebbing 1910, p. 287.

Is the type-species of the genus *Dehaanius*; also H. Milne-Edwards l.c. writes that the "Abdomen du mâle formé de sept articles distincts." But the single male (14 mm) of this species in the Zoological Museum of Copenhagen has only 5 segments, in that there are only very faint indications of the sutures between 4th-5th and 5th-6th segments.—Stebbing (1900, p. 20) writes "the largest specimen nearly 11 lines (c. 24 mm) long;" MacLeay's type of *D. acanthopus* was 16.5 mm (according to his fig.).

Cape of Good Hope (type-locality for *A. dentatus* M.-Edw. 1834

and *D. acanthopus* MacLeay 1838); Natal, rocky coasts (Krauss 1843, p. 48); Cape of Good Hope, Simon's Bay 22 m, False Bay, and Algoa Bay, 18-29 m (Stebbing, l.c., 1910). 3 specimens from Cape of Good Hope and Simon's Bay are in the Zool. Museum of Copenhagen.

4. *Acanthonyx elongatus* Miers 1877, p. 673, pl. 69 fig. 1. Belongs to the genus *Acanthonyx*, for "abdomen (of male) narrow, six-jointed, the fourth and fifth joints coalescent" (Miers l.c.). Length c. 28 mm ("1 inch 1 line"). Red Sea (Miers l.c.).
5. *Acanthonyx (Dehaanius?) limbatus* A. Milne-Edwards, see below (species No. 48).
6. *Dehaanius macleanii* (Krauss). *Acanthonyx m.* Krauss 1843, p. 47, pl. 3 fig. 6. *A. m.* Alcock 1895, p. 199. *D. m.* Stebbing 1910, p. 288 (lit.). Belongs to genus *Dehaanius*, for "das Abdomen des Männchens ist 7-gliedrig" (Krauss l.c., and fig. 6 b). Length c. 15 mm ("7 Linien"; Krauss l.c.). Natal Coast (Krauss l.c.); Karachi, N.W. India (Alcock l.c.); Ceylon (Miers 1886, p. 43); Cheval Paar, Gulf of Manaar, Ceylon (Laurie 1906, p. 376).
7. *Dehaanius quadridentatus* (Krauss). *Acanthonyx 4-dentatus* Krauss 1843, p. 43, pl. 3 fig. 7. Belongs to the genus *Dehaanius*, for "das Abdomen des Männchens ist 7-gliedrig" (Krauss l.c.). Length "5.7 Linien" = c. 12 mm. Natal, rocky coast (Krauss l.c.).

48. *Acanthonyx (Dehaanius?) (limbatus* A. Milne-Edwards?) (Fig. 19)

Acanthonyx limbatus A. Milne-Edwards 1862, p. 7, pl. 17 figs. 4, 4 a, 4 b.

Occurrence. Iranian Gulf. St. 49 D. 6.IV.1937. 2¹/₂ nautical miles E.S.E. of Bustani. 5-6 m. Algæ, sand. 1 ♀ ovig. 20 mm, 1 ♀ 18 mm, 2 small specimens 9-11 mm.—St. 56. 9.IV.1937. Bank of pearl-oysters 2 nautical miles S.S.E. of the northeastern point of the island of Quais. 3-4 m. 1 ♂ 26 mm.—No. of station not noted. 1 ♂ 20 mm, 1 ♀ 19 mm.

No species of *Acanthonyx* (or *Dehaanius*) was hitherto found in the Iranian Gulf, but 1 or 2 species were known from the Red Sea, viz., *A. elongatus* Miers and *A. consobrinus* Paulson (non Milne-Edwards?) (probably = *A. elongatus* Miers).

Description of male (26 mm (St. 56) and 20 mm (Löppenthin leg.)). The carapace is pear-shaped, the maximal breadth (excl. of the lateral teeth) ²/₃ the length from the hind margin to the base of the horns



Fig. 19. *Acanthonyx (limbatus?)*.

A: ♀; B: ♂, fore end, ventral view; C: outer maxilliped; D: ♂, chela; E: ♂, chela, ventral view; F: walking legs; G-H: ♂, pleopods 1-2; I: ♂, abdomen. (A: ♀, 19 mm, Iran without special locality; G-H: ♂, 20 mm, the same locality; all other figures: ♂, 26 mm, St. 56).

of the rostrum. The surface of the carapace is somewhat vaulted. The rostral horns are rather long, acute, and rather wide apart. The supra-ocular tooth is subacute, in length c. $\frac{1}{3}$ the rostral horns, not extending beyond the notch between these. The post-ocular tooth is quite obsolete. There are three pairs of subacute lateral teeth, somewhat decreasing in size from No. 1 to No. 3. In addition to the three dorsal tubercles in the gastric region present also in other species, there are 4 dorsal tubercles (—two females have each a pair of extra dorsal tubercles, see under the female, below—) in the hindmost half of the carapace, viz., one in the cardiac, one in the intestinal, and one in each of the two mesobranchial regions. All these tubercles, as also the rostral horns, lateral teeth etc. have

apically some club-like tubercles, and there are groups of hooked spines on the base of the rostral horns, in front of the anterior pair of dorsal tubercles, and on the lateral margin between the first and the second pairs of lateral teeth. The abdomen is six-jointed; in the large male (26 mm) there is an indication of a suture between 4th and 5th segment (see fig. 19 I), in the smaller male (20 mm) no trace at all of a suture was to be found.

The eyes are black, with a minute projection on the eye-stalk both above and below the cornea. Antenna 1 is probably not different from that of *Dehaanius dentatus* M.-Edw. (MacLeay 1838, p. 57, pl. 3 fig. b (*D. acanthopus* MacLeay)). The fixed (not movable) joint of antenna 2 has the margins somewhat parallel, rather different from *D. dentatus* (MacLeay l.c., fig. b). Regarding the maxillipeds nothing especial to remark. The chelipeds are rather heavy, about as long as the carapace. The hand is somewhat swollen, without ridges, longer than the fingers; the fingers have 6-9 teeth each. The walking legs have the shape usual in the genus, but first pair is very long, c. $1\frac{1}{5}$ times as long as the carapace incl. of rostrum; the legs decrease in length from 1st to 4th pair. The fingers are very finely denticulate.

Pleopod 1 (fig. 19 G) of the male is somewhat compressed, not much tapering towards the apex, and apically somewhat obliquely cut off. Pleopod 2 (fig. 19 H) in length c. $\frac{1}{4}$ of pleopod 1; nothing especial to remark. Pleopod 1 of *A. lunulatus* (Brocchi 1875, p. 98, pl. 19 fig. 181) is somewhat different; pleopod 2 is said to be "rudimentaire", but is not delineated by Brocchi.

The female does not differ essentially from the male. The carapace is somewhat broader (the breadth is $\frac{2}{3}$ the length), and the two larger females (20 and 18 mm) from St. 49 D differ from all the other specimens in having on each side a small extra dorsal tubercle between the unpaired gastric tubercle and the second lateral tooth. The chelipeds are much more feeble than in the male, and the first pair of walking legs are a trifle shorter. The abdomen is as broad as the carapace, 4th to 6th segments totally coalesced.

O n t h e t a x o n o m i c p o s i t i o n . The present specimens belong to the genus *Acanthonyx*, for the male has only 6 joints in the abdomen, 4th and 5th segments being more or less coalesced. They are most closely allied to *Dehaanius (Acanthonyx) limbatus* (H. M.-Edw.), and possibly referable to this species, though in the Iranian specimens the dorsal tubercles on the posterior half of the body are much more projecting than those in *D. limbatus* (according to the drawings in Milne-Edwards 1862, pl. 17 figs. 4 and 4 a). But the male of *D. limbatus* is said to have 7 segments in the abdomen; and if this is correct, it must belong to the

genus *Dehaanius*. Nevertheless I consider the two species identic; for the number of coalesced segments does not always seem to be constant in one and the same species, at all events the degree of coalescence in abdomen is quite different in the two males in the present material which are otherwise quite alike.

Distribution. Previously found only once, viz., at Réunion (type-locality); the type (a male) was 18 mm.

49. *Menæthius monoceros* (Latreille) (Fig. 20 A)

Menæthius monoceros Alcock 1895, p. 197 (with lit. etc.).

Occurrence. Iranian Gulf. St. 49 D. 6.IV.1937. 2¹/₂ nautical miles E.S.E. of Bustani. 5-6 m. Algæ. 5 specimens.—St. 51 D. 7.IV. 1937. Stiffe's Bank. 33 m. Shell, coral-gravel. 1 specimen.—St. 56. 9.IV. 1937. Bank of pearl-oysters 2 nautical miles S.S.E. of the northeastern point of the island of Quais. 3-4 m. 1 specimen.

The species is new to these waters.

Remarks. Pleopod 1 of a male (21 mm, St. 51 D; fig. 20 A) has the usual form in the proximal portion; but the distal fourth is abruptly much narrower, and it terminates in a hammer-shaped lobe. Pleopod 2 could not be found.

Distribution. Widely distributed in the Indian Ocean etc. and the Red Sea: East Africa, Seychelles etc., Maldives, Laccadives, S.W. Malay, N.E. Malay, Hawaii, Fiji, Rotuma, N.W., N. and S.E. Australia (*vide* Montgomery 1931, p. 417). Andaman and Nicobar Islands; a single specimen found in the cloaca of an unnamed Holothurian from Cinque Island in the Andamans (Chopra, Rec. Indian Mus., vol. 33, part 3, 1931, p. 324).

Subfam. PISINÆ sens. str. (Bals 1929, p. 11)

50. *Phalangipus longipes* (Linné) (Fig. 20 B-C)

Egeria arachnoides Alcock 1895, p. 223 (with lit. etc.).

Phalangipus longipes Sakai 1931, p. 191, with figs.

Occurrence. 1. Iranian Gulf. St. 4. 4.III.1937. 2 nautical miles N.E. by N. of the northeastern point of the island of Kharg. 25-30 m. Clay. 1 ♀.—St. 14. 6.III.1937. Off the east coast of Kharg. 12.5 m. Sand, stones. 1 ♀.—St. 24. 13.III.1937. 29°7' N., 49°56' E. 40 m. Sandy clay. 5 ♂.—St. 25. 15.III.1937. 63 nautical miles W.¹/₂S. of Bushire. 49 m. Sand, clay. 2 ♂, 2 ♀.—St. 26. 15.III.1937. Off the east coast of Kharg. 31 m. Shells, sand. 3 ♀.—St. 33. 23.III.1937. The coast N. of Kharg. 31 m. Clay. 1 ♀.—St. 39 D. 27.III.1937. 12 nautical miles E.N.E. of the light-ship at Bahrein. 23 m. Shell-gravel. 2 ♀.—St. 59 D. 10.IV.

1937. 8 nautical miles W. by S. of the island of Henjam. 31 m. Clay. 1 ♀.
 —St. 66. 21.I.1938. 10 nautical miles N.W. of Bushire. 1 ♀.—St. 78.
 14.II.1938. W. of Kharg. 29 m. Soft bottom 4 ♀.—St. 89. 23.III.1938.
 17 nautical miles N.E. by E.¹/₄E. of Farur. 49 m. Clay with a little sand.
 1 ♂, 1 ♀.

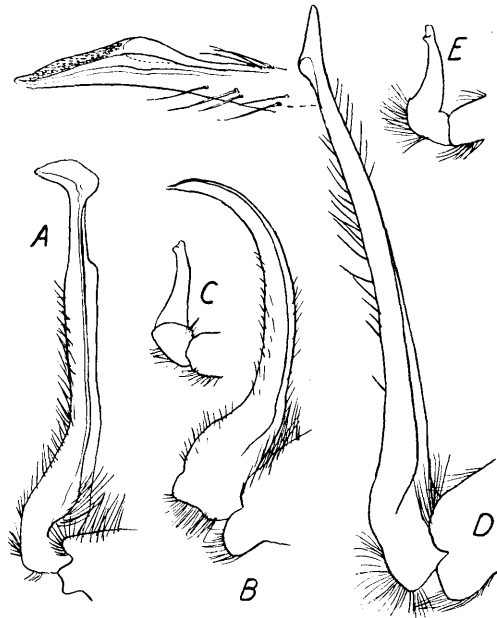


Fig. 20. A: *Menæthius monoceros* ♂, 21 mm, St. 51 D, pleopod 1.
 B-C: *Phalangipus longipes* ♂, 18 mm, St. 83, pleopods 1-2.
 D-E: *Hyastenus hilgendorfi* ♂, 37 mm, St. 15, pleopods 1-2.

2. Strait of Hormuz. St. 83. 4.III.1938. 5 nautical miles N.E. by N. of the black light-buoy off Hor Muza. 15 m. Soft bottom. 1 ♂.

Nobili (1906 a, p. 105) records it from a bank of pearl-oysters c. 25° N., 55° E., 20-30 m.

Remarks. Alcock (1895, p. 225) has established a closely related species, *Egeria investigatoris*, from Ceylon. None of the Iranian specimens may, however, be referred to this species, but agree well with *Ph. phalangipus*, as described by Alcock l.c. and delineated by Cuvier (*Règne Animal, Crust.*, pl. 34 fig. 1 (*Leptopus longipes*)).

Pleopod 1 of the male (18 mm, St. 83; fig. 20 B) is tapering toward the apex, somewhat curvate, with the very apex rather acute. Pleopod 2 in length c. ¹/₄ of plp. 1, of the ordinary shape (fig. 20 C).

Distribution. Not known from the Red Sea or from E. Africa. India: Madras and Gulf of Martaban (Henderson 1893, p. 343).

Ceylon, 35 m (Laurie 1906, p. 382). Malay Archipelago, N. and N.E. Australia, China (Henderson 1893, p. 343).

Subfam. HYASTENINÆ (see Balss 1929, p. 14)

51. *Hyastenus hilgendorfi* de Man (Fig. 20 D, E)

Hyastenus hilgendorfi de Man 1887, p. 14, fig.

Hyastenus hilgendorfi Alcock 1895, p. 209.

Occurrence. 1. Iranian Gulf. St. 2. 27.II.1937. Coral reef S. of Bushire. 1 specimen.—St. 15. 8.III.1937. Bushire, the roads. 3-5 m. Coarse sand etc. 6 specimens.—St. 39 D. 27.III.1937. 12 nautical miles E.N.E. of the light-ship of Bahrein. 23 m. Shell-gravel. 3 specimens.—St. 42 D. 30.III.1937. 24 nautical miles N.E. of Bahrein. 33 m. Shells and gravel. 1 specimen.—St. 44 D. 31.III.1937. 80 nautical miles N.E.³/₄E. of the light-ship of Bahrein. 20 m. Clay. 1 specimen.—St. 86. 16.II.1938. 6 nautical miles N.E. of the light-ship at Bahrein. 20 m. 2 specimens.—St. 87. 2.III.1938. 30 nautical miles E. of the outermost buoy at Bahrein. 17 m. Coral sand etc. 1 spec.—St. ? (exact locality not stated). 1 spec.—Nobili (1906 a, p. 105) records it from 3 localities in the Iranian Gulf, viz., a bank of pearl-oysters c. 25° N., 55° E., 20-30 m, and two places on a bank of pearl-oysters near the Island of Arzana, depth ?.

2. Strait of Hormuz. St. 83. 4.III.1938. 5 nautical miles N.E. by E. of the black outer buoy off Hor Muza. 15 m. 4 specimens.

Remarks. Pleopod 1 (fig. 20 D) of a male (37 mm in length incl. of the rostral spines; St. 15) (see also Buitendijk 1939 b, p. 243, text-figs. 9-10) is slender, tapering toward the apex, with a narrow membrane or "wing" at the lateral side near the apex. Pleopod 2 is very short, in length but c. ¹/₆ of pleopod 1, stout, of ordinary shape (fig. 20 E).

Distribution. Not in the Red Sea, but from Ceylon to the Malakka Strait.

52. *Doclea* (?) sp.

Occurrence. Iranian Gulf. St. 49 D. 6.IV.1937. 2¹/₂ nautical miles E.S.E. of Bustani. 5-6 m. Algæ, sand. 1 small male, length incl. of rostrum 12 mm.

Remarks. This small specimen could not be determined with certainty, but it seems to belong to the genus *Doclea*. The genus has in Indian waters 7 species (see Alcock 1895, p. 225 seq.), but is not known from the Iranian Gulf; a couple of species are, however, found in the Red Sea (Balss 1929, pp. 14-16).

Pleopod 1 of the males of 4 Indian species are delineated by Chopra (1935, figs. p. 468).

Subfam. MAJINÆ (see Balss 1929, p. 16)

53. *Schizophrys dama* (Herbst 1804)

Schizophrys aspera Alcock 1895, p. 243.

Schizophrys dama Montgomery 1931, p. 420 (with lit., etc.).

Occurrence. Iranian Gulf. Bank of pearl-oysters near the island of Arzana, depth ? (Nobili 1906 a, p. 108).

Distribution. S. Africa, Seychelles, Red Sea, India, Ceylon, Christmas Island, S.W. and N.E. Malay, N.W., N., S.W. and S.E. Australia (Montgomery l.c.). Japan (Parisi 1915, p. 293).

Subfam. MITHRACINÆ (see Balss 1929, p. 20)

54. *Micippa philyra* var. *mascarenica* Kossmann (Fig. 21 E, F)

Micippa mascarenica Miers 1885, p. 7 (with lit.).

Micippa philyra var. *mascarenica* Nobili 1906 a, p. 112 (lit. etc.).

Occurrence. Iranian Gulf. St. 39 D. 27.III.1937. 12 nautical miles E.N.E. of the light-ship at Bahrein. 23 m. Shell gravel. 1 ♂ 20 mm.

Nobili (l.c.) records it from a bank of pearl-oysters c. 25° N., 55° E., 20-30 m, and from the harbour of Muscat (Gulf of Oman).

Remarks. Pleopod 1 (fig. 21 E) of the male is rather similar to that of *M. philyra* (Buitendijk 1939 b, p. 253, text-fig. 20). On pleopod 2 nothing is to be remarked (fig. 21 F).

Distribution. Mauritius (Miers 1885, p. 7); Providence Island, 35 m, and Seychelles, 8-22 m (Miers, Alert 1884, p. 525). Probably not known from the Red Sea.

Subfam. MACROCOELOMINÆ (see Balss 1929, p. 22)

55. *Cyphocarcinus minutus* A. Milne-Edwards
(= *Ixion capreolus* Paulson) (Fig. 21 A-B)

Cyphocarcinus minutus Nobili 1906 a, p. 109 (with lit. etc.).

Occurrence. Iranian Gulf. St. 2. 22-24.II.1937. Coral reef 6 nautical miles S. of Bushire. 1 ♂ 18 mm (incl. of rostrum).— St. 49 D. 6.IV.1937. 2½ nautical miles E.S.E. of Bustani. 5-6 m. Algæ, sand. 4 specimens up to 20.5 mm (incl. of rostrum).

Nobili (1906 a, p. 110) records it from St. XLVII; but a station of this number is not in Nobili's list of stations (Nobili, l.c., p. 14), so that it is not certain that Nobili's specimens (4 ♂, 2 ♀) were taken in the Iranian Gulf.

Remarks. Pleopod 1 of a male (18 mm; St. 2; fig. 21 A) is acute, tapering toward the apex; in the apical half no setæ. On pleopod 2 nothing to remark (fig. 21 B).

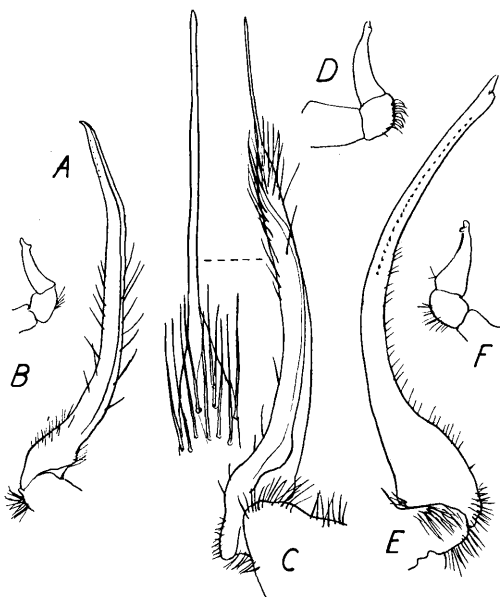


Fig. 21. A-B: *Cyphocarcinus minutus* ♂, 18 mm, St. 2, pleopods 1-2.

C-D: *Xenocarcinus tuberculatus* ♂, 20 mm, pleopods 1-2.

E-F: *Micippa philyra* var. *mascarenica*, 20 mm, pleopods 1-2.

Distribution. Zanzibar, Red Sea, Pedro Shoal and Andamans (Nobili 1906 a, p. 111, and 1906 b, p. 177).

56. *Xenocarcinus tuberculatus* White (Fig. 21 C-D)

Xenocarcinus tuberculatus A. Milne-Edwards 1872, p. 253, pl. 12 fig. 1.

Xenocarcinus tuberculatus Miers 1874, p. 1, pl. 2 fig. 1.

Xenocarcinus tuberculatus Alcock 1895, p. 192 (with lit.).

Xenocarcinus tuberculatus Alcock & Anderson, *Illustr. Zool. Investigator*, Crust., pt. 16, 1898, pl. 33 fig. 3.

Xenocarcinus tuberculatus Laurie 1906, p. 371.

Xenocarcinus tuberculatus Gordon 1934, p. 69.

Occurrence. Iranian Gulf. St. 42 D. 30.III.1937. 24 nautical miles N.E. of Bahrein. 33 m. Shells and gravel. 16 specimens, incl. of ♂ up to 20 mm in length incl. of rostrum and ♀ ovig. up to c. 14 mm.

Remarks. The species is most varying. The present specimens agree more closely with Miers's figure than with the figures of the other authors cited above. But the medio-dorsal tubercles are extremely shallow, not approximately as high as in Miers's fig. (in some of the females the anterior tubercle is transversely divided as in Miers's fig.; in the male it is almost quite missing and not divided). In females and young males the rostrum agrees well with the fig. in the "Investigator" (pl. 33 fig. 3 a). Alcock had females only (see Alcock l.c.). In the big

males the rostrum is somewhat more narrow, but not markedly longer than in females (male: total length 20 mm, rostrum (from central part of ocular cavity) 8 mm; ovigerous female: total length 14 mm, rostrum 4.5 mm).

Laurie (l.c., p. 372) has subdivided the species into 3 varietates, viz., var. *depressus* (from Cape Howe and Murray Island; A. Milne-Edwards l.c., pl. 12 fig. 1); var. *alcocki* (from Ceylon and Andamans; "Investigator", pl. 33 fig. 3); and var. *tuberculatus* (from Long Island, Cumberland Group, Queensland; Miers l.c., pl. 2 fig. 1).

As Laurie characterizes the variety *tuberculatus* as "having its gastric tubercle transversely divided," the Iranian specimens belong to this variety. The species is new to Iranian waters.

Pleopod 1 of a male (20 mm, St. 42 D; fig. 21 C) has the ordinary shape, but terminates in a long, slender spine, $\frac{1}{3}$ as long as the rest of the appendage. On pleopod 2 nothing to remark (fig. 21 D).

Regarding the distribution see above. Since the issue of Laurie's paper it has been recorded (but variety not stated) from Caragos Carajos, 60 m, and Diego Garcia, 28 m (Rathbun 1911, p. 248). Aziro, Japan (Sakai 1935, p. 70, fig.).

Fam. PARTHENOPIDÆ

Subfam. PARTHENOPINÆ

57. *Cryptopodia angulata* Milne-Edwards & Lucas var. *cippifer* Alcock

Cryptopodia angulata var. *cippifer* Alcock 1895, p. 283 (not fig.).

Occurrence. Iranian Gulf. St. 25. 14.III.1937. 63 nautical miles W. $\frac{1}{2}$ S. of Bushire. Sand with a little clay. 49 m. 1 ♀; maximal breadth 52 mm.

Neither *C. angulata* nor the variety were previously known from Iranian waters.

Distribution. Karachi (type-locality of the variety; Alcock l.c.). *C. angulata* is known from the Orissa Coast and the Coast of Malabar, 34-47 m.

58. *Cryptopodia fornicata* (J. C. Fabricius)

Cryptopodia fornicata Alcock 1895, p. 282.

Cryptopodia fornicata Flipse 1930, p. 72.

Occurrence. "Persian Gulf" (Alcock l.c.).

Remarks. Pleopod 1-2 of the male, see Flipse 1930, fig. 22 p. 24.

Distribution. Not Red Sea.—Palk Straits; Gulf of Martaban;

Ceylon; Andamans; Singapore, 25 m; Gulf of Thailand; China Sea; Japan; Malayan Archipelago; Philippine Islands; Australia, 42 m (Flipse l.c.).

59. *Lambrus (Platylambrus) carinatus* (Milne-Edwards)

Adams & White (Figs. 22, 23 C-D)

Lambrus carinatus Adams & White 1850, p. 27, pl. 5 fig. 3.

Lambrus Holdsworthi Miers, Ann. Mag. Nat. Hist., (5) vol. 4, 1879, p. 19, pl. 5 fig. 3.

Platylambrus carinatus Flipse 1930, p. 85 (lit., syn.).

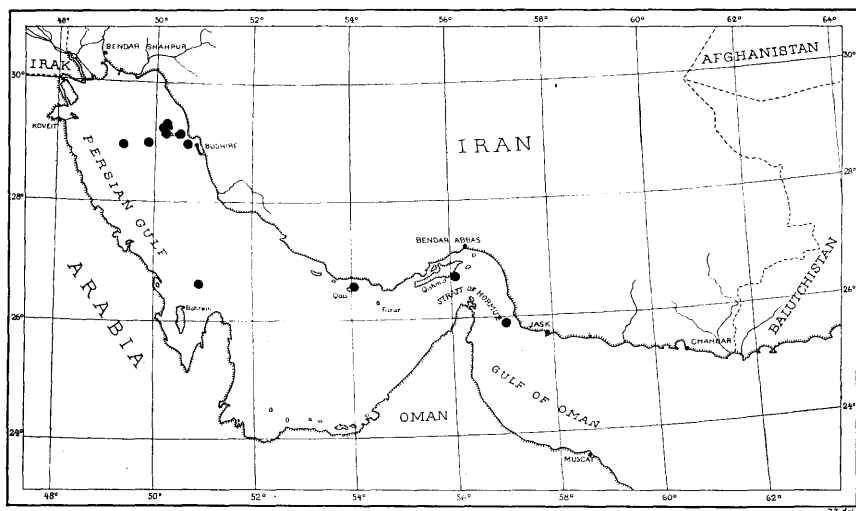


Fig. 22. Occurrence of *Lambrus (Platylambrus) carinatus*.

Occurrence. 1. Iranian Gulf. St. 3. 3.III.1937. Bushire, the roads. One very small specimen, the determination therefore not certain.—St. 9. 5.III.1937. 8 nautical miles W.S.W. of the south end of the island of Kharg. 44 m. 1 ♂ 2 mm.—St. 24. 13.III.1937. 29°07' N., 49°56' E. 40 m. 13 specimens, medium-size.—St. 25. 14.III.1937. 63 nautical miles W.¹/₂S. of Bushire. Sand with a little clay. 49 m. 2 rather small specimens.—St. 26. 15.III.1937. Off the east side of Kharg. 18 m. Sand, shells. 2 rather small specimens.—St. 33. 23.III.1937. The coast N. of Kharg. 31 m. Very fine clay. 1 ♀ 25 mm, 1 ♂ 23 m.—St. 39 D. 27.III.1937. 12 nautical miles E.N.E. of the light-ship of Bahrein. 23 m. Shell gravel. 1 very small and defective specimen; the determination not certain.—St. 53 D. 8.IV.1937. 2 nautical miles E. by S. of the northeastern point of the island of Qais. 27 m. Sand, clay. 4 specimens, medium size.—St. 78. 14.II.1938. W. of Kharg. 29 m. Soft bottom. 1 ♂ 17.5 mm.

2. Strait of Hormuz. St. 61 D. 10.IV.1937. 4 nautical miles

S.W. of the city of Suzeh. 9-11 m. Sand, gravel, shells. 2 rather small specimens;—and besides 2 specimens (the much hairy specimens mentioned below, viz. 1 ♂ 9 mm and 1 ♀ 16 mm) which possibly do not belong to the present species.—St. 77 D. 21.IV.1937. 9 nautical miles W. of Kuh-i-Mubarak. 29 m. 2 ♂ c. 23 mm.

Under the name of *Lambrus holdsworthi* Miers it was recorded in N o b i l i's paper (1906 a, p. 112) on the Iranian Gulf; but N o b i l i's locality (St. XLIII) is not noted in his list of stations (N o b i l i l.c., p. 14).

R e m a r k s. The spines on the dorsal side and the margin of the carapace agree better with M i e r s's fig. than with that of A d a m s & W h i t e. The determination seems to be correct, for the infra-orbital lobe is deeply cleft (M i e r s l.c., key p. 262); the chelæ have on the underside of the arm and the hand 1-3 longitudinal rows of tubercles as in *L. echinatus* (Herbst), whereas *L. prensor* (Herbst) has the underside of the hand quite smooth (specimens in the Zoological Museum, Copenhagen; in the literature I have found no mention of this character in the present species); 4th-6th joints in the walking legs are faintly serrate in the upper edge (most distinctly in 4th joint), and 4th joint on the under margin still more faintly serrate.

Quite different from the others are two specimens from St. 61 D. They agree fairly well with A d a m s & W h i t e pl. 5 fig. 3, i.a. regarding the outline of the carapace with the very large tooth on the outer hind corner, and both the carapace and the legs (incl. of chelæ) are much hairy along the margins. But the dorsal side of the carapace is much tuberculate, even

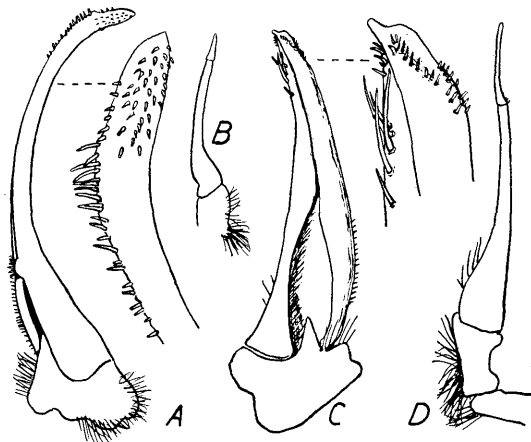


Fig. 23. A-B: *Lambrus (Lambrus) longimanus* ♂, 22 mm, St. 53 D, pleopods 1-2.
C-D: *Lambrus (Platylambrus) carinatus* ♂, 24 mm, St. 9, pleopods 1-2.

much more so than in Adams & White's fig. Possibly they do not belong to the present species.

Pleopods 1-2 of the male of *L. carinatus* (fig. 23 C-D) are not described in the literature, but Brocchi (1875, p. 98, pl. 18 figs. 166-167) has described these appendages of another Indo-Pacific Parthenopid, viz., *Rhinolambrus contrarius* (Herbst) (Brocchi calls it *Lambrus c.*); they agree fairly well with those of the present species, but pleopod 2 is (according to Brocchi's fig.) only half as long as plp. 1.

Pleopod 1 of the male of *L. carinatus* (24 mm; St. 9) is rather stout, faintly curvate, apically tapering; near the apex there are a few large and numerous small spines. The cavity for plp. 2 is very wide and its proximal end very open. Pleopod 2 is as long as plp. 1, slender, subacute, consists distinctly of 3 joints.

Distribution. Red Sea; Mozambique; Ceylon; Singapore; Malayan Archipelago.

60. *Lambrus (Lambrus) longimanus* (A. Milne-Edwards)

(Fig. 23 A-B)

Lambrus (Lambrus) longimanus Flipse 1930, p. 29 (with lit.).

Occurrence. Iranian Gulf. St. 34 A. 23.III.1937. 29° 27' N., 50° 16' E. Coarse gravel, shells. Petersen-grab. 1 ♀ 22 m.—St. 53 D. 8.IV.1937. 2 nautical miles E. by S. of the northeastern point of the island of Qais. 27 m. Sand, clay. 2 ♂, the largest of them 22 × 25 mm, the chelipeds c. 80 mm each.

Probably new to the Iranian waters.

Remarks. Pleopods 1-2 of the male (fig. 23 A-B) are described by Flipse l.c., p. 25, fig. 23. Pleopod 1 is rather slender, curved, apically with numerous spines. Plp. 2 is in length $\frac{1}{3}$ of plp. 1, slender, apically acute.

Distribution. Not found in the Red Sea, but known from Mauritius, and very widely distributed from India to Queensland and the Philippine Islands; regarding special localities, see Flipse l.c.

61. *Pseudolambrus calappoides* (Adams & White)

Lambrus (Parthenolambrus) calappoides Alcock 1895, p. 275.

Pseudolambrus calappoides Flipse 1930, p. 87 (lit.).

Occurrence. Iranian Gulf. St. 39 D. 27.III.1937. 12 nautical miles E.N.E. of the light-ship at Bahrein. 23 m. Shell gravel. 1 ♀ 23 mm.

It was recorded already by Nobili (1906 a, p. 113) from a bank of pearl-oysters c. 25° N., 55° E., 20-30 m.

Distribution. From the Red Sea to Australia and the Hawaiian Islands.

Subfam. EUMEDONINÆ

62. *Eumedonus granulosus* MacGilchrist

Eumedonus granulosus MacGilchrist 1905, p. 253.

Eumedonus granulosus Illustr. Zool. "Investigator," Crust., 1907, pl. 77 fig. 2.

Eumedonus granulosus Rathbun 1911, p. 259.

Eumedonus granulosus Sakai, Sci. Rep. Tokyo Bunrika Daigaku, sect. B, No. 4, Tokyo, 1932, p. 55, pl. 2 fig. 3.

Occurrence. Iranian Gulf. "St. 291", c. 90 m, mud and sand, several specimens, and "St. 296", 85 m, mud and sand, 1 ♂ juv. and 1 ovigerous ♀ (MacGilchrist l.c.).

Distribution. Amirante Isl. (Rathbun l.c.). Simoda, Japan (Sakai l.c.).

Brachygnatha

Brachyrhyncha

I. Cyclometopa

Fam. CORYSTIDÆ

63. *Gomezia distincta* de Haan, var.

Corystes (Oeidea) distincta de Haan 1850, p. 45, pl. 13 fig. 2.

Gomezia distincta MacGilchrist 1905, p. 263.

? *Gomezia distincta* var. *indica* Chopra 1935, p. 490, figs.

Occurrence. Iranian Gulf, "Sta. 292", 95 m, 1 ♂ 8 × 5.5 mm (MacGilchrist l.c.).

Distribution. Japan, exact locality not stated (type-locality; de Haan l.c.); also Sagami Bay and north of Nagato, Yamaguti-ken, 90 m (Yokoya 1933, p. 184). Sandheads, off the mouth of the Hooghly River, India, about 40 m, soft mud with sand (Chopra l.c.).

Fam. PORTUNIDÆ

Subfam. LUPINÆ

64. *Charybdis (Charybdis) cruciata* (Herbst) (Fig. 24 A)

Charybdis (Goniosoma) crucifera Alcock 1899, p. 51.

Charybdis (Goniosoma) crucifera Shen 1932, p. 38, pl. 6 fig. 8.

Charybdis (Charybdis) cruciata Leene 1938, p. 24 (lit. etc.), figs.

Occurrence. I. Strait of Hormuz. St. 80 D. 22.IV. 1937. 1 nautical mile S.E. of Hormuz. 15 m. Clay. 1 ♂ 75 mm.—

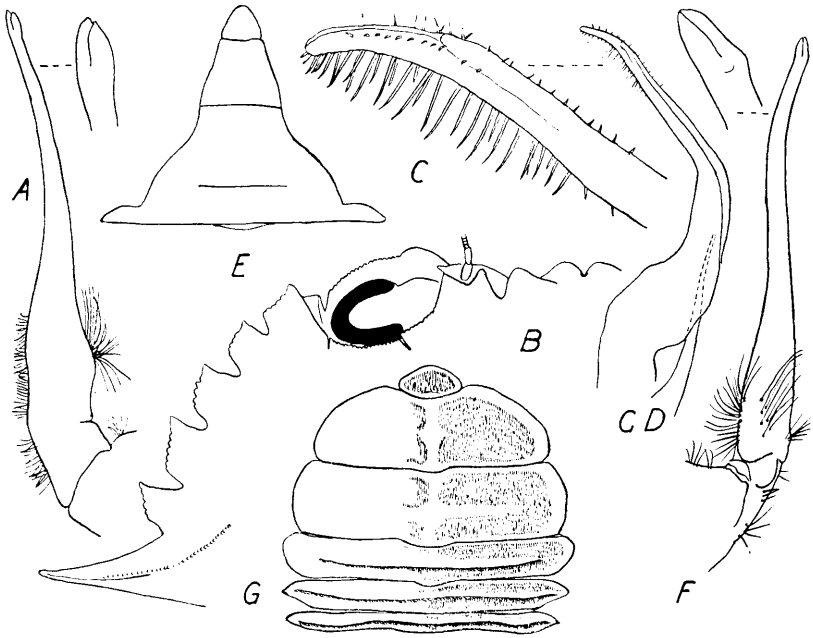


Fig. 24. A: *Charybdis cruciata*, ♂, St. 80 D, pleopod 2. B-E: *C. hoplites (typica ?)*, ♂, St. 24. B: fore end; C-D: pleopods 1-2; E: abdomen. F-G: *C. hoplites longicollis*. F: ♂, 26 mm, St. 25, pleopod 2; G: ♀, St. 120 C, abdomen.

St. 110. 2.IV.1938. 5 nautical miles W.N.W. of the city of Turu. 30 m. 1 small specimen.

2. Gulf of Oman. St. 72 D. 20.IV.1937. 2 nautical miles N.W. by N. of the buoy at Jask. 12 m. Clay. 1 ♀ juv. 35 mm.

It is not known from the Iranian Gulf (is not recorded by Alcock l.c. or Nobili 1906 a).

Remarks. Pleopod 1 of the male is described by Shen l.c. fig. 6 b, Chopra 1935 p. 483, with fig., and Leene l.c. But pleopod 2 was not described; it is $\frac{2}{5}$ the length of pleopod 1 and is apically cleft (fig. 24 A).

Distribution. Is not known from the Red Sea (not recorded by Nobili 1906 b, Klunzinger 1913, Laurie 1914, or Balss 1924), but is recorded from the Indian Ocean, Malay Archipelago, Philippine Islands, Australia, China and Japan (Shen l.c.).

65. *Charybdis (Charybdis) lucifera* (J. C. Fabricius)

Charybdis (Charybdis) lucifera Leene 1938, p. 57 (lit. etc.), figs.

Occurrence. 1. Iranian Gulf. St. 15. 8.III.1937. Bushire, the roads. 3-5 m. Sand with clay. 3 (4?) specimens.

2. Strait of Hormuz. St. 69. 18.III.1937. The island of Quism (Tavila), tidal zone. 2 specimens.—St. 83. 4.III.1938. 5 nautical miles N.E. by E. of the black outermost buoy off Hormusa. 15 m. Soft bottom. 4 specimens.

The species is new to these waters.

Remarks. Pleopod 1 of the male is delineated by Leene l.c.

Distribution. From the Coast of Malabar to Bay of Sagami, Japan.

66. *Charybdis (Charybdis) miles* de Haan

Charybdis (Goniosoma) miles Shen 1937, p. 122, with figs.

Charybdis (Charybdis) miles Leene 1938, p. 38 (lit. etc.), figs.

Occurrence. Iranian Gulf. St. 89. 23.III.1938. 17 nautical miles N.E. by E.¹/₄E. of Farur. 49 m. Clay with a little sand. 1 ♂.

It is new to Iranian waters.

Remarks. Pleopod 1 of the male was delineated by Chopra 1935, fig. p. 487, and Leene l.c.

Distribution. Not known from the Red Sea, but widely distributed from N.E. Indian (Ganjam Coast) to New South Wales and Japan.

67. *Charybdis (Charybdis) variegata* de Haan

Charybdis (Goniosoma) variegata Alcock 1899, p. 60.

Charybdis (Charybdis) variegata Leene 1938, p. 84 (with lit.), figs.

Occurrence. "Persian Gulf" (Alcock l.c.).

Remarks. Pleopod 1 of the male was delineated by Chopra 1935, fig. p. 489, and Leene l.c.

Distribution. From Assab (Red Sea) to Nagasaki and N. Australia.

68. *Charybdis (Charybdis) natator* (Herbst)

Charybdis (Goniosoma) natator Alcock 1899, p. 61.

Charybdis (Goniosoma) natator Shen 1932, p. 48, figs.

Charybdis (Charybdis) natator Leene 1938, p. 93 (with lit.), figs.

Occurrence. Iranian Gulf. Bank N.E. of the island of Arzana (Nobili 1906 a, p. 115).

Remarks. Pleopod 1 of the male is delineated by Leene l.c.; see also Shen l.c., fig. 8 b.

Distribution. From Durban, Madagascar and the Red Sea to Shanghai.

69. *Charybdis* (*Charybdis*) *helleri* (A. Milne-Edwards)

Charybdis (*Goniosoma*) *merguiensis* Alcock 1899, p. 55.

Charybdis (*Goniosoma*) *merguiensis* Shen 1937, p. 120, figs.

Charybdis (*Charybdis*) *helleri* Leene 1938, p. 44 (with lit.), figs.

Occurrence. "Persian Gulf" (Alcock l.c.).

Remarks. Pleopod 1 of the male was delineated by Chopra 1935, fig. 485, and Leene l.c.

Distribution. Red Sea, India, Malay Archipelago, Hong Kong, China. Also found in the Mediterranean, viz., Jaffa, Palestine, 40-50 m (Monod 1930, p. 140, with fig.).

70 a. *Charybdis* (*Goniohellenus*) *hoplites* Wood Mason
f. *typica* Leene (Fig. 24 B-E)

Charybdis (*Goniohellenus*) *hoplites* f. *typica* Leene 1938, p. 99 (with lit.), figs.

Occurrence. Iranian Gulf. St. 24. 13.III.1937. 29°07' N., 49°56' E. 40 m. Sandy clay. 1 ♀ 19 × 37 mm.—St. 38 D. 27.III.1937. 29 nautical miles N.¹/₂E. of the light-ship at Bahrein. 71 m. Sandy clay. 1 ♀ 12 mm.

The forma *typica* is not new to the Iranian Gulf, being recorded by Nobili (1906 a, p. 119; see also Leene l.c.) from between El Katif and Bushire, 80 m, the deepest spot in the Gulf.

Remarks. The determination of the two specimens secured by the present expedition is not quite certain.

The specimen from St. 38 D is very soft (it has just moulted). It was referred to the forma *typica* (and not to f. *pusilla*), i.e. because of the rather small 2nd and 5th antero-lateral teeth, quite agreeing with Leene's figure and description.

The specimen from St. 24 (fig. 24 B-E) agrees on the whole well with Leene's description and figure of f. *typica*, but it differs in the following details. The submedian frontal teeth are separated from the lateral teeth by an incision not quite as wide as in Leene's fig. (not "wide U-shaped"). The 5th antero-lateral tooth is not broader than the 2nd. The inner incision of the orbit (dorsal side) is narrow, not "a rather wide gap". In the abdomen the fused 4th and 5th segments have the lateral margins proximally convex, and the margins of 6th segment are more straight than in Leene's fig., not concave. On the fore margin the arm of the chelipeds has 3 claw-like spines as in the right chela in Alcock & Anderson, Crust. (in Zool., "Investigator") pl. 23, fig. 6, 1896. 2nd and 3rd pairs of legs are lost; therefore nothing can be stated regarding number of spinules.

All the differences from typical specimens listed above are very small

and probably not of any great importance. But pleopod 1 of the male (fig. 24 C) is very different from that of f. *typica* (Leene, l.c. fig. 60); the main difference from var. *longicollis* is the much greater number of spines (viz., c. 20, not c. 5) on the inner side of the apex. Pleopod 2 is apically somewhat damaged (fig. 24 D).

Distribution. Indus Delta; Madras Coast (see also Leene l.c.).

70 b. *Charybdis (Goniohellenus) hoplites* Wood Mason
var. *longicollis* Leene (Fig. 24 F-G, 25)

Charybdis (Goniohellenus) hoplites var. *longicollis* Leene 1938, p. 107, figs.

Occurrence. 1. Iranian Gulf. St. 24. 13.III.1937. 29°7' N., 49°56' E. 40 m. Sandy clay. 1 ♂.—St. 25. 14.III.1937. 63 nautical miles W.¼S. of Bushire. 49 m. Sand, a little clay. 4 specimens, 2 out of them very small.—St. 26. 15.III.1937. Off the east side of the island of Kharg. 18 m. Sand, shells. 1 ♀ juv.—St. 34. 23.III.1937. The coast N. of Kharg. 28.5 m. Coarse gravel, shells. 1 ♀ ovig.—St. 35 D. 24.III. 1937. 3 nautical miles N.W. of Kharg. 32 m. Sandy clay. 1 ♀.—St. 47 D. 5.IV.1938. 2 nautical miles W. of Quanat, 7.5 m. Sand with a little clay. 1 small specimen.—St. 49 D. 6.IV.1938. 2½ nautical miles E.S.E. of Bustani. 5-6 m. Algæ, sand. 1 ♂, 1 ♀.—St. 53 D. 8.IV.1937. 2 nautical miles E. by S. of the northeastern point of the island of Quais. 27 m. Sand, clay. 2 specimens (incl. 1 ♀ with *Rhizocephalid*).—St. 78. 14.II. 1938. W. of Kharg. 29 m. Soft bottom. A few specimens.—St. 120 C.

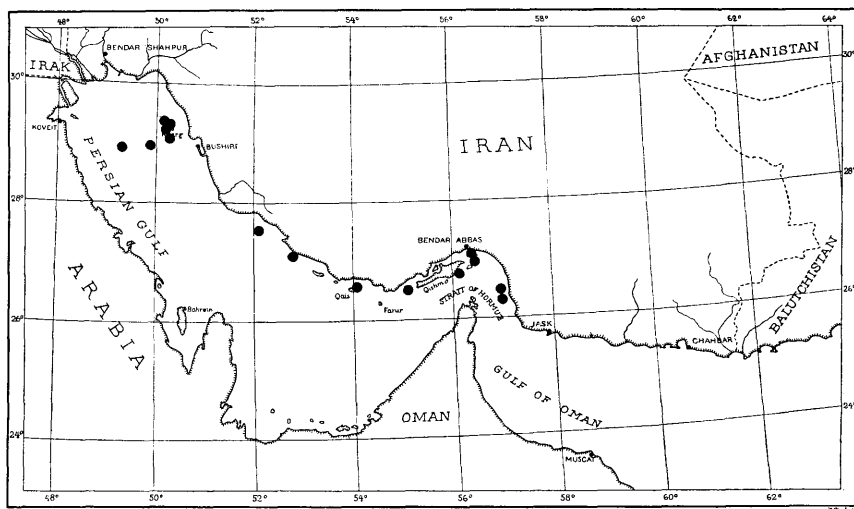


Fig. 25. Occurrence of *Charybdis (Goniohellenus) hoplites* var. *longicollis*.

8.IV.1938. 6 nautical miles E.S.E. of Luigeh, 10 m. Clay etc. 2 ♂, 1 ♀ ovig.

2. Strait of Hormuz. St. 61 D. 10.IV.1937. 4 nautical miles S.W. of the city of Suzeh. 9-11 m. Sand etc. A few specimens, most of them very small.—St. 80 D. 22.IV.1937. 1 nautical mile S.E. of Hormuz. 12 m. Clay. 1 ♂.—St. 109. 2.IV.1938. 7 nautical miles W. by S. of Kunari. 20 m. 1 ♂.—St. 110. 2.IV.1938. 5 nautical miles W.N.W. of the city of Turu. 30 m. 1 ♂.—St. 112. 3.IV.1938. 2 nautical miles S.W. of the fortress of Hormuz. 1 ♂.

