On a small collection of Decapoda Brachyura, chiefly Dromiidae and Oxyrhyncha, from the neighbourhood of Singapore

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At the beginning of 1947 Mr. M. W. F. Tweedie, Director of Raffles Museum at Singapore, sent me a collection of crabs, chiefly Dromiidæ and Oxyrhyncha, for identification. Not many of the species are rare and none is described as new, but as it affords the means of amplifying the existing descriptions of some of them, I consider the material merits publication of a short paper.

Family **Dromiidæ**

Dromidiopsis edwardsi Rathbun, 1919.

Sultan Shoal, Singapore. 1 ♂.
Siglap, Singapore; 1934. 1 ♂.

In 1919 Rathbun (p. 197) pointed out that the specific name *caput-mortuum* Linnaeus, 1766 belongs to the European *Dromia*, and proposed the new name *edwardsi* for Milne Edwards' Indo-Pacific species. The two rather large males in the present collection belong without doubt to Rathbun's species.

Dromidiopsis cranioides (De Man, 1888).

Siglap, Singapore; 1933. 2 ♂ ♂.

The two specimens shows some differences from each other and from De Man's original description in regard to the antero-lateral teeth. In the larger all the teeth are rather sharp; on the left side the first and second are well separated, and moreover a small accessory tooth occurs between the third and fourth teeth. On the right side the second and third teeth are blunter and nearly coalescent. On both sides the third tooth is extremely broad at its base. In the smaller male all the teeth are more blunt and the accessory tooth is missing on both sides; the broad base of the third tooth on the left side bears two and on the right side one granule.

This species is easily separated from *edwardsi* by the fact that all the margins of the meri and the upper margins of wrist and palm bear rather sharp teeth. In *edwardsi* only the upper and outer lower margins of the meri bear some blunter granules, which are practically invisible through the fur.

Cryptodromia tuberculata var. **pileifera** Alcock, 1899.

Seletar, Singapore; January 1933. 2 ♂♂, 1 ♀.

Horsburgh Lighthouse, near Singapore; April 1934. 1 ♀.

Aor Island, South China Sea; June 1938. 1 ♂, 1 ♀.

Senang Island, near Singapore; November 1934. 1 ♂, 1 ♀.

Johore Strait, Singapore; October 1934. 1 rather large but not ovigerous ♀.

Pawai Island, near Singapore; April, 1933. 1 ♂.

The female from Seletar agrees with Alcock's description in having three equal frontal teeth, while both inner orbital angles are tuberculiform, the lower far more so than the upper. Furthermore there are two sub-hepatic teeth, the larger visible in dorsal view. Of the three antero-lateral teeth the third is broadest, and the tooth at the end of the cervical groove is of about the same size as the second antero-lateral. The second supra-orbital tooth is rather indistinct, especially on the right side. The larger male agrees with the female in nearly every respect, but the postero-lateral tooth is smaller, and there are two very small teeth outside the larger supra-sutural tooth. In the smaller male the second antero-lateral and postero-lateral tubercles are rather small.

The female from Horsburgh Lighthouse has two sub-hepatic and one supra-sutural tubercle. On the right side the latter is rather broad, forming a ridge, while on the left side there is only a distinct tubercle outside which is a low but distinct ridge.

Both specimens from Aor Island are typical *pileifera*, with three antero-lateral, two sub-hepatic and one supra-sutural tubercle on each side; in both the blunt median frontal tubercle reaches farther forward than the lateral ones. In the male the first and second antero-lateral teeth are confluent at their base on both sides; on the right side the sub-hepatic tubercle is rather strongly developed and is confluent at its base with the first antero-lateral.

The male from Senang Island is again a typical *pileifera* with three antero-lateral, two sub-hepatic and one supra-sutural tooth on each side. In the small but ovigerous female the supra-sutural and both sub-hepatic teeth are rather low and on the left side the second antero-lateral is also rather small.

The large, but not ovigerous female from Johore Strait has two sub-hepatic teeth on each side, the one nearer the orbit much the larger. On the right side there are three, on the left four supra-sutural tubercles; on the right the second and third are hardly more than granules, on the left the inner is the largest, the second smaller and the third and fourth again mere granules.

The male from Pawai Island belongs on its left side, which has two sub-hepatic teeth, to this variety, but on its right, where three such teeth are developed, to the *forma typica!* As on both sides only one supra-sutural tooth is present, although its base is prolonged into a short, low ridge, I refer this specimen to the variety *pileifera*.

Cryptodromia canaliculata f. **typica** Stimpson, 1859.

Christmas Island, Indian Ocean; 1939. 1 ♀.
Horsburgh Lighthouse, near Singapore; April, 1934. 1 ♀.

In the female from Christmas Island the second antero-lateral tooth is represented only by an indistinct rounding of the margin; all the other typical teeth are well developed. In the specimen from Horsburgh Lighthouse the supra-sutural tubercle is represented by a rather low tubercle.

Cryptodromia canaliculata var. **sibogae** Ihle, 1913.

Telok Kurau, Singapore; February 1934. 1 ♀.
Pisang Island, Malacca Strait; January 1934. 1 ♀.

Both specimens agree in every respect with this variety; the supra-sutural tubercle is missing.

