

The thoracic sinus is a deep hardly Y-shaped cavity, since the outer limb of the Y is greatly produced and the inner limb is very short: the tail of the Y is defined by *two singularly large fungiform or reniform tubercles* with sometimes a third smaller one behind, and the strongly convex edge of the pterygostomian region, which defines the thoracic sinus in front, is finely milled.

The front is prominent, *almost quadrangular, with a sharply transverse sinuous edge and with its dorsal surface, anteriorly, markedly concave.*

The ventral surface of the ischium of the external maxillipeds of the female is broadly carinate up to a strong terminal tooth.

The chelipeds, in the adult male, are very little longer than the carapace. The arm is slender and is ornamented as in *L. pallida*: the wrist is quite smooth: the hand, which *is nearly twice as long as broad and nearly twice the length of the fingers*, has its outer edge carinate and its inner edge sharp: the short fingers meet only at the tip, where alone they are faintly denticulate. The legs are as in *L. pallida*.

Colours in spirit: fawn colour, the front of the carapace sometimes light olive-green; four large round brown spots round the circumference of the carapace behind; two pale spots on either side of the gastric region.

The carapace of the adult male is 14 millim. long and 11 millim. broad; that of the adult female is 13 millim. long and 11 millim. broad.

A young male and 26 adults of both sexes (many of the females with eggs) from the Andamans, are in the Indian Museum collection.

#### 55. *Leucosia whitei*, Bell.

*Leucosia whitei*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 289, pl. xxxi. fig. 2, and Cat. Leucos. Brit. Mus. p. 9: Hess, Archiv für Naturges. XXXI. i. 1865, pp. 155, 172: Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 45, and Cat. Austral. Crust. p. 118: Miers, Zool. H. M. S. 'Alert,' pp. 184, 289, and 'Challenger' Brachyura, pp. 322 (footnote), 325: A. O. Walker, Journ. Linn. Soc., Zool., Vol. XX. 1890, p. 111.

? *Leucosia chevertii*, Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 47, pl. v. fig. 2, and Cat. Austral. Crust. p. 120.

Carapace not appreciably longer than broad, elegantly urn-shaped; its surface smooth, except for (1) a narrow strip of thick short fur clothing its postero-lateral border, (2) a sharp angular granule-tipped eminence springing from the vault of either hepatic region, and (3) a patch of granules just dorsad of the lateral epibranchial angle; its antero-lateral border smooth as far as the front end of the thoracic sinus, and then beaded; its *true* postero-lateral border beaded as far as the level of the base of the 2nd pair of legs (3rd pereopods); its epimeral edge visible in all its extent, dorsally; its posterior margin gently curved,

the inflexed surface below it having numerous punctuations and squamous granules.

The thoracic sinus is a simple cavity defined ventrally by a loop of small somewhat irregular granules, and not very well defined in front.

The front is broader than long, dorsally convex, and its tip, which is truncated pitted and deflexed, ends in 3 broad denticles.

The ventral surface of the ischium of the external maxillipeds of the female is smooth (non-carinate).

The sub-cylindrical arm is closely nodular everywhere except in the middle of the ventral surface; the sub-globular wrist has about half of its upper surface, and a band on the inner edge of its under surface, granular: the hand is inflated, or sub-globular, with its base granular, and its inner edge sharply crenulate: the fingers, which are not much shorter than the hand, meet only at their tips, where alone they are denticulate.

The legs are compressed: the meropodites, which are much compressed, are finely granular along the edges; the carpopodites and propodites are sharply carinate, dorsally; the dactyli, which are nearly as long as their propodites and carpopodites together, are narrowly lanceolate.

The abdomen of the female consists of 4 pieces, and the large third piece is again subdivided into 3 pieces by two deep furrows which, however, are broadly interrupted in the middle line.

A single egg-laden female from the Andamans has the carapace 14 millim. long and 13.5 millim. broad.

The colours, according to Bell, are light brown with small angular red spots on the carapace, and a large red spot on the upper surface of the hand.

Our single specimen, which has been in strongly carbolized spirit for over 20 years, is now an uniform stone grey.

#### 56. *Leucosia cumingii*, Bell.

*Leucosia cumingii*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 290, pl. xxxi. fig. 3, and Cat. Leucos. Brit. Mus. p. 9.