The var. *longicornis* is new to the Iranian waters.

Remarks. The specimens agree well with Leene's description and figures, also regarding pleopod 1 of the male. Pleopod 2 (fig. 24 F) (not mentioned by Leene) is apically cleft, with the two lobi of equal length.

The carapace of the largest ♂ is 26×42 mm, and a few specimens are of about equal size; the majority are smaller.

In the material there are very few large females, viz., 1 ovig. 21×34 mm (St. 120 C), 1 not ovig. 15.5×26 mm (St. 78), 1 not ovig. 16×26 mm (St. 49 D); and 1 ovig. 12×20 mm (St. 34).

Leene has no mention of the abdomen ♀; therefore I give a figure (fig. 24 G).

Distribution. Previously the var. *longicollis* was known only from the Red Sea, viz., Ras Abu Somer and Ravayah.

71. *Charybdis (Goniohellenus) vadorum* (Alcock)

Charybdis (Goniosoma) hoplites var. *vadorum* Alcock 1899, p. 67.

Charybdis (Goniohellenus) sinensis Gordon, Jour. Linn. Soc., London, Zool., vol. 37, 1931, p. 534.

Charybdis (Goniohellenus) vadorum Chopra 1935, p. 493, with figs.

Charybdis (Goniohellenus) vadorum Leene 1938, p. 114 (with lit.), figs.

Occurrence. "Persian Gulf" (Alcock l.c.).

Remarks. Pleopod 1 of the male was described with figures by Chopra l.c. and Leene l.c.

Distribution. Red Sea; India; Hong Kong.

72. *Charybdis (Gonioinfradens) paucidentata* (A. Milne-Edwards)

Charybdis (Goniosoma) giardi Nobili 1906a, p. 115, figs.

Charybdis (Gonioinfradens) paucidentata Leene 1938, p. 131 (with lit.), figs.

Occurrence. Iranian Gulf. Bank of pearl-oysters c. 25° N., 55° E., 20-30 m, and two banks near the island of Arzana (Nobili l.c.; type-localities of *C. giardi* Nobili).

Remarks. Pleopod 1 of the male was delineated by Leene l.c.
 Distribution. Dadalus Reef, Red Sea; Aldabra; Mauritius.

73. *Neptunus (Achelous) orbitosinus* Rathbun

Neptunus granulatus (partim) Alcock 1899, p. 45.

Portunus orbitosinus Rathbun 1911, p. 205, pl. 15 fig. 11.

Neptunus orbitosinus Gordon, Bull. Raffles Mus., vol. 14, 1938, p. 181, figs.

Amphitrite gladiator, var. de Haan 1837, p. 65, pl. 18 fig. 1.

Occurrence. Iranian Gulf. St. 42 D. 30.III.1937. 24 nautical miles N.E. of Bahrein. 33 m. Shells, gravel. 1 ♂ 19 mm.—St. 51 D. 7.IV.1937. Stiffe's Bank. 33 m. Shells, coral gravel. 1 small ♂, 2 ♀ ovig. 11.5 and 13 mm.

Possibly recorded by Alcock (l.c.) from the Iranian Gulf (see under Remarks).

Remarks. Alcock (l.c.) records "*N. granulatus*" from the Iranian Gulf; possibly his *N. granulatus* comprises also *N. orbitosinus*, for Rathbun l.c. 1911 has stated that two closely allied forms have been combined under the specific name of "*granulatus*", viz., *N. (Ach.) granulata* (Milne-Edwards 1834) and *N. (Ach.) orbitosinus* (Rathbun l.c. 1911). Rathbun gives a list of the chief differences, and since then Gordon (l.c.) has given some supplemental notes and some figures. Balss (1924, p. 3) writes that "*Achelous orbitosinus* Rathbun halte ich für ein im Wachstum weiter vorgeschrittenes Stadium dieser Art" (viz., *N. granulatus*).

The specimens from the Iranian Gulf seen by the present author agree well with the descriptions and figures of *N. orbitosinus*.

Pleopod 1 of the male was drawn by Gordon l.c. fig. 5 f-f "and agrees closely with the same appendage of the largest male from the Iranian Gulf. Pleopod 2 was not described or drawn by Gordon l.c., and unfortunately the apical part is damaged in the Iranian specimen recorded above (for the apex is very fragile and is so strongly fixed in the furrow in plp. 1 that it was broken when I tried to loosen it); but it seems to agree well with plp. 2 of *N. (Hellenus) arabicus* (Species No. 75).

Distribution. Gulf of Suez; Seychelles, Friday Is. (Amirante), Cargados Carajos (N. of Mauritius), Andamans, Ceylon, Admiralty Is. Japan (de Haan l.c.). In the Zoological Museum of Copenhagen we have specimens from Koh Kahdat, Thailand (determined as *N. granulatus* (M.-Edw.) by Rathbun 1910, p. 362) and from Maduro Strait, E. Java.

74. *Neptunus (Achelous) granulatus* (A. Milne-Edwards)

Neptunus granulatus (partim) Alcock 1899, p. 45.

Portunus granulatus Rathbun 1911, p. 205, pl. 15 fig. 10 (with lit.).

Neptunus granulatus Gordon, Bull. Raffles Mus., vol. 14, 1938, p. 182, figs.

Occurrence. Up to 1911 this species was confused with *N. orbitosinus* (see under this species, above). Therefore Alcock's record (l.c.) of specimens from the Iranian Gulf is to be taken with due caution, and the present author has seen no specimens from the said sea.

Remarks (see also above). Pleopod 1 of the male is drawn by Gordon (l.c., fig. 5 e); it is very different from that of *N. orbitosinus*.

Distribution (according to Rathbun l.c. and Gordon l.c.). Red Sea; numerous finds from Seychelles and Cargados Carajos etc. to the Fiji Is., Australian Seas, and the "Eastern Seas". In the Zoological Museum of Copenhagen there is a specimen from Tahiti.

75. *Neptunus (Hellenus) arabicus* Nobili (Fig. 26 A-C)

Neptunus (Hellenus) arabicus Nobili 1906a, p. 115, fig.

Occurrence. Iranian Gulf. St. 10. 5.III.1937. E. of the island of Kharg. 16-17 m. Sand. A few specimens.—St. 11. 5.III.1937. Ibid. 13 m. Sand. A few specimens.—St. 26. 15.III.1937. Off the east side of Kharg. 18 m. Sand, shells. 3 specimens.—St. 49 D. 6.IV.1937. 2½ nautical miles E.S.E. of Bustani. 5-6 m. Algæ, sand. 3 specimens.—St. 86. 16.II.1938. 26°38' N., 51°3' E. 20 m. 1 specimen.

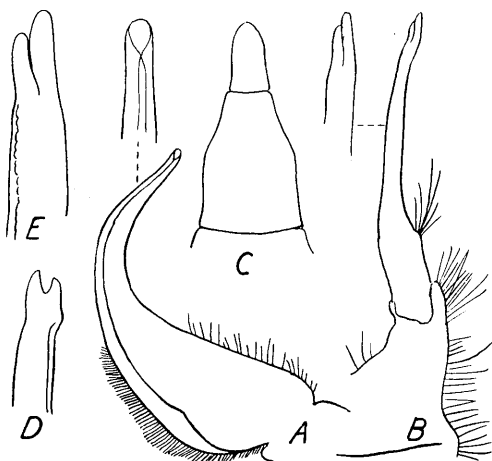


Fig. 26. A-C: *Neptunus arabicus* ♂, 16 mm, St. 10, pleopods 1-2 and apex of abdomen.

D: *N. sanguinolentus* ♂, St. 77 D, apex of pleopod 2.

E: *N. pelagicus* ♂, St. 69, apex of pleopod 2.

Nobili l.c. records it from a bank of pearl-oysters c. 25° N., 55° E., 20-30 m, and from the neighbourhood of the island of Arzana (type-localities).

Remarks. The length is up to 16 mm.

Abdomen of the male (fig. 26 C) has the apical segment rather long and narrow, with the margins almost parallel, acutely rounded apically; the basal breadth is only c. $\frac{1}{3}$ the basal breadth of the preceding segment.

Pleopod 1 of the male (16 mm; St. 10; fig. 26 A) is of the type drawn by Shen (1937, p. 112) for other species of the subgenus *Hellenus*, but it is somewhat broader, and I have not been able to find any small spines near the apex. Pleopod 2 (fig. 26 B) is about as long as plp. 1 and is apically cleft.

Distribution. Djibuti, Red Sea (Nobili 1906 b, p. 191).

76. *Neptunus (Hellenus) andersoni* de Man

Neptunus andersoni Alcock 1899, p. 39.

Occurrence. "Persian Gulf" (Alcock l.c.).

Distribution. Gulf of Martaban and Mergui, Burma. It is not known from the Red Sea (is not recorded by Klunzinger 1913, Laurie 1914, or Balss 1924).

77. *Neptunus (Hellenus) hastatoides* (J. C. Fabricius)

Neptunus (Hellenus) hastatoides Alcock 1899, p. 38.

Neptunus (Hellenus) hastatoides Chopra 1937, p. 477, fig.

Neptunus (Hellenus) hastatoides Shen 1937, p. 106 (lit.), figs.

Occurrence. 1. Iranian Gulf. St. 4 A. 4.III.1937. 2 nautical miles N.E. by E. of the northeastern point of the island of Kharg. 26 m. Clay. Petersen-grab. 1 specimen.—St. 10. 5.III.1937. E. of Kharg. 16-17 m. Sand. 3 specimens.—St. 18. 11.III.1937. S. of Bushire. 3 m. Clay. 1 specimen.—St. 25. 14.III.1937. 63 nautical miles $W.\frac{1}{4}S.$ of Bushire. 49 m. Sand with clay. About 10 specimens.—St. 26. 15.III.1937. Off the east coast of Kharg. 18 m. Sand. 2 specimens.—St. 27. 18.III.1937. Bushire, between the red and the white light-buoy. 4-5 m. Sand. 1 specimen.—St. 28. 18.III.1937. Bushire, 2 nautical miles S. by E. of the outermost light-buoy. 7 m. Clay. About 10 specimens.—St. 33. 23.III.1937. The coast N. of Kharg. 31 m. Very fine clay. 1 specimen.—St. 46 D. 31.III.1937. 21 nautical miles S.E. by $S.\frac{3}{4}S.$ of the light-buoy at Bushire. 19 m. Clay. 1 specimen.—St. 47 D. 5.IV.1937. 2 nautical miles W. of Qyanat. 7.5 m. Sandy clay. 4 specimens.—St. 53 D. 8.IV.1937. 2 nautical miles E. by S. of the northeastern point of the island of Qais. 27 m. Sand, clay. 1 specimen.

Alcock l.c. records it from the "Persian Gulf".

2. Strait of Hormuz. St. 60 F. 10.IV.1937. 4 nautical miles S.W. of the city of Suzeh. 21 m. Sandy clay. 1 small specimen.—St. 61 D. 10.IV.1937. Ibid. 9-11 m. Gravel, shells. 1 specimen.—St. 77 C. 21.IV.1937. 9 nautical miles W. of Kuh-i-Mubarak. 29 m. Clay. 1 very small specimen.—St. 78 C. 21.IV.1937. 17 nautical miles N.W. of Kuh-i-Mubarak. 70 m. Clay. 1 small ♂.—St. 80 D. 22.IV.1937. 1 nautical mile S.E. of Hormuz. 15 m. Clay. 1 specimen.—St. 112. 3.IV.1938. 2 nautical miles S.W. of the fortress of Hormuz. 3 specimens.—St. 114. 4.IV.1938. 27° $\frac{1}{2}$ ' N., 56°03' E. 13 m. Sand etc. 1 ♀ ovig.

3. Gulf of Oman. St. 107. 1.IV.1938. 24 nautical miles W.N.W. of Ras Maidami. 10 m. Clay with sand. 1 specimen.—No No. 1 specimen.

Remarks. The largest specimen (♂) is 18 mm long; the majority of the specimens are not essentially smaller. Egg-bearing females were found from 18.III. to 22.IV.

Pleopod 1 of the male is drawn by Chopra l.c. fig. 4 and Shen l.c. fig. 8 g-h. Pleopod 1 of the specimens from the Iranian Gulf agrees excellently with these figures; the same applies to pleopod 2, as said above under *N. (H.) arabicus*.

Distribution. Widely distributed from Zanzibar to New Guinea and Japan. Probably not known from the Red Sea (not mentioned by Nobili 1906 b, Klunzinger 1913, Laurie 1914, and Balss 1924).

78. *Neptunus (Hellenus) longispinosus* (Dana)

Neptunus (Hellenus) longispinosus Alcock 1899, p. 40.

Occurrence. "Persian Gulf" (Alcock l.c.).

Distribution. Red Sea; Mauritius, Andamans, Maldives, New Caledonia, Hawaiian Isl.

79. *Neptunus (Hellenus) tuberculosus* A. Milne-Edwards

Neptunus (Hellenus) tuberculosus Alcock 1899, p. 43.

Occurrence. "Persian Gulf" (Alcock l.c.).

Distribution. Not known from the Red Sea (is not listed by Klunzinger 1913, Laurie 1914 and Balss 1924).—Andamans, Ceylon, Gulf of Martaban (Burma), Amboina, Aru Isl., Hawaiian Isl.

80. *Neptunus (Neptunus) sanguinolentus* (Herbst) (Fig. 26 D)

Neptunus (Neptunus) sanguinolentus Alcock 1899, p. 32 (with lit. etc.).
Portunus (Portunus) sanguinolentus Shen 1932b, p. 34, figs.

Occurrence. 1. Iranian Gulf. Bank near the island of Arzana (Nobili 1906 a, p. 114; it is not recorded by Alcock from these waters).

2. Strait of Hormuz. St. 77 D. 21.IV.1937. 9 nautical miles W. of Kuh-i-Mubarak. 29 m. 1 ♀ ovig., breadth c. 90 mm, 1 ♂, equal-sized.

3. Gulf of Oman. St. 104. 31.III.1938. 1 nautical mile W. of Chahbar. 7 m. Sand. 2 medium-sized ♂.

Remarks. Pleopods 1-2 of the male are described and delineated by A. Milne-Edwards in Règne Animal, pl. 10 fig. 1 b-c, Brocchi 1875 p. 55, pl. 16 figs. 83-84, and Chopra 1935, fig. p. 475. Apex of the two pairs of pleopods (of the male from St. 77 D, breadth 90 mm) not essentially different from *N. pelagicus* (*N. sanguinolentus*, apex of plp. 2, see fig. 26 D).

Distribution. From S. Africa and the Red Sea to Australia, New Zealand, Hawaii, China and Japan; further see Chopra l.c.

81. *Neptunus* (*Neptunus*) *pelagicus* (Linné) (Fig. 26 E)

Neptunus (*Neptunus*) *pelagicus* Alcock 1899, p. 34 (lit. etc.).

Portunus (*Portunus*) *pelagicus* Shen 1934, p. 37 (with lit.), fig.

Occurrence. 1. Iranian Gulf. St. 21. 13.III.1937. Bushire, the roads. Beach. A few rather small specimens.—St. 40. 28.III. 1937. Manama on the island of Bahrein. Tidal zone. Corals, clay and sand. C. 10 rather small specimens.—St. 47 D. 5.IV.1937. 2 nautical miles W. of Qyanat. 7.5 m. Sandy clay. 1 small specimen.—No No. 2.I. 1938. Gabgob near Bushire. 1 small ♂.

It is known from the "Persian Gulf" (Alcock l.c.) and from a bank near the island of Arzana (Nobili 1906 a, p. 114).

2. Strait of Hormuz. St. 64. 13.IV.1937. N.E. of the island of Hormuz. 15 m. Soft clay. 1 large ♀ ovig.—St. 69. 14.IV.1937. Quism (Tavila). Tidal zone. 1 ♂ 65 × 150 mm, 1 smaller ♀, 3 rather small specimens.—St. 81. 22.IV.1937. 5 nautical miles N.W. by N.¹/₂N. of the light-buoy of Quism. 18 m. Soft clay. 1 ♀ without eggs, breadth 155 mm.

Remarks. Pleopods 1-2 of the male are described and delineated by Brocchi 1875, p. 52, pl. 15 figs. 74-75, and Chopra 1935, fig. p. 476. The figures of Brocchi agree in size with the pleopods of the largest male in the Iranian material (65 × 150 mm, St. 69) and are fairly good; but the slender part of plp. 1 is in reality still more slender, as in Chopra's fig. In the large specimen from St. 69 this slender joint is c. 35 mm in length and provided with spines in the distal half; but only near the apex the spines are densely set. Plp. 2 is apically cleft (fig. 26 E).

Distribution. Red Sea, Indian Ocean, East Africa, Malay Archipelago, Philippine Islands, Australia, China, Japan. Also found in the western part of the Mediterranean, from Port Said to Bay of Alexandrette (Monod 1930, p. 140, with fig.). See also Chopra 1935, p. 476.

82 a. *Thalamita prymna* (Herbst) var. *crenata* (Latreille)
Milne-Edwards

Thalamita crenata Alcock 1899, p. 76.

Thalamita crenata Shen 1937, p. 129, lit., figs.

Thalamita prymna var. *crenata* Montgomery 1931, p. 430.

Occurrence. "Persian Gulf" (Alcock l.c.). Nobili records it in his paper on the Iranian Gulf (1906 a, p. 119); but his locality (St. XVII) is Massawa in the Red Sea.

Distribution. Red Sea; Indian Ocean; Malay Archipelago; Hong Kong; Liukiu Islands (Shen l.c.).

82 b. *Thalamita (prymna)* (Herbst) var. *picta* Stimpson?

Thalamita prymna Alcock 1899, p. 79, lit.

Thalamita prymna Stimpson 1907, p. 85, pl. 10 fig. 5.

Thalamita prymna var. *picta* Montgomery 1931, p. 430.

Thalamita exetastica Sakai 1935, p. 76, spec. b (not spec. a), fig. 10b, d-f.

Occurrence. Gulf of Oman. St. 95. 29.III.1938. 6 nautical miles W. by S. of Jask. 35 m. Clay with sand. 1 ♂ 14 mm, 1 ♀ ovig. 7 mm, 2 ♀ juv. 7-8 mm.

It is new to Iranian waters.

Remarks. The present specimens agree well with Sakai l.c., spec. b which, compared with *T. exetastica*, is characterised as follows. "The first antero-lateral tooth has an accessory denticle as in *T. exetastica*, but the final or 5th antero-lateral tooth is more prominent than the one in front of it, and in general characteristics it much agrees with *T. picta* Stimpson; the both species are, I think, probably related with each other." Besides pleopod 1 of the male agrees fairly well with Sakai fig. 10 b (plp. 1 of *T. picta*), in that there are about 10 small spines on the convex side of the apical part (Sakai has 6), whereas *T. exetastica* (Sakai l.c., fig. 10 a) has only two, very small spines. Also pleopod 2 agrees better with *T. picta* than with the other species, in that *T. picta* (Sakai l.c., fig. 10 d-f) has one of the two apical ends 2-3 times as long as the other, while in *T. exetastica* (Sakai l.c., fig. 10 c) they are of equal length. All the present four specimens have each a transversal row consisting of 4 short carinæ on the middle of the posterior half of the carapace; these carinæ are most prominent in the male (possibly because it is larger than the other specimens) and is also indicated in Sakai's fig. of *T. exetastica* (Sakai l.c., fig. 9).

Distribution. Foukow Bay, Island of Ousima (type-loc.; Stimpson l.c.); Japan (Sakai l.c.); Andamans (Alcock l.c.); New Caledonia (Milne-Edwards 1873, p. 164); Mosambique? (Hilgendorf 1878, p. 800); Darros Island? (where?) (Miers, "Alert" 1884, pp. 518, 540).

83. *Thalamita sima* A. Milne-Edwards (Fig. 27)

(= *T. arcuatus* de Haan, = ? *T. sima* H. Milne-Edwards)

? *Thalamita sima* H. Milne-Edwards, Hist. Nat. Crust., vol. 1, 1834, p. 460.

Portunus (Thalamita) arcuatus de Haan 1850, pp. 10, 43, pl. 2 fig. 2, pl. 13 fig. 1.

Thalamita sima A. Milne-Edwards, Arch. Mus. Hist. Nat. Paris, vol. 10, 1861, p. 359.

Thalamita sima Alcock 1899, p. 81.

Thalamita sima Montgomery 1931, p. 430, pl. 29 fig. 2.

Thalamita sima Shen 1934, p. 54, figs. (with lit.).

non *Thalamita sima poissoni* de Man, Notes Leyden Mus., vol. 2, 1880, p. 181.

Occurrence. This species was not taken by the present expedition, but is recorded from the "Persian Gulf" (Alcock l.c.).

Remarks. Recently this species is well characterised by Shen l.c. and Montgomery l.c. For affinity to other species, see under *T. iranica* (No. 84) and *T. poissoni* (No. 85).

Pleopod 1 of the male (fig. 27 E) is described and delineated by Brocchi 1875, p. 56, pl. 16 fig. 94 and agrees well with the same appendages dissected by the present author from a specimen from Koh

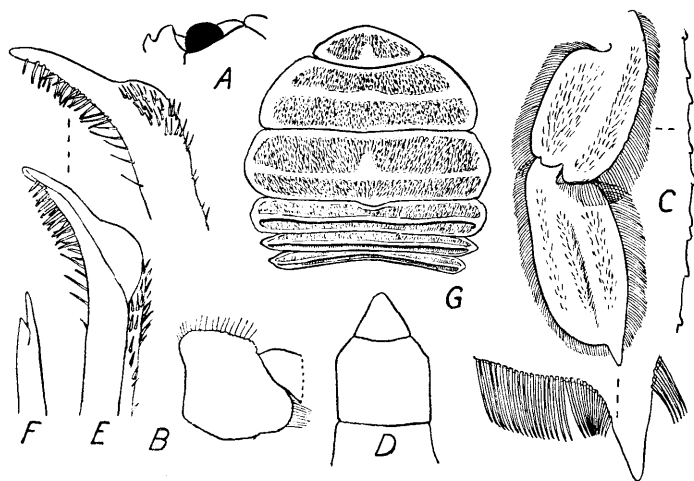


Fig. 27. *Thalamita sima* (A-F: ♂, 13 mm, Koh Kam, Thailand, 2.II.1900). A: orbit; B: outer maxilliped, merus; C: distal end of last pair of legs; D: abdomen, apex; E-F: apex of pleopods 1-2.—G: ♀, 18 mm, Tung Kaban, abdomen.

Kam, Thailand; but it may hardly be characterized as "terminé par une petite fourche". For pleopod 2, see fig. 27 F.

It is a large species: Stimpson (l.c. 1907) quotes a male from Hong Kong 37.6×63 mm, and Shen l.c. records a male 32.5×54 mm. The specimens in the Zoological Museum of Copenhagen are smaller; the largest female (from "China") is 24×39 mm, an ovigerous female (from Kung Kaban, Thailand) is 18×27 mm; all the males are much smaller.

On the literature. The best description of this species which is characterised i.a. by the ridges on the outer side of the hand consisting of squamiform granules (see Shen l.c., fig. 18 a), was given by Shen l.c. 1934.

Already in 1834 H. Milne-Edwards established a species which he called *T. sima*, but his diagnosis (without figures) is so brief, that "il est difficile de comprendre ce que c'est que la *T. sima* de H. Milne-Edwards" (Nobili 1906 b, p. 206). The specimen was from the Caromandel Coast.

Again in 1861 we find the name, since A. Milne-Edwards (without figures) gives a description of *T. sima*; he has no locality for his specimens examined, but writes "Habitation.—Mer Rouge, Java, mers du Japon et de la Chine". The identity of his species is certain; regarding the 4th tooth on the antero-lateral margin, he writes that it is "presque égale aux premières", and about the hand of the chelipeds he says that "sa face externe est garnie de crêtes longitudinales entre lesquelles se voient quelques granulations".

But in 1850 de Haan described a Japanese crab under the name of *Portunus (Thalamita) arcuatus*. It is probably synonymous with *T. sima* A. Milne-Edwards 1861. In his description only one of the most important specific characters is recorded (see below), but his figure of the abdomen of the male (de Haan, pl. 2 fig. 2) represents probably the present species (though the lateral margins of the penultimate segment are drawn somewhat convex), for the ultimate segment is very narrow compared with the penultimate segment, and his fig. 1 on pl. 13 shows the 4th tooth on the antero-lateral margin of the carapace rather large, or, as he says in his text, "only a trifle shorter than the fifth" ("quarti quintis paulo breviores"). Besides essentially his fig. 1 on pl. 13 shows the first tooth on each side (the external orbital tooth) very broad, a character which agrees better with *T. sima* than with any other of the closely allied species.

T. sima Stimpson 1857 and 1907 is *T. sima* A. M.-Edw. 1861, and the largest specimen in the Zoological Museum of Copenhagen (a male from "China", 24×39 mm) was many years ago (—the year is not

noted, but it was before 1890—) presented by the Smithsonian Institution and is probably one of Stimpson's specimens.

Regarding *T. poissoni* de Man 1880 which by the same authors is considered synonymous with *T. sima*, see under *T. poissoni* (No. 85).

For more recent literature, see Shen l.c.

Summary. If in reality *T. sima* H. Milne-Edwards 1834 is synonymous with *Portunus (Thalamita) arcuatus* de Haan (but this cannot be stated with certainty), the correct name should be *T. sima* H. Milne-Edwards; if they are not synonymous, the species should have de Haan's name. Nevertheless the ordinary name is *T. sima* H. M.-Edw.

Distribution. Red Sea; Indian Ocean; Thailand; Malay Archipelago; Australia; New Caledonia; China; Japan.

84. *Thalamita iranica* n. sp. (Figs. 28-30)

Occurrence. 1. Iranian Gulf. St. 15. 8.III.1937. Bushire, the roads. 3-5 m. Coarse sand with clay and stones. 1 ♀ 6.5 mm, 1 ♂ 7 mm.—St. 43 A. 31.III.1937. 84 nautical miles N.E. of the light-ship at Bahrein. 58 m. Sandy clay. 1 ♀ ovig. 7 mm.—St. 49 D. 6.IV.1937. 2.5 nautical miles E.S.E. of Bustani. 5-6 m. Algæ, sand. 4 ♂ up to 8 mm, 1 ♀ ovig. 6 mm.—St. 51 C. 7.IV.1937. Stiffe's bank. 33 m. Coral gravel, shells. 1 ♂ c. 5 mm.—St. 51 D. Ibid. 3 ♂ up to 10 mm, 2 ♀ ovig. 7-8 mm.—St. 53 D. 8.IV.1937. 2 nautical miles E. by S. of the northeastern point of the island of Qais. 27 m. Sand, clay. 3 ♂ up to c. 7 mm, 2 ♀ ovig. 7-9 mm, 1 ♀ juv. 5 mm, 1 ♀ with Rhizocephalid. 7 mm.—St. 56. 9.IV. 1937. Bank of pearl-oysters 2 nautical miles S.S.E. of the northeastern point of the island of Qais. 3-4 m. 6 ♂ up to 13 mm, 4 ♀ ovig. 7 mm, 6 ♀ without eggs up to 7 mm.—St. 86. 16.II.1938. 26°38' N., 51°3' E. 20 m. 1 ♂, 1 ♀, c. 7 mm.—St. 88. 22.III.1938. Off Naby in Farur. Sand etc. 6-31 m. 1 ♀ ovig. 6 mm, 3 specimens c. 5-6 mm.—St. 124. 9.IV.1938. 26°48½' N., 53°24' E. 8-13 m. Gravel etc. 1 ♀ ovig. 10 mm.

2. Strait of Hormuz. St. 67 B. 17.IV.1937. The outermost anchoring-place at the island of Henjam. 23 m. Sand, shells. 1 ♀ ovig. 6 mm.—St. 118. 7.IV.1938. 26°12' N., 55°22' E. 38-60 m. Gravel, shells. 2 ♂ up to 7 mm.

Remarks. The determination of these specimens was rather difficult, for they are very close to *T. sima* and *T. poissoni* and may easily be confused with these species.

Since the issue of Alcock in 1899 the following species of *Thalamita* with the front cut into two lobes (exclusive of the broad inner supra-orbital angles) have been established (descriptions of all new species

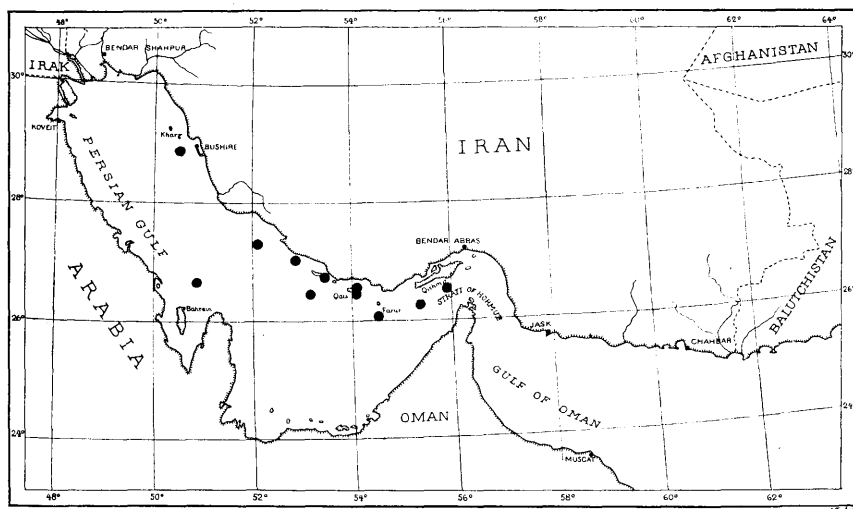


Fig. 28. Occurrence of *Thalamita iranica*.

referred to in Zoological Record up to and including 1938 were gone through):

I: species belonging to group IB (Alcock 1899, p. 74):

T. granosimana, n. var. (Maldives, deep water) Borradaile 1902, p. 202 (is an *admeta*-form).

T. auanensis n. sp. (Hawaiian Is.) Rathbun 1906, p. 874, figs. (is closely allied to *T. admeta*).

T. margaritimana n. sp. (Seychelles) Rathbun 1911, p. 208, fig. (is closely allied to *T. admeta*).

T. africana n. nom. (W. Africa) Rathbun 1921, p. 402, figs. (= *T. integra* var. *africana* Miers, Ann. Mag. Nat. Hist., ser. 5, vol. 8, 1881, p. 208 (no fig.)).

T. dispar (Monte Bello Is., W. Austral.), n. nom. for *T. savignyi* de Man 1895, nec Milne-Edwards (= *T. admeta* M.-Edw.), Rathbun, Proc. Zool. Soc. 1914, p. 657, fig.

T. bilobata n. sp. (Simalur, E. Indies), de Man, Zool. Mededeel., vol. 9, 1926, p. 199, figs.

II: species belonging to group IIC (Alcock 1899, p. 75):

T. minuscula n. sp. (Tuamotu Isl., Polynesia) Nobili, Bull. Mus. Hist. Nat. Paris, vol. 12, 1906, p. 262, no fig.—This species belongs with certainty to group IIC, for “article basilaire de l’antenne plus court que la largeur de l’orbite”.

The species from the Iranian Gulf cannot be identical with any of these new species; it is itself a new species, and I propose *iranica* as the specific name.

T. iranica takes an intermediate position between *T. sima* and *T. poissoni* (see the table pp. 131-133 and figs. 27-31); it differs essentially from the said species in having the ventral inner orbital lobe very prominent (—very slightly or not at all so in the other species—); the chelipeds of the male have on the outer surface of the hand three quite even ridges, and besides the male is characterised by its pleopod 1 (fig. 29 E), that is quite different from that of the related species.

The median frontal notch is somewhat varying, but in most specimens it is very indistinct (as in *T. poissoni*). In *T. sima* there is a transversal row consisting of four granulated ridges across the metabranchial region; these ridges are very distinct also in all the specimens of *T. iranica* except the very small individuals (on the ridges in *T. poissoni*, see the said species).

The chelipeds of the males have on the fore margin of the arm 2-3 acute large and 2 much smaller teeth (quite as in *T. sima* and *T. poissoni*), and the carpus has one long spine on the inner side and one or two small teeth on the outer side (as in the two other species); 7th segment of the abdomen of the male is but a trifle narrower than 6th segment, its breadth somewhat varying, from $1\frac{1}{2}$ times the length to equal to the

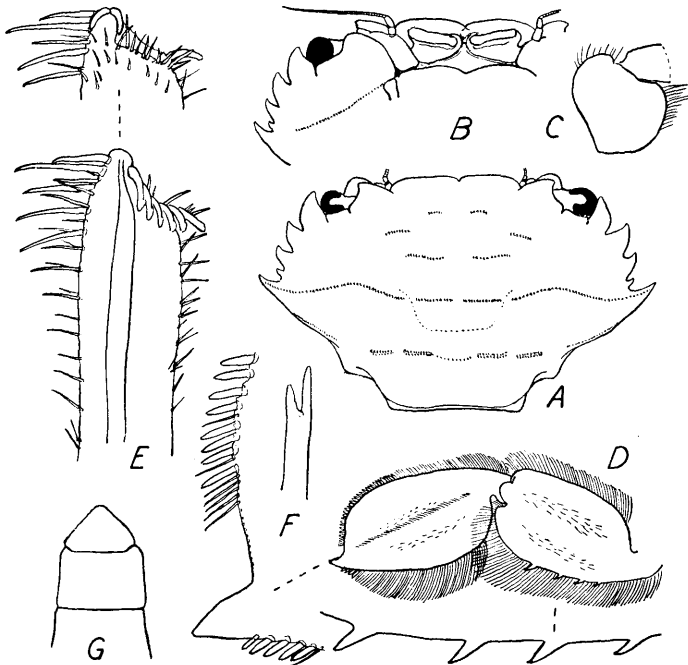


Fig. 29. *Thalamita iranica* ♂, 13 mm, St. 56. A: dorsal view; B: fore end, ventral view; C: merus of outer maxilliped; D: apex of last pair of walking legs; E-F: apex of pleopods 1-2; G: apex of abdomen.

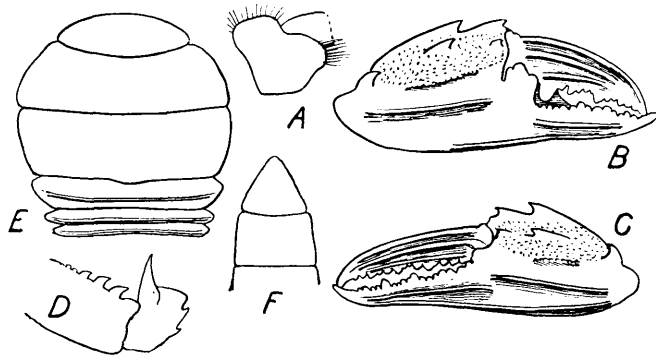


Fig. 30. *Thalamita iranica*. A-D, F: ♂, 7 mm, St. 53 D. A: outer maxilliped, merus; B-C: chelæ, outer side; D: arm and wrist of chelipeds; F: apex of abdomen. E: ovigerous ♀, 7 mm, St. 56, abdomen.

length. The abdomen of the female has a transversal ridge on each of the 3 proximal segments (as in *T. sima*; not described in *T. poissoni*); the breadth of the 7th segment of the abdomen of the female is about $\frac{2}{3}$ the maximal breadth of the abdomen (in *T. sima* c. $\frac{2}{5}$; in *T. poissoni* c. $\frac{1}{3}$ (according to Savigny 1817, pl. 4 fig. 3.2)). The chelipeds are unfortunately lost in the majority of the specimens. The hand differs from that of "*T. sima* (Shen l.c. fig. 18 a) and *T. poissoni* by the total want of transverse squamiform granules" (Alcock 1899, p. 81); there are on the outer side ridges corresponding to those of *T. sima*, but apart from the upper one (which is finely granular) they are narrower and quite even, not composed of a series of broad squamiform warts.

Further see the table below.

It is a small species; the largest males are 13×19.5 mm, most of them only $7(-10) \times 11(15)$ mm; ovigerous females are usually only $7(-9) \times 10.5(13)$ mm, the largest 10×14 mm.

<i>Thalamita</i>	<i>T. sima</i> ¹	<i>T. iranica</i>	<i>T. poissoni</i>
Maximal (?) length and breadth of the carapace in mm	♂: 32.5×54	♂: 13×19.5 ♀ ovig: 10×14	♂ (?) 21×33 ♀ ovig: $7.5 \times ?$
Frontal lobes	slightly concave	slightly convex (fig. 29 A)	straight (fig. 31 A)

¹ The characters for *T. sima* were taken from Shen 1934, p. 54, with figs., and from specimens in the Zoological Museum of Copenhagen, most of them (from Thailand) determined by M. Rathbun.

<i>Thalamita</i>	<i>T. sima</i>	<i>T. iranica</i>	<i>T. poissoni</i>
1st to 3rd teeth of antero-lateral margin of carapace	1st-2nd rather blunt, 3rd more acute (Shen 1934, fig. 17)	rather acute (fig. 29 A-B)	rather acute (fig. 31 A)
4th tooth	not essentially smaller than 3rd (Shen 1934, fig. 17)	much smaller than 3rd (fig. 29 A-B)	much smaller than 3rd (fig. 31 A)
Abdomen ♂ and ♀, surface	partly short-hairy (Shen 1934, fig. 18 b)	quite even, not hairy	quite even, not hairy (♀ not seen by the present author)
Abdomen ♂, 6th segment, lateral margins	nearly parallel in the proximal two thirds, and then obliquely cut off (Shen 1934, fig. 18 b)	nearly parallel, but the distal corner rounded (in small specimens) or obliquely cut off in c. $\frac{1}{6}$ of the length (in larger spec.) (fig. 29 G)	convex, with the largest breadth off the proximal third; distal margin $\frac{2}{3}$ length of base (fig. 31 H)
Abdomen ♂, 7th segment, length of base compared with maximal breadth of 6th segment	c. $\frac{1}{2}$ (Shen 1934, fig. 18 b)	c. $\frac{1}{5}$ (fig. 29 G)	c. $\frac{2}{3}$ (fig. 31 H)
Abdomen ♀, maximal breadth	off the middle of 5th segment	between 5th and 6th segment	of the base of 5th segment ²
Outer maxillipeds, outer corner of apical end	projecting	rounded, not projecting (large specimens); or very little projecting (small specimens) (fig. 29 C, 30 A)	projecting (fig. 31 D)
Chelipeds ♂, hand, spines on dorsal surface	5 (Shen 1934, fig. 18 a)	5 (fig. 30 B-C)	3 (5 ?) (fig. 31 C)

² Measured on Savigny's fig. (Savigny 1817, pl. 4 fig. 3.2).

<i>Thalamita</i>	<i>T. sima</i>	<i>T. iranica</i>	<i>T. poissoni</i>
Chelipeds ♂, hand and immovable finger, outer surface	covered with squamiform granules; 4 very distinct ridges ³ (Shen 1934, fig. 18 a)	dorsal surface very finely granulate; outer surface even, but with 3 distinct ridges and 1 (upper) very indistinct (fig. 30 B-C)	dorsal surface with trace of very minute granulation; outer surface even, with 1 distinct ridge and sometimes besides 2 (upper) extremely indistinct ridges (fig. 31 C)
Natatory legs, 6th joint	on hind margin several small granules (sometimes absent) (Shen 1934, fig. 18 c)	on hind margin c. 4 sharp teeth (fig. 29 D)	on median margin c. 6 not acute teeth (fig. 31 E)
Natatory legs, 7th joint	outer margin has natatory setæ only (fig. 27 C)	distal half of outer margin has heavy spines, not natatory setæ (fig. 29 D)	distal half of outer margin has heavy spines (but not natatory setæ near the apical tooth) (fig. 31 E)
Pleopod 1 ♂	apically very tapering, with numerous spines of somewhat equal length (fig. 27 E)	apically not tapering, with apex obliquely cut off, with spines of much varying length, and with c. 7 strong spines on the oblique end (fig. 29 E)	apically curled, with a few rather long spines (fig. 31 F)
Pleopod 2 ♂, length ratio of the two apical processes	c. 1:2 (fig. 27 F)	c. 1:2 (fig. 29 F)	c. 1:3 (fig. 31 G)

85. *Thalamita poissoni* (Audouin & Savigny) (Fig. 31)

Portunus poissoni Savigny 1817, pl. 4 fig. 3, 1-2 (♀ and abdomen ♀), fig. 5, 1-2 (♂ with abdomen ♂).

Portunus poissoni Audouin 1826, p. 84.

Thalamita poissoni de Man 1880, p. 181.

Thalamita poissoni Alcock 1899, p. 74 (key), p. 81.

Thalamita poissoni Borradaile 1903, p. 201.

³ Montgomery l.c. 1931 writes "the "transverse squamiform granules" of Alcock's description (Alcock 1899, p. 81) on the lower surface of the hand are very characteristic, being in two longitudinal series, giving an appearance exactly like maize in a cob."

Thalamita poissoni Nobili 1906 b, p. 206.

Thalamita poissoni Rathbun 1911, p. 208.

Thalamita poissoni Klunzinger 1913, p. 263, pl. 4 fig. 12a-b (reproductions of Savigny l.c. figs. 5.1 and 3.1).

Thalamita poissoni Balss 1924, p. 4.

Occurrence. Iranian Gulf. St. No. ?. 20.III.1938. 4 nautical miles E.N.E. of the innermost light-buoy at Bahrein. 1 ♂ 14 mm.— Locality and date not noted. 2 ♂ 11-12 mm.

Hitherto it was noted from the "Persian Gulf" (Alcock l.c.) and from a bank of pearl-oysters c. 25° N., 55° E., 20-30 m (Nobili 1906 a, p. 120).

Historical. Audouin's original description (l.c. 1826) is very brief and runs as follows: "La figure 3.1 représente une espèce voisine du *Portunus admète* de M. Latreille: la forme de la carapace est proportionnellement moins large; les pinces n'offrent pas de tubercules à leur surface, et le doigt mobile ne présente pas de petites dents en scie sur le dos; la couleur offre peut-être d'autres différences qui nous semblent autoriser une distinction: cette espèce sera dédiée à M. le baron Poisson, *Portunus Poissoni*."

"La figure 5.1 représente un individu qui a la plus grande analogie avec la figure 3.1, et qui pourrait bien n'être qu'un jeune individu de cette espèce: au reste, elle a quelque ressemblance avec le *Cancer prymna* de Herbst, à cette différence pris que le front n'est pas crenelé."

This description is rather unsatisfactory; but Savigny's drawings of Audouin's specimens are excellent, and fortunately he has a figure (Savigny fig. 5.2) of the abdomen of the male (on the abdomen see further below).—

The next author to record *T. poissoni* was de Man 1880; but de Man it not right when saying that "the first lateral tooth or external orbital angle is blunt, as in *Th. arcuata*"; in the specimens from the present expedition it is acute as the following teeth, but somewhat broader. de Man's species is *T. poissoni* (Aud.), for he writes that "the convex outer, lower and inner surfaces [of the hand] are quite smooth besides a smooth, scarcely visible crest on the middle of the external surface and an equally smooth crest near the lower margin, that proceeds up to the index."

Alcock (1899, p. 74) in his key to the Indian species of *Thalamita* separates "*T. sima*" and *T. poissoni* as follows:

I. Frontal lobes distinct and independent; hand covered with squamiform markings, its outer surface costate *T. sima* (*T. arcuata*?).

II. Median frontal notch indistinct; only the upper part of hand granular, its outer surface smooth or very indistinctly costate (teeth of

antero-lateral border of carapace acute, the last more prominent than the others) *T. poissoni* (? *T. sima*)."

Borradaile l.c. records some variations, and Nobili l.c. discusses affinity to other species. Rathbun l.c. and Klunzinger l.c. have a few morphological remarks.

Further see the table above, pp. 131-133.

On the present material. Certainly the specimens taken by the present expedition belong to the present species, i.a. because of the characteristic 6th segment of the abdomen of the male which has the lateral margins convex (see fig. 31 H, or Savigny l.c. fig. 5.2) and is thus quite different from the abdomen of the males of the two species with which it might be confused (viz., *T. sima* M.-Edw. and *T. iranica* n. sp.). But it is to be noted that in my specimens of *T. poissoni* the 4 transversal ridges in the metabranchial region are not present

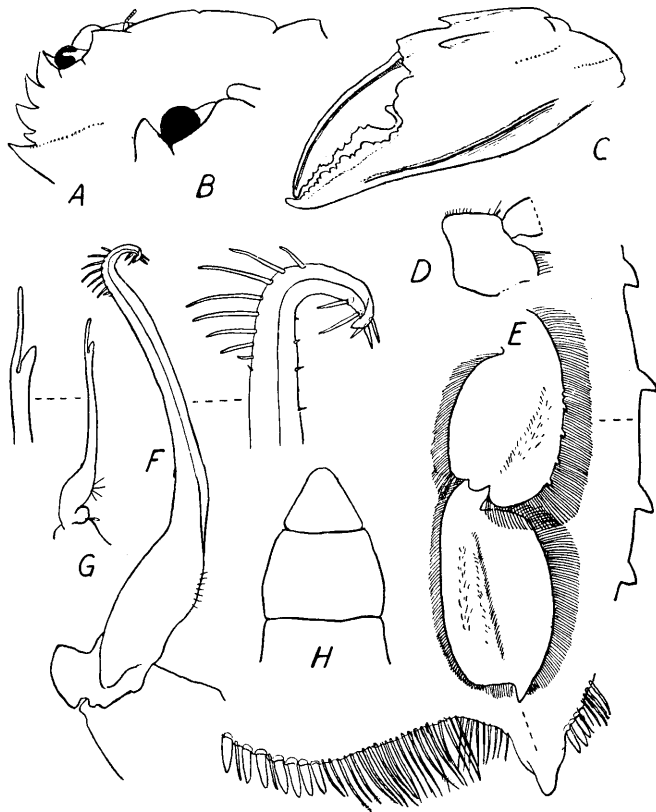


Fig. 31. *Thalamita poissoni*, ♂, 14 mm, 20.III.1938. A: frontal margin etc., dorsal view; B: orbit, ventral view; C: left chela, outer side; D: merus of outer maxilliped; E: distal end of last pair of walking legs; F-G: pleopods 1-2; H: apex of abdomen.

(they are drawn in Savigny l.c. fig. 5.1). On the whole the carapace is even and shining.

For pleopods 1-2 of the male see the table p. 133 and fig. 31 F-G.

The present author has seen no females of this species. According to Savigny's figure (Savigny 1817, pl. 4 fig. 3.2) the maximal breadth of the abdomen of the female is off the base of 5th segment; the length of 7th segment is half the breadth which is $\frac{1}{3}$ the maximal breadth of the abdomen.

The sizes of the present specimens (all males) are 11×16 mm, 12×18.5 mm, and 14×22.5 mm. In the literature there is but little information regarding the size: Laurie (l.c.) gives 7.5 mm as length of an ovigerous female; Rathbun l.c. writes that her largest specimen (male) was 10.8×16 mm, and de Man's largest specimen (sex?) was 21×33 mm.

Distribution. Red Sea (type-locality, Audouin; de Man, Nobili, Balss); Suez (Klunzinger l.c.); Laccadive Is., 14-80 m (Borradaile l.c.); Ceylon, bank of pearl-oysters (Laurie l.c.); Peros, Coin and Saya de Malha (Rathbun l.c.).

86. *Thalamita admete savignyi* (A. Milne-Edwards)

Thalamita savignyi Alcock 1899, p. 82.