Cryptodromia mariæ Ihle, 1913.

Ubin Island, Johore Strait; June 1934. 1 ♀.
Raffles Lighthouse; July 1937. 1 small ♀.

Both specimens lack teeth on both the sub-hepatic and supra-sutural regions. Having compared them with Ihle's material from the Siboga Station 164 I find that they are identical. On the left side of the female from Ubin Island the anterior antero-lateral tooth is sharp and the second very small; between these two teeth and confluent with the base of the first tooth the antero-lateral margin is rounded. On the right side the second antero-lateral tooth is much better developed.

Cryptodromia demani Alcock, 1899.

Horsburgh Lighthouse, near Singapore; April 1934. 1 ♀.
Singapore; 1934. 1 ovigerous ♀.
Sultan Shoal, near Singapore; December 1933. 1 ovigerous ♀
Raffles Lighthouse, near Singapore; July 1937. 2 ♀♀, one with soft carapace.

The female from Horsburgh Lighthouse (cb. 6·5 mm.) is much larger than that collected by the Snellius expedition at Amboina. The tubercle on the hepatic region is small and situated at the base of the rather broad anterior antero-lateral

tooth. The second antero-lateral tooth is distinctly less broad and sharper, and the one at the cervical groove is very small. The median frontal tooth is small and much deflexed, the sub-hepatic tooth rather strong and distinctly visible in dorsal view; in addition there is a tubercle on the supra-sutural region and one at the angle of the buccal cavity. The outer surface of the wrist and upper surface of the palm are nodular, and the lower part of the outer surface of the palm is granular, just as described by Alcock.

The other specimens agree with this female, except that in the ovigerous female from Singapore, 1934, the first antero-lateral tooth is still more broad and blunt. I cannot be sure that the specimen with the soft carapace from Raffles Lighthouse really belongs to this species.

Cryptodromia coronata Stimpson, 1859.

Pawai Island, near Singapore; April 1933. 1 specimen, November 1933. 1 specimen.

I refer these specimens to *coronata* with considerable hesitation. They agree with this species in having few but sharp tubercles on the pereiopods and two rather strong, blunt and broad antero-lateral tubercles of which the anterior is bilobed. But both these tubercles and the frontal teeth are much blunter than those of the specimens figured by De Man (1888, pl. 18, fig. 2) and Stimpson (1907, pl. 20, fig. 2). Moreover the form of the front is different, the frontal teeth being much lower, as well as blunt, and the front much less narrow.

Cryptodromiopsis tridens Borradaile, 1903.

Christmas Island, Indian Ocean: 1932. 1 ♂.

This specimen agrees well with the short description and the figures given by Borradaile (p. 578, pl. 33, fig. 4a–b). The species seems to be rare, for the only subsequent references in literature that I know of, besides that of Ihle in the list at the end of his paper on the Siboga Dromiacea, are those of Edmondson (1922, p. 38, pl. 2 fig. A-C) who recorded 4 males and a female from Waikiki Reef, and of Ward (1934, p. 6) whose record refers to the present specimen.

Family **Maiidæ**

Achæus lacertosus Stimpson, 1858.

Pawai Island, near Singapore; November 1933; 10–15 fathoms; bottom sand and coral. 2 ♂ ♂, 1 ♀.

The carapace is smooth and the dactyli of the last two pereiopods typically falciform.

Xenocarcinus tuberculatus White, 1847.

Sultan Shoal, near Singapore; July 1938, coll. A. Monteiro. 1 ♀.

Johore Strait, Singapore; 1929. 1 young specimen.

Both belong without doubt to this species. As was pointed out by Gordon (1934, p. 72, fig. 37 b, c) the meri of the walking legs no nodules and their dactyli are rather long with numerous teeth on the ventral margin. The tubercles on the carapace are rather high the profile of the carapace agreeing in this respect with the figure given by Miers (1874, pl. 2, fig. 1a), but in the Singapore specimens the tubercle on the cardiac region is double.

Camposcia retusa Latreille, 1829.

Pisang Island, Malacca Strait; January 1940. 1 ♂, 1 ovigerous ♀.

These specimens of this well known species call for no special remark.

Menæthius monoceros (Latreille, 1825).

Pawai Island, near Singapore; November 1933. 1 ovigerous ♀.

Pisang Island, Malacca Strait; January 1934; dredged in 10–15 m. 1 small ♂.

Blakang Mati, near Singapore; 1934. 1 ovigerous ♀.

Siglap, Singapore; October 1934. 1 ♂.

Horsburgh Lighthouse, near Singapore; 1934. 1 ovigerous ♀.

Christmas Island, Indian Ocean; 1940. 1 ♂, 2 ♀♀.

In the specimens from Pawai Island and Horsburgh Lighthouse the tip of the rostrum is bifid; in the small male from Pisang Island the tip is broken off, while in the other specimens the rostrum as a whole bifid. The lateral margin of the specimens from Christmas Island is distinctly three-lobed and the carapace bears three large tubercles.

Hyastenus diacanthus (de Haan, 1839).

Siglap, Singapore; 1934 and 1935. 5 ♂♂.

4° 21′ 3″ N., 111° 58′ 50″ E.; from cable at 43 fathoms; 1938; coll. R. F. Young. 1 ♀.