Thalamita admete Klunzinger 1913, p. 260, pl. 4 fig. 11 (reproduction of Savigny's original figure).

Thalamita admete savignyi Balss 1924, p. 4, with lit.

Occurrence. Iranian Gulf. "Persian Gulf" (Alcock l.c.). 2 localities near the island of Arzana, depth ? (Nobili 1906 a, p. 120).

Distribution. Red Sea, Zanzibar, India, Ceylon, Andamans, Ternate (Moluccas).

87. *Thalamita sexlobata* Miers (Fig. 32 C-D)

Thalamita sexlobata Miers 1886, p. 196, pl. 16 fig. 2.

Thalamita sexlobata Alcock 1899, p. 87.

Occurrence. 1. Iranian Gulf. "Persian Gulf" (Alcock l.c.).

2. Gulf of Oman. St. 95. 29.III.1938. 6 nautical miles W. by S. of Jask. 35 m. Clay with sand. 13 specimens (σ up to 10 mm, ♀ ovig. 7 mm).

Remarks. Pleopod 1 of a male (10 mm) (fig. 32 C) rather similar to that of *T. poissoni* (fig. 31 F); the apex is, however, not curled, but has a small process. In the distal third of the limb is a series of spines, shortest near the very apex. Pleopod 2 agrees with *T. poissoni* (fig. 31 G).

I give a figure of the very characteristic abdomen (fig. 32 D), described by Alcock as follows: "6th abdominal tergum of male with arched sides, the tergum being broader than long and much broader at its base than at its far end, though the base is not quite the broadest part"; 1st, 2nd and 3rd segments have each a transversal carina.

Distribution. Nukalofa, Tongatabu, 35 m (type-locality; Miers (l.c.). Arakan Coast; Andamans (Alcock).

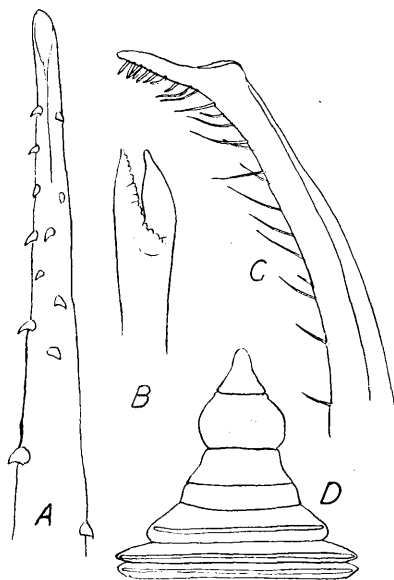


Fig. 32. A-B: *Podophthalmus vigil* ♂, St. 97, apex of pleopods 1-2. C-D: *Thalamita sexlobata* ♂, St. 95, apex of pleopod 1 and abdomen.

88. *Podophthalmus vigil* (J. C. Fabricius) (Fig. 32 A-B)

Podophthalmus vigil Shen 1937 c, p. 136, figs.

Podophthalmus vigil Leene 1938, p. 12, lit., etc.

Occurrence. 1. Strait of Hormuz. St. 80 D. 22.IV.1937. 1 nautical mile S.E. of Hormuz. Clay. 15 m. 1 ♂ with *Balanidæ* (*Cheilonibia* ?), length c. 36 mm.

2. Gulf of Oman. St. 97. 29.III.1938. 6 nautical miles N.W. of Jask. 10 m. Clay. 1 ♂, length 32 mm.

It is probably new to the Iranian waters.

Remarks. Pleopods 1-2 of the male were delineated by Milne Edwards, in *Crust.*, R. Animal, pl. 9 fig. 1, k-m, and by Brocchi 1875, p. 67, pl. 17 figs. 108-110; none of these authors have, however, detailed figures of the apical parts. Pleopod 1 (fig. 32 A) is sparsely set with short, but stout spines; pleopod 2 is apically cleft (fig. 32 B).

Distribution. Red Sea; throughout the Indo-Pacific region (*vide* Leene l.c.); Malay Archipelago; Philippine Islands; Hawaiian Islands (Shen l.c.).

Portunidæ spp. *indet.* (defective etc., or very small)

St. 22 A. 18.III.1937. 31 nautical miles W. by S. of the outermost light-buoy at Bushire. 56 m. Clay. 1 spec. (*Charybdis* sp.).—St. 24. 18.III. 1937. 29°7' N., 49°56' E. 40 m. Sandy clay. 1 specimen.—St. 51 A. 7.IV.1937. 26°27' N., 53°08' E. 33 m. Coral gravel, shells. 1 specimen.—St. 66 D. 16.IV.1937. The anchoring-place at the north side of the island of Larak. 5 m. Sand. 2 chelæ.—St. 72 B. 20.IV.1937. 2 nautical miles N.W. by N. of the buoy at Jask. 12 m. Clay. 1 specimen.—St. 75 B. 21.IV.1937. 20 nautical miles W. by N. of the buoy at Jask. 34 m. Gray clay. 1 specimen.—St. 77 B. 21.IV.1937. 9 nautical miles W. of Kuh-i-Mubarak. 29 m. Clay. 1 specimen.—St. 96. 29.III.1938. 2 nautical miles N.W. of Jask. 8 m. Clay. 1 specimen.

Fam. ATELECYCLIDÆ

Subfam. THIINÆ

89. *Kraussia* (*nitida* Stimpson?) (Fig. 33)

Kraussia nitida Balss 1922, p. 97, p. 98 (lit.).

Kraussia nitida Balss 1938, p. 26 (key to the species), p. 27, figs.

Occurrence. Iranian Gulf. St. 39 B. 27.III.1937. 12 miles E.N.E. of the light-ship of Bahrein. 23 m. Shell gravel. 1 ♂, length 10 mm.

No species of the genus was previously known from Iranian waters.

Remarks. According to the key in Balss 1938 this specimen should be determined as *K. nitida*; but the hands are somewhat more slender than shown in Balss 1938, figs. 11-12, the fixed finger in right chela has but one tooth (besides the apical tooth), and the movable fingers of the hands are on the convex side smooth, not denticulate.

Pleopod 1 (fig. 33) differs from those of *K. integra* and *K. rugulosa* (Sakai 1934, text-figs. 17 a-b) in having the very tiny apex angularly bent. Pleopod 2 agrees with *K. integra* (Sakai 1938, fig. 17 a).

Distribution. From Maldives to Japan and Torres-Strait.

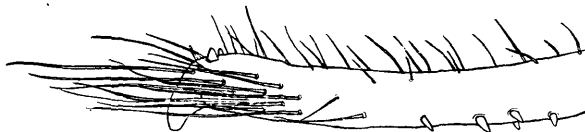


Fig. 33. *Kraussia* (*nitida*?), ♂, St. 39 B, pleopod 1, apex.

Fam. XANTHIDÆ

Subfam. MENIPPINÆ

90. *Menippe rumphii* Fabricius, v. Martens

Menippe rumphii Alcock 1898, p. 178.

Occurrence. "Persian Gulf" (Alcock l.c.).

Distribution. Red Sea; India (Laurie 1914, p. 414).

91. *Epixanthus frontalis* (Milne-Edwards) Heller

Epixanthus frontalis Alcock 1898, p. 185.

Epixanthus frontalis Klunzinger 1913, p. 199 (295).

Occurrence. 1. "Iranian Gulf". (Heller, *vide* Klunzinger l.c.).

2. Strait of Hormuz. St. 68. 17.IV.1937. The island of Henjam, the beach. 1 ♀ 15.5 × 25 mm.

Distribution. Red Sea, abundant; from the Seychelles to India and Ceylon (Laurie 1914, p. 414).

92. *Ozius (Eurüppellia) tenax* (Rüppell) (Fig. 34 A-B)

Cancer tenax Rüppell 1830, p. 11, pl. 3 fig. 1, pl. 6 fig. 5.

Ozius (Eurüppellia) tenax Alcock 1898, p. 187.

Rüppellia tenax Klunzinger 1913, p. 297 [201], pl. 7 figs. 10 a-c.

Ozius (Eurüppellia) tenax Balss 1924, p. 12.

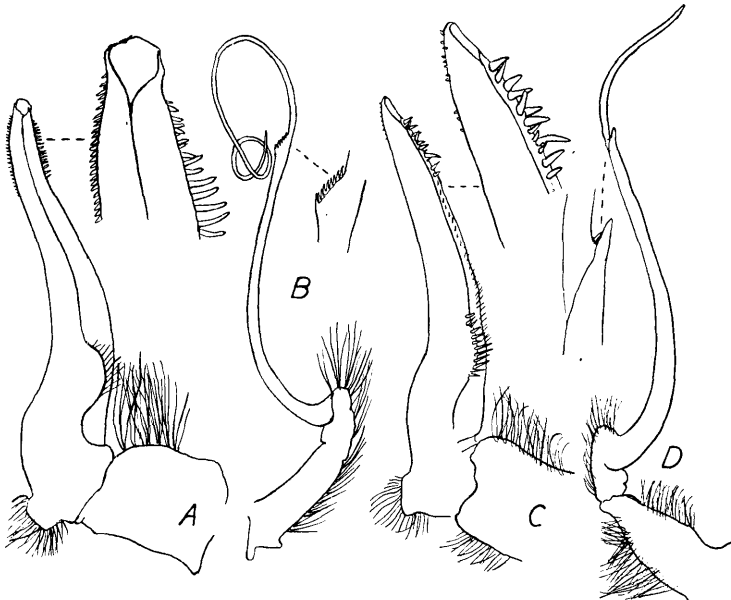


Fig. 34. A-B: *Ozius (Eurüppellia) tenax*, ♂, 21 mm, pleopods 1-2.
C-D: *Eriphia sebana smithi*, ♂, 22 mm, Jask, pleopods 1-2.

Occurrence. (Iranian Gulf. The species is recorded by Balss l.c. from the Iranian Gulf, probably with Nobile 1906 a as a source. But though Nobile (1906 a) according to its title deals with the Iranian Gulf, several of the localities are in other waters, especially in the Red Sea. The locality of the present species, viz., St. VII, is "Pêche côtière. Mer Rouge: ilot des frères (Brothers)", thus not in the Iranian Gulf.)

Strait of Hormuz. St. 68. 17.IV.1937. The island of Henjam, the beach. 1 ♂, 21 × 31 mm.

Remarks. Pleopod 1 of the male (fig. 34 A) is in the distal fourth rather densely set with spines. Pleopod 2 is much longer than pleopod 1, with the distal portion filiform (fig. 34 B).

Distribution. Red Sea; Mekran (Balutchistan); Zanzibar; Coetivy (Rathbun 1911, p. 228).

93. *Eriphia sebana smithi* MacLeay (Fig. 34 C-D)

Eriphia laevimana var. *smithi* Alcock 1898, p. 216 (lit., etc.).

Eriphia smithi Nobile 1906 a, p. 142.

Eriphia sebana smithi Rathbun 1910, p. 359.

Occurrence. 1. Iranian Gulf. 22.III.1938. 1 specimen. Island of Arzana (Nobile l.c.).

2. Strait of Hormuz. St. 69. 18.IV.1937. Island of Quism (Tavila). Some specimens, including ♀ ovig.

3. Gulf of Oman. 20.IV.1937. Jask. 3 specimens.

All the specimens were taken in the tidal zone.

Remarks. In the material there is but a single male, 22 × 27 mm, taken at Jask. Pleopod 1 (fig. 34 C) is rather stout, with c. 10 heavy spines on the median side of the apical end. Pleopod 2 (fig. 34 D) is somewhat longer than plp. 1; the slender apical portion is about half as long as the proximal, more heavy portion, and there is a tooth at the base of the distal, slender portion.

The apical portions of pleopods 1-2 were delineated by Gordon in 1934, p. 43 fig. 29. Savigny (1817, pl. 4; fig. 7.4 ♂, m-n) has drawings of pleopods 1-2 of *E. spinifrons* Fabricius; they seem to agree well with the present species (fig. 34 C-D). Also Brocchi (1875, pl. 17, figs. 136-137) has drawn pleopods 1-2 of *E. spinifrons*; but he writes that the apex of plp. 1 "présente un petit crochet", and plp. 2 is delineated as having no difference in thickness of the distal and proximal portions.

Distribution. Red Sea; Seychelles; India (Laurie 1914, p. 415).

Subfam. PILUMNINÆ

94. *Pilumnopus vauquelini* (Audouin) (Fig. 35 A-B)

Heteropanope vauquelini Klunzinger 1913, p. 191, pl. 3 fig. 8.

Pilumnopus vauquelini Balss 1933, p. 13.

Occurrence. 1. Iranian Gulf. St. 2. 27.II.1937. Coral reef 2 nautical miles S. of Bushire. 1 ♀ 8 mm, 1 small specimen.—St. 15. 8.III.1937. Bushire, the roads. 3-5 m. Coarse sand with clay and stones. 6 specimens up to 6 mm (incl. ♀ ovig.).—St. 40. 28.III.1937. Manama, island of Bahrein. Tidal zone. Corals, sand, clay. 9 specimens (♂, ♀ ovig.) up to 11 m.

2. Strait of Hormuz: St. 69. 18.IV.1937. Island of Quism (Tavila).—Locality and date not noted. 1 small specimen, determination not certain.

It is new to the Iranian waters.

Remarks. The specimens agree excellently with the description in Klunzinger l.c. and with his figure which is a reproduction of the original figure in Savigny 1817; but the anterior lateral tooth of the carapace is rectangular, not acute.

Pleopod 1 of the male (fig. 35 A) is somewhat curved, apically rolled up, and with some spines of varying sizes proximally of the apex. About pleopod 2 nothing to remark (fig. 35 B).

Distribution. Was previously found only in the Red Sea (several authors) and in the eastern Mediterranean (Port Said; Monod 1930, p. 138).

95. *Actumnus asper* (Rüppell) (Fig. 35 C-D)

Actumnus bonnieri Nobili 1906 a, p. 132, pl. 6 fig. 32.

Actumnus asper Klunzinger 1913, p. 276 [180], pl. 2 fig. 19 a-b.

Actumnus bonnieri Nobili 1906 a = *A. asper* (Rüppell 1830), *vide* Odhner 1924, p. 85.

Actumnus asper Balss 1933, p. 36, with lit.

Occurrence. Iranian Gulf. St. 36 B. 24.III.1937. W. of the island of Kharg. 22 m. Shells. 1 ♀ 9 mm.—St. 39 D. 27.III.1937. 12 nautical miles E.N.E. of the light-ship at Bahrein. 23 m. Shell gravel. 1 ♀ juv. 6.5 mm.—St. 86. 16.III.1938. 6 nautical miles N.E. of the light-ship at Bahrein. 1 ♂ 9 mm, 2 ♀ ovig. 5.5 mm, 3 specimens 4-5 mm.

Nobilil.c. records it from a bank of pearl-oysters c. 25° N., 55° E., 20-30 m, and from the island of Arzana (type-localities for *A. bonnieri*).

Remarks. Pleopod 1 of a male (9 mm, St. 86 (fig. 35 C) is apically tapering, with the apex angular, and with some spines proximally of the apex. Pleopod 2 has the usual shape (fig. 35 D).

Distribution. Red Sea (Rüppell, Nobili, Klunzin-

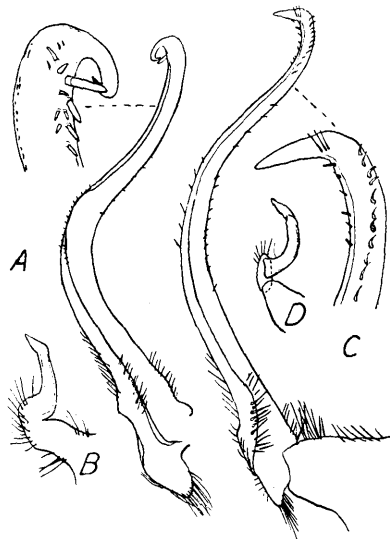


Fig. 35. A-B: *Pilumnopeus vauquelini* ♂, pleopods 1-2.
C-D: *Actumnus asper* ♂, St. 86, pleopods 1-2.

ger, Balss). Widely distributed in the Indo-Pacific Ocean: Seychelles, Andamans, Ceylon, Singapore, Hong Kong, Macclesfield bank, Polynesia (Balss l.c.).

96. *Actumnus tessellatus* Alcock

Actumnus tessellatus Alcock 1898, p. 205.

Actumnus tessellatus "Investigator", Crust., pt. 7, 1899, pl. 37 fig. 9.

Occurrence. Iranian Gulf. St. 54. 8.IV.1937. Island of Qais. Beach. Sand. 1 ♀ ovig. 16 mm.

"Persian Gulf", 1 ♂, 1 ♀ (type-locality, Alcock l.c.). Bank of pearl-oysters c. 25° N., 55° E., 20-30 m, 5 spec., and near the island of Arzana, 11 specimens. (Nobili 1906 a, p. 132).

Probably not found outside the Iranian Gulf.

97. *Actumnus obesus* Dana

Actumnus obesus Dana 1852, p. 244, pl. 14 fig. 3, 3 a-b.

Actumnus obesus Balss 1933, p. 37, with lit.

Occurrence. "Persian Gulf" (Alcock 1898, p. 203, determined as *A. setifer*, see Balss l.c.).

Distribution. Paulson 1875, p. 43, and Klunzinger 1913, p. 274 record it from the Red Sea; but these records are probably due to confusion with *A. setifer*, see Balss l.c.

Madagascar; Amirantes; Andamans, and Abrolhos Is., Mermaid

Straits, W. Australia; New Guinea; Samoa; Fiji Is.; Marquesas Is.; Hawaiian Is.

98. *Actumnus setifer* (de Haan)

Actumnus setifer Balss 1933, p. 38, with lit.

Occurrence. Iranian Gulf. St. 25. 14.III.1937. 63 nautical miles W.¹/₂S. of Bushire. 49 m. Sand with a little clay. 2 ♀ ovig. 12-13 mm.—St. 39 D. 27.III.1937. 12 nautical miles E.N.E. of the light-ship at Bahrein. 23 m. Shell-gravel. 80 specimens (♂ and ♀, incl. ♀ ovig.) up to c. 10 mm.—St. 51 D. Stiffe's Bank. 7.IV.1937. 33 m. Shells, coral gravel. 7 specimens (♂ up to 6 mm, ♀, 3 ovig. c. 5-6 mm) up to c. 8 mm.

Nobili 1906 a, p. 132 records *A. tomentosus* Dana (= *A. setifer* (de Haan)) from a bank of pearl-oysters c. 25° N., 55° E., 20-30 m.

Remarks. Balss l.c. considers *A. setifer* (de Haan) synonymous with *A. tomentosus* Dana. The specimens from the present expedition are much more close to the form *tomentosus* than to *setifer*.

Alcock's record (1898, p. 202) of *A. setifer* from the Iranian Gulf is due to confusion with *A. obesus* (see under this species, above).

Pleopods 1-2 of a male (10 mm, St. 39 D) are scarcely different from those of *A. asper*.

Distribution. The whole of the tropical Indo-Pacific Ocean, from Zanzibar and the Red Sea to Samoa, Fiji Is. and Australia (*vide* Balss l.c.).

99. *Actumnus margarodes* MacGilchrist

Actumnus margarodes MacGilchrist 1905, p. 260.

Actumnus margarodes Illustr. Zool. "Investigator" 1905, pl. 76 fig. 3.

Occurrence. Iranian Gulf, "St. 292", 95 m, 1 ♂ 6 × 7.5 mm (type-locality; MacGilchrist l.c.).

Not found outside this locality.

100. *Heteropilumnus trichophoroides* (de Man)

Pilumnus trichophoroides de Man, Zool. Jahrb., Syst., vol. 8, 1895, p. 549, pl. 13 fig. 8 (in vol. 9, 1897).

Pilumnus trichophoroides Nobili 1906 a, p. 134.

Pilumnus trichophoroides Klunzinger 1913, p. 168, lit.

Heteropilumnus trichophoroides Balss 1933, p. 13.

Pilumnus borradailei Rathbun 1910, p. 56, figs. (*vide* Balss 1933, p. 13).

Occurrence. Nobili l.c. records it from the following localities in the Iranian Gulf, viz., two localities in a bank near the island of Arzana, and a bank of pearl-oysters c. 25° N., 55° E., 20-30 m.

Distribution. Red Sea (Klunzinger). Egmont, Seychelles (Rathbun 1911, p. 230). Thailand (Rathbun 1910). Celebes (de Man).

101. *Pilumnus longicornis* Hilgendorf (Fig. 36 A)

Pilumnus longicornis Hilgendorf 1878, p. 794, pl. 1 figs. 8-9.

Pilumnus longicornis Alcock 1898, p. 193.

Pilumnus longicornis Nobili 1906 a, p. 135.

Pilumnus longicornis Balss 1933, p. 15 (lit., etc.).

Pilumnus andersoni de Man etc. (fide Balss l.c.).

Pilumnus tantalus Rathbun 1923, p. 16, pl. 25 (fide Balss l.c.).

Occurrence. Iranian Gulf. St. 3. 3.III.1937. Bushire, the roads. 6 m. 1 ♀ 10 mm + 10 specimens up to 4 mm.—St. 14. 6.III. 1937. Off the east side of the island of Kharg. 12.5 m. Sand, stones. 5 specimens up to 7 mm.—St. 15. 8.III.1937. Bushire, the roads. 3-5 m. Coarse sand with clay and stones. 14 specimens (♂, ♀) up to 10-11 mm.—St. 25 D. 14.III.1937. 63 nautical miles W.¹/₄S. of Bushire. 49 m. Sand

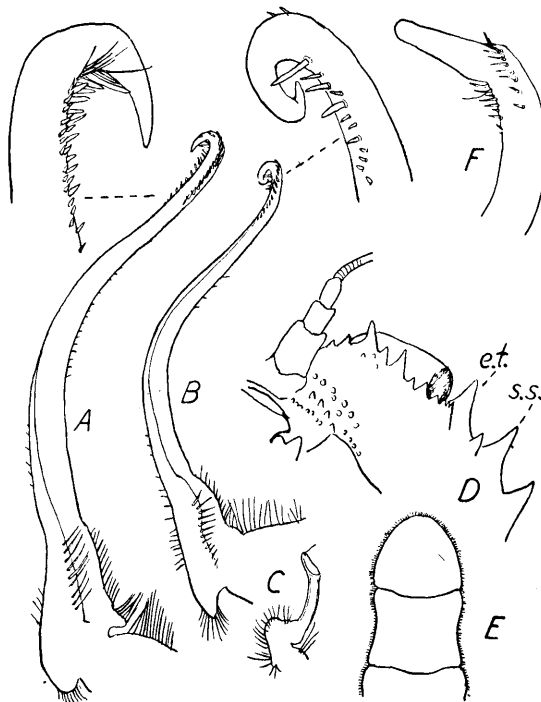


Fig. 36. *Pilumnus longicornis* ♂, St. 123, pleopod 1.

B-C: *P. savignyi*? ♂, St. 36 B, pleopods 1-2.

D-F: *P. hirsutus* ♂, 13 mm, St. 39 D. D: orbit etc., ventral view (e.t.: extra-orbital spine; s.s.: subhepatic spine), all setae are omitted. E: apex of abdomen;

F: apex of pleopod 1.

with clay. 1 specimen 5 mm.—St. 39 D. 27.III.1937. 12 nautical miles E.N.E. of the light-ship at Bahrein. 23 m. Shell gravel. 2 small specimens.—St. 42 D. 30.III.1937. 24 nautical miles N.E. of Bahrein. 33 m. Shells and gravel. 8 specimens up to 7 mm.—St. 69 A. 30.I.1938. 18 nautical miles W.N.W. of the inner light-buoy at Bushire. 32 m. 2 small specimens.—St. 123. 9.IV.1938. 1 nautical mile E.S.E. of Chiru. 13 m. Sand with clay. 1 ♂ 23 × 30 mm, 1 ♀ ovig. 9 mm.—St. 132. 12.IV.1938. 8 nautical miles S. by E. of Funnel Hill. 7-8 m. Gravel and shells. 1 ♀ 10 mm.—Station and date not noted. 3 specimens.

The species was recorded from a bank near the island of Arzana (Nobili l.c.).

Remarks. The big male from St. 123 agrees well with Hilgendorf's original description, and there are spines on the merus of the walking legs, a character considered by Balss l.c. to be very most important. Regarding the other specimens (which are all much smaller) the determination is possibly not quite certain, i.e. as there are no spines on the walking legs.

Pleopod 1 of the big male (fig. 36 A) is apically hooked, and there are several spines in two not quite regular longitudinal rows. About pleopod 2 nothing to remark.

Distribution. From East Africa and Madagascar (but not the Red Sea) to Hawaiian Is. and Ponape.

102. *Pilumnus (savignyi)* Heller? (Fig. 36 B-C)

Pilumnus savignyi Nobili 1906 a, p. 138.

Pilumnus savignyi Nobili 1906 b, p. 277.

Pilumnus savignyi Klunzinger 1913, p. 165, pl. 3 fig. 9.

Pilumnus savignyi Balss 1933, p. 20.

Occurrence. Iranian Gulf. St. 36 B. 24.III.1937. W. of Kharg. 22 m. Shells. 1 ♂ 9 mm.

The determination of this specimen is not quite certain; but that it was referred to this species is due to Balss's remark (see below) on difference from *P. hirsutus*; had there been a terminal spine on carpus, the specimen should have been determined as *P. hirsutus*.

Nobili (1906 a) has a long description, but no locality. But from Nobili (1906 b) it is clear that his specimen was taken in the Iranian Gulf.

Remarks. Balss has examined several specimens and writes (1933, p. 20) that it is very close to *P. hirsutus*, but that it is characterised by the absence of a terminal spine on the fore (upper) edge of the carpus of the walking legs.

Pleopod 1 of the male (fig. 36 B) is apically curled, with spines of different length. About pleopod 2 nothing to remark (fig. 36 C).

Distribution. Zanzibar; Red Sea.

103. *Pilumnus hirsutus* Stimpson (Fig. 36 D-F)

Pilumnus hirsutus Alcock 1898, p. 197.

Pilumnus hirsutus Stimpson 1907, p. 69, fig. 9 fig. 1.

Pilumnus hirsutus Klunzinger 1913, p. 165.

Pilumnus hirsutus Balss 1922, p. 117, lit.

Pilumnus hirsutus Rathbun 1923, p. 122, pl. 28.

Pilumnus hirsutus Balss 1933, p. 20.

Occurrence. Iranian Gulf. St. 39 D. 27.III.1937. 12 nautical miles E.N.E. of the light-ship at Bahrein. 23 m. Shell gravel. 27 specimens (σ up to 13 mm, ♀ incl. ♀ ovig. 9-13 mm).—St. 42 D. 30.III. 1937. 24 nautical miles N.E. of Bahrein. 33 m. Shells and gravel. 1 ♀ 9.5 mm.—St. 86. 20.III.1938. 6 nautical miles N.E. of the light-ship at Bahrein. 20 m. Coral sand and shells. 1 σ 7 mm.

It is new to Iranian waters.

Remarks. (Fig. 36 D-F). No doubt the determination is correct. The specimens were compared with several specimens determined by Balss, and the agreement is good. Both the subhepatic spine (of varying size) and the spine at the distal end of the carpus of the walking legs (mentioned by Balss l.c.) are present.

The subhepatic spine seems to be most varying, and the information in the literature is somewhat differing. Stimpson l.c. writes "no subhepatic tooth", and the same write Alcock l.c., Nobili 1906 b, p. 278 and Klunzinger l.c. But Miss Rathbun l.c. writes regarding the material examined by herself, that it is present, but "only in the largest specimen" (which was 10.1×14.1 mm; the other specimens were 9.8×14.1 , and 7.4×10.1 mm). Balss (1922 and 1933) has no remarks on the spine, but it is present i.a. in the specimens examined and determined by himself in the Zoological Museum, Copenhagen.

The lower orbital margin has c. 10-12 teeth of varying size; the third tooth (from the antennæ) is usually the largest; also no. 5 is very large. 7th segment in the abdomen of the males varies rather much from Thailand to Japan (Balss l.c. 1922); in the Iranian specimens it is nearly as long as broad, with the apical end evenly rounded.

Pleopod 1 of a male (13 mm, St. 39 D) (fig. 36 F) is rather like that of *P. longicornis* (fig. 36 A). Pleopod 2 is of the ordinary shape.

Distribution. From the Red Sea and Seychelles to Japan, Fiji Is. and New Caledonia.

104. *Pilumnus propinquus* Nobili

Pilumnus propinquus Nobili, Bull. Mus. d'Hist. Nat. Paris 1905, p. 163.

Pilumnus propinquus Nobili, 1906 a, p. 140, no fig.

Pilumnus propinquus Nobili, 1906 b, p. 277, pl. 10 fig. 7.

Occurrence. Iranian Gulf. Bank of pearl-oysters c. 25° N., 55° E., 20-30 m (Nobili 1906 a).

Distribution. Red Sea.

Pilumnus spp.

St. 11. 5.III.1937. East of the island of Kharg. 13 m. Sand. 1 specimen 5 mm.—St. 34. 23.III. The coast N. of Kharg. 28.5 m. Coarse gravel, shells. 1 ♀ 7 mm.—St. 36 B. 24.III.1937. West of the island of Kharg. 22 m. Shells. 1 ♀ 6 mm.—St. 51 D. 7.IV.1937. Stiffe's Bank. 33 m. Shells, coral-gravel. 1 ♀ ovig. 6 mm, 1 ♂ 6 mm.—St. 81. 22.IV. 1937. 5 nautical miles N.W. by N.¹/₂W. of the light-buoy at Quism. 18 m. Soft clay. 1 ♀ c. 10 mm, very damaged.

Remarks. The specimens from St. 34 and St. 36 B have the lateral teeth (incl. of the exorbital tooth) triangular and not very acute; they do not belong to any of the species previously found in Iranian waters, and I have not been able to refer them to any of the species known from the Red Sea (Klunzinger 1913, pp. 162-172) or from India (Alcock 1898, pp. 190-200).

Pilumninae sp.

St. 3. 3.III.1937. Bushire, the roads. 3 m. 5 small specimens, up to c. 4 mm.

Remarks. They are not hairy as *Pilumnus*; that they are referred to this subfam. is due to the shape of pleopod 1 ♂ (4 mm), which is quite similar to that typical in the *Pilumninae*.

Subfam. XANTHINÆ

105. *Lophactæa* (*Atergatis*, *Platypodia*) *anaglypta* (Heller)
Milne-Edwards

Lophactæa anaglypta Alcock 1898, p. 102.

Occurrence. "Persian Gulf" (Alcock l.c.).

Distribution. Seychelles, Red Sea, India, Laccadives, Maldives, Ceylon (*vide* Laurie 1914, p. 413). New Caledonia, Samoa, Upolu, Salomon Isls., Coevity, and Palao Isls. (Sakai 1936, p. 164).

106. *Xanthias cumatodes* MacGilchrist

Xanthodes cumatodes Mac Gilchrist 1905, p. 258.

Xanthodes cumatodes Illustr. Zool. "Investigator" 1907, Crust., pl. 79 fig. 1.

Xanthias cumatodes Balss 1929, p. 24.

Occurrence. "Persian Gulf, St. 292", mud bottom, 95 m, 7 specimens (type-locality, Mac Gilchrist l.c.).

Distribution. Red Sea, 168 m (Balss l.c.).

107. *Euxanthus sculptilis* Dana

Euxanthus sculptilis Alcock 1898, p. 111.

Occurrence. "Persian Gulf" (Alcock l.c.).

Distribution. Red Sea, India (*fide* Laurie 1914, p. 413).

108. *Medæus granulosus* (Haswell) (Fig. 37 A-B)

(= *Xantho distinguendus* aut., nec de Haan)

Xantho macgillivrayi Miers 1884, p. 211, pl. 20 fig. C.

Xantho distinguendus Alcock 1898, p. 113.

Xantho distinguendus Klunzinger 1913, p. 200, pl. 1 fig. 7, pl. 3 fig. 1, lit.

Xantho neglectus Balss, Zool. Anzeiger vol. 54, 1922, p. 6.

Medæus granulosus Odhner 1925, p. 81.

Medæus granulosus Gordon 1931, p. 543, with figs.

non *Xantho granulosus* de Haan 1835, p. 48, pl. 13 fig. 7; 1837, p. 66 (*fide* Balss l.c. and Odhner l.c.).

Occurrence. 1. Iranian Gulf. Off the island of Arzana (*Xantho distinguendus*; Nobili 1906 a, p. 12). "Persian Gulf" (Alcock l.c.).

2. Gulf of Oman. St. 95. 29.III.1938. 6 nautical miles W. by S. of Jask. 35 m. Clay with sand. 1 ♂ 7.5 mm, 1 ♀ 8 mm.

Remarks. Balss l.c. has shown that *X. distinguendus* de Haan (with the fingers of the chelæ spoon-shaped) has been confused with *X. distinguendus* aut. (with the fingers sharp-pointed), but the two species are very closely allied. Odhner l.c. refers *X. dist.* aut. to the genus *Medæus*, under the name of *Medæus granulosus* (Haswell 1882). Gordon l.c. has compared *M. granulosus* with the two species with which it ordinarily has been confused (*viz.*, *Xantho exaratus* (Milne-Edwards) and *X. distinguendus* de Haan) and gives a summary of the differences, with figures.

As in the Zoological Museum, Copenhagen, we possess a specimen of both *X. distinguendus* de Haan (from Nagasaki) and *Medæus granulosus* (Haswell) (from Samaloa, Makassar), both of them determined by Odhner, I have been able to compare the Iranian specimens with the two species; they agree well both with the specimen of *M. granu-*

losus and with the literature, especially the fig. in Miers l.c. and Gordon l.c.

Pleopod 1 of the male (7.5 mm, St. 95; fig. 37 A) is rather heavy, with long spines near the apex (Gordon 1931 has a fig. (fig. 22 A) of the apex), besides with very short, but heavy spines; about pleopod 2 nothing is to remark (fig. 37 B).

Distribution. From the Red Sea (Klunzinger) to Queensland (Miers l.c.) and Japan (Parisi 1916, p. 161, *vide* Odhner l.c.); is probably a littoral species (but *X. distinguendus* de Haan is probably found only in Japan). Madagascar, Comores, Mauritius (Balls 1934, p. 507).

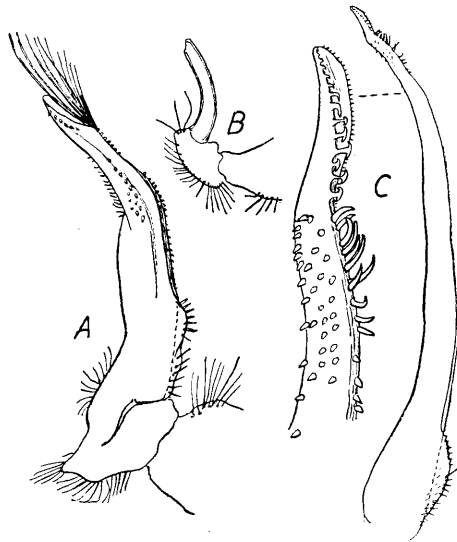


Fig. 37. A-B: *Medæus granulatus*, ♂, 7.5 mm, St. 95, pleopods 1-2.
C: *Xantho exaratus*, ♂, pleopod 1.

109. *Xantho* (= *Leptodius*) *exaratus* (A. Milne-Edwards)
(Fig. 37 C)

Xantho (*Leptodius*) *exaratus* Alcock 1898, p. 118.

Xantho hydrophilus Laurie 1914, p. 444, fig., lit.

Xantho exaratus Gordon 1931, p. 543, figs.

Leptodius exaratus Shen 1932, p. 99, figs.

Xantho (= *Leptodius*) *exaratus* Gordon 1934, p. 29, fig.

Occurrence. Iranian Gulf. St. 1. 18-28.II.1937. Bushire, tidal zone, rocky coast. 1 ♂ 21 mm.—St. 2. 27.II.1937. Coral reef 6 nautical miles south of Bushire. 2 ♂ 12-20 mm, 3 ♀ 13 mm, + 2 ♀ with *Sacculina* 16-18 mm.—St. 12. 6.III.1937. Island of Kharg. Tidal zone, rocks. 1 ♀ 17 mm.—St. 40. 28.III.1937. Manama, island of Bahrein. Tidal

zone. Corals, clay, sand. 1 ♀ with *Sacculina*, 21 mm.—St. 69. 18.IV.1937. Island of Quism (Tavila). Tidal zone. 1 ♂ 20.5 mm.

Alcock (l.c.) records it from the "Persian Gulf"; Nobili (1906 a, p. 121) lists it from 3 places in the Gulf, viz., bank of pearl-oysters N.E. of island of Arzana, the coast of Bahrein, and between El Katif and Bahrein, in the deepest place in the Gulf, 80 m, in all 32 specimens.

Remarks. Gordon has compared the present species with the two species with which it is ordinarily confused, viz., *Medæus granulosus* (Haswell) and *Xantho distinguendus* de Haan, with summary of the differences and some figures.

Gordon in 1934 gives drawings of pleopod 1 of the male of *X. exaratus*, with two varieties. Pleopod 1 of an Iranian male (20 mm, St. 2; see my fig. 37 C) agrees well with Gordon (1931 fig. 16 b) and Shen (1932 fig. 58 C), but is different from the two types delineated in Gordon (1934 fig. 16 a-c). Pleopod 2 agrees with *Zozymodes* (fig. 39 D).

The dactyli of the Iranian specimens are smooth, not with denticulate armature as in Laurie (1914, pl. 43 fig. 1).

Distribution. From Seychelles and Red Sea to Hawaiian Islands (Laurie l.c.).

110. *Xantho* (= *Leptodius*) *sanguineus* H. Milne-Edwards
(A. Milne-Edwards)

Xantho sanguineus Alcock 1898, p. 119.

Occurrence. "Persian Gulf" (Alcock l.c.).

Distribution. Seychelles, Red Sea, India, Maldives and Laccadives, Hawaiian Is. (Laurie 1914, p. 413).

111. *Actæa speciosa* (Dana) Ortmann

Actæa speciosa Alcock 1898, p. 143.

Actæa speciosa Odhner 1925, p. 62.

Occurrence. "Persian Gulf" (Alcock l.c.).

Distribution. Widely distributed in the Indo-Pacific Ocean; certain localities (*vide* Odhner l.c.): Durban, Natal; Mauritius; Zanzibar; Red Sea; Ceylon; Ternate, Moluccas; New Guinea; Caroline Is.; Marshall Is.; Gilbert Is.; Samoa; Tahiti; Honolulu.

112. *Actæa rüppellii* (Krauss) Hilgendorf

Actæa rüppellii Alcock 1898, p. 144.

Actæa rüppellii Odhner 1925, p. 45, text-fig. 4, pl. 3 fig. 6.

Occurrence. "Persian Gulf" (Alcock l.c.). Bank of pearl-oysters c. 25° N., 55° E., 20-30 m (Nobili 1906 a, p. 125).

Distribution. T. Odhner (l.c.) has revised the determination of specimens from numerous localities in the Indo-Pacific Ocean, viz., from S. Africa (Natal) and Madagascar to Hong Kong, Japan, and Samoa Is. It is probably not found in the Red Sea (see Odhner l.c., p. 46).

113. *Actæa cavipes* (Dana) A. Milne-Edwards

Actæa cavipes Alcock 1898, p. 147.

Actæa cavipes Odhner 1925, p. 68 (with syn.).

Actæa cellulosa Dana 1852, p. 164, pl. 8 fig. 2.

Actæa fossulata Girard, Ann. Soc. Entom. France, (3) vol. 7, 1859, p. 149, pl. 4 figs. 2-2 b.

Actæa fossulata Alcock 1898, p. 148.

Occurrence. 1. "Persian Gulf" (*A. cavipes*; Alcock l.c.). Bank of pearl-oysters c. 25° N., 55° E., 20-30 m (*A. fossulata*; Nobili 1906 a, p. 126).

2. Gulf of Oman. Mekram Coast (Alcock l.c.).

Distribution. Red Sea. Very widely distributed in the Indo-Pacific Ocean, from Madagascar to Tahiti; for special localities, see Odhner l.c.

114. *Actæa savignyi* (H. Milne-Edwards) (Fig. 38 C)

Actæa granulata Alcock 1898, p. 151, lit. etc.

Actæa savignyi Odhner 1925, p. 52.

Occurrence. Iranian Gulf. St. 14. 6.III.1937. Off the east side of the island of Kharg. 12.5 m. Sand, stones. 1 ♂ 9 mm.—St. 15. 8.III.1937. Bushire, the roads. 3-5 m. Coarse sand with clay and stones. 1 ♀ 13 mm.—St. 86. 16.III.1938. 6 nautical miles N.E. of the light-ship at Bahrein. 1 ♂ 17 mm.—No. of Station not noted. 20.III. 1938. 4 nautical miles E.N.E. of the inner light-buoy at Bahrein. 1 ♂ 11 mm.

Alcock l.c. notes it from "Persian Gulf", and Nobili (1906 a, p. 127) lists it (*A. granulata*) from the island of Arzana (2 occurrences) and from a bank of pearl-oysters c. 25° N., 55° E., 20-30 m.

Remarks. Pleopod 1 of the male (17 mm, St. 86; fig. 38 C) has the usual form; the apical portion is somewhat twisted, with short stout spines and some long hairs. Also pleopod 2 is of the ordinary type, but it is rather long, quite as in *Cymo andreossyi* (see fig. 38 B). For control I have compared these appendages with those of a large male (20 mm) from the Formosa Channel (T. Odhner determ.), and the agreement is complete.

Distribution. Red Sea (Suez, etc.); Mosambique; N. Borneo; Moluccas; Kei Is. 40-50 m; Sulu Is. 40-60 m; New Caledonia; Hong Kong; Macclesfield Bank; Formosa Strait 50 m; Japan; W. Australia (*vide* Odhner l.c.).

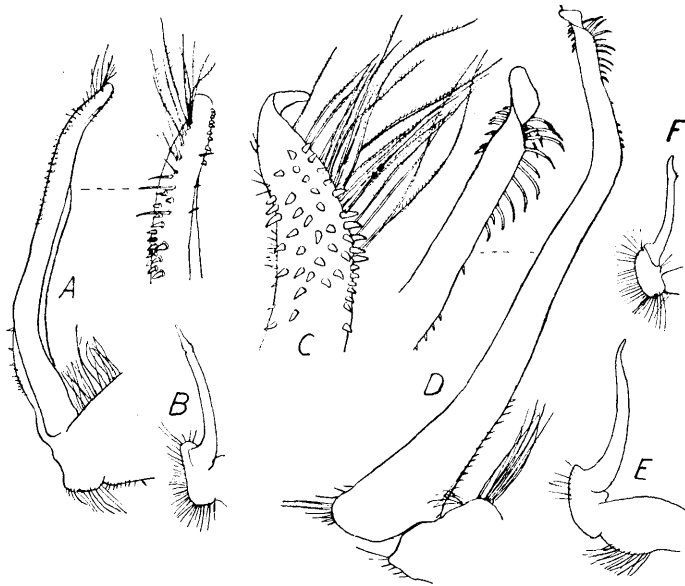


Fig. 38. A-B: *Cymo andreossi* var. *melanodactyla*, ♂, 8 mm, St. 13, pleopods 1-2.

C: *Actæa savignyi*, ♂, apex of pleopod 1.

D-E: *Chlorodius niger*, ♂, St. 13, pleopods 1-2.

F: *Phymodius granulatus*, ♂, St. 2, pleopod 2.

115. *Actæa margaritifera* Odhner

Actæa nodulosa Alcock 1898, p. 148.

Actæa nodulosa Nobili 1906 b, p. 257, pl. 10 fig. 2.

Actæa margaritifera Odhner 1925, p. 48, pl. 3 fig. 10.

Occurrence. Iranian Gulf. St. 51 D. 7.IV.1937. Stiffe's Bank. 33 m. Shells, coral gravel. 1 ♀ 9 mm.—St. 69 A. 30.I.1938. 18 nautical miles W.N.W. of the inner light-buoy at Bushire 29°10' N., 50°30' E. 32 m. 1 ♂ 17 × 24 mm.

Alcock l.c. records it from the "Persian Gulf".

Remarks. The determination of the specimens from the present expedition is not quite certain. They seem to agree well with Nobili's description and figure (which is not quite distinct); but the sculpture in the central part of the dorsal side does not agree in all details with some small specimens determined by Odhner. That nevertheless I have referred them to Odhner's species is due to the presence, especially in the smaller specimen (♀, Stat. 51 D), of symmetrical tufts

of setæ in several places on the carapace; these tufts are, according to Odhner, very characteristic, but are lost in the specimens determined by Odhner. The big specimen (σ , Stat. 69 A) has setæ in the furrows.

Pleopods 1-2 of the male seem to agree with those of *A. savignyi*, but the very apex in plp. 1 is lost.

Distribution. Karachi; Ceylon; Thailand; Singapore; Kei Is. 60-70 m; Torres Strait (Odhner l.c.).

116. *Actæa calculosa* (H. Milne-Edwards) A. Milne-Edwards

Actæa calculosa Alcock 1898, p. 152.

Actæa calculosa Odhner 1925, p. 52.

Occurrence. "Persian Gulf" (Alcock l.c.).

Distribution. Red Sea (Laurie 1914, p. 414); W. Ceylon; Thailand; Sunda Strait 35-55 m; Kei Is. 50 m; W. Australia; N.W. Australia 18-50 m; Cape York; Sydney; Adelaide; Tahiti; China Sea (Odhner l.c.).

117. *Cymo andreossi* var. *melanodactyla* de Haan (Fig. 38 A-B)

Cymo andreossi Alcock 1898, p. 173.

Cymo melanodactylus Alcock 1898, p. 174.

Cymo andreossi (= *C. melanodactyla*) Klunzinger 1913, p. 159, pl. 3 fig. 7, pl. 7 fig. 1.

Occurrence. Iranian Gulf. St. 13. 6.III.1937. Off the east side of the island of Kharg. Coral reef. 2-3 m below the low-water mark. 1 σ , 1 φ , c. 7-8 mm.

Nobili (1906 a, p. 129) notes it from a bank near the island of Arzana.

Remarks. As the two specimens from St. 13 have lost the chelæ, it cannot be seen whether they belong to the form *melanodactyla*, or not; but Klunzinger l.c. considers this form and *C. andreossi* identical.

Pleopod 1 of the male (fig. 38 A) is apically rounded, with some long hairs and numerous small spines. About pleopod 2 nothing especial to remark (fig. 38 B).

Distribution. Red Sea; from E. Africa to Polynesia.

Subfam. XANTHININÆ

118. *Galene bispinosa* (Herbst) de Haan

Galene bispinosa Alcock 1898, p. 136, lit. etc.

Galene bispinosa Chopra 1935, p. 509, figs.

Occurrence. Strait of Hormuz. St. 79. 22.IV.1937. 2

nautical miles S. of the island of Hormuz. 26 m. 1 ♂ 42 mm, 1 ♀ 39 mm.

Remarks. For pleopod 1 of the male, see Chopra l.c., with fig.; apically it has a rather characteristic, blunt, finger-like process. I have not been able to find pleopod 2.

The position of this genus within the subfamilies is probably not quite certain. In Kükenthäl's Handbuch d. Zool. (vol. 3, 1928, p. 1020) Bals has placed it under the subfam. *Menippinæ*, but it is not listed under this subfamily in his papers from 1932 and 1933. It may, however, not belong to the said subfamily which is, according to Bals 1932 and 1933, characterised by the very long pleopod 2; for had pleopod 2 been long, it had not been possible to overlook it in the Iranian specimen. Chopra (l.c.) lists it under the subfam. *Xanthininæ*, without further indication.

Distribution. Indo-Pacific Ocean to Japan, but probably never found in the Iranian Gulf or farther to the West or the Southwest, at any case not in the Red Sea (Klunzinger 1913, p. 161 (257)). For further details regarding the distribution, see Chopra l.c.

119. *Liagora rubromaculata* de Haan (Fig. 39 A)

Liagora rubromaculata de Haan 1833, p. 49, pl. 5 fig. 1.

Liagora rubromaculata Alcock 1898, p. 93.

Liagora rubromaculata Chopra 1935, p. 508, fig.

Occurrence. Iranian Gulf. St. 31. 23.III.1937. The coast N. of Kharg. 28 m. Very soft clay. 1 ♂ 11 mm.

Remarks. Pleopod 1 of the male (fig. 39 A: Chopra l.c., fig. 16) has apically some spines and ciliated setæ. Pleopod 2 is similar to that of *Zozymodes xanthoides* (fig. 39 D). For comparison I have used also the pleopods of a male, 23 mm, from Nagasaki (T. Odhner determ.); the agreement is complete.

Distribution. From the delta of Irrawaddy, India, to Japan.

Subfam. CARPILIINÆ

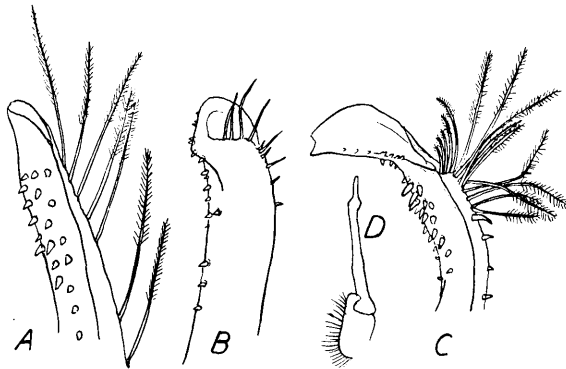
120. *Atergatis integerrimus* (Lamarck) (Fig. 39 B)

Atergatis integerrimus Alcock 1898, p. 95, lit.

Occurrence. 1. Iranian Gulf. St. 2. 27.II.1937. Coral reef 6 nautical miles S. of Bushire. 3 ♂.

2. Gulf of Oman. 27.III.1938. Coral reef near Larak. 1 ♂. It is new to Iranian waters (not recorded by Nobili 1906 a).

Remarks. The biggest specimen has a breadth of 95 mm, the others are not essentially smaller.



St. 39. A: *Liagora rubromaculata* ♂, apex of pleopod 1.
 B: *Atergatis integerrimus* ♂, 60 × 90 mm, Larak, apex of pleopod 1.
 C-D: *Zozymoides xanthoides*, ♂, apex of pleopod 1, and pleopod 2.

Pleopod 1-2 (figured also by Gordon 1934, fig. 14 A,a) were examined in a male, 60 × 90 mm, from Larak. Pleopod 1 (fig. 39 B) is 22 mm in length, very slender. Apex blunt, with a few simple setae and some quite small spines. Pleopod 2 agrees with *Zozymodes xanthoides* (fig. 39 D), in length only $\frac{1}{4}$ of plp. 1.

Distribution. Widely distributed in the Indo-Pacific Ocean, at all events from Mauritius to Japan, but not known from the Red Sea.

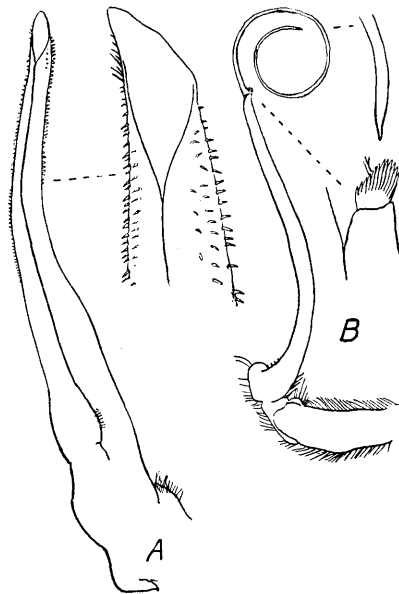


Fig. 40. *Carpilius convexus*, ♂, 42 × 55 mm, Honolulu, pleopods 1-2.

121. *Carpilius convexus* (Forskål) Rüppell (Fig. 40)

Carpilius convexus Alcock 1898, p. 80, lit.

Occurrence. Iranian Gulf. 25.IV.1938. Arabi, washed ashore. 2 big specimens: 1 ♂ 60 × 70 mm, 1 ♀ 70 × 90 mm.

It is probably new to Iranian waters (not recorded by Nobili 1906 a).

Remarks. As the Iranian specimens were dried, I have examined the pleopods of a male, 42 × 55 mm, from Honolulu, Hawaiian Is. Pleopod 1 (fig. 40 A) is about 16 mm in length, of the usual tapering shape; the apex is simple, with some very small spines, but no long hairs. Pleopod 2 is very long, nearly as long as plp. 1; the apical half is very slender, horny and spirally twisted; at the base of this slender portion there is a comb-shaped process (fig. 40 B).

Distribution. Seychelles, Red Sea, India, Laccadives, Maldives, Torres Strait, Hawaiian Is. (Laurie 1914). Also Samoa etc. (specimens in the Zool. Museum, Copenhagen).

122. *Zozymodes xanthoides* (Krauss) (Fig. 39 C-D)

Atergatis carinipes Paulson 1875, pp. 8, 21, pl. 4, fig. 4-4 b.

Zozymodes xanthoides Klunzinger 1913, p. 71, lit.

Occurrence. Iranian Gulf. 7.IV.1938. Nabiyyu Tunb. 1 ♂ 6.5 mm.

It is new to Iranian waters.

Remarks. Pleopod 1 of the male has the usual form (fig. 39 C); the distal end is extremely thin, membranous, not tubiform, with teeth at all events along one edge. Proximally of this portion there are some long ciliated setæ and some small stout spines. About plp. 2 nothing to remark (fig. 39 D).

Distribution. S. Africa (Durban); Red Sea (several occurrences).

123. *Chlorodius niger* (Forskål) (Fig. 38 D-E, p. 152)

Chlorodius niger Alcock 1898, p. 160.

Chlorodius niger Klunzinger 1913, p. 121, pl. 6 figs. 10 a-d.

Occurrence. Iranian Gulf. St. 13. 6.III.1937. Off the east end of the island of Kharg. Coral reef, 2-3 m below low-water mark. 5 specimens, incl. ♀ up to 10 mm and ♂ up to 9 mm.—St. 41. 29.III. 1937. The harbour of Manama, island of Bahrein. 2-4 m. Sand, brown algæ. 1 ♀ ovig. 11 mm.

Nobili (1906 a, p. 128) records it from a bank near the island of Arzana.

Remarks. Pleopod 1 of a male (9 mm, St. 13; fig. 38 D; see also Miyake, Trans. Nat. Hist. Soc. Formosa, vol. 28, no. 177, 1938, p. 192, fig. 3 b (*Chlorodiella nigra*)) is in length equal to abdomen, of the usual form, angularly bent near the apex; on one side of the apex there are rather long spines, on the other side short spines. The very apex is membranous, rounded. Pleopod 2 (fig. 38 E) very short, evenly tapering.

Distribution. Widely distributed in the Indo-Pacific Ocean, from E. Africa and Red Sea to Polynesia.

124. *Phymodius ungulatus* (H. Milne-Edwards) (Fig. 38 F, p. 152)

Phymodius ungulatus Alcock 1898, p. 162.

Phymodius ungulatus Gordon 1934, p. 36, fig. 17 b, 18 b, 19 c.

Occurrence. Iranian Bay. Nobili (1906 a, p. 129) records it from a bank of pearl-oysters c. 25° N., 55° E., 20-30 m, and from a bank near the island of Arzana.

Remarks. Pleopod 1 of the male, see Gordon 1934, fig. 18 b; plp. 2, see fig. 38 F.

Distribution. Red Sea; Indo-Pacific Ocean.

125. *Phymodius granulatus* (Targioni-Tozzetti)

Phymodius granulatus Klunzinger 1913, p. 227, pl. 3 fig. 3.

Chlorodopsis arabica Laurie 1915, p. 450, pl. 42, pl. 43 figs. 2, 4 a-4 d.

Phymodius granulatus Gordon 1934, p. 41, figs. 19 b, 20 b, 21 b.

Occurrence. Iranian Gulf. St. 2. 27.II.1937. Coral reef 6 nautical miles S. of Bushire. 9 specimens (♂, ♀) up to 16.5 mm.—St. 13. 6.III.1937. Coral reef off the east side of the island of Kharg. 2-3 m under low-water mark. 1 ♂ 10 mm, 1 very small specimen.

It is new to Iranian waters.

Remarks. Pleopods 1-2 were examined in the largest specimen (16.5 mm, St. 2). Plp. 1 agrees well with Gordon (1934, fig. 21 b); regarding plp. 2 nothing to remark.

Distribution: Red Sea incl. of Suez Canal.

Subfam. ETISINÆ

126. *Etisus lævimanus* Randall

Etisus lævimanus Alcock 1898, p. 131.

Etisodes lævimanus Klunzinger 1913, p. 141, pl. 6 fig. 13.

Occurrence. Iranian Gulf. "Persian Gulf" (Alcock l.c.). Bank near the island of Arzana, and island of Bahrein, littoral (Nobili 1906 a, p. 121).

Remarks. Seychelles, Red Sea, India, Maldives, Laccadives, Torres Strait, Hawaiian Is. (Laurie 1914, p. 413).

127. *Etisodes anaglyptus* (H. Milne-Edwards)

Etisodes anaglyptus Alcock 1898, p. 133.

Etisus (Etisodes) anaglyptus Klunzinger 1913, p. 149, pl. 1 fig. 12, pl. 6 fig. 16.

Occurrence. Iranian Gulf. St. 49 D. 6.IV.1937. 2.5 nautical miles E.S.E. of Bustani. 5-6 m. Algæ, sand. 1 small ♂, 7 mm.

Alcock l.c. records it from the "Persian Gulf".

Remarks. Pleopod 1 of the very small male from St. 49 D very much resembles that of *Carpilius convexus* (fig. 40 A), but has in the apical part only very few spines. Plp. 2 could not be found.

Distribution. Red Sea, India, Maldives, Laccadives (Laurie 1914, p. 413) Philippine Is. and N.E. Australia (Miers 1884, p. 183). In the Zool. Museum, Copenhagen there are specimens from Jolo (Philippine Is.; T. Odhner determ.) and from Samoa.

128. *Etisodes electra* (Herbst) Miers (Fig. 41 A)

Etisodes electra Alcock 1898, p. 133.

Etisodes electra Nobili 1906 a, p. 122.

Etisodes electra Klunzinger 1913, p. 147, pl. 1 fig. 11, pl. 6 fig. 15.

Occurrence. Iranian Gulf. Bank of pearl-oysters c. 25° N., 55° E., 20-30 m, and bank near the island of Arzana (Nobili l.c.).

Remarks. In the Zoological Museum, Copenhagen, there is a male from Honolulu, 7 mm (T. Odhner determ.). Pleopod 1 (fig. 41 A) has the usual form, is rather slender, and has on one edge of the apex c. 7 plumose setæ, on the other edge c. 6 anchor-shaped spines. Plp. 2 was very damaged.

Distribution. Red Sea, Seychelles, India, Maldives, Laccadives, Torres Strait, Hawaiian Is. (Laurie 1914, p. 413).

129. *Halimede ochtodes* (Herbst) (Fig. 41 B-D)

Cancer ochtodes Herbst 1790, p. 158, pl. 8 fig. 54.

Galene ochtodes Adams & White 1850, p. 43, pl. 10 fig. 2.

Polycremnus ochtodes Alcock 1898, p. 135.

Halimede hendersoni Nobili 1906 a, p. 123, pl. 6 fig. 31.

Halimede ochtodes (Herbst) = *H. hendersoni* Nobili, Odhner 1925, p. 82.

Medæus nodosus A. Milne-Edwards 1873, p. 212, pl. 8 fig. 2.

? *Halimede thurstoni* Henderson 1893, p. 360, pl. 30 figs. 13-14.

Halimede ochtodes + ? *H. thurstoni* Rathbun 1910, p. 353, figs.

Occurrence. Iranian Gulf. St. 3. 3.III.1937. Bushire, the roads. 1 ♂ 10 mm.—St. 10. 5.III.1937. Just E. of the island of Kharg.

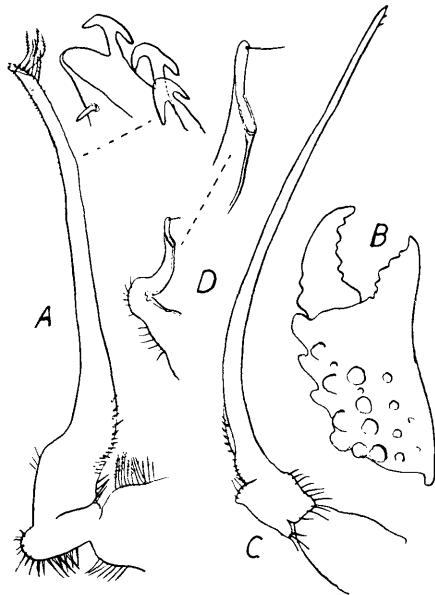


Fig. 41. A: *Etisodes electra*, ♂, pleopod 1.
B-D: *Halimede ochtodes*, ♂, 11 mm, St. 78; B: right chela, outer side;
C-D: pleopods 1-2.

16-17 m. Sand. 1 ♂ 9 mm.—St. 25. 14.III.1937. 63 nautical miles W.¹/₂S. of Bushire. Sand with some clay. 49 m. 2 ♂ 10-12 mm, 1 very small specimen.—St. 39 D. 27.III.1937. 12 nautical miles E.N.E. of the light-ship at Bahrein. 23 m. Shell-gravel. 1 ♂ 10 mm, 1 small specimen.—St. 53 D. 8.IV.1937. 2 nautical miles E. by S. of the northeastern point of the island of Qais. 27 m. Sand, clay. 1 ♂ 11 mm.—St. 78. 14.II.1938. W. of the island of Kharg. 29 m. Soft bottom. 8 specimens 10-11 mm.

Nobili (l.c.) records it from a bank of pearl-oysters c. 25° N., 55° E., 20-30 m, and from a bank near the island of Arzana (type-localities of *H. hendersoni*).

Remarks. The present specimens agree well with Nobili's description and figure (he has but one photo, no detail figures), but the sculpture of the carapace is a little more distinct, and the specimens are somewhat smaller, for Nobili gives the following lengths: ♂ 16 mm, ♀ 15 mm. Besides Nobili remarks that in the large specimens the two hindmost lateral teeth on each side of the carapace are rounded, but that they are conical in a young male. In all specimens taken by the Danish expeditions they are conical and acute, which is no doubt in connection with the small length, up to 12 mm. Further the front is cleft into two parallel lappets separated by a marked interstice. As Nobili has no figure of the chelæ, I give one (fig. 41 B).

About the pleopods of the male nothing especial is to be remarked; see fig. 41 C-D.

O d h n e r l.c. writes that no doubt *H. ochtodes* and *H. hendersoni* are identical. Since we have several specimens of *H. ochtodes* in the Zoological Museum, Copenhagen, determined by M. R a t h b u n (1910, p. 352; from Thailand) and by T. O d h n e r (from Singapore and Manila Bay; records not published), I have compared all these specimens with the material from Iranian waters. Small specimens (up to 10 mm; Thailand) agree excellently with those from Iran. Bigger specimens (14-17 mm; from Singapore and Manila) have the dorsal side of the carapace a little more smooth, nearly as in N o b i l i 's photo of *H. hendersoni* which has a similar length (viz., 15 or 16 mm), or still more smooth, as in the fig. in A d a m s & W h i t e. In these specimens of 14-17 mm the fissure in the front is somewhat more narrow than in the small specimens, and the frontal lappets are apically a trifle more rounded. The antero-lateral teeth are rather short and not acute, and the carpus and the hand of the chelipeds have the tubercles on the lateral side (but not on the upper edge) much more depressed. The tubercles on the upper edge of the carpus and the hand are nearly pisiform. The largest specimen (♀ ovig., 31×42 mm, from Thailand) agrees fairly well with H e r b s t's figure. It has the carapace still more smooth than in the smaller specimens, but the front is more protruding and has a deep median depression but is not divided into two lobes. The lateral teeth are very little projecting, but broad and rounded. The tubercles on the lateral side of the hand are still lower than in the smaller specimens.

No doubt O d h n e r is right when considering the two species synonymous; *H. hendersoni* represents the young, *H. ochtodes* the bigger specimens.

O d h n e r (l.c., p. 81) writes also that "*Medæus nodosus* A. M.-Edw., dessen Typus sich in Paris nicht auffinden lässt, gehört unzweifelhaft zu *Halimede*." When comparing M i l n e - E d w a r d s's brief description and his figures with the Iranian specimens of *H. ochtodes* we find, that agreement is very close (—and *Medæus nodosus* is of equal size, viz., 10×12 mm—). I have not been able to find other differences than that the front is entire, not bilobate (—but in bigger specimens of *H. ochtodes* it is entire, see above—), and the more dense armature of tubercles on the hand. Otherwise the agreement is so close, that no doubt also *Medæus nodosus* M.-Edw. is synonymous with *H. ochtodes*.

R e m a r k s r e g a r d i n g *Halimede thurstoni* R a t h b u n 1910. Miss R a t h b u n 1910, p. 353 records some specimens of *H. thurstoni* from Thailand. Also these specimens (except a few which were taken

out for the U. S. Nat. Mus.) are in the Zoological Museum of Copenhagen. Most of them are small, up to 8 mm; only a single specimen is bigger, viz., 16 mm. They all agree fairly well with equal-sized specimens of *H. ochtodes*, but none of them have the front markedly divided into two lobes. All Miss Rathbun's specimens of "*H. thurstoni*" have 4 pairs of lateral teeth, quite like *H. ochtodes*, and therefore they cannot belong to the species *H. thurstoni* Henderson which is characterised by having only 3 pairs of teeth. On the other hand, *H. thurstoni* is, according to Henderson's description and drawing, so closely allied to *H. ochtodes*, that were it not for the different number of lateral teeth (3, not 4, pairs), one should be inclined to consider them synonymous. Possibly Henderson has overlooked the anterior, small, and more ventrally set tubercle; Henderson's type specimen (from Tuticorin, S. India) was only 9 × 10 mm, and other specimens are not recorded, apart from those listed above, determined by Miss Rathbun.

Distribution. Not found in the Red Sea. From the Iranian Gulf (see above) to Sunda Strait and Philippine Is. (specimens in the Zoological Museum, Copenhagen), possibly to New Caledonia (*Medæus nodosus* A. Milne-Edwards 1873); it seems to live in shallow water.

Subfam. TRAPEZIINÆ

130. *Tetralia glaberrima* (Herbst) (Fig. 42 A-B)

Tetralia glaberrima Alcock 1898, p. 223.

Occurrence. Iranian Gulf. leg. 31.I.1938. Coral reef near the island of Kharg. 3 m. 1 ♀ 11.5 mm with ♂ 7.5 mm in copula; 1 ♂ 6.5 mm.

Nobili (1906 a, p. 143) records it from the island of Arzana.

Remarks. Pleopod 1 ((fig. 42 A) of the male is very slightly tapering towards the apex, and in the distal two fifths set with very stout spines. Pleopod 2 is half as long as plp. 1, apically tapering, and distally with a few spines which are apically cleft (fig. 42 B).

Distribution. From the Red Sea and Seychelles to Torres Strait (Laurie 1914, p. 415).

131. *Trapezia cymodoce* (Herbst?) Alcock (Fig. 42 C-D)

Trapezia cymodoce Alcock 1898, p. 219.

Occurrence. Iranian Gulf. St. 13. 6.III.1937. Off the east side of the island of Kharg. Coral reef. 2-3 m. Under the low-water mark. 2 ♂ 11-15 mm, 1 ♀ 10 mm.

It is new to the Iranian Gulf; the locality (St. 17) listed in

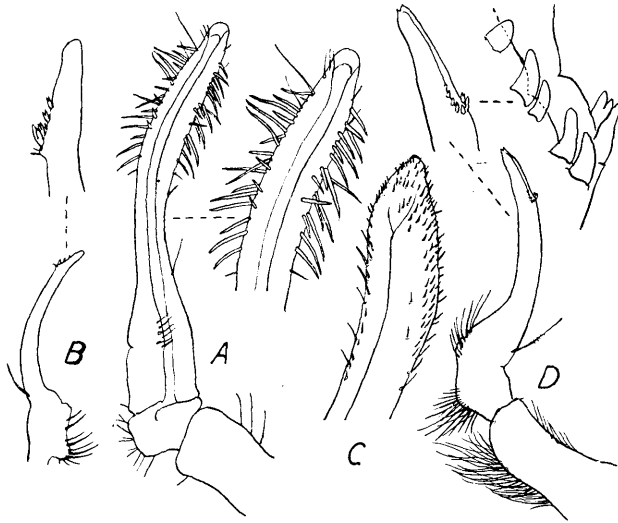


Fig. 42. A-B: *Tetralia glaberrima* ♂, 6.5 mm, Iran without special locality, pleodos 1-2.

C-D: *Trapezia cymodoce* ♂, 15 mm, St. 13, pleopods 1-2.

Nobili's paper on the Iranian Gulf (1906 a, p. 143) is Massawa in the Red Sea (see Nobili 1906 a, p. 14).

Remarks. The synonymy of the species is not quite certain (see for instance Klunzinger 1913, p. 318); but the present specimens agree with Alcock's characterization of *T. cymodoce* (Alcock 1898, p. 218).

Pleopod 1 of the male (15 mm) (fig. 42 C) rather similar to *Tetralia glaberrima*; but the spines in the distal end are much shorter, in length hardly over $\frac{1}{4}$ of the diameter of the appendage. Also plp. 2 agrees with *Tetralia*; but the very apex has two small teeth; the spines in the apical end are simple, only one seems to be apically cleft (fig. 42 D).

Distribution. A widely distributed Indo-Pacific species; but because of the uncertain synonymy the distribution cannot be noted in all details. Laurie (1914, p. 415) gives it as follows: Red Sea; Seychelles; on the Iranian Gulf, (see above); India; Laccadives, Maldives; Ceylon; Torres Strait; Hawaiian Is.

Subfam. ?

132. *Camptoplax coppingeri* Miers

Camptoplax coppingeri Miers 1884, p. 239, pl. 24 fig. A.

Camptoplax coppingeri Nobili 1906 a, p. 146.

Occurrence. Iranian Gulf. Bank of pearl-oysters c. 25° N., 55° E., 20-30 m, 1♂ 7.5 × 9 mm (Nobili l.c.).

Remarks. The genus is removed from the fam. *Goneplacidae* to *Xanthidae*, but the subfamily is uncertain (see Alcock 1900, p. 282).

Distribution. Prince of Wales Channel, Torres Straits, 14-18 m, 2 ♂ (type-locality; Miers l.c.).

Dentoxanthus n.gen.

Diagnosis. The genus may be defined as follows. Carapace rhomboid, but rounded fore and aft, moderately broad, with most regions well defined. Front rather projecting, depressed, in breadth at least one third of the maximal breadth of carapace. Orbit small, with two faintish suture lines above; no inner orbital angle; outer orbital angle confluent with the antero lateral margin which is thin and crest-like and without teeth, but with three small incisions. Antero-lateral borders end either (in female; no male is known) in a very large horizontal lateral spine. Antennæ 1 (antennulæ) fold obliquely. Anterior edge of external maxillipeds is almost transverse. Chelipeds subequal (in female; male not known), somewhat *Calappa*-like, compressed, with a sharp crest on metacarpus and proximal end of movable finger; fingers dentate, subacute. Walking legs rather slender, subequal, with a sharp crest on fore (outer) margin of merus, carpus and proximal end of metacarpus; fingers acute. On the palate no ridges defining the efferent branchial channels. Abdomen of female (male not known) has 7 separate segments.—

The specimen described below as *D. iranica* n. sp. was sent to Dr. Balss for examination; my most sincere thanks are due to Dr. Balss who has helped me to classify this very peculiar species.

Balss writes „Diese Krabbe hat auch mir viele Mühe gemacht, da ich eine derartige Form nie gesehen habe. Es handelt sich meiner Ansicht nach wegen der Form des Mundfeldes um eine Xanthide (gen. et sp. nov.), die wohl in der Nähe von *Parapanope* de Man 1895¹ (= *Hoploxanthus* Alcock 1898) gehört. Bemerkenswert sind:

1. Die starke Verlängerung des letzten Seitendornes² die sonst bei Xanthiden nicht vorkommt, bei Portuniden aber gewöhnlich ist.

2. Die Ausbildung der Stirn, die so stark vorspringt, was ebenfalls bei Xanthiden sehr ungewöhnlich ist.

¹ *Parapanope* n. gen. de Man 1895, p. 513.

Parapanope euagora n. sp. de Man 1895, p. 514; de Man 1897, pl. 12 fig. 4.

Hoploxanthus n. gen. Alcock 1898, p. 125.

Hoploxanthus hextii n. sp. Alcock 1898, p. 126; Illustr. Zool. Investigator, Crust., 1899, pl. 37 fig. 1.

Hoploxanthus cultripes n. sp. Alcock 1898, p. 126 (no fig.).

H. hextii Alcock 1898 = *Parap. euagora* de Man 1898, *vide* de Man 1902, p. 595.

² The generic name *Dentoxanthus* was chosen in allusion to these long lateral spines or teeth.

3. Die Form der Beine, die sehr denen von *Carpilodes* ähneln³ (vergl. z. B. *C. lophopus* bei O d h n e r 1925, Taf. I/13); doch hat *Carpilodes* eine andere Skulptierung des Carapax."—

The genus *Parapanope* with which B a l s s compares the present form belongs to the subfam. *Xanthinae* of the section *Hyperolissa*, "in which ridges defining the efferent branchial channel are either altogether absent or are present on the posterior part of the palate only." (A l c o c k 1898, p. 70); in *Dentoxanthus* no ridges at all could be found.

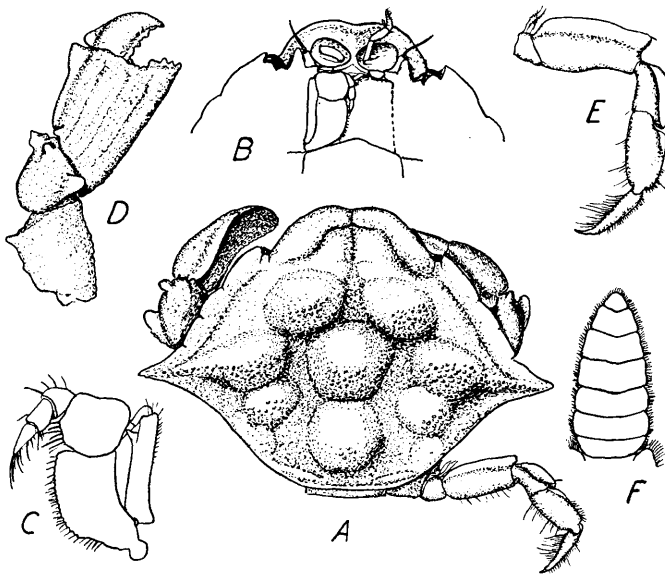


Fig. 43. *Dentoxanthus iranicus* ♀.
A: dorsal side; B: fore end, ventral view; C: outer maxilliped; D: right chela;
E: 1st walking leg; F: abdomen.

133. *Dentoxanthus iranicus* n. sp. (Fig. 43)

Occurrence. Gulf of Oman. St. 107. 1.IV.1938. 24 miles W.N.W. of Ras Maidani, 10 m, hard clay with sand. 1 ♀ 7 × 10.5 mm.

Description. Carapace, length two thirds of the greatest breadth = twice the greater depth, the great breadth is due to the much projecting lateral spines. Body rather convex fore and aft, but marginal part of front and antero-lateral borders on a much lower level than the rest of the body.

³ I find the walking legs more similar to those of several other genera, e.g. *Zozymus* (*Z. æneus* L., see D a n a 1852, pl. 10 fig. 4), *Lophozozymus* (*L. cristatus* A. Milne-Edwards 1872, pl. 6 fig. 4), *Lophactæa* (*L. violacea*, ibid. pl. 6 fig. 1), or *Atergatis* (*A. dilatatus*, ibid. pl. 5 fig. 6).

Front rather projecting, marginally depressed, rather evenly rounded, with an extremely slight median excavation; breadth about two fifths of the maximal breadth of carapace, length about one third of the breadth. Antero-lateral margin (either side) in length two thirds of the length of carapace, depressed; it has no teeth (apart from the outer orbital angle and the long and acute lateral tooth) but is rather evenly curved and with three small rimæ, so that it is divided into two shorter lobes (in the central part) and two broader lobes (one of which at either end). Postero-lateral margin rather evenly curved, but somewhat concave behind the lateral teeth.

The dorsal surface of carapace rather uneven, set with small granulations. The dorsal regions are well defined: meso-gastric and the two proto-gastrics are prominent as also the cardiac; the branchial regions have three elevations each, the anterior of which extends into the lateral tooth.

On the ventral surface of carapace several details could not be stated with certainty. Inter-antennular septum is not broad. Basal joint of antenna 2 not reaching the front. Lower orbital border has inner angle strongly developed, and one tooth (or 2 teeth) behind the eye. External maxillipeds, see fig.

Chelipeds rather heavy and equal, rather *Calappa*-like, fit into the underside of carapace, in length equal to the first walking leg. The distal joints, from merus to dactylus, are on the inner (median) side smooth and rather flat while the outer (lateral) side is granulous and much convex; the dorsal edge of these joints (especially metacarpus and proximal part of dactylus) is rather sharp, lamellar, while the ventral edge is much more blunt. Merus has at the upper margin a process; carpus which is a trifle shorter than merus, has near the distal end 3 or 4 processes, the most ventral and largest of which is rather lamellar and directed just outwards. Metacarpus as long as merus and carpus combined, maximal breadth two thirds of maximal length; on the outer side traces of three granulous longitudinal ridges. The fixed finger very short, not longer than broad, with about 5 teeth; the movable finger a trifle longer.

Walking legs somewhat decreasing in length from no. 1 to no. 4. Merus is about as long as carpus and metacarpus combined, dactylus in length equal to metacarpus. Merus is very broad, with a broad crest along the fore margin and a deep longitudinal concavity behind it; a similar crest and concavity are present also in carpus, but in metacarpus only in the proximal end.

Abdomen is lanceolate, 7-articulate, broadest in second segment.

II. *Catametopa*

Fam. GONEPLACIDÆ

Subfam. PSEUDORHOMBILINÆ

134. *Carcinoplax (purpurea Rathbun?)* (Fig. 44)*Carcinoplax purpurea* Rathbun 1914, p. 140, no. fig.*Carcinoplax purpurea* Balss 1929, p. 24.

Occurrence. Iranian Gulf. St. 25. 14.III.1937. 63 nautical miles W.¹/₂S. of Bushire. 49 m. Sand with a little clay. 2 ♂, 29 and 15 mm.

It is new to Iranian waters.

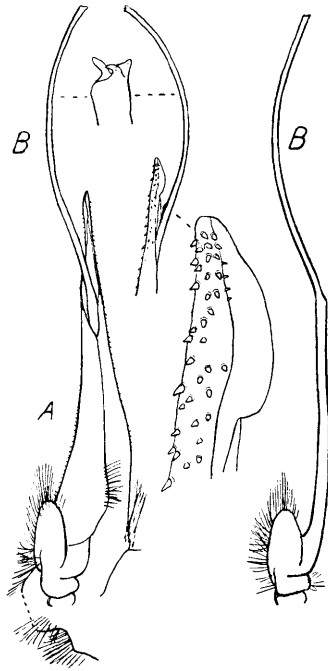


Fig. 44. *Carcinoplax purpurea* ♂.

A: pleopod 1 with pleopod 2 (B) lying in the natural position within it. B: pleopod 2.

Remarks. Rathbun l.c. gives a description, but no figure. Since then it has been mentioned only by Balss l.c.

Pleopod 1 (fig. 44 A) of the big male is most tapering toward the apex. It is tubular to the very apex, but in the distal third the tube is open in the underside; it is set with numerous small spines and 12 mm in length. Pleopod 2 (fig. 44 B) lies in the tube of plp. 1 and is much longer, 16 mm. Proximally it has an oval lobe, but the distal joint of the appendage is slender, filiform, and a trifle more slender in the distal than in the prox-

imal half; the distal half is brown and horny and extends far beyond pleopod 1.

Distribution. Red Sea $24^{\circ}15' N.$, $33^{\circ}37' E.$, 562 m (Balss l.c.). Philippine Is. $13^{\circ}42'50'' N.$, $121^{\circ}51'30'' E.$, 175 m (type-locality; Rathbun l.c.).

135. *Eucrate sulcatifrons* (Stimpson) (Fig. 45 A-B)

Eucrate affinis de Man 1888, p. 89, pl. 5 figs. 5-7.

Eucrate sulcatifrons Tesch 1918, p. 158 (with lit. etc.).

Occurrence. 1. Iranian Gulf. St. 11. 5.III.1937. E. of Kharg, 73 m. 1 ♀ c. 7 mm.—St. 33. 23.III.1937. The coast of Kharg, 31 m. Very fine mud. Trawl. 1 ♂ 13 mm.—St. 34. 23.III.1937. $29^{\circ}27' N.$, $50^{\circ}16' E.$ Coarse gravel, shells. $28\frac{1}{2}$ m. Petersen-grab. 4 specimens up to 8 mm.—St. 127. 10.IV.1938. 3 nautical miles S.S.W. of Asalu $27^{\circ}25' N.$, $52^{\circ}36' E.$ 17-10 m. Shells and a little clay. 1 small specimen.

2. Strait of Hormuz: St. 67 A. 17.IV.1937. The outermost anchoring-place at the island of Henjam. 23 m. Sand etc. 1 very small and very defective specimen; the determination not certain.

The species is probably not new to these waters, for the specimens recorded by Nobili 1906 a, p. 145 under the name of *E. crenata* de Haan are rather small (a ♀ ovig. is 11×14.5 mm) and thus much smaller than normal *E. crenata* (de Haan) which have the carapace 30-40 mm in breadth (Tesch l.c., p. 158). Nobili's localities are: bank of pearl-

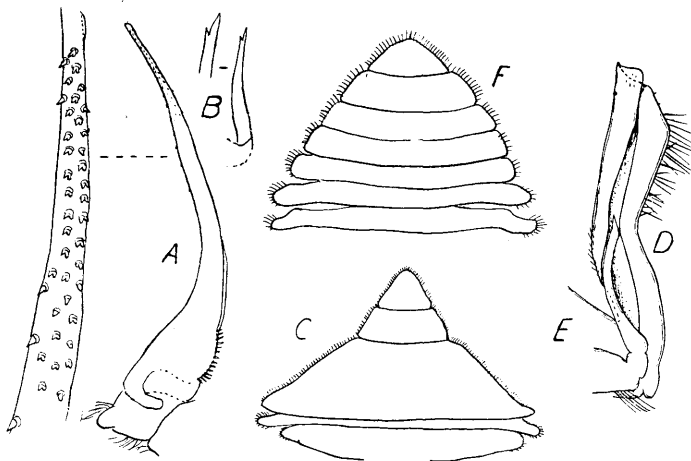


Fig. 45. A-B: *Eucrate sulcatifrons* ♂, 23 mm, St. 33, pleopods 1-2.
C-E: *Libystes nitidus* ♂, St. 25 A. C: abdomen; D: pleopod 1 with pleopod 2 (E) lying in the natural position within it.
F: *Libystes nitidus*, ovigerous ♀, 4.5×6.5 mm, from $5^{\circ}33' S.$, $105^{\circ}18' E.$, abdomen.

oysters c. 25° N., 55° E., 20-30 m, and banks of pearl-oysters near the island of Arzana.

Remarks. No doubt the specimens from the present expedition belong to *E. sulcatifrons*, not to *E. crenata* (de Haan); but the two species are very closely allied and probably synonymous (see *Tesch* l.c.). If, however, the two species are to be kept separated, *Tesch* "thinks it preferable to keep the name *crenata* for the Japanese specimens, that grow to a large size, and to refer the much smaller specimens from the Indian Ocean to *E. sulcatifrons*" (*Tesch* l.c., p. 159).

Pleopod 1 of the big male (13 mm, St. 33) (fig. 45 A) is apically tapering, somewhat curved, apically with numerous small bifid spines. Pleopod 2 in length c. a third of plp. 1, slender, bifid (fig. 45 B).

Distribution (*vide* *Tesch* l.c.) Indian Ocean, widely distributed: from the Seychelles to the Mergui Archipelago, the Andamans, Suvadiva Atoll, Madras, and to the Gulf of Thailand; Hong Kong, the Moluccas, Australia (Port Denison, Port Molle), always c. 40-80 m. A subspecies (*atlantica*) is described from Goree Island, Senegambia.

The closely allied (synonymous?) species *E. crenata* (de Haan) (further see *Shen* 1932, p. 114, figs., lit.) was originally described from Japan, but it has been recorded from the Red Sea (Aden) (*Nobili*, 1906 b, p. 296) and the variety *E. crenata* var. *dentata* (*Stimpson*) *Alcock* from "Red Sea" and Djibouti (*Nobili* 1906 b, p. 297).

136. *Libystes edwardsi* *Alcock*

Libystes edwardsi *Alcock* 1900, p. 306.

Libystes edwardsi *Illustr. Zool. "Investigator"*, Crust., pl. 61 fig. 1.

Occurrence. "Persian Gulf" (*Alcock* l.c.).

Strait of Hormuz: St. 91. 24.III.1938. Larak, 24 m. *Petersen*-grab. 1 dried specimen, 6.5 × 11 mm.

Distribution. Andamans (*Alcock* l.c.).

137. *Libystes nitidus* *A. Milne-Edwards* (Fig. C-F)

Libystes nitidus *A. Milne-Edwards* 1868, p. 83, pl. 20 figs. 5-7.

Libystes nitidus *Nobili* 1906 b, p. 297.

Libystes nitidus *Tesch* 1918, p. 178 (key; no new record).

? *Libystes alphonsi* *Alcock* 1900, p. 307.

? *Libystes alphonsi* *Illustr. Zool. "Investigator"*, Crust., pl. 61 fig. 2.

Occurrence. Iranian Gulf. St. 25 A. 14.III.1937. 63 nautical miles W.¹/₄S. of Bushire. 49 m. Sand, a little clay. 1 ♂ c. 3.5 × 6 mm.

The species is new to these waters.

Remarks. The present specimen agrees fairly well with *Milne-Edwards* l.c. and *Nobili* l.c., but is much smaller than the two

specimens hitherto recorded: the type (♀) was 15×24 mm, the ♀ juv. from Djibouti 7.5×12 mm. It has been compared with the three specimens (recorded below) from $5^{\circ}33' \text{ S.}, 105^{\circ}18' \text{ E.}$; they are about equal-sized (♂ 3×4.5 mm, ♀ ovig. 4.5×6.5 mm).

All the specimens I have had for examination have on the anterolateral margin of the carapace on each side three small granulae, as recorded by Nobili, and the chelae have the fingers very slender and the hand rather swollen, but there seems to be no sexual difference in the chelae.

Hitherto the male was unknown. The abdomen of the male (fig. 45 C) is triangular, the breadth c. $1\frac{1}{2}$ times the length; the greatest breadth is at the base of the coalesced 3rd-5th segments. 1st and especially 2nd segments very short. Pleopod 1 (fig. 45 D) of the male is very stout, broad, apically truncate and not tapering, with some setae in the distal half; pleopod 2 (fig. 45 E) is of the usual shape, half as long as plp. 1. The abdomen of the female (fig. 45 E) is triangular, the breadth is $1\frac{1}{3}$ times the length; the greatest breadth is near the base, and all the 7 segments are free.

Most probably the present species is synonymous with *L. alphonsi* Alcock 1900, known (by a single specimen, 4×7 mm) from the Andamans.

Distribution. Zanzibar, depth ?, 1 ♀ (type-locality; A. Milne-Edwards l.c.); Red Sea: Djibouti, depth ?, 1 ♀ (Nobili l.c.); $5^{\circ}33' \text{ S.}, 105^{\circ}18' \text{ E.}$ (S. Sumatra), 27 m, mud, pumice (3 specimens (♂, 2♀ ovig.)), Th. Mortensen leg. 1922, determined by T. Odhner 1924; in the Zoological Museum, Copenhagen).

138. *Litocheira* (*amoyensis* Gordon ?) (Fig. 46)

Litocheira amoyensis Gordon 1931, p. 545, figs.

Occurrence. Indian Gulf. St. 19 B. 11.III.1937. 3 nautical miles S.E. by $S.\frac{1}{2}S.$ of Bushire. 8 m. Clay. Petersen-grab. 1 specimen 2 mm.—St. 28. 18.III.1937. 2 nautical miles S. by E. of the outermost light-buoy at Bushire. 7 m. Gray brown clay. 1 ♂ 4 mm.—St. 28 C. Ibid. Petersen-grab. 1 ♂ 3 mm.—St. 29 A. 18.III.1937. C. 3 nautical miles S. by E. of the outermost light-buoy at Bushire. 10 m. Clay. Petersen-grab. 1 ♂ 8 mm.—St. 31 C. 23.III.1937. The coast N. of the island of Kharg. 28 m. Clay. Petersen-grab. 1 ♂ 6.5 mm.—St. 35 C. 24.III.1937. 3 nautical miles N.W. of the island of Kharg. 32 m. Clay. Petersen-grab. 1 specimen 3 mm.—St. 47 D. 5.IV.1937. 2 nautical miles W. of Qyanat. 7.5 m. Sandy clay. 1 ♀ 7 mm.—St. 90. 23.III.1937. $26^{\circ}31' \text{ N.}, 54^{\circ}47' \text{ E.}$ 12 m. Clay etc. 1 specimen 3 mm.

It is new to Iranian waters.

Remarks. Miss Gordon had only a single specimen, a male, 6.4×4.6 mm. A few of the Iranian specimens are larger, up to 8 mm in length. They agree excellently with Gordon's description and figures; but there are a few differences. There is no felt on the dorsal side of the carapace which is shining and polished and without any trace of areolation.

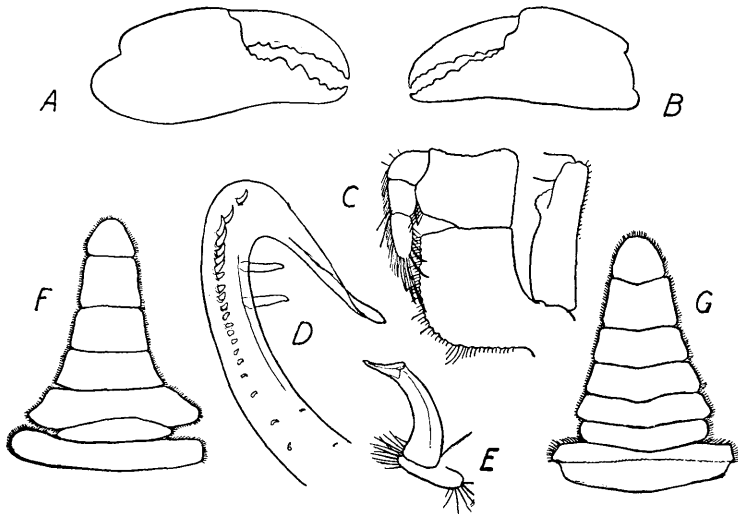


Fig. 46. *Lithocheira (amoyensis?)*. A-F: ♂, St. 29 A; G: ♀, St. 47 D. A-B: right and left chela, outer side; C: outer maxilliped; D-E: pleopod 1, apex, and pleopod 2. F: abdomen ♂; G: abdomen ♀.

I have not been able to trace "one or two closed, absolute notches" in the outer half of the orbital border (see also Gordon fig. 24). The outer maxilliped (not drawn by Gordon) has merus broader than long, with the outer anterior corner somewhat projecting. The chelæ of the male are approximately, but not quite, equal in size; the right is somewhat more slender, but not essentially shorter than the left; they are shining and devoid of felt. Silky hairs are present on the arm, on the wrist (but not on the chelæ), on the walking legs, and on the under side of the carapace near the antero-lateral border. I give a fig. of the male abdomen (Gordon has none). Pleopod 1 of the male is somewhat different from that described by Gordon. In the Iranian specimen dissected (length 8 mm) the apical end has two rather long and a series of small spines (no spines in Gordon's fig.), and the right and left pleopods are in contact along the distal third of their length (as in other species of the genus), not crossing over near the apex (Gordon fig. 25 C). Pleopod 2 is of the usual shape.

The female differs but very little from the male. Even the chelæ are like those in the male, and the abdomen is rather narrow.

The differences from the specimen described by Gordon are so small that there may be no doubt as to the correctness of the determination; the disagreements may be due to difference in size.

Distribution. Amoy, southern China (Gordon l.c.).

Subfam. GONEPLACINÆ

139. *Goneplax maldivensis* Rathbun

Goneplax maldivensis M. Rathbun 1902, p. 124, figs. 3-5.

Goneplax maldivensis Tesch 1918, p. 183, pl. 9 fig. 1.

Occurrence. Iranian Gulf. St. 11. 5.III.1937. E. of the island of Kharg. 13 m. Sand. 2 ♂, 5 and 6 mm.—St. 26. 15.III.1937. Off the east side of the island of Kharg. 18 m. 1 ♂, c. 5 mm, defective.—St. 34 B. 23.III.1937. 29°27' N., 50°16' E. 28½ m. Coarse gravel, shells. Petersen-grab. 1 ♀ ovig. 6 mm.—St. 39 A. 27.III.1937. 12 nautical miles E.N.E. of the light-ship at Bahrein. 23 m. Shell-gravel. 1 ♂, 3 mm, very defective; all the legs except chelæ are lost, the determination therefore not certain.

The genus is not new to the Iranian Gulf; for Alcock (1900, p. 317) records a young female of *Goneplax* sp. from these waters.

Remarks. The specimen from St. 11 which are better preserved than the other ones, agrees fairly well with the description and figures of Rathbun and Tesch; but it is to be noted that the chelæ of the males agree better with Rathbun's fig. than with that of Tesch, and there is a great tuft of setæ on the inner side of the base of the fingers of the chelæ, especially in the larger male; and on the three distal joints of the last pair of legs there are plumose setæ only on the inner margin, but simple hairs on the outer margin (cf. Tesch l.c. fig. 1 c, showing plumose setæ on both margins). Abdomen of the male agrees excellently with Rathbun's fig.

Pleopod 1 of the male (St. 11) is slender, with a few setæ, but unfortunately the apex is broken. Pleopod 2 is small, slender, apically acute as in many other Brachyura, in length probably c. ¼ of plp. 1.

Distribution. Gan Island, Addu Atoll, Maldives, at anchorage, 40 m (type-locality; Rathbun l.c.). Between Wowoni and Buton Isl., S.E. of Celebes, 75-94 m ("Siboga" St. 204; Tesch l.c.). Off Doelah, Kei Isl., 50 m, fine sand (several specimens in the Zoological Museum, Copenhagen; Th. Mortensen leg. 1922, T. Odhner det. 1924).

Subfam. RHIZOPINÆ

140. *Notonyx nitidus* A. Milne-Edwards. (Fig. 47 A-B)*Notonyx nitidus* A. Milne-Edwards 1873, p. 269, pl. 12 fig. 3.*Notonyx nitidus* Alcock 1900, p. 319.*Notonyx nitidus* Tesch 1918, p. 219.? *Ceratoplax laevis* Miers 1884, p. 244, pl. 25 fig. C (*vide* Tesch l.c. p. 221).

Occurrence. "Persian Gulf" (Alcock l.c.).