The specimen from cable is a typical *diacanthus* with the carapace smooth (when denuded), a single median tubercle on the gastric region and a rather strong epibranchial spine. The anterior of the pterygostomian tubercles is enlarged, the second, at its base, very small.

Hyastenus aries (Latreille, 1825).

Off Singapore Island; 8 fathoms; January 1926. 1 ♀.

Off Singapore Island; October 1927. 2 ♂♂.

4° N., 99° 52′ E.; from cable at 40 fathoms; January 1933. 1 ♀.

5° 35′ 40″ S., 112° 5′ 30″ E; from cable at 36 fathoms; January 1933. 2 ♀♀.

4° 21′ 3″ N., 111° 58′ 50″ E.; from cable at 43 fathoms; coll. R. F. Young, 1938. 1 ♀.

The form of the gastric region affords the best means of separating this from the foregoing species. In *diacanthus* it is rather high and culminates in a small median tubercle; in *aries* it bears two tubercles, the anterior of which is the larger and sharper, the posterior low and blunt. The male pleopod is similar in the two species, but that of *diacanthus* is broader in its basal part and, in addition, the implantation of the hairs is different; in *diacanthus* there is a rather large bunch of extremely long hairs, while in *aries* they are shorter and more scattered.

Hyastenus hilgendorifi de Man, 1888.

4° 6′ N., 99° 52′ E.; from cable at 40 fathoms; January 1933. 1 ♂.

5° 53′ 32″ N., 99° 25′ 10″ E.; from cable at 45 fathoms; October 1933. 1 ♂.

Siglap, Singapore; May 1935. 1 ♀.

The male from 4° 6′ N., 99° 52′ E., has the carapace rather smooth but the pleopod has the form typical for the species, with a narrow membrane at the lateral side near the apex. There is another specimen from Horsburgh Lighthouse, near Singapore (1934) which may belong to this species, but is too damaged for certain identification.

Hyastenus pleione (Herbst 1803).

Siglap, Singapore; 1934. 1 ♂, 2 ♀♀.

The tubercles on the gastric region are arranged in the form of a cross, and a small tubercle is present in the median line separating the gastric and cardiac regions.

Hyastenus subinermis Zehntner, 1894.

Off Sultan Shoal, near Singapore; dredged from 18 fathoms, bottom sand and coral; December 1933. 1 ♀, 4 immature specimens.

The female shows the smooth carapace with the three spines (2 epibranchial and 1 intestinal) so characteristic for this

species. The immature specimens are practically smooth, but in one a small granule indicates the position of the epibranchial spine.

Balss (1935, p. 123) places this species in the synonymy of *convexus* Miers (1884, p. 196, pl. 18, fig. B and b), but the two species differ in the form of the cheliped. In *convexus* the palm is short and broad, its fingers widely gaping at their base and the movable finger provided with a small tooth near the base of the cutting edge. In Zehntner's *subinermis* the palm is long and slender with only a small gap between the fingers at their base, and the cutting edge of each finger is provided with a row of small but distinct teeth near its tip; there is no larger tooth near the base of the cutting edge of the immovable finger.

Naxioides robillardi (Miers, 1882).

6° 22′ 45″ N., 97° 57′ 42″ E.; from cable at 72–95 fathoms; 1933. 1 ♀.

Off Norfolk Island, 29° 10′ S., 167° 53′ E.; from cable at 43 fathoms; 1938. 1 ♂.

Both specimens agree with Miers' description and figure (p. 339, pl. 20) but for the fact that the carpi of the chelipeds are smooth. Miers' specimens (1 ♂, 1 ♀) were collected at Mauritius. I could find only one other record of the species in the literature, that of Balss, 1931, p. 14, where it is mentioned in the list of species.

Egeria arachnoides (Latreille, 1825).

Siglap, Singapore; 1934. 3 ♀♀, 1 ♂.

I compared the largest female with the descriptions given by Alcock (1895, p. 223) and De Man (1929, p. 106, fig. 1, 1*a*) and found some differences from both. As De Man points out the largest spine is that on the pterygostomian region but the relation of the length of the chelipeds and legs to that of the carapace agrees better in these specimens, with Alcock's account: chelipeds more than half as long as carapace and rostrum, first pair of walking legs at least six times this length, the other pairs progressively shorter, the last being 2 1/3 times this length.

A small granule is present in the groove separating the gastric and cardiac regions, and the male shows a second, though smaller, spine on the sternum near the base of the first pair of walking legs.

Doclea canalifera Stimpson, 1857.

Siglap, Singapore; May 1935. 1 ♀; June 1934. 1 ♂, 1 young ♀.

Port Swettenham, Selangor; December 1934. 4 young specimens, probably 2 ♂♂, 2 ♀♀.

The two larger specimens from Siglap agree with the detailed description of this species given by De Man in 1895 (p. 486, pl. 12, fig. 1–1*b*), except for some small differences, especially in the position of the granules on the median line of the carapace. The young specimen from Siglap agrees with Alcock's description of *japonica* Ortmann in possessing far fewer and smaller granules and spines. The four young crabs from Port Swettenham belong without doubt to this species; the spines on the antero-lateral and posterior borders of the carapace are rather large and very sharp.

Doclea ovis (Herbst, 1788).

Siglap, Singapore; May 1935. 1 specimen with Sacculinid.

The four antero-lateral teeth on the left side of the carapace were exposed by removing the fur; they are fairly sharp but small and of equal size. The posterior border is perfectly smooth.

Doclea tetraptera Walker 1887.

Siglap, Singapore; July 1934. 1 ♀.

Singapore; 1 ♂.

Both specimens belong without doubt to this species. The rostrum is about 1/5 of the length of the carapace, which is covered everywhere with a dense fur. The posterior antero-lateral spines and especially the most ventral of the postero-median spines are large. Stiff hairs are implanted along the margins of the joints of the walking legs, giving them a quadrangular or triangular form.

Tylocarcinus styx (Herbst, 1803).

Aor Island, South China Sea; June 1938. 3 ♂♂, 2 ovigerous ♀♀, 1 juv.

The rostrum of one of the males is very aberrant. It is usually formed of two spines, proximally fused and anteriorly divergent, the tips being slightly incurved. In this male there are four spines, each rostral spine being double. The spines are fused basally, and then the median two become widely separated and their tips are not incurved. At the base of these spines arises another pair which are fused with the median ones over a short distance, and then become directed outwards and slightly upwards, their tips being very slightly incurved. In every other respect, including the form of the pleopod, this specimen closely resembles the others from Aor Island.

Maia miersi Walker, 1887.

Pawai Island; dredged in 10–15 fathoms; November 1933. 1 small ♂.

This specimen, which is in a poor state of preservation, closely resembles another species, *Maia gibba* Alcock (1895, p. 39, pl. 4, fig. 5). *M. gibba,* however, bears no spines on the carapace and our specimen has a rather strong spine on the cardiac and another on the gastric region and a small spine on each branchial region. The carapace is hairy, the hairs long and placed in groups on small tubercles. The condition of the antero-lateral border is equivocal, on the right side there are two or three small tubercles which appear to have been broken off; on the left the tubercles are still smaller. In *miersi* this border bears large spines while in *gibba* it is without them. The two small spines on the posterior border are present in both species. The description "hunch-backed", which Alcock applies to *gibba,* does not fit our specimen.

The orbits show the usual form with a supra ocular eave whose posterior angle is produced into a short but distinct spine; between this and the large, sharp post-ocular spine is a spinous tubercle. The rostrum consists of two rather short divergent spines. The chelipeds are short and slender; the pleopods not yet developed.

The specimen is rather difficult to place, and I have only identified it with *M. miersi* after some hesitation.

Schizophrys aspera (H. Milne-Edwards, 1834).

Pisang Island; January 1934. 1 ♀.

Sultan Shoal; November 1934. 1 ♂.

Schizophrys dama (Herbst, 1804).

Siglap, Singapore; June 1933 and June 1934. 2 ♂ ♂.

All the features enumerated by Alcock (1895, p. 254) to distinguish these two species are seen in these specimens.

The palm of the cheliped of the male *aspera* from Sultan Shoal is exceedingly slender, its length being slightly more than three times its breadth; the lower border of the palm passes smoothly into that of the immovable finger. There are no teeth on the cutting edges of either finger, and the fingers meet for about half their length.

In the larger males of *S. dama* the length of the palm is only slightly more than twice its breadth, and there is a large gap between the fingers, which meet for a much shorter distance. The inner edge of the movable finger bears one rather strong tooth, while that of the immovable finger is indistinctly concave.

The lower border of the immovable is not straight, as in *aspera*, but convex in its proximal half.

The differences in the armature of the male pleopods of these two species are only very small. There is some difference in the group of granules near the apex, and the two rows of hairs on the concave side are wider apart in *dama* than in *aspera*, while those of the inner row are longer in *dama*.

Micippa platipes Rüppell, 1830.

Aor Island, South China Sea; June 1938. 1 young ♀.

Christmas Island, Indian Ocean; 1940. 1 ♂ and 2 young ♀ ♀.

All four specimens are typical *platipes* with the basal antennal joint smooth and the first movable joint of the antennae rather broad. As the specimens are small the chelipeds are slender. The female from Aor Island has the right branchial region swollen by a Bopyrid parasite.

Micippa philyra (Herbst, 1803).

Pisang Island, Malacca Strait; January 1934. 1 ♀, 1 juv.

Senang Island, near Singapore; November 1934. 1 ♂.

In the young specimen the granules on the basal antennal joint are small in its basal part and lacking on the floor of the orbit, but the orbit is already closed and the eyestalk therefore invisible in ventral view. The other two show the normal characters of the species.

Micippa excavata Lanchester, 1900.

Pawai Island, near Singapore; 10–15 fathoms, bottom sand and coral; November 1933. 1 ♂, cb. 6 mm.

This small male shows the distinctly carinated but smooth meri of the chelipeds, which is one of the characters of Lanchester's species. The front is strongly deflexed, its two median lobes small, granular and blunt, separated from each other by a rather wide gap, the outer lobes broad, rounded and projecting far less forward than the median ones. The greater part of the carapace is granular, some of the granules distinctly larger than the others. The basal antennal joint is smooth, the floor of the orbit closed, tubular and granular. The sub-hepatic region consists of a rounded and granular median part flanked on either side by a rather deep and smooth depression.