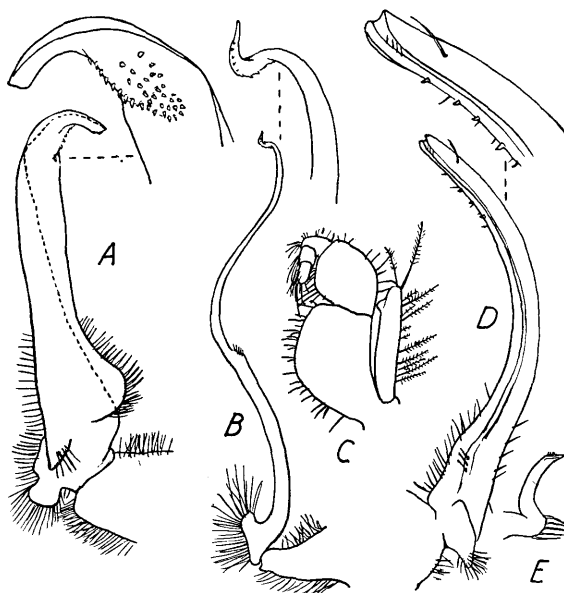


Fig. 47. A-B: *Notonyx nitidus*, ♂, Th. Mortensen St. 11, 9.IV.1922, pleopods 1-2. C-E: *Xenophthalmodes dolichophallus* ♂, St. 105, outer maxilliped, and pleopods 1-2.

Remarks. Pleopod 1 of a male (c. 7×10 mm, Toeal (Kei-Is.), 20 m, fig. 47 A) is very stout, apically not very tapering, and with the apex hook-shaped, with some short spines on the concave side. Pleopod 2 is a trifle longer than plp. 1, very slender; the proximal half is somewhat heavier than the filiform distal half which is somewhat curved and with the acute apex spirally twisted. The form and length of pleopod 2 (fig. 47 B; longer than plp. 1) is rather similar to that in *Eurüppellia* and *Eriphia* (fig. 34 B, D); fam. Xanthidæ, Menippinæ), *Carpilius* (fig. 40 B; fam. Xanthidæ, Carpiliinæ), *Matuta* (fig. 5 D; fam. Calappidæ, Matutinæ), and *Carcinoplax* (fig. 44 B; fam. Goneplacidæ, Pseudorhombilinæ).

Distribution. Bay of Bima, north coast of Sumbava, 13-31 m; Amboyna, 54 m; southeast coast of Timor, 34 m; and Banda (Tesch l.c.). New Caledonia (type-locality; A. Milne-Edwards l.c.), S. of

New Guinea, 50 m (Miers, "Challenger"). Arafura Sea, 40-50 m (*Ceratoplax laevis*; Miers l.c.).—The Zoological Museum, Copenhagen, has specimens from the following localities in the East Indies, collected by T. h. M o r t e n s e n in 1922 and determined by T. O d h n e r in 1924: Sunda Strait 6°38' S., 105°21' E., 35 m, sandy mud, and 5°28' S., 106°03' E., 22 m, sandy mud; Lontor, Banda, beach, low tide; Toeal, Kei-Is., 20 m, fine sand; Saparoea Bay (E. of Amboina), 20-30 m, clayish sand.

141. *Paraselwynia ursina* Tesch

Paraselwynia ursina Tesch 1918, p. 222, pl. 14 fig. 2.

O c c u r r e n c e. Iranian Gulf. St. 88. 22.III.1938. Off Nabyiu Farur. 6-31 m. Sand etc. 1 ♀, breadth 6 mm.

The species is new to Iranian waters.

R e m a r k s. The specimen is very defective, but the determination seems to be certain. I have dissected out the outer maxillipeds, and they agree excellently with Tesch's fig. (fig. 2 a), even regarding the long plumose setæ on the merus.

D i s t r i b u t i o n. Toeal, Kei-Is., 22 mm. 1 ♀, breadth 11.5 mm (type-locality; Tesch l.c.).

Genus *Typhlocarcinus* Stimpson

Typhlocarcinus Tesch 1918, p. 207.

According to the "Zool. Record" (incl. of 1938) no new species have been established since the issue of Tesch 1918 (with list of species), and no figs. of *T. rubidus* Alcock 1900 and *T. craterifer* Rathbun 1914 were ever published.

A new species, *T. dentatus* n. op., is described below.

142. *Typhlocarcinus nudus* Stimpson (Figs. 48, 49 A-H)

Typhlocarcinus nudus Stimpson, Proc. Ac. Nat. Sci. Philadelphia 1858, p. 96.

Typhlocarcinus nudus Alcock 1900, p. 322.

Typhlocarcinus nudus Rathbun 1910, p. 343, figs. (♂ in dorsal view, external maxillipeds).

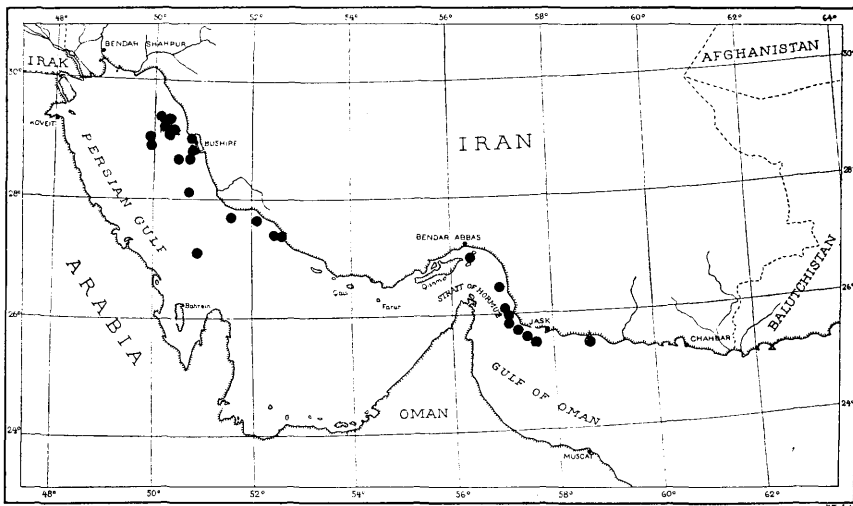
Typhlocarcinus nudus Tesch 1918, p. 208, figs. (♂ in dorsal view, external maxillipeds, abdomen ♂).

Typhlocarcinus nudus Shen 1937¹, p. 295, with description and figs.

O c c u r r e n c e. Iranian Gulf. St. 5. 4.III.1937. 8 nautical miles N.E. by E. of the island of Kharg. 22 m. Clay. 2 ♂, cb.² 5.5-8.5 mm, 1 ♀ 5.5 mm.—St. 7 B. 4.III.1937. 6 nautical miles N.E. by E. of the

¹ I have not had access to this paper.

² cb = breadth of carapace.

Fig. 48. Occurrence of *Typhlocarcinus nudus*.

northeastern point of the island of Kharg, 24 m. Clay. Petersen-grab. 1 ♂, cb. 7.5 mm.—St. 7 C. Ibid. Petersen-grab. 1 ♂, cb. c. 5 mm.—St. 8 A. 5.III.1937. 2 nautical miles S.S.W. of Kharg. 40 m. Clay. Petersen-grab. 2 spec., cb. c. 2 mm.—St. 8 B. Ibid. Petersen-grab. 1 ♂, cb. 4 mm.—St. 16 A. 10.III.1937. 13 nautical miles S. of Bushire. 28 m. Clay etc. Petersen-grab. 1 ♂ cb. 4 mm, 1 ♀ cb. 5.5 mm.—St. 16 B. Ibid. Petersen-grab. 1 ♂ cb. 5.5 mm.—St. 16 C. Ibid. Petersen-grab. 1 ♂ cb. 4 mm, 1 very damaged specimen. — St. 19 B. 11.III.1937. 3 nautical miles S.E. by S.¹/₂S. of Bushire. 8 m. Clay. Petersen-grab. 1 ♂ cb. c. 3.5 mm (determination uncertain).—St. 21. 13.III.1937. 1 nautical mile S. of the outermost light-buoy at Bushire. 8 mm. Clay. Petersen-grab. 1 ♀ cb. 5.5 mm.—St. 23 A. 13.III.1937. 29°4' N., 49°56' E. 50 m. Clay. Petersen-grab. 1 ♂ cb. c. 4 mm, 1 ♀ cb. 5 mm.—St. 23 C. Ibid. Petersen-grab., 1 ♀ cb. 5 mm.—St. 23 D. Ibid. Petersen-grab. 1 ♂ cb. 5 mm.—St. 24. 13.III.1937. 29°7' N., 49°56' E. 40 m. Sandy clay. 3 spec. (♂, ♀), cb. up to 5 mm.—St. 24 A. Ibid. Petersen-grab. 1 ♂ cb. c. 5 mm, 1 very small specimen.—St. 24 B. Ibid. Petersen-grab. 2 ♂, 1 ♀, cb. up to c. 5 mm.—St. 28. 18.III.1937. 2 nautical miles S. by E. of the outermost light-buoy at Bushire. 7 m. Graybrown clay. 1 ♂ cb. c. 4.5 mm, 1 ♀ cb. 7 mm.—St. 31 B. 23.III.1937. The coast N. of Kharg. 28 m. Mud. Petersen-grab. 1 ♂ cb. c. 6 mm.—St. 31 C. Ibid. Petersen-grab. 2 ♀ cb. 5-7 mm.—St. 33 B. Ibid. 31 m. Mud. Petersen-grab. 1 ♂ cb. c. 4 mm, 1 ♀ 6mm.—St. 34 B. 23.III.1937. 29°27' N. 50°16' E. 28¹/₂ m. Coarse gravel, shells. Petersen-grab. 2 ♀ cb. c. 5-6 mm.—St. 37 A. 26.III.1937. 41 nautical miles S.³/₄E. of the light-buoy at Bushire. 43 m. Fine mud. 1 ♂ cb. 5.5 mm.

—St. 38 C. 27.III.1937. 29 nautical miles N. by E. of the light-ship at Bahrein. 71 m. Sandy clay. 1 ♂ cb. 6 mm.—St. 45 C. 31.III.1937. 76 nautical miles N.N.E. of the light-ship at Bahrein. 21 m. Sandy clay. 1 small defective specimen, determination uncertain.—St. 69. 31.I.1938. 18 nautical W.N.W. of Bushire. 32 m. Sandy clay. 1 ♂ cb. c. 2 mm.—St. 76. 9.II.1938. Off the city of Kangun. 10 m. Clayish sand with shells. 1 ♂ c. 4 mm, 1 ♀ c. 6 mm.—St. 127. 10.IV.1938. 27°25' N., 52°36' E. 17-10 m. Shells with clay. 1 ♂ cb. c. 5 mm, rather defective, determination not certain.—St. 130. 11.IV.1938. 3 nautical miles S.W. of Tahiri. 29 m. 1 ♂ cb. c. 4 mm, defective, determination not certain.

2. Strait of Hormuz: St. 80 C. 22.IV.1937. 1 nautical S.E. of Hormuz. 15 m. Brown clay. 1 ♂ cb. 6 mm.—St. 108. 2.IV.1938. 26°7' N., 57°9' E. 17 m. Clay. 1 ♂ 5 mm.—St. 110.2.IV.1938. 26°34' N., 57°01½' E. 30 m. Clay. 2 ♂ cb. 3-5 mm, 1 ♀ cb. 3 mm.

3. Gulf of Oman: St. 72 B. 20.IV.1937. 2 nautical miles N.W. by N. of the buoy at Jask. 12 m. Clay. 1 ♂ cb. 5.5 mm.—St. 75 B. 21.IV.

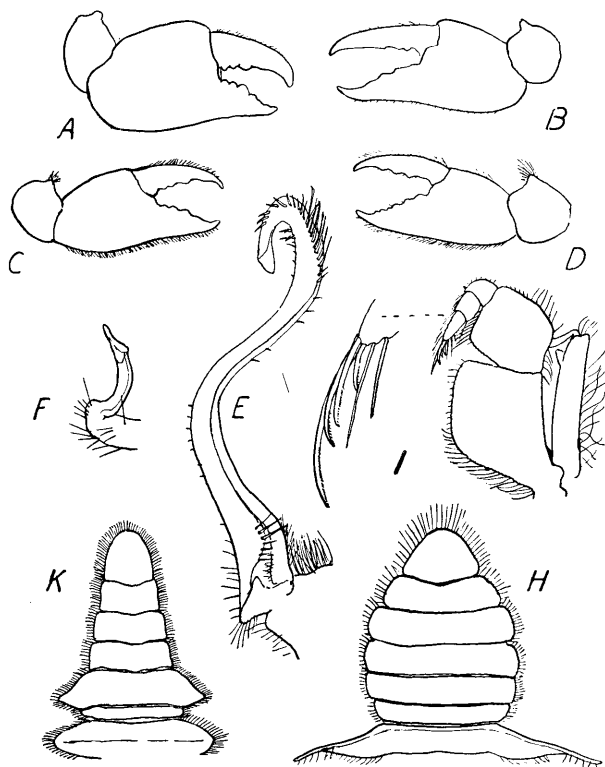


Fig. 49. A-H: *Typhlocarcinus nudus* (♂, St. 5, and ♀, St. 28). A-B: ♂, right and left chela, outer side; C-D: ♀, right and left chela, outer side; E-F: ♂, pleopods 1-2; H: ♀, abdomen.

I-K: *T. dentatus* ♂, outer maxilliped and abdomen.

1937. 20 nautical miles W. by N. of the buoy at Jask. 34 m. Grey clay. 1 ♂ cb. 4.5 mm.—St. 76 A. 21.IV.1937. 30 nautical miles W. by N. of Jask. 110 m. Brown clay. 1 very small specimen, defective, the determination not certain.—St. 76 B. Ibid. 1 ♂ cb. c. 3.5 mm, the determination not certain.—St. 76 C. Ibid. 3 ♂ cb. 2-3.5 mm.—St. 77 A. 21.IV.1937. 25°57' N., 57°12' E. 29 m. Grey clay. 4 ♂ cb. 3-6 mm.—St. 77 B. Ibid. 2 ♂ cb. c. 3-6 mm.—St. 77 C. Ibid. 4 ♂ cb. c. 3-5 mm.—St. 78 A. 21.IV.1937. 17 nautical miles N.W. of Kuh-i-Mubarak. 70 m. Grey clay. 2 ♂ cb. c. 6 mm.—St. 78 B. Ibid. 1 ♂ cb. c. 3 mm, 1 ♀ cb. 6 mm.—St. 95. 29.III.1938. 6 nautical miles W. by S. of Jask. 35 m. Clay and sand. 1 ♂ cb. 5 mm.—St. 100. 30.III.1938. 25°31½' N., 58°29' E. 12 m. Clay. 2 ♂ cb. 5-6 mm.

It is new to Iranian waters.

Remarks. For comparison I have had the material from Thailand determined by Rathbun l.c.; the agreement is excellent (also regarding the pleopods of the males).

Tesch l.c. writes than in the male the left cheliped is the larger (fig. 49 A-B); but sometimes the contrary is the case. The chelipeds in the female are almost alike, rather similar to the smaller in the males (fig. 49 C-D).

The abdomen of the female (fig. 49 H) is oval, with all segments free; 1st segment is rather broad, covering the half of the distance from 2nd segment to last pair of legs.

In the literature there is no description or drawing of pleopod 1 (fig. 49 E) of the male. It is somewhat curved and rather slender, with the apex hook-shaped, obliquely truncate, and apically with several spines in two rows. On pleopod 2 nothing to remark (fig. 49 F).

Distribution. India (Karachi, coast of Mekran and Madras, Sandheads (mouth of river Ganges)), Andamans, depth? (Alcock l.c.); Gulf of Thailand and Singapore, depth (when noted) 4-30 m (Rathbun l.c.); Makassar and north east coast of Ceram, 18 m (Tesch l.c.); Hong Kong (type-locality; Stimpson). Also recorded by Shen l.c.

143. *Typhlocarcinus (villosus) Stimpson ?*

Typhlocarcinus villosus Alcock 1900, p. 322.

Typhlocarcinus villosus Rathbun 1910, p. 343, fig. 28.

Typhlocarcinus villosus Tesch 1918, p. 209, pl. 13 fig. 2.

Occurrence. Iranian Gulf. St. 48 B. 5.IV.1937. 9 nautical miles S.W. of Bustani, 72 m. Clay. 1 ♀ cb. 5 mm. The determination is rather uncertain, for several of the legs are lost.

It is new to Iranian waters.

Distribution. Bay of Bengal; Gulf of Thailand, 14-28 m; Sumba; 36 m; Timor, 34 m; Hong Kong.

144. *Typhlocarcinus dentatus* n. sp. (Figs. 49 I-K, 50)

Occurrence. Iranian Gulf. St. 34 C. 23.III.1937. The coast N. of Kharg. 28.5 m. Gravel, shells. Petersen-grab. 1 ♂ cb. c. 6 mm, 1 ♀ cb. 5 mm. St. 45 A. 31.III.1937. 76 nautical miles N.N.E. of the light-ship at Bahrein. 21 m. Sandy clay with shells. 1 ♂ cb. 6 mm.—St. 47 D. 5.IV.1937. 2 nautical miles W. of Qyanat. 7.5 m. Sandy clay. 1 ♂ cb. 7 mm, 2 ♀ cb. c. 5 mm.—St. 64. 23.I.1938. Bushire, the roads. 7 m. 1 ♂ cb. 6 mm.—St. 76. 9.II.1938. Off the city of Kangun. 10 m. Clayish sand with shells. 1 ♂ cb. 9 mm.—St. 76 B. Ibid. 1 ♂ cb. 9 mm, 1 ♀ cb. 9 mm.—St. 90. 23.III.1938. 26°31' N., 54°47'E. 12 m. Clay etc. 1 ♀ cb. 5 mm.

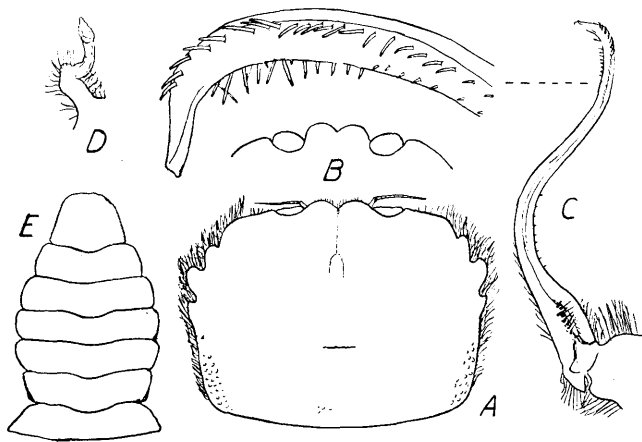


Fig. 50. *Typhlocarcinus dentatus*. A: ♂, carapace; B: ♂, carapace, frontal part in frontal view; C-D: ♂, pleopods 1-2; E: ♀, abdomen, marginal setæ omitted.

Remarks. This species is very close to *T. nudus* Stimpson (Species No. 142, see above p. 173) as described by T e s c h 1918, p. 208, but differs by the following features. The dorsal side of the carapace is pubescent, not glabrous, with long hairs along the margins; the dorsal furrows are extremely indistinct. The breadth is $1\frac{1}{3}$ times the length. The front is bilobed, rather projecting, with the lobes rounded (in *T. nudus* the anterior margin of the front is much more straight). The antero-lateral margins have three teeth each, the anterior of which is rounded and rather protruding; the median is rounded and much more projecting, and the posterior is triangular, acute, but very little projecting. The postero-lateral

margins are almost parallel. The chelipeds of the male are stout as in *T. nudus*, somewhat unequal, the right being the larger; they are hairy especially on the outer side of the hand which is granular; the teeth on the fingers are more acute, especially on the right hand. In the female the chelipeds are rather similar to those of *T. nudus*, but much more hairy. The external maxillipeds (fig. 49 I) are rather like those of *T. nudus* (Tesch 1918, pl. 13, fig. 1 a); the palp terminates in c. 4 serrated spines, but similar spines are present also in *T. nudus* (not drawn by Tesch).

The ambulatory legs take, regarding the length of the joints (especially metacarpus in the penultimate pair) an intermediate position between *T. nudus* and *T. villosus* (Tesch 1918, pl. 13, figs. 1 and 2), but the dactylus of the last pair is curved as in *T. nudus*. The setose armature of the legs is closer to that of *T. nudus* than to *T. villosus* (i.e. there are short, not long, hairs along the inner margin of the dactyli of 1st-3rd pairs of legs), but the setose armature of 3rd pair is not (as in *T. nudus*) shorter and sparser than in the two first pairs. 4th pair of legs has long hairs along both margins of the 4 distal joints (like *T. villosus*), except on the fore margin of merus which is setose only in the distal end.

Abdomen of the male (fig. 49 K) not markedly different from that of *T. nudus* (Tesch 1918, pl. 13, fig. 1 b). Pleopods 1-2 of the male (fig. 50 C-D) similar to those of *T. nudus*, except that plp. 1 is not apically hook-shaped, only bent into a right angle, and the truncate end of the apex is probably narrower. Abdomen of the female (fig. 50 E) narrower than in *T. nudus*; 1st segment is not broader than 4th, and 7th segment is apically very broad, truncate with rounded corners.

145. *Xenophthalmus moebii* Richters

Xenophthalmus moebii Richters 1880, p. 155, pl. 16 fig. 29, pl. 17 figs. 1-5.

Xenophthalmus moebii Miers, Proc. Zool. Soc. 1884, pp. 10, 12.

Xenophthalmus moebii de Man, Notes Leyden Mus., vol. 12, 1890, p. 68, pl. 3 fig. 5.

Xenophthalmus moebii Alcock 1900, p. 324.

Xenophthalmus moebii Tesch 1918, p. 215.

Occurrence. "Persian Gulf" (Alcock l.e.).

Distribution. Mauritius (Black River), Red Sea (Djeddah), Malabar and Coromandel Coast, Gulf of Mortaban, Andamans.

146. *Xenophthalmodes dolichophallus* Tesch. (Fig. 47, C-E (p. 172)).

Xenophthalmus dolichophallus Tesch 1918, p. 216, pl. 14 fig. 1.

Occurrence. Gulf of Oman. St. 105. 1.IV.1938. 25°25' N., 59°28' E. 14 m. Sand etc. 1 ♂, very damaged, cb. c. 6 mm.

Remarks. Like T e s c h I have compared my specimen with *X. moebii* Richters; for references to this species, see above.

The carapace has setæ along the margins, but the dorsal side is bare as in *X. moebii*. The front has no notch in the middle. No traces of pigment in the eyes could be found; the epistome agrees with T e s c h's description of *X. dolichophallus*. The external maxillipeds (fig. 47 C) are granulate; the antero-external angle of the merus rounded, so that the anterior and external angle form a continuous arched line (as in R i c h t e r's fig. 5 (*X. moebii*) and in T e s c h's fig. 1 a (*X. dolich.*); d e M a n's fig. 5 a (*X. moebii*) shows a distinct angle between the anterior and external margins). Ischium is broader than merus, and the palp is short, reaching only to the inner proximal corner of merus (as in R i c h t e r's fig. 5; in d e M a n's fig. 5 a and T e s c h's fig. 1 a the palp is much longer). The chelæ agree with T e s c h's description of *X. dolich.*, but I have not been able to find any granulation on the outer surface of the hand.

Pleopod 1 of the male (fig. 47 D) reaches far beyond the apex of the abdomen, as in T e s c h fig. 1 b. It is not described by any of the previous authors, but is somewhat curved, slender, apically not much tapering, apically truncate and with a few short spines. About plp. 2 nothing to remark (fig. 47 E).

X. dolichophallus differs from *X. moebii* by the following characters (according to T e s c h): eyes not quite devoid of pigment, and pleopod 1 of the male reaching far beyond the apex of abdomen; (there are said to be specific differences also in the external maxillipeds; but this is not to be seen clearly from the literature). The most important specific difference would seem to be the length of pleopods 1 of the male. The smaller length of these appendages cannot be a juvenile character, for *X. moebii* is larger than *X. dolich.* The measurement of the first-named species are the following: R i c h t e r s (σ) 7.5×10.5 mm, d e M a n (σ) 8.2×11 mm, A l c o c k ("the largest specimen"; sex?) 10×12 mm, while *X. dolich.* is much smaller, viz; (according to T e s c h; σ) 6.5×7.2 mm; the Iranian specimen is still a trifle smaller.

No doubt the Iranian specimen belongs to *X. dolichophallus*, but apart from the different length of the pleopod of the male the two species seem to be very closely allied, if not synonymous.

Distribution. Djangkor, east coast of Java, 9 m; Madura Bay, west coast of Flores, 54-90 m. Lohio Bay, Buton Strait, south of Celebes, 22 m (T e s c h l.c.). In the Zoological Museum, Copenhagen, there are a σ (6×7.5 mm) and a ♀ (4×5 mm) from $5^{\circ}33' \text{ S.}$, $105^{\circ}18' \text{ E.}$ (Lamong Bay, southern Sumatra), 27 m (T h. M o r t e n s e n, St. 98, 1922; T. O d h n e r determ. 1924).

147. *Mertonia lanka* Laurie (Fig. 51)*Mertonia lanka* Laurie 1906, p. 424, pl. 1 fig. 1.*Mertonia lanka* Rathbun 1910, p. 342, pl. 2 fig. 2.*Mertonia lanka* Tesch 1918, p. 217, pl. 16 fig. 2 a.*Mertonia lanka* Yokoya, Japan. Journ. Zool., vol. 7, 1936, p. 144, figs. (description).

Occurrence. Iranian Gulf. St. 11 E. 5.III.1937. E. of the island of Kharg. 13 m. Shells and sand. Petersen-grab. 1 ♀ cb. 3.5 mm.—St. 11 F. Ibid. Petersen-grab. 1 juv. (♂?).—St. 39 A. 27.III.1937. 12 nautical miles E.N.E. of the light-ship at Bahrein. 23 m. Shell-gravel. 1 ♂ cb. 5 mm, 1 ♀ cb. 7 mm.—St. 39 B. Ibid. 1 ♂ cb. 5 mm.—St. 39 D. Ibid. 1 ♀ cb. 5 mm.

It is new to Iranian waters.

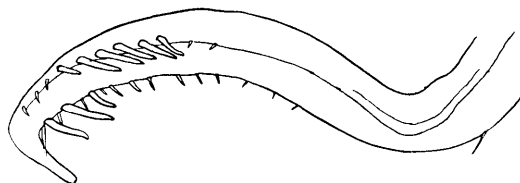


Fig. 51. *Mertonia lanka* ♂, breadth 5 mm, St. 39 B: pleopod 1.

Remarks. The specimens, both ♂ and ♀, are very broad, about as in Yokoya's fig. of ♀ (Yokoya l.c., fig. 4 A); both Laurie l.c. (sex of the specimen not noted) and Rathbun l.c. (♀ ovig.) delineate their specimens not essentially broader than long.

Pleopod 1 of the male (fig. 51) is somewhat curved, with the very apex rectangularly bent, and with several spines near the apex. Pleopod 2 could not be found.

The genus has a second species, viz., *M. integra* (Haswell) (*Pilumnus integra* Haswell 1881, see MacNeill, Rec. Austral. Mus. Sydney, vol. 17, 1929, p. 154, figs.).

Distribution. Gulf of Manaar, Ceylon (type-loc.; Laurie l.c.); Gulf of Thailand, 18 m (Rathbun l.c.); Aru Is., 13 m (Tesch l.c.); Misaki, Japan (Yokoya l.c.).

Subfam. RHIZOPINÆ ?

St. 44 B. 31.III.1937. 80 nautical miles N.E.³/₄N. of Bahrein, 20 m. Gray clay with a little sand. 1 ♂, cb. 6 mm.

Subfam. HEXAPODINÆ

148. *Lambdophallus sexpes* Alcock (Fig. 52)*Lambdophallus sexpes* Alcock 1900, p. 330.*Lambdophallus sexpes* Illustr. Zool. "Investigator", Crust., pt. 10, 1903, pl. 62 fig. 1.*Lambdophallus sexpes* Tesch 1918, p. 239.

Occurrence. Strait of Hormuz. St. 78 B. 21.IV.1937. 17 nautical miles N.W. of Kuh-i-Mubarak. 70 m. Clay. 1 ♂ cb. 6.5 mm.

This locality is in the outer part of the Strait of Hormuz; the species is not known from the Iranian Gulf.

Remarks. This species is well described and figured by Alcock l.c. and in the "Investigator," but Alcock had only two ♂; the "Investigator"-figs. show a ♂ in dorsal and in ventral view, and a fig. of abdomen ♂. The ♀ is not known.

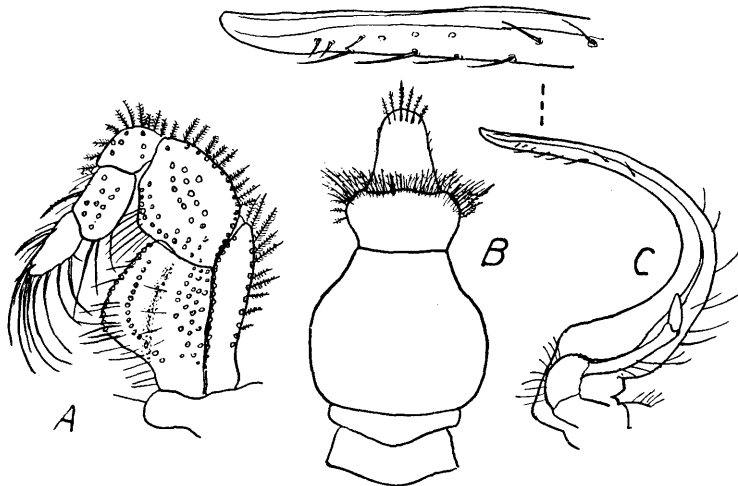


Fig. 52. *Lambdophallus sexpes* ♂, St. 28: outer maxilliped, abdomen, and pleopod 1 with pleopod 2.

The Iranian specimen agrees with that described, but I am unable to find the sutures shown in the "Investigator"-fig. between the coalesced 3rd, 4th and 5th segments of the abdomen ♂ (Alcock, in his text, writes that "the 3rd, 4th and 5th segments are fused to a sort of hexagonal plate"). As Alcock has no detail figure of the external maxillipeds and of pleopod 1 of the male, I give figures of these appendages (fig. 52 A); plp. 1 is, however, not "bent into the form of an L," but sigillate. The apex of plp. 1 is subacute, with a few setae. About plp. 2 (not described by Alcock) nothing is to remark. The walking legs seem to have the joints broader than in the "Investigator"-fig. and are much more densely set with setae.

Distribution. "Bay of Bengal," 125 m (type-locality; Alcock l.c.). Not found anywhere else.

149. *Hexapus seipes* (J. C. Fabricius). (Fig. 53)

Cancer seipes J. C. Fabricius, Suppl. Entom. Syst. 1798, p. 344 (Very brief description; "Habitat in India orientali").

Hexapus seipes de Haan 1835, pp. 35, 63, pl. 11 fig. 6 (not pl. 9 fig. 5, as stated in de Haan's text. *Hexapus latipes* on pl. D. No localities recorded) (pl. 11 fig. 6 represents ♂ in dorsal view, and chela and abdomen ♂, all in about natural size; the fig. of maxillipeds (pl. D) about 2-3 times natural size).

Hexapus seipes A. Milne-Edwards 1873, p. 253, pl. 12 fig. 1 (New Caledonia; fig. 1: ♀, dorsal view; fig. 1a: antennal region).

Hexapus seipes Miers, Ann. Mag. Nat. Hist., ser. 5, vol. 8, 1881, p. 262 (brief note; no new records).

Hexapus seipes de Man 1888a, p. 322, pl. 13 (7), fig. 3 (Amboina; fig. 3: ♂, dorsal view; fig. 3a: frontorbital region ♂; fig. 3b: chela ♂).

Hexapus seipes Zehntner, Revue Suisse de Zool., vol. 2, 1894, p. 159 (Amboina; no fig.).

Hexapus seipes Stebbing 1910, p. 315, pl. 41 (Cape? (locality uncertain). 1 ♀; description and drawings of most appendages, incl. of external maxillipeds and abdomen).

Hexapus seipes Tesch, Siboga 1918, p. 240 (with lit. etc.), pl. 17 fig. 1a, 1b. (Kei Is., 22 m; Sailus Ketzil, Paternoster Is. (E. Indies), 27 m. Fig. 1a: external maxillipeds; fig. 1b: abdomen ♂).

Lambdophallus anfractus Rathbun 1910, p. 348, fig. (Thailand; figs. of sternum with abdomen ♂, pleopod 1 ♂, and external maxillipeds).

Occurrence. Iranian Gulf. St. 6 A. 3.III.1937. Bushire, the roads. 6 m. Petersen-grab. 1 ♀ juv. cb. c. 4 mm (determination not certain).—St. 19 C. 11.III.1937. 3 nautical miles S.E. by S.^{1/2}S. of Bushire. 8 m. Clay. Petersen-grab. 2 ♀ juv. cb. 4-5 mm (determination not certain).—St. 28. 18.III.1937. 2 nautical miles S. by E. of the outermost light-buoy at Bushire. 7 m. Graybrown clay. 1 ♂ cb. 6.5 mm.—St. 19 A. 18.III.1937. 3 nautical miles S. by E. of the outermost light-buoy at Bushire. 10 m. Clay. Petersen-grab. 1 ♀ cb. 7 mm.—St. 30 A. 19.III.1937. Bushire, between the red and the white light-buoy. 6.5 m. Clay. Petersen-grab. 1 ♀ cb. 4.5 mm.—St. 30 C. Ibid. Petersen-grab. 3 ♂ cb. 3-4 mm, 3 ♀ cb. 4-5 mm.—St. 31 A. 23.III.1937. The coast N. of Kharg. 28 m. Clay, Petersen-grab. 1 ♀ cb. 4 mm.—St. 32 C. 23.III.1937. Ibid. 7.5 m. Clay, gravel, shells. Petersen-grab. 1 ♂ cb. 5 mm.—St. 38 B. 27.III.1937. 29 nautical miles N.^{1/4}E. of the light-ship at Bahrein. 71 m. Sandy clay. 1 specimen, cb. 3 mm; determination not certain.

Nobili (1906a, p. 146) records a ♀ from the Iranian Gulf: bank of pearl-oysters c. 25° N, 55° E., 20-30 m.

Remarks about *Hexapus seipes* (Fabr.) and *Lambdophallus anfractus* Rathbun. According to the Zoological Record up to and including 1938 the genus *Hexapus* has only two species, viz., *H. seipes* (Fabr.) and *H. williamsoni* Glassell (from the Pacific coast of Guatemala; Trans.

S. Diego Soc., vol. 8, 1938, p. 445, figs.), and the genus *Lambdophallus* has two species, viz., *L. sexpes* Alcock (see above, p. 181), and *L. anfractus* Rathbun 1910.

Hexapus sexpes is rather well described in the literature, and T e s c h (l.c.) is of opinion that *L. anfractus* Rathbun is synonymous with it. As the whole material of *L. anfractus* is in the Zoological Museum, Copenhagen, I have compared the Iranian specimens with Miss R a t h b u n's material of the said species.

A comparison of these materials with literature induces me to the following remarks.

External maxillipeds. Ischium (of *H. sexpes*; see fig. 53 A) agrees better with S t e b b i n g's fig. (S t e b b i n g 1910, pl. 41 (15)) than with T e s c h's fig. (1918, pl. 17, fig. 1 a); it is similar to R a t h b u n's fig. (1910, fig. 36 c) of *L. anfractus*. The two proximal joints of the palp are of nearly equal length, and the apical joint is about as long as the two preceding joints together, a character common to *H. sexpes* and *L. anfractus*. The right chela ♂ (of *H. sexpes*) is shown in d e H a a n's fig. 6 (1835) in a very small scale; in my specimens, and in R a t h b u n's specimens of *L. anfractus* (see my fig. 53 F) it agrees with T e s c h's description of *H. sexpes*.

The left chela ♂ of both of the species is much more feeble than the right, rather similar to that of ♀ (S t e b b i n g 1910, pl. 41 (15), prp. 1).

The walking legs of *H. sexpes* agree fairly well with T e s c h's description; in *L. anfractus* they are much more slender. And both sexes in both of the species have on the median margin of the 4 distal joints some very long hairs, about as long as the dactyli (on the lateral margin the hairs are much shorter); there does not seem to be any sexual difference regarding these hairs (T e s c h writes that the legs are glabrous in ♀ of *H. sexpes*).

The grooves in the sternum ♂ for reception of the abdomen and the apex of pleopod 1 are quite alike in the two species (as in R a t h b u n's fig. of *L. anfractus* (1910, fig. 36 a)).

But there is some difference in the shape of abdomen ♂. In the literature there are the following drawings of the male abdomen: d e H a a n l.c. fig. 6 (*H. sexpes*), T e s c h l.c. fig. 1 b (*H. sexpes*), and R a t h b u n l.c. fig. 36 a (*L. anfractus*). R a t h b u n's and T e s c h's figures are rather alike; R a t h b u n describes it as follows "The narrow abdomen ♂ (fig. 53 B) has the first two segments short, no suture lines visible between the third, fourth, and fifth segments, sixth segment nearly as long as wide and widest near the middle, seventh segment subtriangular with convex sides." d e H a a n's fig. is somewhat different, showing the third to fifth segments free, not coalesced. The Iranian specimens disagree from those

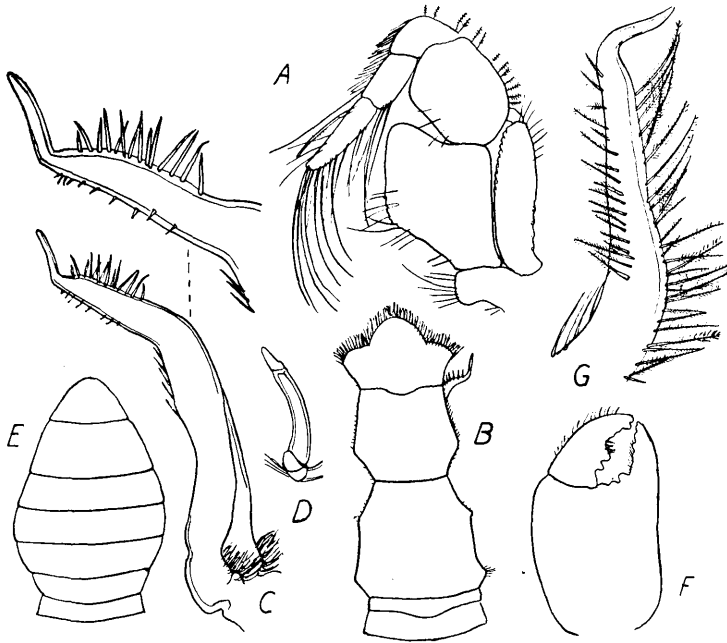


Fig. 53. A-D: *Hexapus sexpes* ♂, St. 28: outer maxilliped, abdomen, pleopods 1-2.
 E: *H. sexpes* ♀, St. 30 C, abdomen.
 F-G: *Lambdophallus anfractus* ♂, off Koh Kat, Thailand, 12 m, 26.I.1900, outer side of right chela, and pleopod 1.

of Rathbun and Tesch in having the seventh segment trilobate, with the segment widened on each side near the base.

Abdomen ♀ is drawn by Stebbing l.c. (*H. sexpes*); he writes that "all segments are distinct, the first two the shortest, the third and fourth the broadest, the sixth and seventh the longest." In Stebbing's fig. the greatest breadth of abdomen is in the third segment; in the Iranian specimens the greatest breadth is in the fourth. In *L. anfractus* the abdomen is quite like that of *H. sexpes*, with the exception that sixth and seventh segments are a trifle narrower.

Pleopod 1 of the male is drawn only by Rathbun (l.c. fig. 36 b; *L. anfractus*); there is no description of this appendage of any of the species. In the Iranian specimens of *H. sexpes* (fig. 53 C) it is medium-heavy, tapering toward the apex, and bent outwards about $\frac{1}{3}$ the length from the apex, and then again bent at a short distance before the apex. The very apex is smooth, without spines etc., but proximally of the apex there are, on the median edge, about 15 simple spines and a few very short spines. I have dissected plp. 1 out of one of Miss Rathbun's Thailand specimens of *L. anfractus* (fig. 53 G). The appendage quite resembles that of *H. sexpes*, but the armature is different; proximally of

the apex there are numerous bottle-brush-setæ, not a few simple spines. Regarding plp. 2 ♂ of *H. seipes* nothing is to remark; I was not able to find it in *L. anfractus*.

Regarding the size there is in the literature the following information (*H. seipes*): Fabricius l.c.: no record; de Haan: 3" × 5" (sex?, ♂?) = 6 × 10 mm; Milne-Edwards: 3 × 6 mm (♀); de Man 12.75 × 18 mm (♂); Zehntner: 15 × 23.5 mm (♀); Stebbing: 9 × 14 mm (♀); Rathbun (*Lambdoph. anfractus*) 4.7 × 7.3 mm (♂; ♀ ovig. (not measured by Rathbun) is of equal size); Tesch: 5.5 × 8.4 mm (♂); Iranian specimens (the present paper): c. 4 × 6.5 mm (♂), c. 3 × 5 mm (♀). Thus the size ordinarily seems to be c. 5 × 8 mm, but the maximum measurements are much greater, viz., 12.75 × 18 mm (♂) and 15 × 23.5 mm (♀).

Summary. No doubt Tesch is right in considering *H. seipes* and *L. anfractus* synonymous. The Iranian specimens differ from *L. anfractus* by the 7th segment of abdomen ♂ and in having simple spines, not bottle-brush-setæ, near the apex of pleopod 1 ♂; they differ from *H. seipes* by the 7th segment of abdomen ♂. Nevertheless I prefer to determine the Iranian specimens as *H. seipes*.

Ecology. Usually the species is recorded from mud or clay bottom, and all the Iranian specimens too are found in clay. But sometimes there are some more detailed records in the literature. Miers's specimen was taken "in den Röhren einer riesigen Annelide," and Zehntner's specimen was found "dans le tube d'une grande Annélide tubicole"; one of Miss Rathbun's specimens of *L. anfractus* was taken on *Chætodiadema granulatum*.

Distribution. Cape; Thailand; Amboina; Japan. For details see under the bibliography.

Fam. PINNOTHERIDÆ

Subfam. PINNOTHERINÆ

150. *Pinnotheres perezi* Nobili

Pinnotheres perezi Nobili 1906 a, p. 147, pl. 5 fig. 25.

Pinnotheres perezi Tesch 1918, pp. 250, 253, 287 (no new record).

Occurrence. Iranian Gulf, bank N.E. of the island of Arzana, in a *Pholas*, 1 ♀ (type-locality, Nobili l.c.). Not found anywhere else.

151. *Ostracotheres spondyli* Nobili

Ostracotheres spondyli Nobili 1906 a, p. 149, pl. 5 fig. 24, pl. 6 fig. 33.

Ostracotheres spondyli Tesch 1918, p. 262 (no new record).

Occurrence. Iranian Gulf: Bank N.E. of the island of Arzana,

in *Spondyli*, 72 ♀, 8 juv., and 8 nautical miles N.N.E. of Arzana, 10 m, 44 ♀ (Nobili l.c.; type-localities). Not found elsewhere.

Subfam. XENOPHTHALMINÆ

152. *Xenopthalmus pinnotheroides* White (Fig. 54)

Xenopthalmus pinnotheroides White 1848, p. 63, pl. 12 fig. 3.

Xenopthalmus pinnotheroides Alcock 1900, p. 332.

Xenopthalmus pinnotheroides Rathbun 1910, p. 338, figs.

Xenopthalmus pinnotheroides Tesch 1918, p. 272.

Xenopthalmus pinnotheroides Shen 1937¹, p. 301, figs.

Occurrence. 1. Iranian Gulf. St. 45 A. 31.III.1937. 76 nautical miles N.N.E. of the light-ship at Bahrein. Sandy clay with shells. 21 m. 1 ♂ cl. c. 5.5 mm.

2. Strait of Hormuz: St. 60 A. 10.IV.1937. 4 nautical miles S.W. of the city of Suzeh. Sandy clay. 21 m. 134 spec. juv. (♂, ♀), cl. c. 3-4.5 mm.—St. 60 B. Ibid. 108 small spec. (♂, ♀) up to c. 4.5 mm.—St. 60 C. Ibid. 18 spec., same size.—St. 60 D. Ibid. 114 spec. same size.—St. 60 E. Ibid. 181 spec., same size.—St. 60 F. Ibid. 85 spec., same size.—St. 61 A. Ibid. 10.IV.1937. Sandy clay. 11 m. 1 ♀ c. 8 mm, 1 juv. 4 mm.—St. 61 B. Ibid. Sand, gravel, shells. 9-11 m. 1 ♂ 9 × 13 mm.—St. 112. 3.IV.1938. 2 nautical miles S.W. of the fortress of Hormuz. Gravel etc. 22 m. 1 big ♂.

It is new to the Iranian waters.

Remarks. For comparison I have the (rather small) specimens from Thailand, mentioned and figured by Rathbun 1910. The agreement is fairly close, apart from a few differences probably due to the difference in size (Zoological Record up to and including 1938 has no new species of the genus established after the issue of Tesch's paper).

Tesch l.c. (p. 271) writes that the "abdomen of both sexes is narrow," and (p. 274) he repeats the same remark. This is not correct regarding the female. The female abdomen is very broad; in my largest specimen (cl. c. 8 mm, from St. 61 A) it is 10.5 × 8.5 mm, quite agreeing with the abdomen drawn by White l.c., fig. 3 a, and with a Siamese specimen determined by Rathbun. The palp of the external maxillipeds agrees well with Tesch's description.

The chelipeds in the female are feeble as in White's and Rathbun's figures. But in my largest male (cl. 9 mm, St. 61 D; fig. 54 A) they are very strong, much stronger than in Rathbun's figure², and with a row of setæ along the inner margin and on each side of the

¹ I have not had access to this paper.

² Rathbun's male which is in the Zool. Museum of Copenhagen, is much smaller, only c. 5 × 6.5 mm.

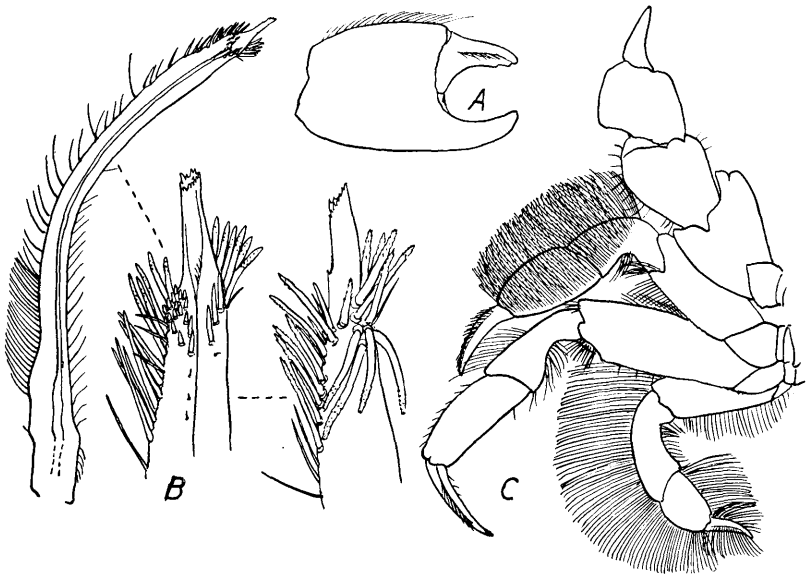


Fig. 54. *Xenophthalmus pinnotheroides* ♂, 9 mm, St. 61 D. A: right chela, outer side; B: pleopod 1; C: ambulatory legs.

movable finger. 1st and 3rd pairs of walking legs (fig. 54 C) are only very sparsely setose; 2nd pair has a dense cloth of long hairs on the under side of carpus and metacarpus, and 4th pair has feathery setae along almost the whole of the margins.