This species seems to be rare and I can find no other record of it since it was described by Lanchester. His types, a male and ovigerous female, also came from Singapore.

Family **Parthenopidae**

Cryptopodia fornicata (Fabricius, 1781).

Siglap, Singapore; June 1934. 1 ♂.

This specimen has the carapace smooth but for the row of granules bounding the triangular depression, and only slightly more than 1½ times as long as broad, while the rostrum is as long as broad. Comparison with part of Flipse's material collected by the "Gier" confirms my opinion that it belongs to *fornicata*.

Parthenope (Parthenope) tumidus (Lanchester, 1900).

Off Tekong Island, near Singapore; 1929. 1 ♂.

Off Singapore Island; September 1928. 1 ♀.

Both specimens agree wholly with Lanchester's description and figure with the exception of one point. Lanchester states that the second postero-lateral tooth bears a minute tooth at its base. In the male from Tekong Island this tooth is present on the left side but is much reduced on the right. In the other specimen it is still more reduced, being represented on both sides only by a minute granule.

Parthenope (Parthenope) longimanus (Linnaeus, 1766).

Siglap, Singapore; 1933. 2 ♂♂, 1 ♀.

I am unable to understand why Flipse in his two publications on the Parthenopidae indicates A. Milne-Edwards as the author of this species. The only justification for using Leach's or even H. Milne-Edwards' name would be that we are not sure that the *longimanus* of Herbst, Linnaeus and other early authors is identical with the species now designated under this name; but in this case there are no grounds for such uncertainty.

Parthenope (Platylambrus) echinatus (Herbst; 1790).

Off Singapore Island; 1929. 1 ♂.

Siglap, Singapore; 1934. 2 ♂♂.

This seems to be rather a variable species as regards the armature of the carapace. In the specimen obtained off Singapore Island the carapace is armed with sharp, granular tubercles, while those on the carapace of the two from Siglap are mushroom-shaped, each of these flat tubercles being covered with small granules. The females in the collection of the Leiden Museum are again of another type, especially a specimen from Banka. Here the carapace is far less granular, considerable areas even being smooth.

Parthenope (Rhinolambrus) longispinus (Miers, 1879).

Siglap, Singapore; June 1933. 1 sub-adult ♂.

Off Sultan Shoal, near Singapore; dredged from 18 fathoms, bottom sand and coral. 2 small ♂♂.

In the small male from Siglap, which has a soft carapace, the pleopods are just growing out and some of the other pleopods are still present. The rostrum and some of the spines are broken off, and there is only one spine instead of the normal complement of three on the cardiac region. In spite of this comparison with a series of specimens from Bohol in the Philippines, which have the three cardiac spines, convinces me that they are identical with the Siglap specimen.

Of the other two specimens one is a small but fully developed male with only two spines on the cardiac region. The other, which has a soft carapace, is of about the same size but has only one cardiac spine and the pleopods are in the same intermediate stage as in the Siglap specimen.

Parthenope (Rhinolambrus) latifrons (Flipse, 1930).

Siglap, Singapore; 1935. 5 ♂♂.

One of the chelipeds, it may be the right or the left, is always more massive than the other, but both are of the same length. On the gastric region, in front of the larger tubercles mentioned by Flipse, there are two short, diverging rows of granules.

Parthenope (Aulacolambrus) hoplonotus (Adams and White, 1850).

Off Horsburgh Lighthouse, near Singapore; dredged from 20 fathoms; April 1934. 1 small ♂.

It can only be said of this specimen that it probably belongs to this species. The characteristic granular tubercles are present, some of them strongly developed, but the hairs on the walking legs, shown in Adams and White's figure of the Samarang specimen, are almost lacking. A much larger specimen in the Amsterdam Museum collection, taken at Sinabang Bay, with which I compared the small male, lacks the two strongly developed tubercles in the median line of the dorsal surface of the carapace. Both specimens are in a rather bad state of preservation.

Harrovia albolineata Adams & White, 1850.

1° 25′ 03″ N., 102° 58′ E.; from cable at 18 fathoms; February 1933. 1 ♂.

a. Although no trace of colouration is left there is no doubt in my opinion that this specimen belongs to *albolineata*. The

antero-lateral border bears four tubercles; the anterior one is at the post ocular angle and the others are progressively enlarged, the second being a low tubercle, the third a more distinct one and the posterior one forming a blunt spine.

Harrovia sp.

Singapore. 1 dismembered and incomplete ♂ (one cheliped, three legs, carapace and abdomen).

This small crab, with its deflexed front with broad median and more advanced and spiniform lateral lobes, is a typical *Harrovia*.

This genus is divided into two groups; one has only one, the other two spine-like antero-lateral teeth. This specimen belongs in the second group, which consists at present of *elegans* de Man, 1888, *truncata* Rathbun, 1906 and *japonica* Balss, 1921.

H. japonica is a very hairy species, for Balss speaks of a close tomentum leaving only the borders of the spines and the antero-lateral border free. In *japonica* the meri of the walking legs have six small spines; in our specimen these borders are rather sharply granular and only on one of them can I detect a single small spine. As Balss gives only a short description and no figure of his species, it is rather difficult to form a good impression of it.

De Man's description of *elegans* is much better and is supplemented by a figure. He, too, speaks of the spinous meri of the walking legs and a densely tomentose carapace, while of the four antero-lateral teeth the "third is largest, conical and acute, the last resembles the third, but is smaller". Now in our specimen these two teeth are about equal, the fourth even slightly the larger. The second tooth is a blunt, low tubercle while in De Man's specimen it was a distinct truncate tubercle.

Rathbun describes the walking legs of *truncata* as compressed with sharp cristiform borders. The three surviving legs of our specimen are rounded without a trace of cristiform borders, so this species is out of the question.

Our specimen appears to be closest to *H. elegans* de Man, but although it does not fit this species, or either of the other two mentioned, exactly, I consider the specimen too small and incomplete to justify describing it as a new species.

Eumedonus pentagonus (White, 1847).

Siglap, Singapore; June 1934. 1 ♂ 1 ♀.

Description of the male.

The carapace is rather flattened, pentagonal, the angle between the postero- and antero-lateral borders produced into a short spine, the base of which is surrounded by a shallow groove. The whole upper surface is covered with distinct but

low tubercles, and on each pterygostomian region there is a bunch of setae.

The rather short granulose rostrum is rounded at the tip and has only a very slight median emargination. The orbits are small and the eye-stalks short.

The ventral surface of the carapace is also granular; on the abdomen the granules are still lower and each segment has a broad, smooth slightly pitted part near its articulation.

The chelipeds are rather long, more massive than the walking legs; their whole surface is granular and the carpus bears a spine on its upper margin. The fingers are fluted and bear some fairly strong teeth on their cutting edges.

The walking legs are slender with the surface roughened and hairs along their margins; dactyli rather long and hairy.

While in the male the chelipeds are longer than the walking legs, in the female they are of about the same length. The granules are far more distinct, faintly spiniform on the carpi, more definitely so on the palms. The ridges on the fingers are more strongly developed and granular at the base.

Four successive authors have given their opinion concerning the species of *Eumedonus*. In 1922 Balss (p. 138) states that there is much resemblance between the species described above (at that time placed in *Gonatonotus*) and *Eumedonus pentagonus* (Rathbun, 1894, p. 60) for which the genus *Echinoecus* was established by Rathbun. In 1934 Gordon (p. 65) remarks that *Gonatonotus* only differs from *Eumedonus* in the condition of the rostrum, which is much shorter in the former and unforked at the apex, and that probably this genus should be included in *Eumedonus;* she then refers to Balss. In 1938 Monod (p. 111) enumerates five "species" belonging in *Eumedonus: niger* H. Milne-Edwards, 1834: *vicinus* Rathbun, 1918; *villosus* Rathbun, 1918; *zebra* Alcock, 1895 (all four with a partly bilobed rostrum) and *pentagonus* Rathbun, 1894, originally described under *Echinoecus,* with the rostrum unforked. He gives the synonymy of these species and under that of *pentagonus* Rathbun he points out that four different authors have used the name *pentagonus* for species of the genus in question, three of whom possibly were describing the same animal. *Echinoecus pentagonus* Rathbun is thus synonymous with *Liomedon pentagonus* Klunzinger, 1906, and probably with *Eumedonus pentagonus* A. Milne-Edwards, 1879. *Gonatonotus pentagonus* White he regards as belonging to the same genus but probably to a different species.

Then in 1939 Miyake published a paper on the genus *Echinoecus* Rathbun, in which he not only accepts the genus as valid but includes in it four species and two subspecies, re-establishing under new names *pentagonus* both of Rathbun and of Klunzinger and mentioning the species *petiti* Gravier

1922 which Monod, whose paper Miyake did not know of, had recently placed in the synonymy of *pentagonus* Rathbun. Miyake divides *Echinoecus* into two groups, using two characters: (*a*) the eyes, which are (1) hidden beneath the carapace or (2) visible in dorsal view, and (*b*) the meri of the walking legs, which are (1) normal or (2) much produced.

In Milne-Edwards' description of *pentagonus*, as Miyake himself emphasizes, nothing is said about the eyes, but Gravier, describing *petiti*, remarks that in the male the eyes are just as in *pentagonus* while in the female they are not, being hidden under the carapace. From this we may conclude that they are visible in *pentagonus* of Milne-Edwards, and at the same time that the two sexes of *petiti* fall into two of Miyake's groups, the male in a2, the female in a1. It is the same with *pentagonus* of Rathbun; in that author's figure of the male of *Echinoecus pentagonus* the eyes, though small, are visible, while she describes the female as having "small circular orbits concealed by the carapace". *Pentagonus* of Sakai (1938), which is clearly conspecific with Rathbun's species, Miyake places in his group a2. Only the female of Klunzinger's *Liomedon pentagonus* is known, and nothing is said about its eyes, but in the figure they are visible though small. In Bouvier and Seurat's *convictor* (of which also only the female is known) the eyes are completely hidden. All these species Miyake places in his group a. He makes no mention of *E. pentagonus* (White), but here the eyes are larger, far larger indeed than in any of the other known species.