Pleopod 1 of the male (fig. 54 B) is described by T e s c h as "obtuse at the tip which is armed with a bunch of slender spines." In my largest specimen it is long, slender, with setae along the margins; apically it terminates in a narrow process, at the base of which there are several spines of different length and shape. Pleopod 2 could not be found.

Distribution. Gulf of Martaban, Birma; Gulf of Thailand. Batavia; Djongkar, east coast of Java, 9 m; Sapeh Bay, east coast of Sumbava, 36 m; Philippine Is. (type-locality); harbour of Hong Kong.

Fam. CYMOPOLIIDÆ

153. *Cymopolia investigatoris* (Alcock), var.

Palicus investigatoris Alcock 1900, p. 455.

Palicus investigatoris var. MacGilchrist 1905, p. 265.

Occurrence. "Persian Gulf, Sta. 291," 48-49 m, 1 ♂ 9 × 11 mm (Mac Gilchrist l.c.).

Distribution. Andamans (Alcock).

Fam. OCYPODIDÆ

Subfam. OCYPODINÆ

154. *Ocyпода aegyptiaca* Gerst. (Fig. 55)

Ocyпода aegyptiaca Miers, Ann. Mag. Nat. Hist. (5), vol. 10, 1882, p. 381, pl. 17 fig. 3.

Ocyпода aegyptiaca Nobili 1906 b, p. 152 (lit.).

Occurrence. Iranian Gulf. St. 2. 22.-24.III.1937. Coral reef 6 km. S. of Bushire. 1 ♂.—10.III.1938. Bahmani near Bushire, 1 ♂ washed ashore.—9.IV.1938. Jez Shit war E. of Sheikh Shuaib, 2 ♀.

Previously not known from Iranian waters.

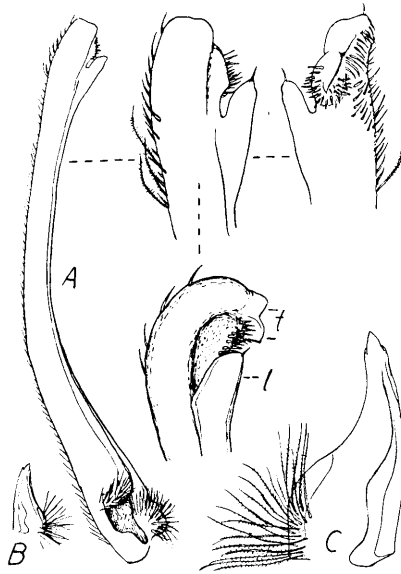


Fig. 55. *Ocyпода aegyptiaca* ♂, St. 2. A: pleopod 1; B-C: pleopod 2.
l: lobe, t: terminal teeth.

Remarks. Pleopod 1 of a male, 37 mm (St. 2; fig. 55 A) is very long, 18 mm, slightly curved, and somewhat compressed. It terminates in a lobe (l in the fig.) which, in contrast to *Gelasimus* (see e.g. *G. coarctatus*, Gordon 1934, p. 12 fig. 4) is not setose (except for a single apical seta), and the terminal tube ends in two sharp teeth (t. in the fig.), not one. Pleopod 2 (fig. 55 B-C) is very diminutive, in length only $\frac{1}{8}$ of plp. 1, conical, compressed.

Distribution. Red Sea and Madagascar (Balss 1924, p. 14). Nobili (l.c.) notes it from Massaouah (St. XVII, Red Sea) and Makalla (St. XXVI, southern coast of Arabia).

155. *Uca annulipes* (Latreille)

Gelasimus annulipes Alcock 1900, p. 353.

Uca annulipes Balss, Archiv f. Naturgesch., 88. Jahrg. 1922, Abt. A, p. 142, (with lit.).

Occurrence. Iranian Gulf, no special locality (Nobili 1906 a, p. 151; two specimens of the western form (var. *orientalis* Nobili)).

Distribution. Red Sea; from East Africa to Ceylon. Also Japan from Bonin Islands to Misaki (Sakai 1936, p. 171; Balss l.c.).

Subfam. SCOPIMERINÆ

156. *Scopimera scabricauda* Alcock (Fig. 56)

Scopimera scabricauda Alcock 1900, p. 370.

Scopimera scabricauda "Investigator" pl. 63, figs. 5, 5 a, 5 b.

Scopimera scabricauda Kemp 1919, p. 311.

Occurrence. Iranian Gulf: 18.I.1938. Bushire. 13 spec. (♂, ♀) up to 5 × 8 mm.

The species is new to Iranian waters; and the locality is probably the westernmost finding place for any *Scopimera*.

Remarks. This species is easily recognizable by the form of the male abdomen (fig. 56 A). The present specimens agree fairly well with Alcock l.c. and Kemp l.c., but the sculpture on the dorsal surface of the carapace is not as distinct as in Alcock's fig. (Alcock's specimen

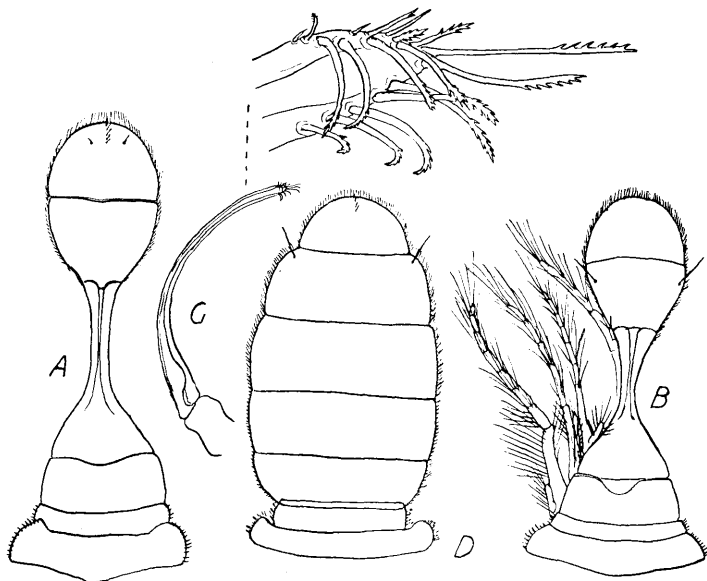


Fig. 56. *Scopimera scabricauda*. A: ♂, abdomen; B: ♀, abnormal abdomen; C: ♂, pleopod 1; D: ♀, normal abdomen.

was bigger, 6.5 mm in length). I give figures of the abdomen of male, normal female (Alcock has no fig. of female abdomen), and of an abnormal female (fig. 56 B, D). I have not been able to find any trace of a suture between 4th and 5th segments in the abdomen of male and of abnormal female.

Pleopod 1 of the male (fig. 56 C) is not mentioned by Alcock and Kemp. It is slender, rather curved, and apically with c. 15 dentate spines. The spinose armature is of a type rather similar to that of other species of the genus (see Shen 1932, fig. 157 b (*S. globosa* de Haan), fig. 160 b (*S. longidactyla* Shen), fig. 163 b (*S. bitympana* Shen)), but specifically different. Pleopod 2 could not be found.

Distribution. Karachi (Alcock l.c., Kemp l.c.). The species is not found anywhere else.

157. *Dotilla* (*wichmanni* de Man?) (Fig. 57)

Dotilla wichmanni de Man 1892, p. 308, pl. 18 fig. 8.

Dotilla wichmanni Kemp 1918, p. 227, text fig. 1.

Dotilla wichmanni Kemp 1919 a, p. 329 (lit.), text-fig. 9 d.

Occurrence. Iranian Gulf. St. 1. 18.-28.II.1937. Bushire. Tidal zone, rocky coast. 1 ♂ 4 mm. (very defective), 2 ♀ about 4 mm.

The genus is new to Iranian waters.

Remarks. The determination is not quite certain, for the specimens are rather small and somewhat defective. But they seem to agree well with *D. wichmanni* regarding the sculpture of the carapace (but the two hind-

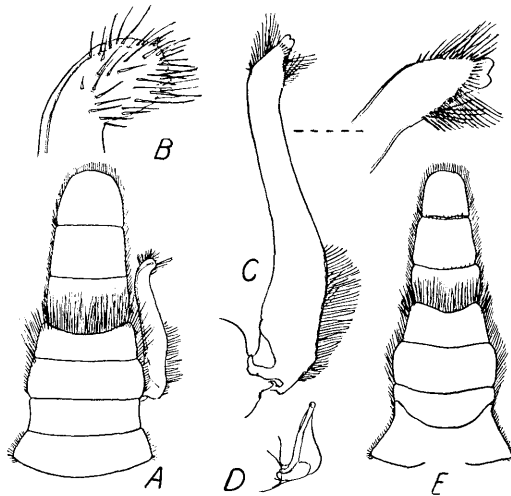


Fig. 57. A-B: *Dotilla wichmanni* ? ♂, St. 1, abdomen with pleopod 1, and apex of pleopod 1.
C-E: *D. wichmanni* ♂, Koh Kong, Thailand, M. Rathbun determ.; pleopod 1-2, and abdomen.

most pairs of lateral teeth are missing). I was not able to state the presence of tympana on the segments of sternum.

I give a figure of abdomen and of pleopod 1 of the male (fig. 57 A-B) which is rather similar to pleopod 1 of "high male" of *D. intermedia* (Kemp 1919 a, p. 332, text fig. 10 d). Pleopod 2 could not be found.

Abdomen of this species is not figured in the literature; de Man l.c. p. 311 writes "das Abdomen verhält sich ungefähr wie bei *D. sulcata*." For comparison I give figures of abdomen and pleopods 1-2 of a male, 7 mm, from Koh Kong, Thailand, determined by M. Rathbun (fig. 57 C-E). In this specimen the abdomen is apically much narrower than in the Iranian specimens, and pleopod 1 is apically more tapering, with two horny sharp teeth. Pleopod 2 is very short, in length between $\frac{1}{4}$ and $\frac{1}{5}$ of pleopod 1.

Distribution. Several localities from Celebes to Andamans (Kemp 1919).

Subfam. MACROPHTHALMINÆ

158. *Macrophthalmus (convexus) Stimpson* ?

Macrophthalmus convexus Alcock 1900, p. 378.

Macrophthalmus convexus Tesch 1915, p. 175 (with lit. and syn.), pl. 8 fig. 8.

Macrophthalmus convexus Kemp 1919 b, p. 389, pl. 24 fig. 2.

Macrophthalmus inermis A. Milne-Edwards 1873, p. 277, pl. 12 fig. 5.

Macrophthalmus graeffei Laurie 1915, p. 470, figs.

Occurrence. Iranian Gulf. St. 26. 15.III.1937. Off the eastern side of the isle of Kharg. 18 m. Sand, shells. 2 ♂, cb. 15 mm and 7.5 mm.

The species was previously not found in Iranian waters.

Remarks. The determination is not certain, for especially in the larger specimen the eye-stalks are too long: the middle of the cornea is off the external orbital angle.

Distribution. Red Sea (Laurie 1915, p. 470; *M. graeffei*). Widely distributed from the Gulf of Manaar to Australia, Samoa, the Loo Choo Is., and the Hawaiian Is. (Kemp l.c.).

159. *Macrophthalmus depressus* Rüppell (Fig. 58 A)

Macrophthalmus depressus Alcock 1900, p. 380.

Macrophthalmus depressus Tesch 1915, p. 196 (with lit. etc.), pl. 9 fig. 13.

Macrophthalmus depressus Kemp 1919 b, p. 392.

Occurrence. Iranian Gulf. St. 40. 28.III.1937. Manama, Bahrein. Tidalzone. Corals, clay, sand. 1 ♂ 12 mm.

Probably new to the Iranian Gulf (Nobili 1906 a, p. 155 records it only from Suez).

Remarks. The specimen belongs to *M. depressus*, not to the very closely allied species *M. teschi*, established by Kemp l.c., p. 392, pl. 24 figs. 8-9.

Pleopod 1 of the male (fig. 58 A) is very stout, a little curved, along the convex edge with many stiff spines intermingled with rather few ciliated setæ, along the concave edge with a few spines apically, and in the very apex with a rather stout, horny process. Pleopod 2 could not be found.

Distribution. From Red Sea to Madras, India, but probably not Australia etc. (see Kemp l.c.).

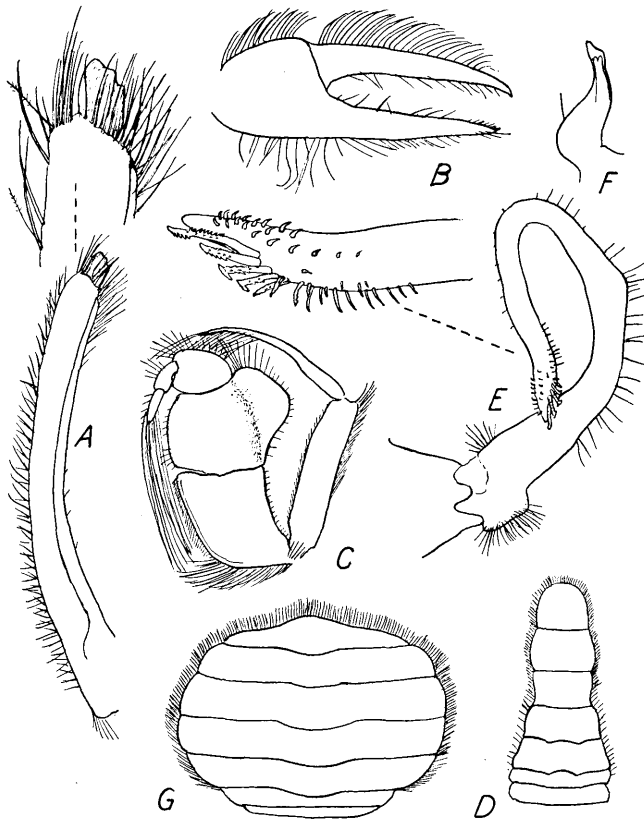


Fig. 58. A: *Macrophthalmus depressus* ♂, St. 40, pleopod 1.
B-G: *Tylodiplax indica*. B-F: ♂, St. 28 C; G: ♀, St. 103. B: ♂, right chela, outer side; C: outer maxilliped; D: ♂, abdomen; E-F: ♂, pleopods 1-2; G: ♀, abdomen.

160. *Tylodiplax indica* Alcock (Fig. 58 B-G)

Tylodiplax indica Alcock 1900, p. 374.

Tylodiplax indica "Investigator", pl. 64 fig. 2.

Tylodiplax indica Tesch 1918, p. 69.

Occurrence. 1. Iranian Gulf. St. 6 A. 4.III.1937. 12 nautical miles N.E. of the north eastern point of island of Kharg. 10 m. Clay. Petersen-grab. 5 small specimens, cb. up to 7 mm.—St. 6 B. Ibid. Petersen-grab. 1 ♀, cb. 9 mm.—St. 7 A. 4.III.1937. 6 nautical miles N.E. by E. of the northernmost point of island of Kharg. 20 m. Clay. Petersen-grab. 1 ♂, cb. 4 mm.—St. 25 B. 14.III.1937. 63 nautical miles V.¹/₄S. of Bushire. 49 m. Sand with a little clay. Petersen-grab. 1 ♂, cb. 10 mm, 1 ♀ ovig. 7 mm, ¹/₂ large ♀.—St. 28. 18.III.1937. 2 nautical miles S. by E. of the outer light-buoy at Bushire. 7 m. Graybrown clay. 2 ♂ cb. 7.5-9 mm, 1 ♀ 8 mm.—St. 28 A. Ibid. 7 m. Petersen-grab. 1 ♀ cb. 6 mm.—St. 28 B. Ibid. 7 m. Petersen-grab. 1 ♀ cb. 5 mm.—St. 28 C. Ibid. 7 m. Petersen-grab. 1 ♂ cb. 8 mm, 1 ♀ 8mm.—St. 29 C. 18.III.1937. About 3 nautical miles S. by E. of the outermost light-buoy at Bushire. 10 m. Clay. Petersen-grab. 1 ♂ cb. 8 mm.—St. 30 A. 19.III.1937. Bushire, between the red and the white light-buoy. 6¹/₂ m. Clay. Petersen-grab. 1 ♀ cb. 5 mm.—St. 30 B. Ibid. Petersen-grab. 1 ♂ cb. 9 mm.—St. 32 A. 23.III.1937. The coast N. of Kharg. 7¹/₂ m. Clay. Petersen-grab. 2 ♂ cb. c. 4-4.5 mm, 1 ♀ ovig. 8 mm, 1 ♀ 4 mm.—St. 32 C. Ibid. Petersen-grab. 11 specimens (♂, ♀ ovig., ♀), cb. up to 9 mm.—St. 64. 23.I.1938. Bushire, the roads. 7 m. 1 ♂ cb. 6 mm, 2 ♀ 5-6 mm.—St. 90.23.III.1938.4 nautical miles S.E. by E.¹/₂E. of Lingeh, 26°31' N., 54°47' E. 12 m. Clay etc. 1 ♀ cb. 8 mm, 2 ♀ 5.5-7 mm.—St. 120 (C?). 8.IV.1938. 6 nautical miles E.S.E. of Lingeh, 26°29' N., 54°49' E. 10 m. Clay etc. 1 ♀ cb. c. 7 mm.—St. 134. 26.IV.1938. 4 nautical miles E. of Harkus, 40 m. Soft bottom. 1 ♂ cb. 8 mm, 1 ♀ 8 mm.

2. Strait of Hormuz: St. 62 A. 11.IV.1937. Bendar Abbas. 7 m. Clay. 1 ♂ cb. c. 5 mm.

3. Gulf of Oman. St. 103. 31.III.1938. 3 nautical miles W.N.W. of Chahbar, 25°18' N., 60°35' E. 10 m. Sand. 1 ♂ cb. 11 mm, 3 ♀ ovig. cb. c. 10 mm.

The species is new to Iranian waters.

Remarks. This species is well described and figured by Alcock l.c.; but he had only two young males, 6.5 × 11 mm, and since then no new specimens have been recorded in the literature.

The antero-external angle of the outer maxillipeds (fig. 58 C) are still more projecting than shown by Alcock. The chelæ (fig. 58 B) are equal, very slender and small, even in the adult male, rather smaller than larger than in the "Investigator"-figure. There is no sexual difference in the chelipeds. Alcock writes regarding the male abdomen (of genus *Tylodiplax*; he had no female) that "it is narrow and consists of 5 separate joints, the 3rd, 4th and 5th segments being fused, but without obliteration of sutures." In the Iranian specimens (fig. 58 D) all the

sutures are distinct, and no doubt all the 7 segments are free. In the female the abdomen (fig. 58 G) is broader than long, covering almost the whole of the interspace between the legs of the two sides, and consisting of 7 free segments.

Pleopod 1 of the male (fig. 58 E) is medium-heavy, strongly curved, with the distal end bent backwards. On the apex there are a few dentate heavy spines, and several more slender spines of varying length. Pleopod 2 (fig. 58 F) is rather stout and of the usual shape.

Distribution. Previously only two specimens were known; the locality was Karachi (Alcock l.c.).

161. *Cleistostoma dotilliforme* Alcock

Cleistostoma dotilliforme Alcock 1900, p. 373.

Cleistostoma dotilliforme Investigator, pl. 63 fig. 1.

Cleistostoma dotilliforme Tesch 1918, p. 61.

Occurrence. Iranian Gulf. 19.II.1938. Bender Shahpur, near the high-water mark, clay. 1 ♀.

New to Iranian waters.

Distribution. Probably known only from Karachi (type-locality; Alcock l.c.).

Fam. GRAPSIDÆ

Subfam. GRAPSINÆ

162. *Grapsus maculatus* Gatesby (Fig. 59 A-D) subsp. *tenuicrustatus* Herbst (= *G. grapsus* aut.)

Grapsus grapsus Alcock 1900, p. 392, with lit. etc.

Grapsus maculatus Tesch 1918, p. 71.

Grapsus maculatus tenuicrustatus Tesch 1918, p. 72.

Grapsus grapsus Rathbun 1917, p. 227, pls. 53-54.

Occurrence. 1. Strait of Hormuz. St. 68. 17.IV.1937. Isle of Henjam, beach. 1 small specimen.—St. 69. 18.IV.1937. Isle of Quism (Tavila), Tidal zone. 2 big specimens.

2. Gulf of Oman. St. 73. 20.IV.1937. Jask. Tidal zone. 3 small specimens.

The species is not known from the Iranian Gulf.

Remarks. Pleopod 1 of the male was briefly described by Brocchi 1875, p. 78, but without figure. Pleopod 1 (♂, 47 mm, St. 69; fig. 59 A-B) is about 11 mm in length, very broad, proximally compressed, distally thick with a transversal depression in the very apex, and with numerous apical setæ. Pleopod 2 (fig. 59 C-D) is half as long as pleopod 1, apically tapering and cleft in the very apex; a semicircle of feathery setæ round the frontal side of the base of the distal joint.

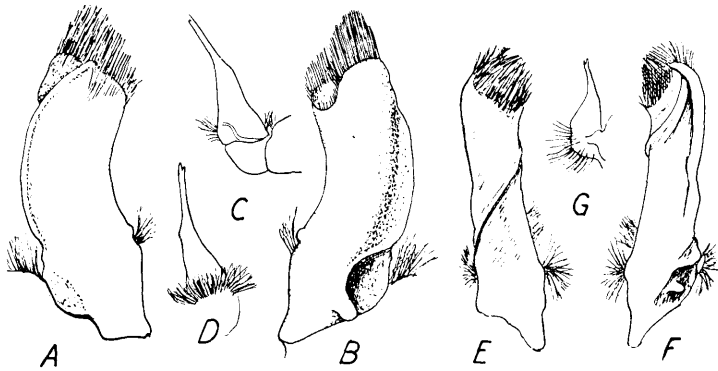


Fig. 59. A-D: *Grapsus maculatus* ♂, 47 mm, St. 69, right pleopods 1-2 (A, C: anterior side; B, D: caudal side).
E-F: *Metopograpsus messor* ♂, St. 2, right pleopods 1-2.

Distribution. Red Sea (Nobili 1906 b, p. 155). *G. grapsus* is distributed along the "tropical and subtropical shores of America as well as of the eastern Atlantic. South Florida and Bahamas to Pernambuco, Brazil; Bermudas; Lower California (San Benito Island) to Chile. The subspecies *G. grapsus tenuicrustatus* inhabits the Indo-Pacific region" (Rathbun l.c.).

163. *Metopograpsus messor* (Forskål) (Fig. 59 E-G)

Metopograpsus messor Alcock 1900, p. 397, with lit. etc.

Metopograpsus messor Tesch 1918, p. 79.

Occurrence. 1. Iranian Gulf. St. 2. 27.II.1937. Coral reef 6 miles S. of Bushire. 6 specimens of varying size.—St. 40. 28.III. 1937. Manama, island of Bahrein. Tidalzone. Corals, clay, sand. 6 specimens of varying size.—22.III.1938. Farur. Tidal zone. 3 small specimens.

2. Strait of Hormuz. St. 69. 18.IV.1937. Isle of Quism (Tavila). Tidalzone. 1 ♂.

Nobili (1906 a, p. 155) records it from Bahrein and N.E. of Arzana.

Remarks. The Iranian specimens seem to belong to the "typical" form (see Tesch l.c., p. 80, with lit.) as the protopodite of 4th pair of legs is not especially elongate.

Pleopod 1 (♂, 24 mm, St. 69; fig. 59 E-F) is about 8 mm in length, broad, compressed, distally thick, and with numerous apical setae. The furrow for plp. 2 begins at the proximal end of the median margin, continues across the frontal side and ends near the median margin of the caudal side. Pleopod 2 (fig. 59 G) is about $\frac{1}{3}$ the length of plp. 1, apically tapering and cleft in the very apex.

Distribution. Widely distributed in the Indo-Pacific Ocean, from W. Africa and Red Sea to Hawaiian Islands.

Brachyura indeterminata.

S. 80 A. 22.IV.1937. 1 mile S.E. of Hormuz. Brown clay. 1 specimen, small and very defective.—St. 104. 31.III.1938. 25°16' N., 60°35' E. 7 m. Sand. 1 specimen, small and very defective.

APPENDIX (Fresh-water crab)

Fam. POTAMONIDÆ

Subfam. POTAMONINÆ

164. *Potamon (Potamon) ibericus* (Marschall de Bieberstein) (Fig. 60)

Potamon (Potamon) ibericus M. Rathbun 1904, p. 259, pl. 9 fig. 4.

Potamon (Telphusa) ibericum N.-G. Lignau: Zur Oekologie der Süßwasserkrabbe *Potamon (Telphusa) ibericum* (Bieberstein).—Russ. Hydrobiol. Zeitschr., Saratow, vol. 7, 1928, pp. 179-183.

Potamon ibericum Szombathy, Ann. Mus. Nat. Hungar. Budapest, vol. 14, 1922, p. 412 (distrib.).

Potamon (Potamon) fluviatile var. *ibericum* Alcock 1910, p. 21, pl. 10 fig. 37.

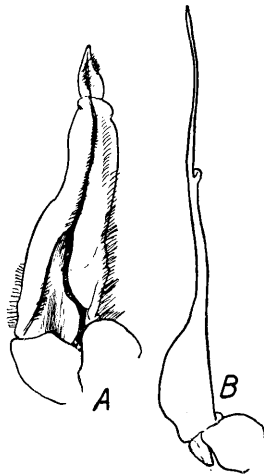


Fig. 60. *Potamon ibericus* ♂, 51 mm, locality 94, pleopods 1-2.

Occurrence. Locality 4. 6.II.1937. Kermanshah (about 600 km. W.S.W. of Teheran). Fountain head, temp. (water) 15° C, 15 m. from the head 12.5° C (water). 1 ♂ 65.25 × 79 mm, 3 ♂ 33-36 mm, 1 ♂ 13.5 mm.—Locality 10. 12.II.1937. Kazerun (about 120 km. W. of Shiraz). Terrestrial. Under stones in dug out holes near a canal. The canal

very narrow (50 cm), artificial, but coupled with a fountain. 1 ♂ 26 mm, 1 ♀ 29.5 mm.—Locality 11. 17.II.1937. Shahpur Rud (about 150 km. W. of Shiraz). In or near the river. 1 ♀ 38 mm.—Locality 42. 14.III.1937. Shahpur Rud. "Running at forenoon in the sun up to 100 m. from the river." 2 ♂ 20-23 mm, 2 ♀ 25-42 mm.—Locality 44. 15.III.1937. One of the sources of Shahpur Rud, near the Shahpur-ruins (about 12 km. N.W. of Kazerun, on the same plateau as Kazerun, above 960 m above the level of the sea). The source contains most water; the water streams in torrents out of the side of the mountains in 3-4 places (about 20° C?). Vegetation abundant in the sources and in the brooks. "*Potamon* is frequent in sources and brooks; several were seen pecked to dead by birds (herons?) both in the brook and on land." 2 ♂ 21-25 mm.—Locality 55. 15.III.1937. Shah Bazan (about 80 km N.E. of Dezful, between Bala Rud and Ab-i-Diz). Brook, slowly streaming. 3 ♂ 13-19 mm, 1 ♀ 29 mm. "Crab everywhere, also running on the bank in the sun."—Locality 92. 19.V. 1937. Bicheh. 1200 m above the level of the sea. 1 ♀ 18 mm.—Locality 94(?). 22.V.1937. Bicheh. 1 ♂ 51 × 61.5 mm.—7.II.1935. Canal 5 km. S. of Teheran. 1 ♂ 24 mm, 1 ♀ 30 mm.

Hitherto it was found several times in Iran (Rathbun l.c.; Alcock l.c.).

Remarks. The biggest specimen (♂; Kaiser, loc. 4) is 65.25 × 79 mm; Alcock's largest specimen is much smaller (♂, "about 1.75 inch long by 2 inches broad," = c. 44 × 50 mm).

Pleopod 1 of the male (fig. 60 A) has the same shape as figured by Brocchi 1875 (p. 86, pl. 17 fig. 122) for *P. edule* (*Telphusa fluviatilis* Brocchi). Also pleopod 2 (fig. 60 B) has the same shape as Brocchi's fig. (fig. 123) of the said species, but has a squamiform process about midway in the filiform portion; such a process is in reality also present in *P. edule* (I have examined a ♂, 45 mm, from Sicilia), but was overlooked by Brocchi.

Distribution. "From the Crimea and Syria on the west, through the Caucasus and Persia, to Kashmir on the east" (Alcock l.c.).

Summary

The Iranian Gulf has an extent somewhat equal to the Baltic. The average depth is 50 m; but a single spot in the southern part of the Gulf has a depth of 113 m. The salinity is about 40 ‰, the temperature about 28° C and differs very little from the surface to the bottom.

151 (+ 1?) species of crabs are found in the Gulf. But as numerous littoral-sublittoral species are known to be common to the Red Sea and In-

dia without hitherto being found in the Iranian Gulf, and as the Danish expeditions have enriched the fauna of the very Gulf with no less than 47 species (104 + 1? were known up to 1942) or about 45 %, it may be expected that more extensive researches will considerably increase the number of species.

A few species were taken in great quantities; this applies especially to *Philyra granigera* (1 haul with dredge took 520 specimens). But several were taken in great numbers of hauls, for instance *Typhlocarcinus nudus* (43 hauls, 70 specimens).

7 species are not found outside the Gulf, viz.

- no. 16 *Nursia* sp.
- no. 52 *Doclea* sp.
- no. 96 *Actumnus tessellatus*
- no. 99 *Actumnus margarodes*
- no. 144 *Typhlocarcinus dentatus*
- no. 150 *Pinnotheres perezii*
- no. 151 *Ostracotheres spondyli*

One species, viz., no. 14 *Nursia persica*, is found also in the Strait of Hormuz, but not in other localities.

As might be expected because of the rather small depths, almost all the Iranian crabs are littoral-sublittoral species, and the majority of them are widely distributed tropical Indo-Pacific species.

A few seem to inhabit only the western part of the Indian Ocean, being not found east of India; they are:

- no. 12 *Nursia abbreviata* (not west of Iranian Gulf)
- ?no. 21 *Ixa edwardsi*
- no. 24 *Pseudophilyra blanfordi*
- no. 29 *Philyra granigera* (only Iranian Gulf and Red Sea)
- no. 30 *Philyra rectangularis* (ditto)
- no. 33 *Philyra variegata*
- no. 35 *Leucosia hilaris*
- no. 46 *Ophthalmias curvirostris* (only Iranian Gulf and Red Sea)
- no. 47 *Menæthiops nodulosa* (ditto)
- no. 48 *Acanthonyx (limbatus ?)* (not Red Sea)
- no. 54 *Micippa philyra* var. *mascaenica* (not East of Gulf of Oman)
- no. 55 *Cyphocarcinus minutus* (not East of Andamans)
- no. 57 *Cryptopodia angulata* var. *cappifer*
- no. 71 *Charybdis paucidentata*
- no. 102 *Pilumnus savignyi* (only Iranian Gulf and Red Sea)
- no. 107 *Euxanthus sculptilis*
- no. 125 *Phymodius granulatus* (only Iranian Gulf and Red Sea)

- no. 145 *Xenophthalmus moebii*
 no. 154 *Ocypoda aegyptiaca*
 no. 156 *Scopimera scabricauda* (not West of Iranian Gulf)
 no. 160 *Tylodiplax indica* (ditto)
 no. 161 *Cleistostoma dotilliforme* (ditto).

At least 81 of the Iranian Brachyura extend to India, 75 to the Malayan Archipelago or Thailand, 60 (+ 1?) to Japan, and 36 to Polynesia (see the table pp. 200-211).

If we compare the Iranian seas with the Brachyuran fauna of the Red Sea¹, we find here a much greater number of species. Laurie (1916) lists 260 Brachyura, and Balss (1929, pp. 24-25) adds the following 22:

- Ebalia nobilii* Balss (780 m)
Nursia dimorpha Balss (800 m)
Pariphiculus coronatus Alcock & Anderson (800 m)
Pseudophilyra tridentata (Miers) (littoral-sublittoral)
Philyra granigera Nobili (ditto)
Philyra platychira de Haan (= *P. variegata* (Rüppell)) (ditto)
Randallia pustulilabris Alcock (3 occur. 168-350 m, in other seas
 30-50 m)

- Arcania quinquespinosa* Alcock & Anderson (212 m)
Cosmonotus grayi Adams & White (212 m)
Aepinus indicus (Alcock) (168 m; usual depth 40-180 m)
Achæus erythræus Balss (5 occurrences 341-978 m)
Menæthiops dubia Balss (depth ?)
Eurynome verhoeffi (Balss) (168 m)
Heterocrypta investigatoris Alcock (littoral-sublittoral)
Ceratocarcinus spinosus Miers (depth ?)
Charybdis giardi (Nobili) (depth ?)
Xanthias cumatodes (Mac Gilchrist) (168 m)
Typhlocarcinus rubidus Alcock (3 occurrences 50-323 m)
Carcinoplax purpurea Rathbun var. (562 m)
Notonyx vitreus Alcock (depth ?)
Pachygrapsus minutus minutus Milne-Edwards (littoral-sublittoral)
Hapalocarcinus marsupialis Stimpson (depth ?)

Thus 282 species of Brachyura are known from the Red Sea, and 82 (+ 3 ?) of these are found also in the Iranian area.

¹ The Red Sea has an extent which is more than twice as large as the Iranian Gulf and is much deeper: in the central part it is 1000-1500 m, and the maximal depth (S.W. of Djidda) is 2177 m; the southern mouth has a depth of 216 m.

The marine Brachyura of the Iranian waters	Iranian waters				
	Iranian Gulf			Strait of Hormuz	Gulf of Oman
	Alcock 1895-1900	MacGil- christ etc.	Nobili 1906	Danish Expeditions 1937-38	
DROMIACEA					
<i>Dromiidae</i>					
× ¹ 1. <i>Dromia dormia</i>	×			×	n ²
× 2. <i>Cryptodromia canaliculata</i>	×			×	
× 3. <i>Dromidia unidentata</i>	×		×	×	
OXYSTOMATA					
<i>Dorippidae</i>					
× 4. <i>Dorippe dorsipes</i>	×		×	×	n ² n
n 5. — (<i>jacchino</i> ?)				n ²	n
<i>Calappidae</i>					
6. <i>Calappa gallus</i>	×				
× 7. — <i>hepatica</i>	×				n
× 8. — <i>lophos</i>	×				n
9. — <i>philargius</i>	×				
n ² 10. <i>Matuta planipes</i>				n	n
<i>Leucosiidae</i>					
11. <i>Oreophorus reticulata</i>	×	×			
n 12. <i>Nursia abbreviata</i>				n	n
13. — <i>blanfordi</i>	×				
× 14. — <i>persica</i>	×				n
× 15. — <i>plicata</i>	×			×	
× 16. — <i>sp.</i>				×	
n 17. <i>Iphiculus spongiosus</i>					n
18. <i>Myra affinis</i>	×		×		
× 19. — <i>fugax</i>	×			×	
× 20. <i>Arcania quinquespinosa</i>	×				n
n 21. — <i>septemspinosa</i>	×				n
n 22. <i>Ixa edwardsi</i>		×			n
23. <i>Ixoides cornutus</i>					
n 24. <i>Pseudophilyra blanfordi</i>				n	n
n 25. — <i>melita</i>				n	
26. — <i>tridentata</i>	×		×		

¹ × in this column indicates that the species was taken by the Danish expeditions.² n: taken as new to the area by the Danish expeditions.

E. Africa, Zanzibar	Seychelles, Amirantes	Red Sea	Karachi	India	Maldives, Laccadives	Ceylon	Malayan Archipelago ; Thailand	Japan	Polynesia	Further Remarks
×		×		×	×		×	×	×	from S. Africa to Japan East Africa to Japan Indo-Pacific to Kermadec Is. and Japan
×	×	×		×		×	×	×		
×	×	×		×	×	×	×	×		to W. Australia and Japan Hong Kong
×	×	×		×	×	×	×	×	×	to Hawaiian Is. ; also Atlantic to Japan and Hawaiian Is. whole Indian Ocean, to Japan from Red Sea to Japan and Samoa to E. Asia and Australia
		×	×	×	×	×	×	×	×	to Sunda Strait
			×	×	×	×	×	×		Hong Kong
×	×	×		×	×	×	×	×		to Hong Kong to Japan and Australia to Japan and New Caledonia
×		×		×	×	×	×	×		to Hong Kong
				×				×		Hong Kong?
	×	×		×		×	×	×		Thailand

The marine Brachyura of the Iranian waters	Iranian waters					
	Iranian Gulf			Strait of Hormuz	Gulf of Oman	Danish Expeditions 1937-38
	Alcock 1895-1900	MacGil- christ etc.	Nobili 1906			
× 27. <i>Philyra globulosa</i>	×			×	n	n
n 28. — <i>globosa</i>				n		
× 29. — <i>granigera</i>			×	×	n	
n 30. — <i>rectangularis</i>				n		
× 31. — <i>scabriuscula</i>	×			×	×	
× 32. — <i>sexangula</i>	×			×		
× 33. — <i>variegata</i>	×			×		n
34. <i>Leucosia elata</i>	×					
35. — <i>hilaris</i>			×			
36. — <i>longifrons</i>	×		×			
× 37. — (— var.) <i>pulcherrima</i>	×		×	×		
× 38. — <i>perlata</i>	×			×	n	
× 39. — <i>pubescens</i>	×			×	n	
<i>Raninidæ</i>						
40. <i>Cosmonotus grayi</i>	×					
BRACHYRHYNCHA OXYRHYNCHA <i>Hymenosomatidæ</i>						
× 41. <i>Elamene sindensis</i>		C.-D. ¹		×		
<i>Maiidæ</i>						
n 42. <i>Collodes malabaricus</i>				n		
n 43. <i>Achæus tenuicollis</i>				n		
n 44. — <i>lacertosus</i>				n		
45. — <i>spinus</i>	×					
46. <i>Ophthalmias curvirostris</i>			×			
× 47. <i>Menæthiops nodulosa</i>			×	×		
n 48. <i>Acanthonyx (limbatus ?)</i>				n		
n 49. <i>Menæthius monoceros</i>				n		
× 50. <i>Phalangipus longipes</i>			×	×	n	
× 51. <i>Hyastenus hilgendorfi</i>			×	×	n	
n 52. <i>Doclea</i> sp.				n		

¹ C.-D. = Chopra & Das 1930.

E. Africa, Zanzibar	Seychelles, Amirantes	Red Sea	Karachi	India	Maldives, Laccadives	Ceylon	Malayan Archipelago ; Thailand	Japan	Polynesia	Further Remarks
			×	×		×		?		to Malakka distribution uncertain not other localities ditto
×	×	×	×	×						to Malayan Archipelago not other localities
×		×				×			×	not other localities ditto
	×		×			×		×		to Japan and New Caledonia ; San Fran- cisco Torres Strait ; Australia
				×		×	×		×	Hong Kong to West Australia
×		×					×	×		from E. Africa to Japan
			×	×		×				not other localities
				×						not other localities Andamans? ; between Australia and Tas- mania
				×		×	×		×	Australia not other localities
		×								ditto
		×								ditto
	×					×		×	×	ditto
×	×	×		×		×	×	×	×	also Australia
			×	×		×	×		×	also China and Australia
						×	×		×	from Ceylon to Malayan Archipelago and Hawaii

The marine Brachyura of the Iranian waters	Iranian waters				
	Iranian Gulf			Strait of Hormuz	Gulf of Oman
	Alcock 1895-1900	MacGil- christ etc.	Nobili 1906		
53. <i>Schizophryx dama</i>			×		
× 54. <i>Micippa philyra</i> var. <i>mascare- nica</i>			×	×	×
× 55. <i>Cyphocarcinus minutus</i>			?	×	?
n 56. <i>Xenocarcinus tuberculatus</i>				n	
<i>Parthenopidæ</i>					
n 57. <i>Cryptopodia ungulata</i> var. <i>cap- pifer</i>				n	
58. — <i>fornicata</i>	×				
× 59. <i>Lambrus carinatus</i>			?	×	n
n 60. — <i>longimanus</i>				n	
× 61. <i>Pseudolambrus calappoides</i>			×	×	
62. <i>Eumedonus granulatus</i>		×			
BRACHYGNATHA BRACHYRHYNCHA I. CYCLOMETOPA <i>Corystidæ</i>					
63. <i>Gomezia distincta</i> var.		×			
<i>Portunidæ</i>					
n 64. <i>Charybdis cruciata</i>				n	n
n 65. — <i>lucifera</i>				n	n
n 66. — <i>miles</i>				n	
67. — <i>variegata</i>	×				
68. — <i>natator</i>			×		
69. — <i>helleri</i>	×				
× 70a — <i>hoplites</i>			×	×	
n 70b — — var. <i>longicollis</i>				n	n
71. — <i>vadorum</i>	×				
72. — <i>paucidentata</i>			×		
× 73. <i>Neptunus orbitosinus</i>	?			×	
74. — <i>granulatus</i>	?				
× 75. — <i>arabicus</i>			×	×	
76. — <i>andersoni</i>	×				
× 77. — <i>hastatoides</i>	×			×	n
78. — <i>longispinosus</i>	×				n

E. Africa, Zanzibar	Seychelles, Amirantes	Red Sea	Karachi	India	Maldives, Laccadives	Ceylon	Malayan Archipelago ; Thailand	Japan	Polynesia	Further Remarks
×	×	×		×		×	×	×	×	to Japan and Australia
×	×	×				×		×		not E. of Andamans from Ceylon to Japan and Australia
			×	×		×	×	×		also Australia
×	×	×		×		×	×	×		also Australia
	×	×		×		×	×		×	also Australia and Pacific not other localities
								×		not other localities
				×				×		to Hong Kong and Japan from India to Japan
				×		×		×		from N.E. India to Austral. and Japan
		×		×				×		to Australia and Japan
×		×		×		×		×		to Shanghai and Japan
	×	×	×	×			×			Hong Kong ; Mediterranean Indian Ocean from W. to E.
	×	×		×						not other localities
	×	×		×						Hong Kong
	×	×		×		×	×	×	×	not other localities
	×	×		×	×	×	×	×	×	from Madagascar to Tahiti and Japan not other localities
×		×		×	×	×	×	×		Burma Hong Kong

The marine Brachyura of the Iranian waters	Iranian waters				
	Iranian Gulf			Strait of Hormuz	Gulf of Oman
	Alcock 1895-1900	MacGill- christ etc.	Nobili 1906		
79. <i>Neptunus tuberculatus</i>	×				
× 80. — <i>sanguinolentus</i>			×	n	n
× 81. — <i>pelagicus</i>	×		×	n	
82a <i>Thalamita prymna</i> var. <i>crenata</i>	×				
n 82b — — (var. <i>picta</i> ?)					n
83. — <i>sima</i>	×				
n 84. — <i>iranica</i>				n	
× 85. — <i>poissoni</i>	×		×		
86. — <i>admete savignyi</i>	×		×		
× 87. — <i>sexlobata</i>	×				n
n 88. <i>Podophthalmus vigil</i>				n	n
<i>Atelecyclidæ</i>					
n 89. <i>Kraussia (nitida</i> ?)				×	
<i>Xanthidæ</i>					
90. <i>Menippe rumphi</i>	×				
× 91. <i>Epixanthus frontalis</i>		K ¹)		n	
n 92. <i>Ozius (Eurüppellia) tenax</i>				n	
× 93. <i>Eriphia sebana smithi</i>			×	n	n
n 94. <i>Pilumnopus vauquelini</i>				n	n
× 95. <i>Actumnus asper</i>			×	×	
× 96. — <i>tessellatus</i>	×		×	×	
97. — <i>obesus</i>	×				
× 98. — <i>setifer</i>			×	×	
99. — <i>margarodes</i>		×			
100. <i>Heteropilumnus trichophoroides</i>			×		
× 101. <i>Pilumnus longicornis</i>			×	×	
× 102. — <i>savignyi</i>			×	×	
n 103. — <i>hirsutus</i>				n	
104. — <i>propinquus</i>			×		
105. <i>Lophactæa anaglypta</i>	×				
106. <i>Xanthias cumatodes</i>		×			
107. <i>Euxanthus sculptilis</i>	×				
× 108. <i>Medæus granulosus</i>	×		×		n
× 109. <i>Xantho (Leptodius) exaratus</i> .	×		×	×	

¹ K. = Klunzinger 1913.