Of the second character used by Miyake, the normal or produced meri of the walking legs, I cannot express an opinion as my study has been based chiefly on literature (I have seen no material apart from that cited here under the name *pentagonus* White) and I can find no other mention of this character. Regarding the eyes, I think it is possible that in the female, which is adapted for commensalism, they are hidden under the carapace while in the free-living male they are small but visible.

In 1913 Klunzinger himself admits the identity of his *pentagonus* and *convictor* Bouvier and Seurat, and I agree with Monod that Klunzinger's species and *Echinoecus pentagonus* Rathbun, which were described in the same year, are identical. Klunzinger's *pentagonus* and *petiti* of Gravier are the same, as the authors' colour descriptions, which are cited by Monod, clearly show. I think, then, that we may safely conclude that all the specimens described by these authors belong to the same species. If we include *pentagonus* White in the same genus, the earliest name available for the other species is *convictor*, Bouvier and Seurat, and this is the name I propose to use for it. It is under this name that Mortensen (1940, p. 294) records a small parasitic crab in some specimens of *Echinothrix diadema*.

There remains only *Eumedonus pentagonus* A. Milne-Edwards, 1897, known only from Milne-Edwards' description of a species without antero-lateral teeth and spines, and the cephalothorax with "petites depressions plus ou moins arrondies", i.e. pitted rather than tuberculate. This is probably identical with *convictor* Bouvier and Seurat.

Comparison of the figures given by Adams and White (Samarang Crustacea, pl. 6, fig. 7) and by Rathbun (1906, fig. 37) immediately shows the difference between the true *pentagonus* and *convictor*, as do also the authors' descriptions. Rathbun's species (= *convictor*) is smooth with rounded antero-lateral angles, while White's species has the angle between the antero- and postero-lateral borders produced to form a distinct spine. The upper surface of the carapace is covered with low but distinct tubercles and the tip of the rostrum is very slightly emarginate. It is for this reason that I place all these species in one genus, *Eumedonus*. As already stated by Gordon, the only difference between *Eumedonus* H. Milne-Edwards and *Echinoecus* Rathbun is the bilobed or entire condition of the front.

Eumedonus sculptus (Ward, 1935).

Christmas Island, Indian Ocean; 1940. 2 ♂♂, 4 ♀♀ commensal with the echinoid *Colobocentrotus atratus* (Linnaeus).

Ward made this species the type of a new genus *Proechinoecus*, but if we place *Echinoecus*, *Gonatonotus* and *Eumedonus* in one genus, Ward's species is best included in it as well.

In his description of the genus Ward states "the anterior legs are short and sub-equal", while in that of the male type he says "the chelipeds are unequal". The fact is that the chelipeds are unequal in both the male and the female.

Family **Xanthidae.**

Carpilodes rugatus (A. Milne-Edwards, 1865).

Christmas Island, Indian Ocean, 1932, 1940. 2 ♂♂, 1 ♀.

This material agrees well with the figure given by Odhner (1925, p. 20, pl. 1, fig. 16).

Carpilodes erythrus (Lanchester, 1901).

1° 25′ 03″ N., 102° 58′ E.; from cable at 18 fathoms, bottom temp. 81° F.; 1933. 1 ♀.

Description: Carapace quite *Carpilodes*-like, rather broad, the front separated from the orbit by a notch. The front is

bilobed, having a small median notch, but the lobes are not sub-divided into lobules; the orbit with the usual sutures, the angles not produced. The antero-lateral lobes rounded; many of the lobes of the carapace well delimited. 2 M is divided in two over its whole length, 1 M is distinct, 1, 2 and 3 L are fused to form one lobe; 4 L is transverse, reaching the antero-lateral lobe. The posterior part of the carapace is damaged, so it is impossible to say if 3 and 4 M are separated, or fused. The whole carapace is pitted.

The meri of the walking legs have their upper borders crested and those of the carpi are also rather sharp. Only one cheliped is preserved; it has the outer surface of the palm rather rough and the cutting edges of the fingers bear a row of teeth.

Odhner's figures (1925, pl. 1, fig. 14, 14a) give a good impression of this species.

Atergatopsis tweediei Balss, 1938.

4° 21′ 03″ N., 111° 58′ 50″ E.; from cable at 43 fathoms; 1938. 1 ♂.

1° 41′ 30″ S., 108° 16′ E.; from cable at 23 fathoms; 1938. 1 ♂.

This species differs from *granulatus* A. Milne-Edwards (1865, p. 255, pl. 13, figs. 2–2b) by the great extent of the carapace which is both smooth and hairless. Both species will be described in detail in a forthcoming paper on the Xanthids collected by the Siboga and Snellius expeditions in the Malay Archipelago.

Medaeus granulosus (Haswell, 1882).

Sultan Shoal, near Singapore; 1933. 4 ♂♂.

These specimens belong without doubt to this species, which will be described in detail in the report on the Snellius and Siboga material.

Halimede ochtodes (Herbst, 1783).

Siglap, Singapore; 1935. 1 ♂.