E. Africa, Zanzibar	Seychelles, Amirantes	Red Sea	Karachi	India	Maldives, Laccadives	Ceylon	Malayan Archipelago ; Thailand	Japan	Polynesia	Further Remarks
×		×		×	×	×	×	×	×	from Cape to Hawaii and Japan
×		×		×	×	×	×	×	×	to Tahiti and Japan ; Mediterranean
	×	×		×	×	×	×	×	×	to Hong Kong and Marquesas Is.
×		×		×	×		×	×	×	to Hawaii
×	×	×		×	×		×	×	×	to China, Japan and Hawaii
		×								not other localities
×		×				×	×			not E. of Ceylon
		×		×		×				not E. of Ternate, Moluccas
	×	×					×		×	to Hawaii
					×	×	×	×		from Amirantes to Japan
×	×	×		×		×		×		
×	×	×		×				×	×	to Polynesia
	×	×				×			×	
×	×	?				×	×	×	×	to Australia, Tahiti and Japan
	×	×								not outside Iranian Gulf
×		×						×	×	Celebes
×		×						×	×	from E. Africa to Polynesia
	×	×			×	×		×	×	not other localities
	×	×			×	×		×	×	to Fidji
	×	×		×	×	×			×	to Samoa
		×		×						not other localities
×		×	×	×	×			×		from Madagascar and Red Sea to Ja-
×		×	×	×	×	×	×	×	×	pan and Australia
		×	×	×	×	×	×	×	×	to Japan and Polynesia

The marine Brachyura of the Iranian waters	Iranian waters				
	Iranian Gulf			Strait of Hormuz	Gulf of Oman
	Alcock 1895-1900	MacGill-christ etc.	Nobili 1906		
110. <i>Xantho (Leptodius) sanguineus</i>	×				
111. <i>Actæa speciosa</i>	×				
112. — <i>rüppelli</i>	×		×		
113. — <i>cavipes</i>	×		×		×
× 114. — <i>savignyi</i>	×		×	×	
× 115. — <i>margaritifera</i>	×			×	
116. — <i>calculosa</i>	×				
× 117. <i>Cymo andreossi</i> var. <i>melanodactyla</i>			×	×	
n 118. <i>Galene bispinosa</i>					n
n 119. <i>Liagora rubromaculata</i>				n	
n 120. <i>Atergatis integerrima</i>				n	n
n 121. <i>Carpilius convexus</i>				n	
n 122. <i>Zozymodes xanthoides</i>				n	
× 123. <i>Chlorodius niger</i>			×	×	
124. <i>Phymodius ungulatus</i>			×		
n 125. — <i>granulatus</i>				n	
126. <i>Etisus lævimanus</i>	×		×		
× 127. <i>Etisodes anaglyptus</i>	×			×	
128. — <i>electra</i>			×		
× 129. <i>Halimede ochtodes</i>			×	×	
× 130. <i>Tetralia glaberrima</i>			×	×	
n 131. <i>Trapezia cymodoce</i>				n	
132. <i>Camptoplax copperingi</i>			×		
n 133. <i>Dentoxanthus iranicus</i>					n
II. CATAMETOPA					
<i>Goneplacida</i>					
n 134. <i>Carcinoplax purpurea</i>				n	
× 135. <i>Eucrate sulcatifrons</i>			×	×	n
× 136. <i>Libystes edwardsi</i>	×				n
n 137. — <i>nitidus</i>				n	
n 138. <i>Lithocheira (amoyensis ?)</i>				n	
× 139. <i>Goneplax maldivensis</i>	?			×	
140. <i>Notonyx nitidus</i>	×				
n 141. <i>Paraselwynia ursina</i>				n	
n 142. <i>Typhlocarcinus nudus</i>				n	
n 143. — (<i>villosus ?</i>)				n	n
n 144. — <i>dentatus</i>				n	

E. Africa, Zanzibar	Seychelles, Amirantes	Red Sea	Karachi	India	Maldives, Laccadives	Ceylon	Malayan Archipelago ; Thailand	Japan	Polynesia	Further Remarks
×	×	×		×	×	×	×	×	×	from E. Africa to Hawaii
×	×	×			×	×	×		×	to Hawaii
×	×	?			×	×	×	×	×	from E. Africa to Japan and Tahiti
×	×	×			×	×	×		×	from Madagascar to Tahiti
		×	×			×	×	×		to Japan and W. Australia
		×	×	×		×	×			from Aden to Torres Strait
		×	×			×	×	×	×	to Japan and Tahiti
×	×					×	×		×	tropical Indo-Pacific
				×				×		a rare species ; Hong Kong
				×		×		×		from Irrawady to Hong Kong
×	×					×	×	×	×	to Japan
×	×	×				×	×		×	to Hawaii
×	×	×		×	×	×	×	×	×	not other localities
×	×	×		×	×	×	×	×	×	to Polynesia incl. of Hawaii
		×				×	×		×	ditto
		×		×	×				×	not other localities
	×	×		×	×		×		×	to Hawaii
	×	×		×	×		×		×	from Red Sea to Samoa
	×	×		×	×				×	tropical Indo-Pacific
				×	×		×		×	to Philippine Is. (and New Caledonia?)
×	×	×		×	×	×	×	×	×	to Polynesia
×	×	×		×	×	×	×	×	×	ditto
										Torres Strait
										not outside Gulf of Oman
	×	×		×			×			Philippine Is.
										Hong Kong ; Australia
										Andamans
×		×					×			not other localities
					×					Amoy, southern China
										not other localities
							×			S. of New Guinea
							×			not other localities
			×	×			×			Hong Kong
				×			×	×		to Hong Kong and Japan
							×	×		not outside Iranian Gulf

The marine Brachyura of the Iranian waters	Iranian waters					
	Iranian Gulf				Strait of Hormuz	Gulf of Oman
	Alcock 1895-1900	MacGill- christ etc.	Nobili 1906	Danish Expeditions 1937-38		
145. <i>Xenopthalmus moebii</i>	×					
n 146. <i>Xenopthalmodes dolichophallus</i>						n
n 147. <i>Mertonia lanka</i>				n		
n 148. <i>Lambdophallus sexpes</i>					n	
× 149. <i>Hexapus sexpes</i>			×	×		
<i>Pinnotheridæ</i>						
150. <i>Pinnotheres perezi</i>			×			
151. <i>Ostracotheres spondyli</i>			×			
n 152. <i>Xenopthalmus pinnotheroides</i>				n	n	
<i>Cymopoliidæ</i>						
153. <i>Cymopolia investigatoris</i> var. ...		×				
<i>Ocypodidæ</i>						
n 154. <i>Ocypoda ægyptiaca</i>				n		
155. <i>Uca annulipes</i>			×			
n 156. <i>Scopimera scabricauda</i>				n		
n 157. <i>Dotilla (wichmanni ?)</i>				n		
n 158. <i>Macrophthalmus (convexus ?)</i>				n		
n 159. — <i>depressus</i>				n		
n 160. <i>Tylodiplax indica</i>				n	n	n
n 161. <i>Cleistostoma dotilliforme</i>				n		
<i>Grapsidæ</i>						
n 162. <i>Grapsus maculatus</i> subsp. <i>tenuicrustatus</i>					n	n
× 163. <i>Metopograpsus messor</i>			×	×	n	—
Number of species	51 +1?	9	50 +2?	46 +47n	1 +34n	2 +1? +24n
	Iranian Gulf 151+1?					

	E. Africa, Zanzibar	Seychelles, Amirantes	Red Sea	Karachi	India	Maldives, Laccadives	Ceylon	Malayan Archipelago ; Thailand	Japan	Polynesia	Further Remarks
			×		×			×	×		Mauritius, Andamans not other localities
					×		×	×	×		not other localities to Japan and New Caledonia
								×			not other localities ditto Burma, Hong Kong
											Andamans
	×		×				×	×	×		not other localities to Japan
	×			×				×			not other localities from Andamans to Celebes
		×		×	×				×	×	to Japan and Polynesia
				×	×					×	to Japan and Hawaii
				×							not other localities ditto
	×		×	×	×		×	×		×	Indo-Pacific region to Hawaii etc.
48 +1?	52	82 +3?	18	81	37	63	75	61 +1?	36		

Appendix

The Male Pleopoda of the Brachyura

While the females have 4 pairs of simple, biramose pleopoda (viz., on 2nd-5th abdominal segments; 1st pair is always missing), the males have only two pairs, viz., on 1st and 2nd segments. Very young males of *Dromiacea* may, however, have pleopoda also on 3rd-5th segments, but they disappear at an early stage.

The basal part of each pleopod is more or less coalesced with the abdominal segments; then two joints follow which F l i p s e (1930, p. 24, figs. 22-23) calls protopodite and endopodite. Miss C o c h r a n (1935, pp. 46-48, figs. 14 A-B) who has described the musculature, considers the basal part an individual joint, so that each pleopod consists of 3 joints which she calls coxopodite, basipodite, and flagellum.

Pleopod 1 is usually at least half as long as abdomen; the form is most varying in the individual families, genera, and species. Usually it is rather stout, prismatic, or shaped as a compressed cylinder or conus; especially apex is most varying. Near the median margin the long distal piece has a canal in which pleopod 2 is imbedded (see I h l e 1913, fig. 64 (transversal section); W i l l i a m s o n 1904, pl. 3 fig 60 (longitudinal section)); the proximal end of the canal is somewhat widened in order to fit the broad basal part of pleopod 2.

Pleopod 2 is usually only $\frac{1}{6}$ to $\frac{1}{2}$ the length of pleopod 1. In most families it is very simple, viz., a compressed conus without special details, but with apex obliquely cut off, or sometimes bifid. Because of the very small length pleopod 2 is usually overlooked and not described in the literature. But in a few families or genera it is rodlike or more or less fili-form and as long as or longer than pleopod 1.

Long pleopoda 2 are described in the following families etc.:

Dromiacea: plp. 2 in length = plp. 1, or longer.

Calappidæ: plp. 2 in length = plp. 1.

Leucosiidæ, *Ebaliinæ*: *Ebalia longimana*: plp. 2 > plp. 1.

Parthenopidæ, *Parthenopinæ*: *Platylambrus carinatus*: plp. 2 in length = plp. 1.

Cancriidæ: plp. 2 > plp. 1.

Xanthidæ, *Menippinæ*: plp. 2 > plp. 1.

Xanthidæ, Carpiliinæ: Carpilodes convexus: plp. 2 > plp. 1.

Potamonidæ: plp. 2 > plp. 1.

Goneplacidæ, Goneplacinæ: Goneplax rhomboides: plp. 2 in length = plp. 1.

Goneplacidæ, Pseudorhombiliinæ: Carcinoplax (purpurea?): plp. 2 > plp. 1.

Goneplacidæ, Rhizopinæ: Notonyx nitidus: plp. 2 > plp. 1.

In the literature the male pleopoda are described under different names, for instance: male appendages or first and second penis (Williamson), appendices copulateurs or fausses pattes (Duvernoy), appendices mâles (Brocchi), or Ruten (Balss; Peters & Panning).

The male pleopoda of very few species are described in the old literature, for instance by Milne-Edwards in Règne Animal. But Duvernoy was the first to give an account of the pleopoda of a certain number of the most important families of Brachyura (Duvernoy 1850, pp. 145-166), with rather few but excellent figures. Later, in a list of the majority of families of Brachyura, Brocchi (1875) has given descriptions with figures of these appendages of all the species (total c. 80) in which they were described in the literature or which he had himself had an opportunity of examining (for Brachyura, see Brocchi 1875, pp. 51-116, 120-123), and the majority of his descriptions are accompanied by good figures.

On the function of the male pleopoda. The male pleopoda are copulatory organs, but *copula* has been observed by only very few authors, for "the act of impregnation is not very easily studied" (Williamson 1904, p. 101).

Regarding *Cancer pagurus* Williamson writes (1904, pp. 101¹): the external opening of the *vas deferens* is in the genital papilla which is situated on the coxopodite of the fifth pereopod, but "it is a physical impossibility for the genital papillæ to reach the vulvæ of the female. The sperms have to be transferred from the papillæ by means of the abdominal appendages" "which are attached to the first and second segments and are very dissimilar in form. They are in fact complementary. The first appendage is of tapering shape, and is tubular. The tube is formed by the involution of its sides. The second appendage is a long rod, bent, and jointed about the middle of its length." The first and second abdominal appendages together form one organ, the penis. The second appendage is during copulation inclosed within the first penis and moves up and down in it like the plunger of a pump.

"The genital papilla is sometimes found inserted into the tube of the first penis, but oftener it is lying on the posterior surface of the base of

¹ Here cited only in abstract.

that organ. But if the first penis is drawn backwards into the position it occupies when in the vagina of the female, the papilla usually slips into the tube." "By each movement the second penis presses on the genital papilla, and therefore probably causes the issue of the spermatophores into the tube. The efficacy of the pumping arrangement was demonstrated experimentally. A small quantity of a thin carmine paste was introduced into the bottom of the tube, and by alternately pushing in and withdrawing the second penis the carmine was pumped out at the top. By the flexion and extension of the portion of the abdomen, then, the sperms (spermatophores) would be gradually transferred to the spermatheca, into which the first penis penetrates."

Copulation of *Eriocheir sinensis* was described by Peters & Panning (1933, p. 135, with figures) as follows. "Das Männchen hebt seine beiden Ruten (Pleopoden 1) und drückt sie gegen die hervorspringenden Vulvae des Weibchens, und zwar derart, dass sie mit ihren an der Aussenseite liegenden Öffnungen hinter einem Vorsprung am Deckel der weiblichen Geschlechtsöffnung haken. Dadurch wird ohne viel Kraftaufwand eine innige Verbindung bewirkt, die nach erfolgter Begattung rückartig gelöst zu werden pflegt. Die aus den männlichen Genitalöffnungen heraushängenden häutigen, etwa $\frac{1}{2}$ cm langen Penes¹ leiten nun den Samen in die röhrenförmigen Ruten 1, in deren Hohlkanal die kleinen Ruten 2 (Pleopoden 2) hineinragen und wahrscheinlich durch pumpenartige Bewegungen das Sperma vorwärts in die weibliche Geschlechtsöffnung hineintreiben."

On the male pleopoda from a taxonomic point of view. Already Duvernoy (1850) and especially Brocchi (1875) have made attempts to trace the differences of the male pleopoda in the individual families etc.; but since then these appendages of numerous species have been described by a great number of authors, especially during the last twenty years. Therefore I have gone through all the Brachyuran literature to which I have had access and have noted all the descriptions and figures I have found; but as the descriptions are most dispersed, and as Zoological Record has no notes regarding these appendages, my list cannot be a complete one. Brocchi's list (1875) comprises about 80 species. The list given below comprises between 400 and 500 species, arranged according to families and subfamilies, and at each fam. (subfam.) I have, if possible, given a brief characterization. In many cases especially pleopods 1 have been a good help in the determination of species, for sometimes they are very different even in closely allied species (see for instance *Philyra globulosa* and *P. globosa*, pp. 80 and 83).

¹ Genital papils.

List of Familiæ

1. tribus DROMIACEA de Haan 1839

The very young males may, in contrast to all other Brachyura, have also plp. 3-5; but these disappear early. Plp. 2 may have a very short exopodite (for instance *Homola barbata* Herbst, see A. Milne-Edwards & Bouvier 1902, pl. 6 fig. 3).

1. fam. DROMIIDÆ Alcock 1899

Plp. 1 extremely stout, truncate, apical end with a dense tuft of setæ. Plp. 2 as long as or longer than plp. 1, more or less styliform.

Dromia dormia (L.), *D. hirtissima*, *D. nodipes*, *D. rumpfii*, *D. vulgaris*, plp. 1-2: see p. 161.

Cryptodromia fallax (M.-Edw.), plp. 1-2: Duvernoy 1850, p. 160.

Cryptodromia tumida Stimpson, plp. 1-2: Ihle 1913, p. 18, figs. 17-18.

Dromidiopsis cranioides (de Man): Ihle 1913, p. 18.

Exodromidia spinosa (Studer), plp. 1-2: Stebbing, Mar. Invest. S. Afr., vol. 4, 1905, p. 67, pl. 18, 2 figs.

2. fam. HOMOLIDÆ Henderson 1888 (incl. LATREILLIDÆ)

Plp. 1 stout, apically somewhat tapering or bifurcate. Plp. 2 stout, ending in an apical disc; in length equal to plp. 1.

Homola barbata Herbst (= *H. spinifrons* Leach), plp. 1-2: Brocchi 1875, p. 107, pl. 19 figs. 200-202; A. Milne-Edwards & Bouvier 1902, pl. 6 figs. 2-5.

Homologenus malayensis Ihle, plp. 1-2: Ihle 1913, p. 66, figs. 66-67.

3. fam. HOMOLODROMIIDÆ Alcock 1899

4. fam. DYNOMENIDÆ Ortmann 1892

Plp. 1-2 not described.

2. tribus OXYSTOMATA de Haan 1840

1. fam. DORIPPIDÆ Dana 1852

Plp. 1 rather stout, acipally somewhat tapering, with apex hook-shaped or of other special shape. Plp. 2 not much shorter, more or less styliform, sometimes apically cleft.

Subfam. DORIPPINÆ Alcock 1896

Dorippe dorsipes (L.), plp. 1-2: see p. 63.

Dorippe (facchino de Haan?), plp. 1-2: see p. 65.

Dorippe lanata (L., Herbst), plp. 1-2: Brocchi 1875, p. 102, pl. 19 figs. 194-95.

Ethusa indica Alcock, plp. 1-2: Ihle 1916, p. 113.

Ethusa pygmaea Alcock, plp. 1-2: *ibid.*

2. fam. CALAPPIDÆ Alcock 1896

Plp. 1 stout, apically tapering or not tapering. Plp. 2 varying (see Monod 1928, p. 111), but always very slender, more or less filiform, in length equal to plp. 1, or longer.

Subfam. CALAPPINÆ Alcock 1896

- Calappa gallus* (Herbst), plp. 2: Monod 1928, p. 115, fig. 3.
Calappa granulata (L.), plp. 2: ibid., fig. 10.
Calappa flammea (Herbst), plp. 2: ibid., fig. 4.
Calappa hepatica (L.), plp. 2: ibid., fig. 13 A.
Calappa lophos (Herbst), plp. 1-2: see p. 66.
Calappa peli Herklots, plp. 2: Monod 1928, p. 115, fig. 8.
Calappa rubroguttata Herklots, plp. 2: ibid., fig. 11.

Subfam. MATUTINÆ Alcock 1896

Matuta planipes Fabricius, plp. 1-2: see p. 67.

3. fam. LEUCOSIIDÆ Dana 1852

Subfam. EBALIINÆ Stimpson 1871

Plp. 1 most varying (stout or slender, truncate or apically tapering, etc.). Plp. 2 usually short, in length up to $\frac{1}{3}$ of plp. 1, sometimes filiform, longer than plp. 1 (*Ebalia longimana*).

- Ebalia glomus* Stebb., plp. 1-2: Stebbing, Ann. S. Afr. Mus., vol. 18, 1921, p. 461, pl. 17, fig.
Ebalia longimana Ortman, plp. 1-2: Sakai 1937, fig. p. 109.
Ebalia scabriuscula Ortman, plp. 1-2: ibid., fig. p. 108.
Ebalia tuberculosa A. M.-Edw., plp. 1-2: ibid., fig. p. 111.

Subfam. ILIINÆ Stimpson 1871

Plp. 1 most varying. Plp. 2 short.

- Arcania quinquespinosa* Alcock & Anderson, plp. 1-2: see p. 73.
Arcania septemspinosa (Fabr.), plp. 1: see p. 73.
Arcania undecimspinosa de Haan, plp. 1: Sakai 1937, fig. p. 124.
Arcania undecimspinosa elongata Yokoya, plp. 1: ibid., fig. p. 124.
Ilia nucleus Leach, plp. 1-2: Milne-Edwards, R. Animal, pl. 25 fig. 2 h-i.
Iphiculus spongiosus Adams & White, plp. 1-2: see p. 71.
Myra affinis Bell, plp. 1-2: see p. 72.
Myra fugax (Fabr.), plp. 1-2: see p. 72.
Nursia abbreviata Bell, plp. 1: see p. 69.
Nursia (persica Alcock?), plp. 1: see p. 69.
Nursia plicata Herbst, plp. 1: see p. 70.
Nursia scandens Stebb., plp. 1: Stebbing, Ann. S. Afr. Mus., vol. 17, 1920, p. 247, pl. 106 A.
Nursia postulans Stebb., pl. 1: ibid., vol. 18, 1921, p. 461, pl. 18 A.

Subfam. LEUCOSIINÆ Miers 1886

Plp. 1 most varying. Plp. 2 short.

- Leucosia obtusifrons* de Haan, plp. 1: Sakai 1937, fig. p. 146.
Leucosia pubescens Miers, plp. 1-2: see p. 96.
Leucosia pulcherrima Miers, plp. 1: see p. 95.
Leucosia rhomboidalis (de Haan), plp. 1: Sakai 1931, p. 188, fig. 6 C.
Leucosia unidentata de Haan, plp. 1: Sakai 1937, fig. p. 146.
Philyra globosa (Fabr.), plp. 1: see p. 83.
Philyra globulosa M.-Edw., plp. 1-2: see p. 80.
Philyra granigera Nobili, plp. 1: see p. 87.
Philyra heterograna Ortmann, plp. 1: Sakai 1937, fig. p. 159.
Philyra kanekoi Sakai, plp. 1: Sakai 1934, p. 288, fig. 4 b.
Philyra pisum de Haan, plp. 1: Sakai 1937, fig. p. 164.
Philyra platychira de Haan, plp. 1: Sakai 1934, p. 286, fig. 3 b.
Philyra rectangularis Miers, plp. 1: see p. 87.
Philyra scabriuscula (Fabr.), plp. 1: see p. 89.
Philyra syndactyla Ortmann, plp. 1: Sakai 1934, p. 286, fig. 2 b.
Philyra tuberculosa (Stimpson), plp. 1: Sakai 1931, p. 187, fig. 4 b.
Philyra variegata (Rüppell), plp. 1: see p. 92.
Pseudophilyra blanfordi Alcock, plp. 1: see p. 75.
Pseudophilyra melita de Man, plp. 1: see p. 76.
Pseudophilyra tridentata Miers, plp. 1: see p. 77.

4. fam. RANINIDÆ Dana 1852

Plp. 1 long, stout, apex varying. Plp. 2 not described, but is in *Ranina dentata* not longer than plp. 1 (its "extrémité est cachée dans la portion tubulaire des appendices de la première paire" (Milne-Edwards, l.c.)).

- Lyreides brevifrons* Sakai, plp. 1: Sakai 1937, fig. p. 171.
Lyreides politus Parisi, plp. 1: ibid., fig. p. 172.
Lyreides tridentatus de Haan, plp. 1: ibid., fig. p. 164.
Ranina dentata Lamarck, plp. 1-2: Milne-Edwards, R. Animal pl. 41, fig. 1 k.

3. tribus BRACHYGNATHA Borradaile 1907

1. group OXYRHYNCHA Latreille 1803

1. fam. HYMENOSOMATIDÆ Stimpson 1858

Plp. 1 varying, especially in the apex. Plp. 2 short.

- Elamene abrothensis* Gordon, plp. 1: Gordon, Proc. Linn. Soc. London, 152nd sess., 1939-40 (1940), fig. 7 a.
Elamene gracilis Borradaile, plp. 1: ibid., fig. 7 d.
Elamene mathæi (Desmarest), plp. 1: ibid., fig. 3 a, 3 c.
Elamene pilosa, plp. 1: Brocchi 1875, p. 87, pl. 19 fig. 182.
Elamene sindensis Alcock, plp. 1-2: see p. 97.
Elamene truncata Stimpson, plp. 1: Gordon l.c. fig. 5 a-b.
Halicarcinus whitei Miers, plp. 1: ibid., fig. 8 b.
Rhynchoplax coralicola Rathbun, plp. 1: Sakai 1934, fig. 5 b.
Rhynchoplax messor Stimpson, plp. 1: ibid., fig. 5 a.
Rhynchoplax setirostris Stimpson, plp. 1: ibid., fig. 5 c.
Rhynchoplax sinensis Shen, plp. 1: Shen 1932, p. 61, fig. 36 b-c.

2. fam. MAIDÆ Alcock 1895

Subfam. INACHINÆ COMPOSCIOIDEA Balss 1929, p. 3

Plp. 1 not very stout; straight or curved, apically tapering, but apex most varying (hairy, spinose, naked, etc.; acute, blunt, bifid, etc.). Plp. 2 short.

Achæus lacertosus Stimpson, plp. 1: see p. 98.

Achæus tenuicollis Miers, plp. 1-2: see p. 97.

Camposcia sp., plp. 1: Brocchi 1875, p. 89, pl. 18 fig. 156 (plp. 2 is said to be quite rudimentary)

Collodes malabaricus Alcock, plp. 1: see p. 97.

Eurypoda sp. ? (from Patagonia), plp. 1-2: Brocchi 1875, p. 90, pl. 19 figs. 177-78.

Eurypoda sp. (from New Zealand), plp. 1: *ibid.*, p. 90, pl. 18 fig. 165.

Inachus thoracicus: Brocchi 1875, p. 91, no fig.

Inachus dorynchus: *ibid.*, p. 91, no fig.

Leptopodia (= *Stenorhynchus*) *sagittaria* Fabr., plp. 1-2: Brocchi 1875, p. 88, pl. 19 fig. 176.

Leptopodia (= *Stenorhynchus*) *phalangium* (Penn): *ibid.*, p. 89.

Oregonia gracilis Dana, plp. 1: Shen 1932, p. 48, fig. 25, a and c.

Subfam. OPHTHALMIINÆ Balss 1929

Plp. 1-2 not described.

Subfam. ACANTHONYCHINÆ Alcock 1895

Plp. 1 medium-stout, apex most varying (hammer-shaped; divided into 3-4 lobes; etc.). Plp. 2 short.

Acanthonyx limbatus A. M.-Edw., plp. 1-2: see p. 104.

Pugettia (*Menæthius*) *quadridens* de Haan, plp. 1: Shen 1932, p. 52, fig. 28 c.

Menæthiops nodulosa (Nobili), plp. 1: see p. 99.

Menæthius monoceros (Latr.), plp. 1: see p. 105.

Subfam. PISINÆ sens. str. + HYASTENINÆ Balss 1929

Plp. 1 medium-stout to slender, usually apically somewhat tapering, but apex extremely varying (blunt, acute, filiform, straight, geniculate, etc.). Plp. 2 short.

Doclea canalifera Stimpson, plp. 1: Chopra 1935 fig. p. 468.

Doclea gracilipes Stimpson, plp. 1: *ibid.*

Doclea ovis (Herbst), plp. 1: *ibid.*

Doclea tetraptera Walker, plp. 1: *ibid.*

Halimus elongatus Ortmann, plp. 1: Sakai 1934, fig. 9 b.

Halimus diacanthus de Haan, plp. 1: *ibid.*, fig. 9 c.

Hyas araneus (L.), plp. 1-2: Brocchi 1875, p. 93, pl. 19 figs. 187-88.

Hyastenus aries (Latr.), plp. 1: Buitendijk 1939 b, p. 239, textfigs. 1-2.

Hyastenus brocki de Man, plp. 1: *ibid.*, p. 239, textfig. 3.

Hyastenus bispinosus Buitendijk, plp. 1: *ibid.* p. 241, textfig. 4.

Hyastenus diacanthus (de Haan), plp. 1: *ibid.*, p. 242, textfigs. 5-8.

Hyastenus hilgendorfi de Man, plp. 1-2: see p. 107.

Hyastenus oryx A. M.-Edw., plp. 1: Buitendijk 1939 b, textfigs. 11-12.

- Hyastenus planasius* (Ad. & White), plp. 1: *ibid.*, textfig. 13.
Hyastenus pleione (Herbst), plp. 1: *ibid.*, textfig. 14.
Hyastenus sebæ White, plp. 1: *ibid.*, textfigs. 15-16.
Hyastenus subinermis Zehntner, plp. 1: *ibid.*, textfigs. 17-18.
Hyastenus ternatensis Buitendijk, plp. 1: *ibid.*, textfig. 19.
Libinia canaliculata, plp. 1: Brocchi 1875, p. 91, pl. 19 fig. 179.
Lissa chiragra, plp. 1: *ibid.*, p. 92, pl. 18 fig. 153.
Naxia diacantha, plp. 1: *ibid.*, p. 94, pl. 19 fig. 172.
Phalangipus longipes (L.), plp. 1-2: see p. 106.
Pisa tetraodon: Duvernoy 1850, p. 158, and Brocchi 1875, p. 92.

Subfam. MAIINÆ sens. str. + MITHRACINÆ Balss 1929
 + MICROCOELOMINÆ Balss 1929

Plp. 1 like that in preceding subfam. Plp. 2 short.

- Cyphocarcinus minutus* A. M.-Edw., plp. 1-2: see p. 108.
Maia japonica Rathbun 1932, plp. 1: Sakai 1934, fig. 11 a.
Maia nipponensis Sakai 1934 (= *M. japonica* Yokoya 1933 (non Rathbun 1932)), plp. 1: *ibid.*, fig. 11 b.
Maia squinado Rondelet, plp. 1-2: Brocchi 1875, p. 95, pl. 18 figs. 144-46.
Maia verrucosa: *ibid.*, p. 97.
Micippa cristata (L.), plp. 1: Buitendijk 1939 b, p. 252, textfig. 20.
Micippa philyra (Herbst), plp. 1: *ibid.*, p. 253, textfig. 21.
Micippa philyra var. *mascarenica* Kossmann, plp. 1-2: see p. 108.
Micippa platipes Rüppell, plp. 1: Buitendijk 1939 b, p. 254, textfig. 22.
Micippa thalia (Herbst), plp. 1: *ibid.*, p. 257, textfig. 23.
Mithrax verrucosus, plp. 1-2: Brocchi 1875, p. 94, pl. 19 figs. 185-86.
Paramithrax sp., plp. 1-2: *ibid.*, p. 95, pl. 18 figs. 150-52.
Pitho aculeata (Gibbes), plp. 1: Rathbun 1925, p. 357, fig. 116 c.
Pitho anisodon (v. Martens), plp. 1: *ibid.*, p. 369, fig. 116 b.
Pitho lherminieri (Schramm), plp. 1: *ibid.*, p. 363, fig. 116 a.
Pitho mirabilis (Herbst), plp. 1: *ibid.*, p. 366, fig. 116 d.
Pitho picteti (Saussure), plp. 1: *ibid.*, p. 360, no fig.
Tiarinia angusta Dana, plp. 1: Buitendijk 1939 b, p. 257, textfig. 24.
Tiarinia cornigera (Latr.), plp. 1: *ibid.*, p. 259, textfig. 25.
Tiarinia gracilis Dana, plp. 1: *ibid.*, p. 259, textfig. 26.
Tiarinia lævis A. M.-Edw., plp. 1: *ibid.*, p. 264, textfig. 27.
Xenocarcinus depressus Miers, plp. 1: Gordon 1934, p. 71, fig. 37 a.
Xenocarcinus tuberculatus, plp. 1-2: see p. 110.

3. fam. PARTHENOPIDÆ Alcock 1895

Plp. 1-2, see Flipse 1930, p. 25, with figs.

Subfam. PARTHENOPINÆ Miers 1879

Plp. 1 varying, more or less stout, apically tapering or not tapering.
 Plp. 2 usually short and of usual shape, but in *Platylambrus carinatus* in length equal to prp. 1.

- Cryptopodia fornicata* (J. C. Fabr.), plp. 1-2: see p. 110.
Lambrus (*Lambrus*) *longimanus* (A. M.-Edw.), plp. 1-2: see p. 113.
Platylambrus carinatus (M.-Edw.) Ad. & White, plp. 1-2: see p. 113.
Rhinolambrus contrarius (Herbst), plp. 1-2: Brocchi 1875, p. 98, pl. 18 figs. 166-67.

Subfam. EUMEDONINÆ Miers 1879

Plp. 1 medium-stout, apex obliquely bent or even hook-shaped.

Plp. 2 not described.

Echinoecus petiti nipponensis Miyake (= *Eumedonus pentagonus* Sakai 1936),
plp. 1: Miyake, Annotat. Zool. Japon., vol. 18, 1939, fig. 9, B 3.

Harrovia purpurea Gordon, plp. 1: Gordon 1934, p. 67, fig. 34 a.

2nd group BRACHYRHYNCHA Borradaile 1907

A. CYCLOMETOPA

1st fam. CORYSTIDÆ Dana 1852

Plp. 1 very stout, a little tapering toward the oblique apex. Also plp. 2 stout, not essentially shorter than plp. 1, apically much tapering, apex acute.

Corystes dentatus, plp. 1-2: Brocchi 1875, p. 102, pl. 19 figs. 192-93.

2nd fam. PORTUNIDÆ Dana 1852

Uncertain in this fam.:

Benthochascon hemingi Alcock & And., plp. 1-2: Doflein 1904, p. 91, pl. 41 fig. 1.

Subfam. CARCININÆ Alcock 1899

Plp. 1 rather stout. Plp. 2 more slender.

Carcinus mænas (L.), plp. 1-2: Duvernoy 1850, p. 148, pl. 3-4 fig. 1; Brocchi 1875, p. 62; copula described (but no figs. of plp.): Williamson 1904, p. 104.

Subfam. PORTUNINÆ Alcock 1899

Plp. 1 stout, but apically tapering; or more or less styliform, with spines; apex acute. Plp. 2 not much different from plp. 1, but shorter; slender.

Polybius henslowi, plp. 1-2: Milne-Edwards, R. Animal, pl. 8 fig. 2 c.

Portunus arcuatus Leach: Brocchi 1875, p. 61; plp. 1: Palmer 1927, p. 885, fig. 4 E.

Portunus corrugatus (Penn.), plp. 1-2: Brocchi 1875, p. 59, pl. 16 figs. 85-86; plp. 1: Palmer 1927, p. 882, fig. 2 E.

Portunus depurator (L.), plp. 1: Palmer 1927, p. 894, fig. 8 E.

Portunus holsatus Fabr., plp. 1-2: Brocchi 1875, p. 60, pl. 16 figs. 87-88; plp. 1: Palmer 1927, p. 890, fig. 7 E.

Portunus marmoreus Leach, plp. 1: Palmer 1927, p. 888, fig. 6 E.

Portunus puber (L.), plp. 1-2: Duvernoy 1850, p. 146, pls. 3-4 figs. 2-8; Brocchi 1875, p. 61; plp. 1: Palmer 1927, p. 886, fig. 3 E.

Portunus pusillus Leach, plp. 1: Palmer 1927, p. 886, fig. 5 E.

Portunus subcorrugatus A. M.-Edw.? (= *P. rondeletti* Savigny), plp. 1-2: D u v e r n o y 1850, p. 148 (no fig.).

Portunus (Portunus) trituberculatus Miers, plp. 1: S h e n 1932, p. 67, figs. 38 a-b.

Portunus tuberculatus Roux, plp. 1: P a l m e r 1927, p. 896, fig. 9 E.

Subfam. CAPHYRINÆ Alcock 1899

Plp. 1 medium-stout, somewhat curved, apex spinose. Plp. 2 bifid.

Caphyra alcyoniophila Monod, plp. 1-2: M o n o d, Service océanogr. pêches de l'Indochine, Stat. Maritime de Canda, 8e note, Saigon 1928, fig. 1, I, J.

Lissocarcinus arkati Kemp, plp. 1: C h o p r a 1935, fig. 14.

Subfam. LUPINÆ Alcock 1899

Plp. 1 medium-stout or slender, somewhat curved, apex usually spinose.
Plp. 2 short, bifid.

Callinectes arcuatus, *C. bocourti*, *C. danæ*, *C. exasperatus*, *C. marginatus*, *C. ornatus*, *C. sapidus*, *C. toxotes*, plp. 1: R a t h b u n 1930, fig. 17 a-i (p. 102).

Callinectes gladiator Benedict, plp. 1: R a t h b u n 1931, fig. 3 d (p. 398).

Callinectes latimanus Rathbun, plp. 1: *ibid.* fig. 4 e (p. 399).

Callinectes marginatus (A. M.-Edw.), plp. 1: *ibid.* fig. 2 d (p. 396).

Charybdis, numerous spp., plp. 1: see C h o p r a 1935 and L e e n e 1938.

Charybdis anisodon de Haan, plp. 1-2: B r o c c h i 1875, p. 58, pl. 15 figs. 72-73.

Charybdis erythrodactylus, plp. 1-2: *ibid.*, p. 57, pl. 15 figs. 70-71.

Charybdis orientalis, plp. 1-2: *ibid.*, p. 59, pl. 15 figs. 105-07.

Charybdis (Charybdis) cruciata (Herbst), plp. 2: see p. 115.

Charybdis (Goniosoma) japonica (A. M.-Edw.), plp. 1: S h e n 1932, p. 75, fig. 42 a-b.

Charybdis (Gonioneptunus) bimaculata Miers, plp. 1: *ibid.*, p. 83, fig. 47 a-b.

Charybdis (Gonioneptunus) hoplites Wood Mason f. *typica* L e e n e, plp. 1-2: see p. 118.

Charybdis (Gonioneptunus) hoplites var. *longicollis* L e e n e, plp. 2: see p. 119.

Neptunus diacanthus Latr., plp. 1-2: B r o c c h i 1875, p. 53, pl. 16 figs. 76-82.

Neptunus (Hellenus) arabicus Nobili, plp. 1-2: see p. 122.

Neptunus (Hellenus) brocki de Man, plp. 1: S h e n 1937 c, fig. 8.

Neptunus (Hellenus) hastatoides (Fabr.), plp. 1: *ibid.* fig. 8; C h o p r a 1935, fig. 4.

Neptunus (Hellenus) pulchricristatus Gordon, plp. 1: G o r d o n 1931, p. 534, fig. 10 A; C h o p r a 1935, fig. 5.

Neptunus (Hellenus) spinipes Miers, plp. 1: G o r d o n 1931, p. 534, fig. 10 B.

Neptunus (Hellenus) tenuipes de Haan, plp. 1: S h e n 1937 c, fig. 8.

Neptunus (Hellenus) tweediei Shen, plp. 1: *ibid.*, fig. 8.

Neptunus (Lupocycloporus) gracilimanus Stimpson, plp. 1: C h o p r a 1935, fig. 6.

Neptunus (Neptunus) pelagicus (L.), plp. 2: see p. 124.

Neptunus (Neptunus) sanguinolentus (Herbst), plp. 2: see p. 124.

Podophthalmus vigil Fabr., plp. 1-2: see p. 137.

Thalamita coeulipes Jacq. et Lucas, plp. 1: M i y a k e 1939, p. 172, fig. 1.

Thalamita integra Dana, plp. 1-2: B r o c c h i 1875, p. 56, pl. 16 figs. 91-93; plp. 1: M i y a k e 1939, p. 172, fig. 2.

Thalamita iranica n. sp., plp. 1-2: see p. 133.

Thalamita poissoni (Aud. & Sav.), plp. 1-2: see p. 133.

Thalamita sexlobata Miers, plp. 1: see p. 136.

Thalamita sima A. M.-Edw., plp. 1-2: see p. 127.

3rd fam. ATELECYCLIDÆ Ortmann 1893

Subfam. ATELECYCLINÆ Alcock 1899

Plp. 1 rather slender, apically tapering, apex setose. Plp. 2 short, of usual shape.

Atelecyclus cruentatus Desm., plp. 1-2: Brocchi 1875, p. 103, pl. 19 figs. 197-99.

Subfam. THIINÆ Alcock 1899

Plp. 1 varying, straight or S-shaped. Plp. 2 short.

Kraussia integra de Haan, plp. 1-2: Sakai 1934, fig. 17 a.

Kraussia rugulosa Krauss, plp. 1: *ibid.*, fig. 17 b.

Kraussia (nitida) Stimpson?, plp. 1: see p. 138.

Thia polita Leach: Duvernoy 1850, p. 158; Brocchi 1875, p. 103.

4th fam. CANCRIDÆ Ortmann 1893

Plp. 1 rather stout, conical, hairy. Plp. 2 longer than plp. 1, slender, consists of two pieces, with a heel at apex of first piece; apex of second piece expanded and obliquely cut off.

Cancer pagurus L., plp. 1-2: Duvernoy 1850, p. 151, pls. 3-4 figs. 12-13; Brocchi 1875, p. 68 (no fig.); Williamson 1904, pp. 101-103, numerous figs.; Pearson 1908, p. 320, pl. 2 figs. 14-16.

5th fam. TRICHIIDÆ de Haan 1841

Plp. 1-2 not described.

6th fam. XANTHIDÆ Alcock 1898

Subfam. not certain:

Calmania prima Laurie, plp. 1-2: Sakai 1935, p. 81, fig. 14, d, e (probably subfam. *Pilumninæ* (plp. 2!; Sakai l.c.)).

Geryon affinis M.-Edw., plp. 1-2: Doflein 1904, p. 109, pl. 41 fig. 6.

Geryon ischyrodous Stebb., plp. 1-2: Stebbing, Fish. & Mar. Biol. Survey S. Afr., Rep. No. 3, For the Year 1922 (printed 1923), p. 2, pl. 11, plp. 1-2.

Maxillothrix actæiformis Stebb., plp. 1: Stebbing, Ann. S. Afr. Mus., vol. 18, 1921, pl. 14 fig. plp. ♂.

Subfam. MENIPPINÆ Ortmann, sensu emendato Balss 1932

Balss (Zeits. Wiss. Zool., vol. 142, 1932, p. 510, and Capita Zool., vol. 4, 1933, p. 6) has revised the two subfam. *Menippinæ* and *Pilumninæ* and states that they differ in the shape of the pleopoda 1-2 of the males (Balss calls them "Ruten").

In *Menippinæ* plp. 2 are "lange cylindrische Stäbe, die in eine dünne gebogene Geissel auslaufen, wobei die Ansatzstelle der Geissel deutlich abgesetzt ist" (Balss l.c. 1932, fig. 1: *Globopilumnus globosus* (Dana); l.c. 1933, fig. 1: *G. calmani* Balss). Regarding plp. 2 in the subfam.

Pilumninæ Balss (l.c. 1932, p. 516) writes that they "nur kurze Röhren darstellen und sich also von der Form derer der *Menippinæ* weit entfernen" (Balss l.c. 1932, fig. 2: *Pilumnus etheridgei* Rathbun; l.c. 1933, fig. 2: *P. spinulus* Shen).

Balss has figures but no descriptions of plp. 1 (*Menippinæ*: Balss l.c. 1932, fig. 1: *Globopilumnus globosus*; Balss l.c. 1933, fig. 1: *G. calmani*;—and of *Pilumninæ*: Balss l.c. 1932, fig. 2: *Pilumnus etheridgei*, and l.c. 1933, fig. 2: *P. spinulus*): in the *Menippinæ* they are rather heavy and obliquely cut off, while in the *Pilumninæ* they are more slender and apically much tapering, with the apical end curved and with many spines.

Baptozius (Eurüppellia) vinosus (M.-Edw.), plp. 1: Miyake, Annotat. Zool. Japon., vol. 15, 1936, p. 499, fig. 2 A, C.

?*Daira perlata* (Herbst) de Man, plp. 1-2: Gordon 1934, p. 51, fig. 27 a-b (plp. 2 long, but subfam. uncertain).

Eriphia granulosa A. M.-Edw., plp. 1-2: Rathbun 1930, p. 551, fig. 85.

Eriphia sebana smithi Mac Leay, plp. 1-2: see p. 140.

Eriphia spinifrons Fabr., see under the preceding species.

Eriphia squamata Stimpson, plp. 1: Rathbun 1930, p. 550, fig. 84.

Globopilumnus calmani Balss, plp. 1-2: Balss 1933, fig. 1.

Globopilumnus globosus (Dana), plp. 1-2: Balss 1932, fig. 1.

Ozius (Eurüppellia) tenax (Rüppell), plp. 1-2: see p. 140.

Subfam. PILUMNINÆ Ortmann, sensu emendato Balss 1932.

On the basis of plp. 2 ♂ Balss 1932 and 1933 has transferred several genera from the subfam. *Menippinæ* to the present subfam. (see above under *Menippinæ*, p. 222). But also plp. 1 are very different in the two subfam. (see above).

Actumnus asper (Rüppell), plp. 1-2: see p. 141.

Heteropanope markiana Rathbun, plp. 1-2: Shen 1932, p. 106, fig. 106 e-f.

Pilumnopeus vauquelini (Aud.), plp. 1-2: see p. 141.

Pilumnus etheridgei Rathbun, plp. 1-2: Balss 1932, fig. 2.

Pilumnus heterodon Sakai, plp. 1: Sakai 1934, fig. 19 c.

Pilumnus hirsutus Stimpson, plp. 1: see p. 146.

Pilumnus hirtellus (Penn.), plp. 1-2: Duvernoy 1853, p. 152, pls. 3-4, figs. 16-18.

Pilumnus longicornis Hilgendorf, plp. 1: see p. 145.

Pilumnus penicillatus Gordon, plp. 1: Gordon 1931, p. 543, fig. 18 b.

Pilumnus quadridentatus de Man, plp. 1: *ibid.*, p. 543, fig. 17 c.

Pilumnus (savignyi) Heller?, plp. 1-2: see p. 146.

Pilumnus seminudus Miers, plp. 1: Gordon 1931, p. 542, fig. 17 a-b.

Pilumnus sinensis Gordon, plp. 1-2: *ibid.*, p. 541, fig. 16 a-b.

Pilumnus spinohirsutus Rathbun, plp. 1: *ibid.* p. 541, fig. 16 c.

Pilumnus spinulus Shen, plp. 1-2: Balss 1933, fig. 2.

Subfam. XANTHINÆ Ortmann 1898

Plp. 1 more or less slender, straight or somewhat curved, apex most varying, usually with spines or setæ. Plp. 2 short, of usual type.

- Actæa savignyi* (H. M.-Edw.), plp. 1: see p. 151.
Actæa tomentosa (H. M.-Edw.), plp. 1: Miyake 1939, p. 184 fig. 8.
Cymo andreossi var. *melanodactyla* de Haan, plp. 1-2: see p. 153.
Galene bispinosa (Herbst), plp. 1: see p. 154.
Liagora rubromaculata de Haan, plp. 1-2: see p. 154.
Leptodius, see *Xantho*.
Lophactæa, see *Platypodia*.
Medæus granulatus (Haswell), plp. 1-2: see p. 149.
Platypodia alcocki Buitendijk, plp. 1: Buitendijk 1941, p. 297, fig. 1 a.
Platypodia anaglypta (Heller), plp. 1: *ibid.* p. 297, fig. 1 b.
Platypodia corallina (Alcock), plp. 1: *ibid.* p. 301, fig. 2 a.
Platypodia cristata (A. M.-Edw.), plp. 1: *ibid.* p. 297, fig. 1 c.
Platypodia eydoui (A. M.-Edw.), pdp. 1: *ibid.* p. 303, fig. 3 a.
Platypodia (Lophactæa) granulosa (Rüppell), plp. 1: Brocchi 1875, p. 71, pl. 17 fig. 138; Gordon 1934, p. 27, fig. 15 a; Miyake 1939, p. 177, fig. 4; Buitendijk 1941, p. 305, fig. 1 d.
Platypodia maculata (de Man), plp. 1: Gordon 1939, p. 27, fig. 15 b.
Platypodia multicristata (Zehntner), plp. 1: Buitendijk 1941, p. 307, fig. 2 b.
Platypodia semigranosa (Heller), plp. 1: *ibid.* p. 303, fig. 3 b.
Platypodia tomentosa (de Man), plp. 1: *ibid.* p. 303, fig. 3 c.
Pseudozius (Parapanope) caystrus (Ad. & White), plp. 1: Miyake 1939, p. 186, fig. 9.
Xantho (= *Leptodius*) *exaratus* (H. M.-Edw.), plp. 1: see p. 150.
Xantho (= *Leptodius*) *exaratus* var., plp. 1: Gordon 1934, p. 29, fig. 16 a.
Xantho (= *Leptodius*) *exaratus* var. *gracilis* (Dana), plp. 1: *ibid.* p. 29, fig. 16 c.
Xantho (= *Leptodius*) *crassimanus* A. M.-Edw., plp. 1: Miyake 1939, p. 179, fig. 6.
Xantho (= *Leptodius*) *floridus*, plp. 1-2: Duvernoy 1853, p. 152 (no fig.); Brocchi 1875, p. 71 (no fig.).
Xantho sanguineus (H. M.-Edw.), plp. 1: Miyake 1939, p. 181, fig. 7.

Subfam. CARPILIINÆ Ortmann 1898

Plp. 1 like *Xanthinæ*. Plp. 2 short, of usual type (but known in only very few species); but in *Carpilodes convexus* long, of a type similar to that of subfam. *Menippinæ* (see above, p. 222).

- Atergatis floridus* Rumph, plp. 1: Gordon 1934, p. 25, fig. 14.
Atergatis integerrimus (Lamarck), plp. 1: see p. 155.
Atergatis reticulatus (de Haan), plp. 1: Gordon 1934, p. 25, fig. 14 A, b.
Carpilodes (Carpilius) convexus (Forskål) Rüppell, plp. 1-2: see p. 156.
Carpilodes bellus (Dana), plp. 1: Miyake 1939, p. 175, fig. 3.
Carpilodes lippus (Nobili), plp. 1: Gordon 1934, p. 25, fig. 13.
Chlorodiella bidentata (Nobili), plp. 1: *ibid.*, p. 49, fig. 26 b.
Chlorodiella lævissimiana Miyake, plp. 1: Miyake, Trans. Nat. Hist. Soc. Formosa, vol. 28, no. 177, 1938, p. 192, fig. 3 b.
Chlorodius niger (Forskål), plp. 1-2: see p. 157.
Chlorodopsis (Chlorodius) pilumnoides (White), plp. 1: Gordon 1934, p. 48, fig. 26 a.
Phymodius granulatus (Targ. Tozz.), plp. 1-2: see p.
Phymodius monticulosus (Dana), plp. 1: Gordon 1934, fig. 18 a.
Phymodius nitidus (Dana), plp. 1: *ibid.*, p. 41, fig. 21 a, a'.
Phymodius odhneri Gordon, plp. 1: *ibid.*, p. 47, fig. 25 b, b'.
Phymodius ungalatus (Dana), plp. 1: Gordon 1934, fig. 18 a.
Zozymodes pumilus (Jacq. & Lucas), plp. 1: Miyake 1939, p. 178, fig. 5.
Zozymodes xanthoides (Krauss), plp. 1-2: see p. 156.

Subfam. ETISINÆ Ortmann 1898

Plp. 1-2 like subfam. *Xanthinæ* (see above, p. 223), but plp. 2 has a seta at apex.

Etisodes electra (Herbst) Miers, plp. 1: see p. 158.

Etisus deflexus Dana, plp. 1: S a k a i 1936, fig. 5 b.

Halimede ochtodes (Herbst), plp. 1-2: see p. 160.

Subfam. TRAPEZIINÆ Miers 1886

Plp. 1-2 like subfam. *Xanthinæ* (see above, p. 223), but plp. 2 has some spines (some of them apically cleft) at base of the oblique apex.

Tetralia glaberrima (Herbst), plp. 1-2: see p. 161.

Trapezia cymodoce (Herbst?) Alcock, plp. 1-2: see p. 162.

7th fam. POTAMONIDÆ Ortmann 1896

Plp. 1 rather stout, sometimes more or less conical, with apex very differing (acute, lobate, etc.). Plp. 2 (described in only very few species) longer than plp. 1, more or less styliform, sometimes with a process near the centre.

Subfam. POTAMONINÆ Colosi 1920 (incl. DECKENIINÆ)

Plp. 1 (not plp. 2) in numerous species described by M. R a t h b u n, in several papers in Proc. U. Nat. Mus. 1893 and further on, with figs.; M. R a t h b u n 1904-1906; B a l s s 1936¹ (Beiträge zur Kenntnis der Potamonidae (Süßwasserkrabben) des Kongogebietes; in: Revue de Zool. et de Bot. Afric., vol. 28, no. 2, Bruxelles), and B a l s s 1937 (Potamoniden (Dekapoda Brachyura) der Philippinen und des Malayischen Archipels; in: Internat. Revue d. ges. Hydrobiol. u. Hydrogr., vol. 34, parts 3-5, 1937, pp. 143-187 (gen. *Potamon*)).

Deckenia mitis Hilgendorf, plp. 1: R a t h b u n 1921, fig. 16 b (p. 435).

Paratelphusa (*Perithelphusa*) *pilosimana* Roux, plp. 1: R o u x 1936, fig. 14.

Paratelphusa (*Liotelphusa*) *kadamiana* (Borradaile), plp. 1: C h a c e 1938, p. 18, pl. 3 fig. f.

Paratelphusa (*Liotelphusa*) *kadamiana* (Borradaile), plp. 1: C h a c e 1938, p. 18, pl. 3 fig. f.

Paratelphusa (*Liotelphusa*) *luidana*, plp. 1: *ibid.*, p. 19, pl. 4 fig. g.

Potamon (*Acanthothelphusa*) *foradrejensis* Rathbun, plp. 1: R a t h b u n 1921, fig. 13 f-g (p. 428).

Potamon (*Acanthothelphusa*) *langi* Rathbun, plp. 1: *ibid.*, fig. 14 f (p. 432).

Potamon (*Geotelphusa*) *dehaani* Stimpson, plp. 1-2: S h e n 1932, p. 91, fig. 53 b-c.

Potamon (*Geotelphusa*) *congoënsis* Rathbun, plp. 1: R a t h b u n 1921, fig. 11 a-b (p. 423).

Potamon (*Geotelphusa*) *perparvus* Rathbun, plp. 1: *ibid.*, fig. 12 a (p. 426).

Potamon (*Potamiscus*) *chaseni* Roux, plp. 1: R o u x 1936, fig. 8.

Potamon (*Potamiscus*) *cognatum* Roux, plp. 1: *ibid.*, fig. 2.

¹ I have not had access to this paper.

- Potamon* (*Potamiscus*) *pahangense* Roux, plp. 1: *ibid.*, fig. 6.
Potamon (*Potamiscus*) *rafflesi* Roux, plp. 1: *ibid.*, fig. 4.
Potamon (*Potamiscus*) *tweediei* Roux, plp. 1: *ibid.*, fig. 10.
Potamon (*Potamon*) *anomalus* Chace, plp. 1: Chace 1938, p. 14, pl. 2, figs. f-h.
Potamon (*Potamon*) *bolloyi* (A. M.-Edw.), plp. 1: Rathbun 1921, fig. 10 c-d (p. 420).
Potamon (*Potamon*) *consobrinus* de Man, plp. 1: Chace 1938, fig. 1.
Potamon (*Potamon*) *denticulatus* (H. M.-Edw.), plp. 1-2: Shen 1932, p. 87, fig. 50 b-c.
Potamon (*Potamon*) *formosanum* Parisi, plp. 1: Parisi, Atti Soc. Ital. Sci. Nat., Pavia, vol. 55, 1916, fig. p. 161.
Potamon (*Potamon*) *griswoldi* Chace, plp. 1: Chace 1938, p. 12, pl. 1 figs. f-h.
Potamon (*Potamon*) *ibericum* (Marchall de Bieberstein), plp. 1-2: see p. 197.
Potamon (*Potamon*) *johorensis* Roux, plp. 1: Roux 1936, fig. 12.
Potamon (*Potamon*) *kinabaluensis* Rathbun, plp. 1: Chace 1938, fig. 2.
Potamon (*Potamon*) *orientale* Parisi, plp. 1: Parisi, Atti Soc. Ital. Sci. Nat., Pavia, vol. 55, 1916, fig. p. 161.
Potamon (*Potamonautes*) *dybowskyi* Rathb., plp. 1: Rathbun 1921, fig. 7 d (p. 411).
Potamon (*Potamonautes*) *floweri* de Man, plp. 1: *ibid.*, fig. 6 a (p. 408).
Potamon (*Potamonautes*) *lirrangensis* Rathb., plp. 1: *ibid.*, fig. 89 (p. 414).
Potamon (*Potamonautes*) *stanleyensis* Rathb., plp. 1: *ibid.*, fig. 9 h (p. 416).

Subfam. not certain:

- Boscia dentata* (= *Cancer fluviatilis* Herbst, Bosc), plp. 1-2: Brocchi 1875, p. 86, pl. 17 figs. 119-21.

B. CATAMETOPA

1st fam. GONEPLACIDÆ Dana 1852

Plp. 1 varying. Plp. 2 in most species of usual shape, short, but in a few genera subfiliform and as long as or longer than plp. 1.

Subfam. PSEUDORHOMBILIINÆ Alcock 1900

Plp. 1 rather varying (apically tapering or not tapering, with apex straight or angularly bent). Plp. 2 of usual shape, short (up to half as long as plp. 1), except in *Carcinoplax* (*purpurea*?), in which it is about $1\frac{1}{2}$ times as long as plp. 1, filiform, rather straight.

- Carcinoplax* (*purpurea* Rathb.?), plp. 1-2: see p. 166.
Eucrate sulcatifrons (Stimpson), plp. 1-2: see p. 168.
Heteropilumnus (*Lithocheira*) *setosus* (A. M.-Edw.), plp. 1: Miyake 1937, p. 187 fig. 12.
Libystes nitidus A. M.-Edw., plp. 1-2: see p. 169.
Lithocheira amoyensis Gordon, plp. 1: Gordon 1931, p. 549, fig. 25 c, c'; plp. 1-2: see p. 170.
Lithocheira subintegra Lanchester, plp. 1: Gordon 1931, p. 549, fig. 25 b.
Lithocheira subintegra var. *hirsutior* Lanchester, plp. 1: *ibid.*, p. 549, fig. 25 a.

Subfam. GONEPLACINÆ Miers 1886

Plp. 1 stout, somewhat conical. Plp. 2 as long as plp. 1, subfiliform.

Goneplax rhomboides (Fabr., Herbst), plp. 1-2: Brocchi 1875, p. 76, pl. 19 figs. 183-84.

Subfam. RHIZOPINÆ Stimpson 1858

Plp. 1 varying (slender or stout, with apex more or less straight or angularly bent). Plp. 2 of usual shape, short, except in *Notonyx nitidus* in which it is subfiliform, somewhat longer than plp. 1.

Mertonia lanka Laurie, plp. 1: see p. 180.

Notonyx nitidus A. M.-Edw., plp. 1-2: see p. 172.

Typhlocarcinus dentatus n. sp., plp. 1-2: see p. 178.

Typhlocarcinus nudus Stimpson, plp. 1-2: see p. 176.

Xenophthalmodes dolichophallus Tesch, plp. 1-2: see p. 178.

Subfam. HEXAPODINÆ Miers 1886

Plp. 1 varying, apically somewhat tapering, but never straight, sometimes L- or C-shaped. Plp. 2 short, of usual shape.

Hexapus sexpes (Fabr.), plp. 1-2: see p. 184.

Lambdophallus anfractus Rathbun, plp. 1: Rathbun 1910, p. 348, fig.

Lambdophallus sexpes Alcock, plp. 1: see p. 181.

Thaumastoplax orientalis Rathbun, plp. 1: Rathbun 1910, fig. 33 b.

2nd fam. PINNOTHEHIDÆ H. Milne-Edwards 1852

Plp. 1 varying, apically tapering or not tapering. Plp. 2 not described.

Subfam. PINNOTHERELINÆ Alcock 1900

Plp. 1 most varying, sometimes hook-shaped and exceeding abdomen if extended. Plp. 2 not described.

Alarconia seaholmi Glassell, plp. 1: Glassell, Trans. San Diego Soc. Nat. Hist., vol. 8, no. 33, 1938, p. 450, fig. 4.

Mortensenella forceps Rathbun, plp. 1: Rathbun 1910, fig. 21 b.

Pinnixa tumida Stimpson, plp. 1: Shen 1932, p. 129, fig. 77 b-c.

Pinnixa lunzi Glassell, plp. 1: Glassell, Charleston Mus. Leaflets, no. 9, 1937, p. 5, fig. 8.

Subfam. PINNOTHERINÆ Alcock 1900

Plp. 1 apically tapering, hairy, curved or somewhat straight. Plp. 2 not described.

Pinnotheres gordonii Shen, plp. 1: Shen 1932, p. 153, fig. 97 c.

Pinnotheres putensis Rathbun, plp. 1: Rathbun 1910, fig. 19 b.

Pinnotheres serrignathus Shen, plp. 1: Shen 1932, p. 144, fig. 88 b.

Pinnotheres sinensis Shen, plp. 1: *ibid.*, p. 133, fig. 79 h.

Pinnotheres tsingtaoensis Shen, plp. 1: *ibid.*, p. 150, fig. 94 c.

Pinnotheres villosus Guérin, plp. 1: Gordon 1934, p. 21, fig. 11 c.

Pinnotheres sp.? (aff. *edwardsi* de Man), plp. 1: *ibid.*, p. 22, fig. 11 a.

Subfam. ASTHENOGNATHINÆ Alcock 1900

Plp. 1 usually broad, apically not tapering, sometimes with a stout horny tip. Plp. 2 not described.

Asthenognathus atlanticus Monod, plp. 1: Monod, Bull. Soc. Sci. Nat. Maroc, Rabat, vol. 12, nos. 4-6, 1932 (1933), fig. 9 B, p. 151.

Tridynamia rathbuni Shen, plp. 1: Shen 1932, p. 121, fig. 70 b.

Tridynamia horvathi Nobili, plp. 1: *ibid.*, p. 124, fig. 72 c; Sakai 1934, fig. 25 b.

Subfam. XENOPHTHALMINÆ Alcock 1900

Plp. 1 apically somewhat tapering, with many stout spines. Plp. 2 not described.

Xenophthalmus pinnotheroides White, plp. 1: see p. 187.

3rd fam. CYMOPOLIIDÆ Faxon 1895

Plp. 1 medium-stout, twisted, apex with several processes. Plp. 2 not described.

Cymopolia longimana Miyake, plp. 1: Miyake, Annotat. Zool. Japon., vol. 15, 1936, p. 496, fig. 1, D, F.

4th fam. RETROPLUMIDÆ Gill 1894

Plp. 1-2 not described.

5th fam. OCYPODIDÆ Ortmann 1894

Plp. 1 most varying. Plp. 2 (described in very few species) of usual shape, but rather stout, more or less conical; short.

Subfam. OCYPODINÆ Miers 1886

Plp. 1 rather varying, sometimes with apical processes. Plp. 2 short.

Gelasimus annulipes Latr., plp. 1: Tweedie, Bull. Raffles Mus., vol. 13, 1937, fig. 1 p. 142.

Gelasimus coarctatus H. M.-Edw., plp. 1: Gordon 1934, p. 11, fig. 4.

Gelasimus dussumieri H. M.-Edw., plp. 1: *ibid.*, p. 12 fig. 5.

Gelasimus latreillei, plp. 1: Brocchi 1875, p. 73, pl. 17 fig. 135.

Gelasimus manii (Rathbun), plp. 1: Tweedie, Bull. Raffles Mus., vol. 13, 1937, fig. 1 p. 142.

Gelasimus marionis var. *nitidus* Dana, plp. 1: *ibid.*, fig. 1 p. 142.

Gelasimus maracoani, plp. 1: Brocchi 1875, p. 73, pl. 17 fig. 126.

Gelasimus platydactylus, plp. 1-2: Duvernoy 1850, p. 154, pls. 3-4 figs. 24-25; plp. 1: Brocchi 1875, p. 74.

Gelasimus roseus Tweedie, plp. 1: Tweedie, Bull. Raffles Mus., vol. 13, 1937, fig. 1, p. 142.

Gelasimus triangularis A. M.-Edw., plp. 1: *ibid.*, fig. 1, p. 142.

Gelasimus signatus Hess, plp. 1: Gordon 1934, p. 14, fig. 6 a.

- Gelasimus signatus* var. *angustifrons* de Man, plp. 1: *ibid.*, fig. 6 b.
Ocyroda aegyptiaca Gerst., plp. 1: see p. 188.
Ocyroda ceratophthalmus (Pallas), plp. 1: Milne-Edwards, R. Animal, pl. 17 fig. 1 m-n; Brocchi 1875, p. 74, pl. 18 fig. 141.
Ocyroda sp., plp. 1: Brocchi 1875, pl. 18 fig. 142.

Subfam. SCOPIMERINÆ Kemp 1919

Plp. 1 varying. Plp. 2 (known only in *Dotilla* (*wichmanni*?)) short, of usual type.

- Dotilla* (*Doto*) *sulcata* (Forskål, Savigny), plp. 1: Brocchi 1875, p. 75, pl. 17 fig. 131.
Dotilla (*wichmanni* de Man?), plp. 1-2: see p. 191.
Doto intermedia de Man, plp. 1: Kemp, Rec. Ind. Mus., vol. 16, 1919, p. 332, fig. 10, c-d.
Ilyoplax dentimerosa Shen, plp. 1: Shen 1932, p. 251, fig. 154 b.
Ilyoplax deschampsii (Rathb.), plp. 1: *ibid.*, p. 243, fig. 150 b.
Ilyoplax pingi Shen, plp. 1: *ibid.*, p. 247, fig. 152 b.
Ilyoplax serrata Shen, plp. 1: Shen, Bull. Fan Memor. Inst. Biol., Peiping, vol. 2, 1931, fig. 4 b (p. 181).
Potamocyroda pugil Tweedie, plp. 1: Tweedie, Bull. Raffles Mus., vol. 14, 1938, p. 200, fig. 2 d.
Pseudogelasimus plectodactylus Tweedie, plp. 1: Tweedie, *ibid.*, vol. 13, 1937, p. 155, fig. 3 f.
Scopimera bitympana Shen, plp. 1: Shen 1932, p. 265, fig. 163 b; Gordon 1934, p. 17, fig. 8 c.
Scopimera globosa de Haan, plp. 1: *ibid.*, p. 256, fig. 157 b.
Scopimera longidactyla Shen, plp. 1: *ibid.*, p. 260, fig. 160 b.
Scopimera scabricauda Alcock, plp. 1: see p. 190.
Scopimera aff. *inflata* A. M.-Edw., plp. 1: Gordon 1934, p. 17, fig. 8 b.

Subfam. MACROPHTHALMINÆ Dana 1852

Plp. 1 in *Macrophthalmus* medium-stout, with parallel sides, straight or slightly curved; in all the other genera listed below bent back on itself, with apex most varying: spinose, lobate, etc. Plp. 2 (described in only very few species) of the usual type, short.

- Camptandrium sexdentatum* Stimpson, plp. 1-2: Shen 1932, p. 228, fig. 140 d-e.
Cleistostoma dilatatum de Haan, plp. 1: *ibid.*, p. 239, fig. 148.
Cleistostoma edwardsi (Mc. Leay), plp. 1: Buitendijk 1939 a, p. 77, fig. 5.
Leipocten sordidulum Kemp, plp. 1: Tweedie 1937, fig. 7.
Macrophthalmus depressus Rüppell, plp. 1: see p. 192.
Macrophthalmus grandieri A. M.-Edw., plp. 1: Stebbing, Ann. Durban Mus., vol. 2, 1917, p. 12, pl. 3: plp.
Macrophthalmus latreillei, plp. 1: Brocchi 1875, p. 76, pl. 17 fig. 134.
Paracleistostoma cristatum de Man, plp. 1: Gordon 1931, p. 552, fig. 28; Shen 1932, p. 234, fig. 144.
Paracleistostoma depressum de Man, plp. 1: Gordon 1931, p. 552, fig. 26.
Paracleistostoma japonicum Sakai, plp. 1-2: Sakai 1934, p. 332, fig. 26 c.
Paracleistostoma leachi (Audouin), plp. 1: Gordon 1931, p. 552, fig. 27.
Paracleistostoma longimanum Tweedie, plp. 1: Tweedie 1937, fig. 5 e.
Paracleistostoma macrocheirum Tweedie, plp. 1: *ibid.*, fig. 6 d.
Tylodiplax indica Alcock, plp. 1-2: see p. 194.

6th fam. MYCTIRIDÆ Dana 1852

Plp. 1 long, rather narrow, hairy. Plp. 2 is said to be rudimentary (Brocchi 1875, p. 75).

Myctiris platycheles, plp. 1: Brocchi 1875, p. 75, pl. 17 fig. 132.

7th fam. GRAPSIDÆ Dana 1852

Plp. 1 medium-stout to very stout, with the edges somewhat parallel, but sometimes conical; rather straight; sometimes an apical process. Plp. 2 short, of usual type, with apex obliquely cut off.

Subfam. GRAPSINÆ Dana (partim) 1852

Plp. 1-2, see *Grapsidæ*.

Goniopsis cruentata (Latr.), plp. 1: Rathbun 1917, p. 237, fig. 136 b.

Grapsus maculatus (Gatesby), plp. 1-2: see p. 194.

Grapsus pictus Lam., plp. 1: Milne-Edwards, R. Animal, pl. 22 fig. 1 m-n.

Grapsus rudis, plp. 1: Brocchi 1875, p. 78, pl. 17 fig. 111.

Heterograpsus sp. (New Zealand), plp. 1: *ibid.*, p. 83, pl. 18 fig. 143.

Leptograpsus marmoratus (Rondolet), plp. 1: *ibid.*, p. 79 (no fig.).

Metopograpsus messor (Forskål), plp. 1-2: see p. 195.

Pachygrapsus minutus A. M.-Edw., plp. 1: Gordon 1934, p. 7 fig. 2.

Pachygrapsus planifrons de Man, plp. 1: *ibid.*, p. 7 fig. 3.

Subfam. VARUNINÆ Alcock 1900

Plp. 1-2, see under *Grapsidæ* (above).

Eriocheir rectus Stimpson, plp. 1: Shen 1932, p. 179 fig. 113 c.

Eriocheir sinensis H. M.-Edw., plp. 1-2: Peters & Panning 1933, p. 31 fig. 13 a-b; plp. 1: Shen 1932, p. 175 fig. 110 c.

Planes (Nautilograpsus) minutus (L., Herbst), plp. 1: Brocchi 1875, p. 80, pl. 17 fig. 133.

Varuna litterata (Fabr.) H. M.-Edw., plp. 1: *ibid.*, p. 80, pl. 19 fig. 198.

Subfam. SESARMINÆ Dana 1852

Plp. 1-2, see under *Grapsidæ* (above).

Helice granulata, plp. 1-2: Brocchi 1875, p. 83, pl. 17 figs. 127-28.

Sesarma barbatus Krauss (= *Cyclograpsus punctatus*), plp. 1: Brocchi 1875, p. 84, pl. 17 fig. 129.

Sesarma livida (A. M.-Edw.), plp. 1: Brocchi 1875, p. 83, pl. 17 fig. 130.

Sesarma smithi, plp. 1: *ibid.*, p. 82, pl. 18 fig. 139.

Sesarma tetragona, plp. 1-2: *ibid.*, p. 82, pl. 18 fig. 140.

Sesarma (Holometopus) cinereum (Bosc), plp. 1: Rathbun 1917, p. 301 fig. 149 b.

Sesarma (Holometopus) hanseni Rathbun, plp. 1: *ibid.*, p. 315, fig. 152 b.

Sesarma (Holometopus) occidentale Smith, plp. 1: *ibid.*, p. 300, fig. 148 f.

Sesarma (Holometopus) tampicense Rathbun, plp. 1: *ibid.*, p. 307, fig. 151.

Sesarma (Sesarma) curacaoense de Man, plp. 1: *ibid.*, p. 293, fig. 147.

Sesarma (Sesarma) maculata de Man 1892 (nec 1902), plp. 1: Gordon, Proc. Linn. Soc. London, 1936/37 (1937), p. 153, fig. 3 a-b.

- Sesarma (Sesarma) maculata* de Man 1902 (nec 1892), plp. 1: *ibid.*, p. 153, fig. 3 c.
Sesarma (Sesarma) ocyropa Nobili subsp. *gracillima*, plp. 1: *ibid.*, p. 153, fig. 4.
Sesarma (Sesarma) sylvicola de Man, plp. 1: *ibid.*, p. 155, fig. 5.
Sesarma (Sesarma) sinensis (H. M.-Edw.), plp. 1: Sakai 1931, p. 196, fig. 13 b.

Subfam. PLAGUSIINÆ Dana 1852

Plp. 1-2, see under *Grapsidæ* (above, p. 230).

- Acanthopus (Plagusia) planissimus* (Herbst), plp. 1: Brocchi 1875, p. 81, pl. 19 fig. 171.
Plagusia clavimana Latr., plp. 1: Milne-Edwards, R. Animal, pl. 13 fig. 13 d, a.
Plagusia depressa Say, plp. 1: Brocchi 1875, p. 80, pl. 19 fig. 170.
Plagusia sayi (= *P. depressa* Say), plp. 1-2: *ibid.*, p. 81, pl. 19 figs. 168-69.

8th fam. GECARCINIDÆ Dana 1852

Plp. 1 stout, prismatic, with apex oblique and hairy, and sometimes with a vermiform apical process. Plp. 2 small and offers "rien de remarquable" (Brocchi 1875, p. 84: *Gecarcinus lateralis*).

- Cardisoma armatum* Herklots, plp. 1: Rathbun 1921, fig. 21 a-b (p. 457).
Cardisoma guanhumii de Lupstadt, plp. 1-2: Brocchi 1875, p. 85, pl. 17 figs. 115-16.
Cardisoma carnifex Herbst?, plp. 1: *ibid.*, p. 85, pl. 17 figs. 117-18.
Gecarcinus lateralis Fremenville, plp. 1-2: *ibid.*, p. 84, pl. 17 figs. 113-14.

9th fam. HAPALOCARCINÆ Stimpson 1859

Plp. 1-2 not described.

Literature

- Adams, A., & White, A., 1848: Crustacea.—The Zool. of H. M. Ship "Samarang", London 1848, pp. 1-66.
 Alcock, A., 1895: Materials for a Carcinological Fauna of India. No. 1. The Brachyura Oxyrhyncha.—Jour. Asiatic Soc. Bengal, vol. 64, part 2, No. 2, Calcutta, pp. 157-291.
 — 1896: Materials No. 2. Brachyura Oxystomata.—*Ibid.*, vol. 65, part 2, No. 2, pp. 134-296.
 — 1898: Materials No. 3. The Brachyura Cyclometopa. Part 1. The family Xanthidæ.—*Ibid.*, vol. 67, part 2, No. 1, pp. 67-233.
 — 1899: Materials No. 4. The Brachyura Cyclometopa. Part 2. The families Portunidæ, Cancridæ and Corystidæ.—*Ibid.*, vol. 68, part 2, No. 1, pp. 1-103.
 — 1899 a: Materials No. 5. The Brachyura Primigenia or Dromiacea.—*Ibid.*, vol. 68, part 3, No. 3, pp. 123-169.
 — 1900: Materials No. 6. The Brachyura Catametopa or Grapsoidea.—*Ibid.*, vol. 69, part 2, No. 3, pp. 280-456.
 — 1901: Catalogue of the Indian Decapod Crustacea in the collection of the

- Indian Museum. Part I. Brachyura. Fasc. I. Introduction and Dromides or Dromiacea (Brachyura Primigenia). Calcutta, pp. 1-80.
- Alcock, A., 1910: Brachyura I. Fasc. II. The Indian Fresh-water Crabs.—Potamonidae.—Catalogue of the Indian Decapod Crustacea in the collection of the Indian Museum. Calcutta, pp. 1-135.
- Alcock & Anderson, see Investigator.
- Audouin, Victor, 1809: Explication sommaire des Planches de Crustacés de l'Égypte et de la Syrie, publiées par Jules-César Savigny.—Description de l'Égypte, Histoire Naturelle, vol. 1, Paris, pp. 77-98.
- Balss, H., 1915: Die Decapoden des Roten Meeres. II. Anomuren, Dromiaceen und Oxystomen.—Denschr. K. Akad. Wiss. Wien, Math.-nat. Kl., Bd. 92, pp. 1-20.
- 1922: Ostasiatische Decapoden IV. Die Brachyrynchen (Cancridea).—Archiv f. Naturgesch., 88. Jahrg., Abt. A, 11. Heft, pp. 94-166.
- 1924: Decapoden des Roten Meeres. III. Die Parthenopiden, Cyclo- und Catametopen.—Denschr. Akad. Wiss. Wien, Math.-naturw. Kl., Bd. 99, pp. 1-18.
- 1929: Decapoden des Roten Meeres. IV. Oxyrhyncha und Schlussbetrachtungen.—Ibid., Bd. 102, pp. 1-30.
- 1932: Über einige systematisch interessante Xanthidæ (Crustacea Decapoda Brachyura) der Harmschen Reisen nach dem Sundaarchipel.—Zeitschr. Wiss. Zool., Bd. 102, Heft 4, pp. 510-519.
- 1933: Beiträge zur Kenntnis der Gattung Pilumnus (Crustacea Dekapoda) und verwandter Gattungen.—Capita Zoologica, deel 4, afl. 3, pp. 1-47.
- 1934: Sur quelques Décapodes brachyours de Madagascar.—Faune des Colonies Françaises, Paris, vol. 5, fasc. 8, pp. 501-528.
- 1938: Die Dekapoda Brachyura von Dr. Sixten Bocks Pazifik-Expedition 1917-18.—Göteborgs Kungl. Vet.- och Vitterh. Samh. Handl., 5. följd, ser. B, vol. 5, no. 7 (= Meddel. Göteborgs Musei Zool. Avd., 75), pp. 1-85.
- Borradaile, L. A., 1902-1903: Crustacea.—Fauna and Geography of the Maldive and Laccadive Archipelagoes. London. Vol. 1, pp. 191-208, 237-271, 424-443.
- Brocchi, 1875: Recherches sur les organes génitaux males des Crustacés Décapodes.—Ann. Sci. Nat., Zool., sér. 6, vol. 2, Paris, pp. 1-131 (Brachyura pp. 51-116).
- Buitendijk, A. M., 1939 a: Note on *Cleistostoma edwardsii* (McLeay), a South African Ocypodid.—Zool. Mededeel., Leiden, vol. 2, pp. 76-78.
- 1939 b: Biological Results of the Snellius Expedition. V. The Dromiacea, Oxystomata, and Oxyrhyncha of the Snellius Expedition.—Temminckia, vol. 4, Leiden, pp. 223-276.
- 1941: Biological Results XIII. On some Xanthidæ, chiefly of the genus *Platypodia* Bell.—Ibid., vol. 6, pp. 295-312.
- Chace, jr., Fenner A., 1938: Fresh water Decapod Crustacea from Mount Kinabalu, British North Borneo.—Proc. New Engl. Zool. Club, vol. 17, pp. 9-22.
- Chopra, B., 1935: Further Notes on Crustacea Decapoda in the Indian Museum. VIII. On the Decapod Crustacea collected by the Bengal Pilot Service off the Mouth of the River Hooghly. Brachygnatha (Oxyrhyncha and Brachyryncha).—Rec. Indian Mus., vol. 37, part 4, pp. 463-514.
- Cochran, Doris M., 1935: The skeletal musculature of the blue Crab, *Callinectes sapidus* Rathbun.—Smiths. Misc. Coll., vol. 92, No. 9, pp. 1-76.
- Dana, J., 1852: Crustacea.—U. S. Explor. Exped., vol. 13, Philadelphia.
- Doflein, F., 1904: Brachyura.—Wiss. Ergebn. "Valdivia"-Exped., vol. 6.
- Duvernoy, G. L., 1853: Fragments sur les organes de génération de divers animaux.—Mém. Acad. Sci. Paris, vol. 23, pp. 105-299 (Crustacés, pp. 136-182).
- Edmondson, Ch. H., 1925: Crustacea of tropical central Pacific.—Bull. Bernice Bishop Mus., No. 27, Honolulu.
- Flipse, H. J., 1930: Die Parthenopidae der Siboga-Expedition.—Siboga-Exp., Monogr. 39 c², pp. 1-96.
- Gordon, I., 1931: Brachyura from the coast of China.—Jour. Linn. Soc. London, Zool., vol. 37 (no. 254), pp. 525-558.

- Gordon, I., 1934: Crustacea Brachyura.—Mem. Mus. R. d'Hist. Nat. Belgique, hors série, vol. 3, fasc. 15, Bruxelles, pp. 1-78.
- Gravier, C., 1920: Sur une collection de Crustacés recueillis à Madagascar.—Bull. Mus. Hist. Nat. Paris, vol. 26, pp. 376-383 (465-472).
- de Haan, W., 1850: Crustacea, in: Ph. Fr. de Siebold, Fauna Japonica.
- Heller, C., 1861: Beiträge zur Crustaceenfauna des Rothen Meeres. I.—Sitzber. math.-nat. Kl. K. Akad. Wien, Bd. 43, 1. Abt., pp. 297-374.
- Henderson, J. R., 1893: A Contribution to Indian Carcinology.—Trans. Linn. Soc., Zool., (2) vol. 5, pp. 325-458.
- Herbst, J. F. W., 1782 seq.: Versuch einer Naturgeschichte der Krabben und Krebse, vol. I 1782-90, vol. II 1796, vol. III 1799-1804.
- Hilgendorf, F., 1878: Die von Herrn Dr. Peters in Mozambique gesammelten Crustaceen.—Monatsber. K. Preuss. Akad. Wiss., Berlin, pp. 782-850.
- Ihle, J. E. W., 1913: Die Decapoda Brachyura der Siboga-Expedition. I. Dromiacea.—Siboga-Exp., Monogr. 39 b, Leiden, pp. 1-96.
- 1916: Die Decapoda II. Oxystomata: Dorippidae.—Ibid., 39 b¹, pp. 97-158.
- 1918: Die Decapoda III. Oxystomata: Calappidae, Leucosiidae, Raninidae.—Ibid., 39 b², pp. 159-322.
- Investigator: A. Alcock & A. R. S. Anderson: Illustrations of the Zoology of the Royal Indian Surveying Steamer "Investigator". Calcutta (Brachyura: Crustacea, pls. 14 seq., 1895 seq.).
- Kemp, Stanley, 1917: Notes on the Crustacea Decapoda in the Indian Museum. X. Hymenosomatidae.—Rec. Ind. Mus., Calcutta, vol. 13, part 5, No. 15, pp. 243-279.
- 1918: Crustacea Decapoda and Stomatopoda. Zoological results of a tour in the Far East. Edited by N. Annandale.—Mem. Asiatic Soc. Bengal, Calcutta, vol. 6, pp. 217-297.
- 1919 a: Notes on the Crustacea Decapoda in the Indian Museum. XII. Scopimerinae.—Rec. Ind. Mus., Calcutta, vol. 16, part 5, No. 22, pp. 305-348.
- 1919 b: Notes XIII. The Indian species of Macrophthalmus.—Ibid., vol. 16, part 5, No. 25, pp. 383-396.
- Klunzinger, C. B., 1906: Die Spitz- und Spitzmundkrabben des Roten Meeres. Stuttgart.
- 1913: Die Rundkrabben des Roten Meeres.—Nova Acta K. Leopold. Carol. Deutsch. Akad. Naturf., Halle, Bd. 99.
- Kossmann, R., 1877: Zoologische Ergebnisse einer Reise in die Küstengebiete des Rothen Meeres. Erste Hälfte, III, Malacostraca (1. Theil: Brachyura), pp. 1-66.
- 1880:, Zweite Hälfte, Erste Lief., III, Malacostraca (2. Theil: Anomura) Dromiidae, pp. 67-70.
- Laurie, R. D., 1906: Report on the Brachyura collected by Prof. Herdman at Ceylon (1902).—Ceylon Pearl Oyster Fisheries Report, London, vol. 5, pp. 349-432.
- 1915: On the Brachyura. Reports of the Marine Biology of the Sudanese Red Sea, from Collections made by C. Crossland.—Jour. Linn. Soc., Zool., London, vol. 31, pp. 407-475.
- Leene, Jentina E., 1938: The Decapoda Brachyura of the Siboga-Expedition. VII. Brachygnatha: Portunidae.—Siboga-Exped., Monogr. 39 c², Leiden, pp. 1-156.
- MacGilchrist, A. C., 1905: Natural History Notes from the R. I. M. S. "Investigator", Capt. T. H. Hening, R. N., (retired), commanding. Series III, No. 6. An Account of the new and some of the rarer Decapod Crustacea obtained

¹ I have not had access to this paper.

- during the Surveying Seasons 1901-1904.—Ann. Mag. Nat. Hist., ser. 7, vol. 15, pp. 233-268.
- MacLeay, W. S., 1838: Illustrations of the Annulosa of South Africa. On the Brachyurous Decapod Crustacea brought from the Cape by Dr. Smith.—in: Andrew Smith: Illustrations of the Zoology of South Africa, Invertebrata, London, pp. 53-71.
- Mc Niell, F. A. & Ward, M., 1930: Carcinological notes.—Austral. Mus., Sydney, vol. 17, pp. 357-383.
- de Man, J. G., 1887-88: Report on the Podophthalmous Crustacea of the Mergui Archipelago, collected for the Trustees of the Indian Museum, Calcutta—Journ. Linn. Soc., London, vol. 22, pp. 1-312.
- 1888 a: Bericht über die im Indischen Archipel von Dr. J. Brock gesammelten Decapoden und Stomatopoden.—Archiv f. Naturgesch., Bd. 53, pp. 215-600.
- 1890: Carcinological Studies in the Leyden Museum.—Notes from the Leyden Mus., vol. 12, pp. 46-126.
- 1892: Decapoden des Indischen Archipels.—Max Weber: Zool. Ergebn. einer Reise nach Niederl. Ost-Indien, vol. 2, Leiden, pp. 265-527.
- 1895: Bericht über die von Herrn Schiffscapitän Storm zu Atjeh, an den westlichen Küsten von Malakka, Borneo und Celebes sowie in der Java-See gesammelten Decapoden und Stomatopoden.—Zool. Jahrb., Syst., vol. 8, pp. 485-609 (no figs.).
- 1895: Bericht, 5. Theil.—Ibid., vol. 9, pp. 725-790.
- 1902: Ergebnisse einer zoologischen Forschungsreise in den Molukken und Borneo, im Auftrage der Senckenberg. naturforsch. Gesellschaft ausgeführt von Dr. Willy Kükenthal. Teil 2, Reiseergebn., Bd. 3, Heft 3.—Abh. Senckenberg. Naturf. Ges., Bd. 25, Heft 3, pp. 467-929.
- Miers, Edward J., 1874: Crustacea.—Zool. of the Voyage of H. M. S. Erebus and Terror, vol. 2, London, pp. 1-5.
- 1877: On a Collection of Crustacea, Decapoda and Isopoda, chiefly from South Africa, with description of new Genera and Species.—Proc. Zool. Soc. London, p. 653-679.
- 1884: Crustacea.—Report of the zool. collections of H. M. S. "Alert", London, pp. 513-575.
- 1885: Species of Micippa Leach and Paramicippa Milne-Edwards.—Ann. Mag. Nat. Hist., ser. 5, vol. 15, pp. 1-13.
- 1886: Brachyura.—Report H. M. S. "Challenger", vol. 17, London.
- Milne-Edwards, A., 1862: Faune Carcinologique de l'Île de la Réunion—in: L. Maillard: Notes sur l'Île de la Réunion (Bourbon), Paris, seconde partie, Annexes, F, p. 7, pl. 17 figs. 4, 4 a, 4 b.
- 1865: Études zoologiques sur les crustacés recents de la famille des Cancériens.—Nouv. Arch. Mus. d'Hist. Nat., Paris, vol. 1, pp. 177-308.
- 1865 a: Description de quelques crustacés nouveaux, appartenant à la tribu des Maiens.—Ann. Soc. Entomol. France (4), tome 5.
- 1867: Description de quelques espèces nouvelles de crustacés brachyures.—Ibid., (4), tome 7.
- 1868: Description de quelques Crustacés nouveaux provenant des voyages de M. Alfred Grandidier à Zanzibar et à Madagascar.—Nouv. Arch. Mus. d'Hist. Nat. Paris, vol. 4, pp. 69-92.
- 1872: Recherches sur la faune carcinologique de la Nouvelle Calédonie. I.—Ibid., vol. 8, pp. 229-267.
- 1873: Recherches II. — Ibid., vol. 9, pp. 155-332.
- 1874: Recherches III. — Ibid., vol. 10, pp. 39-58.
- Milne-Edwards, A., et Bouvier, E.-L., 1902: Les Dromiacés et Oxystomes ["Blake"].—Mem. Mus. Comp. Zool. Harvard Coll., Cambridge, U. S. A., vol. 27, no. 1.

- Milne-Edwards, H., 1834-37: Histoire Naturelle des Crustacés, Paris, vol. 1, 1834; vol. 2, 1837.
- , year ? : Les Crustacés,—in: Cuvier: Règne Animal, Paris.
- Miyake, S., 1939: Notes on Crustacea Brachyura collected by Professor Teiso Esaki's Micronesia Expeditions 1937-1938 together with a check list of Micronesian Brachyura.—Records Oceanogr. Works in Japan, vol. 10, no. 2, pp. 168-247.
- Monod, Th., 1928: Les Calappes de la côte occidentale d'Afrique.—Bull. Soc. Sci. Nat. Maroc, Rabat, vol. 8, nos. 4-6, pp. 109-127.
- 1930: Über einige indo-pazifische Decapoden des Meeresfauna Syriens.—Zool. Anzeiger, Bd. 92, pp. 135-141.
- Montgomery, S. K., 1931: Report on the Crustacea Brachyura of the Percy Sladen Trust expedition to the Abrolhos Islands along with other crabs from Western Australia.—Jour. Linn. Soc., London, Zool., vol. 37, pp. 405-465.
- Nobili, G., 1906a: Crustacés décapodes et stomatopodes (Mission J. Bonnier et Ch. Pérez) (Golfe Persique 1901).—Bull. Sci. France et Belgique, vol. 40, Paris, pp. 13-159.
- 1906b: Faune carcinologique de la mer rouge, décapodes et stomatopodes.—Ann. Sci. Nat., sér. 9, Zool., Paris, vol. 4, pp. 1-347.
- Odhner, T., 1925: Monographierte Gattungen der Krabbenfamilie Xanthidae. I.—Göteborgs Kungl. Vet.- och Vitterh. Samh. Handl., 4. följd, vol. 29, no. 1, Göteborg, pp. 1-92.
- Ortmann, A., 1892: Die Decapoden-Krebse des Strassburger Museum, Theil 5. Hippidea, Dromiidea und Oxystomata.—Zool. Jahrb., Syst., Bd. 6, pp. 532-588.
- Palmer, R., 1927: A Revision of the Genus "Portunus" (A. Milne-Edwards, Bell, etc.).—Jour. Mar. Biol. Assoc. United Kingdom, vol. 14, no. 4, pp. 877-908.
- Paulson, O., 1875: Untersuchungen über die Crustaceen des Roten Meeres. I. (Russian). Kiev, pp. 1-144.
- Pearson, Joseph, 1908: Cancer.—Proc. & Trans. Liverpool Biol. Soc., vol. 22, pp. 291-499 (= Liverpool M. B. C. Memoirs, No. XVI).
- Peters, N., & Panning, Albert, 1933: Die chinesische Wollhandkrabbe (*Eriocheir sinensis* H. Milne-Edwards) in Deutschland. Mit einem Beitrag von W. Schnakenbeck.—Zool. Anzeiger, Ergänzungsband zu Bd. 104.
- Rathbun, M., 1902: Crabs from the Maldive Islands.—Bull. Mus. Comp. Zool. Harvard College, vol. 39, no. 5, pp. 123-138.
- 1904: Les crabs d'eau douce (Potamonidæ), 1re partie.—Nouv. Arch. Mus. d'Hist. Nat. Paris, 4e sér., vol. 6, fasc. 2, pp. 224-312.
- 1906: The Brachyura and Macrura of the Hawaiian Islands.—Bull. U. S. Fish Comm., vol. 23 (for 1903), Wash., pp. 827-930.
- 1910: Brachyura (The Danish Exped. to Siam 1899-1900, V).—Kgl. Danske Vid. Selsk. Skr., 7. Række, Naturvid.-math. Afd., vol. 4, København, pp. 301-367.
- 1911: Brachyura of the Percy Sladen Trust Expedition to the Indian Ocean in 1905.—Trans. Linn. Soc., London, Zool., vol. 14, pp. 191-261.
- 1914: A new genus and some new species of crabs of the family Goneplacidae.—Proc. U. S. Nat. Mus., vol. 48 (no. 2067), pp. 137-154.
- 1917: The Grapsoid Crabs of America.—Bull. U. S. Nat. Mus. 97, 1917 (1918).
- 1921: The brachyuran crabs collected by the American Museum Congo expedition 1905-15.—Bull. Amer. Mus. Nat. Hist., vol. 43, New York, pp. 379-468.
- 1923: Report on the Brachyrhyncha, Oxystomata and Dromiacea ["Endeavour"].—Commonwealth of Australia, Fisheries, vol. 5, part 3, Sydney, pp. 95-156.
- 1925: The Spider Crabs of America.—Bull. U. S. Nat. Mus. 129.
- 1930: The Cancroid Crabs of America of the families Euryalidae, Portunidae, Atelecyclidae, Cancridae, and Xanthidae.—Ibid., 152.
- 1937: The Oxystomatous and allied Crabs of America.—Ibid., 166.

- Richters, F., 1880: Decapoda—in: Möbius: Meeresfauna der Insel Mauritius und der Seychellen, pp. 137-169.
- Roux, Jean, 1936: Second Note upon Freshwater Decapod Crustaceans from the Malay Peninsula.—Bull. Raffles Mus., vol. 12, pp. 29-43.
- Rüppell, E. d., 1830: Beschreibung und Abbildung von 24 Arten kurzschwänziger Krabben, als Beitrag zur Naturgeschichte des Rothen Meeres. Frankfurt a. M., pp. 1-28.
- Sakai, T., 1934: Brachyura from the coast of Kyusyu, Japan.—Sci. Rep. Tokyo Bunrika Daigaku, ser. B, vol. 1, no. 25, pp. 281-330.
- 1935: New or Rare species of Brachyura, collected by the "Misago" during the zoological survey around the Izu-Peninsula.—Ibid., ser. B, vol. 2, no. 32, p. 63-88.
- ¹ — 1935 a: Crabs of Japan. 66 Plates in Life colours with descriptions. Tokyo.
- 1936: Report on the Brachyura collected by Mr. F. Hiro at Palo Islands.—Sci. Rep. Tokyo Bunrika Daigaku, ser. B, vol. 2; no. 37, pp. 155-177.
- 1936 a: Studies on the Crabs of Japan. I. Dromiacea.—Ibid., ser. B, Suppl. No. 1, pp. 1-66.
- 1937: Studies on the Crabs of Japan. II. Oxystemata.—Ibid., vol. 3, Suppl., no. 2, pp. 67-192.
- ¹ — 1938: Studies III. Brachygnatha, Oxyrhyncha. Tokyo.
- Savigny, Jules-César, 1817: Crustacés.—Description de l'Égypte, Hist. Nat., Zool., Planches, vol. 2.
- Shen, C.-J., 1931: The Crabs of Hong Kong, part 1.—Hong Kong Naturalist, vol. 2, no. 2, pp. 92-110.
- 1931: The Crabs, part 2.—Ibid., vol. 2, no. 3, pp. 185-197.
- 1932 a: The Brachyuran Crustacea of North China.—Zoologia Sinica, ser. A, Invertebrates of China, vol. 9, fasc. 1, Peiping, pp. 1-320.
- 1932 b: The Crabs of Hong Kong, part 3.—Hong Kong Naturalist, vol. 3, no. 1, pp. 32-45.
- 1934: The Crabs, part 4.—Ibid., Suppl. no. 3, pp. 37-56.
- 1937 a: On some account of the Crabs of North China.—Bull. Fan Memorial Inst. Biol. Peiping, vol. 7, pp. 167-185.
- ¹ — 1937 b: Second addition to the fauna of Brachyuran Crustacea of North China, with a check list of the species recorded in this particular region.—Contrib. Inst. Zool. Peiping, vol. 3, pp. 277-312.
- 1937 c: Notes on a collection of swimming crabs (Portunidae) from Singapore.—Bull. Raffles Mus., Singapore, vol. 13, pp. 96-139.
- Stebbing, T. R. R., 1900: South African Crustacea.—Marine Invest. of South Africa, Cape Town, pp. 14-66.
- 1910: General Catalogue of South African Crustacea.—Ann. S. African Mus., vol. 6, pp. 281-593.
- Stimpson, W., 1907: Report on the Crustacea (Brachyryncha and Anomura) collected by the North Pacific Exploring Expedition 1853-56.—Smithson. Miscell. Coll., vol. 49, Wash., pp. 1-240.
- Targioni-Tozzetti, A., 1877: Crostacei Brachyuri e Anomuri, in: Zoologia del Viaggio intorno al Globo della R. pirocorvetta Magenta durante gli anni 1865-68.—Pubbl. R. Istit. Studi Super., Firenze, Sci. Fis. e Nat., vol. 1, pp. 1-277.
- Tesch, J. J., 1915: The catametopous genus *Macrophthalmus* as represented in the collection of the Leiden Museum.—Zool. Mededeel., Leiden, vol. 1, pp. 149-204.
- 1918: The Decapoda Brachyura of the Siboga Expedition. II. Goneplacidae and Pinnotheridae.—Siboga-Exped., Monogr. 39 c', Leiden, pp. 149-295.
- Tweedie, M. W. F., 1937: The crabs of the Family Ocypodidae in the collection of the Raffles Museum.—Bull. Raffles Mus., Singapore, vol. 13, pp. 140-170.

¹ I have not had access to this paper.

- Williamson, H. Chas., 1904: Contribution to the life-histories of the Edible Crab (*Cancer pagurus*) and of other Decapod Crustacea: impregnation: spawning: casting: distribution: rate of growth.—22nd Ann. Rep. Fishery Board for Scotl. for the year 1903, part III, Sci. Invest., Glasgow 1904, pp. 100-140.
- Yokoya, Yu, 1933: On the Distribution of Decapod Crustaceans inhabiting the Continental Shelf around Japan, chiefly based upon the Materials collected by S. S. Sôyô-Marû, during the Years 1923-1930.—*Jour. Coll. Agricult., Tokyo Imp. Univ.*, vol. 12, no. 1, pp. 1-226.
- Zehntner, L., 1894: Crustacés de l'Archipel Malais.—*Revue Suisse Zool.*, Genève, vol. 2, pp. 135-214.