In this specimen the third antero-lateral lobe is broader than the fourth; in two other specimens examined these two are of about the same size, some of the granules on the antero-lateral border between them being larger and sharper than others. A male from Ceylon in the collection of the British Museum bears a tubercle and a small granule on the upper border of the movable finger and three on that of the palm; these are represented by two and five tubercles, respectively, in the present specimen, and between the anterior one of the five and the next there is a group of two or three granules. The outer

surface of the palm bears only some groups of granules and that of the wrist is smooth; near the upper anterior angle of the wrist there are only two tubercles and some indistinct ones on its lower border.

Lioxanthodes alcocki Calman, 1909.

Christmas Island, Indian Ocean; 1940. 2 ♀♀ (1 ovigerous).

Both specimens agree with the description I made of the largest specimen (a female) of Calman's type material from Christmas Island, which is preserved in the British Museum. I quote this description here:

Carapace extremely broad, barrel shaped, with long, very unequal chelipeds of rather unequal form, the left (in these specimens) being much more slender than the right. Carapace about half as long as wide, smooth, its regions very indistinct.

Fronto-orbital breadth more than half the greatest breadth of the carapace; front distinctly bilobed, with a median notch and separated by a notch from the orbit, the outer frontal angle not prominent. Orbital margin not at all tumid; the short antero-lateral margin only very indistinctly divided into lobules, the postero-lateral border much longer and strongly bent inwards; the posterior border very short.

Antennules folded transversely; the antennal flagellum lodged in the orbital hiatus, the basal antennal joint in contact with the down turned edge of the front.

The larger cheliped has the arm and wrist rather stout with rounded margins and smooth surfaces. The palm is also stout, but its outer surface bears some fairly large granules on its upper part, the lower part being smooth. On the upper part there are also some short hairs. Fingers stout, gaping at the base, but the gap is hidden by numerous short brown hairs implanted on the basal part of the immovable finger; cutting edge of this finger with two teeth near its apex, that of the movable finger with a row of teeth, the proximal one the largest.

The smaller cheliped far more slender, outer surface of arm and wrist smooth, that of the palm nearly so, the granules on the latter being obsolete. The fingers are also more slender with some teeth near their apex, but the larger proximal tooth is missing and the gap between them is not filled with hairs, both fingers bearing only a few rather long hairs.

The slender walking legs have their dactyli hairy and bear some rather long hairs on the upper borders of the propodi and carpi.

Remarks: Odhner (1925, p. 27) associates this species with *Xanthodes notatus* Dana, but later on (p. 84), when he makes *notatus* Dana the type of his new genus *Paraxanthias*,

he does not mention *alcocki* Calman. Rathbun (1930, p. 466) declares that *alcocki* should remain in *Lioxanthodes,* while Balss (1938, p. 50) places it in *Paraxanthias.* In my opinion it is assuredly no *Paraxanthias,* the form of the carapace and chelipeds differ too much from those of any of the other species in this genus. Rathbun (1930, p. 243) places *dispar* and *longimana* in *Paraliomera,* distinguishing this genus from *Lioxanthodes* by its having the outer frontal angle separated from the orbit by a notch. But Calman's specimens also have a notch between front and orbit, and, although I have examined neither of the American species, I suspect that all three species belong in one genus, which should then, for priority's sake, be named *Lioxanthodes* Calman, 1909.

Distribution: Christmas Island, Indian Ocean.

The two females sent from the Raffles Museum, and presented to the Rijksmuseum van Natuurlijke Historie, differ from the above description in having no trace of granules on the palm of the smaller chelipeds.

Lophoxanthus reynaudii (H. Milne-Edwards, 1834).

Siglap, Singapore; July 1934. 1 ♂.

The first two antero-lateral lobes are indistinct and not clearly separated, and the top of the second is marked only by a small group of low granules. The anterior part of the sternum is not pitted, and the upper border of the meri of the fourth pair of walking legs is armed with a row of strong, sharp spines.

This specimen is smaller than a male from the Malay Peninsula preserved in the Zoological Museum at Amsterdam, which will be described in a later paper.

Lophoxanthus reynaudii var. **baccalipes** (Alcock, 1898).

Angsa Island, Malacca Strait; 1926, coll. N. Smedley. 1 ♂.

This variety differs by the more worn tubercles on the carapace and the absence of crests on the limbs. Those on the arm and meri of the walking legs are represented by a row of teeth, those on the carpi and propodi only by low elevations.

A full description of the variety will be given in a forthcoming paper on the Xanthids of the two Dutch expeditions to the Malay Archipelago.

Lophoxanthus reynaudii var. **cultripes** (Alcock, 1898).

Fishmarket, Singapore; 1935. 1 ♂.

It was on this specimen and on the male in his own collection in Munich, from the Philippines, that Balss (1938, p. 51) bases

his opinion of the synonymy of *Demania splendida* Laurie (1906, p. 397, pl. 1, fig. 8; pl. 2, fig. 1) with *L. reynaudii* var. *cultripes*. I have been able to compare the two, and find that the form of the front, more prominent in *Demania* and with a far wider median gap, the form of the antero-lateral margin and the lobulation of the carapace are distinct in Laurie's species and the variety.

The available material is too scanty to solve the question definitely, but at present I am inclined to maintain the generic distinction between the two forms *Demania splendida* Laurie and var. *cultripes* of *Lophoxanthus reynaudii*.

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