Carapace quite devoid of marginal fur, a little broader than long, the inequality being hardly appreciable in the adult female, elegantly hexagonal as in the preceding species. The antero-lateral border, the main curve of which would be slightly concave, is convex by reason of the strongly marked angular projection of the hepatic region. The antero-lateral margin may be obscurely milled just in front of its junction with the true postero-lateral border, but the latter, as well as the posterior margin, is quite smooth: the posterior margin is gently curved, and in the male prominent.

The thoracic sinus is a deep obscurely Y-shaped cavity full of hair, the tail of the Y being defined by a row of 5 flat pearly granules situated above the chelipeds, the inner limb of the Y being very short, and the outer limb of the Y being produced up to the antero-lateral border to accent the boundary between the hepatic and branchial regions, the concavity of the fork of the Y being sharply defined by the smooth convex edge of the pterygostomial region.

The front is broader than long, deflexed and obscurely bilobed at tip, and a little concave in the mid-dorsal line anteriorly.

The ventral surface of the ischium of the external maxillipeds of the female is perfectly flat.

The edges of the trigonal arm are tuberculate: on the upper surface of the arm two short rows of tubercles arise from a mass of granules and short hairs at the base of the arm, and run, one towards the inner, one to the outer, edge of the arm: the wrist and the hand are quite devoid of granules: the fingers are nearly as long as the hand, and meet only at the tips.

The legs have all the joints compressed but not dilated.

The abdomen of the male consists of 4 pieces, that of the female of 3 pieces only.

Colours in spirit: yellowish white with yellowish brown markings, the hand and the fingers each with a brownish cross-band, the abdomen of the female with brownish yellow markings in its anterior (true posterior) third.

A male and an egg-laden female from the Nicobars: the carapace of the male is 11 millim. long and 10 millim. broad, that of the female is 12 x 11.5 millim.

57. *Leucosia sima*, n. sp. Plate VI. fig. 5.

Very closely related to *L. cumingii*, but differs from it, and from all other species of the genus, in the length of the posterior margin of the carapace, which is considerably more than half the greatest breadth of the carapace. Its form therefore would be broadly hexagonal, but owing to the shortness of the front and to the great convexity of the hepatic regions, it almost forms a pentagon.

Besides in the form of the carapace, which is unique in the genus, it differs from *L. cumingii*, Bell, only in the following characters, adult females being compared:—

1. The front hardly breaks beyond the general convexity of the anterior half of the carapace owing to the still greater angular prominence of the hepatic regions.

2. The antero-lateral margin of the carapace behind the angular

prominence of the hepatic region, and the postero-lateral margin up to the level of the base of the 1st pair of legs, are distinctly beaded.

3. The thoracic sinus has no definite boundary in front, although it is deep and defined ventrally by large pearly granules as in *L. cumingi*.

4. The inner edge of the upper surface of the wrist bears a row of granules, which is continued on to the base of the hand.

5. *The fingers are only half the length of the hand.*

An adult egg-laden female from Bombay has the carapace 13 millim. long and 13 millim. broad.

58. *Leucosia elata*, A. Milne Edwards.

*Leucosia elata*, A. Milne Edwards, Nouv. Archiv. du Mus. Vol. X. 1874, p. 41, pl. ii. fig. 2.

Carapace as broad as long, hexagonal, with the antero-lateral borders strongly convex and smooth: the true postero-lateral border is clothed with a strip of dense dark-coloured fur: there are also a few scattered stiff hairs on the posterior part of the epibranchial regions.

The thoracic sinus is a simple cavity, deep, sharply defined anteriorly, containing a good many hairs and a line of tiny granules, besides the row of 2 or 3 larger pearly granules (situated above the base of the chelipeds) which define it ventrally.

The front is prominent, broader than long, concave in the mid-dorsal line and distinctly bilobed.

The arm is markedly trigonal *with the antero-external angle expanded*, its upper surface is bounded internally by a row of pearly tubercles, externally by a row of pearly granules, and is otherwise smooth, except for a few granules almost hidden in hair and a single larger tubercle at its base. The wrist is smooth and subglobular, with obscure traces of carination along its outer surface. The hand is a little longer than broad and has its outer edge strongly carinate, the carina being continued on the mobile finger, where, however, it is less marked: the little lobule at the base of the inner margin of the hand is beaded all round its edge. The fingers, which are not much shorter than the hand, meet only at the tip, and have their opposed edges smooth throughout.

The legs are much compressed, and have the carpopodites strongly carinate dorsally, the propodites strongly carinate dorsally and ventrally, and the dactyli extremely slender and hardly as long as their propodites: the meropodites also of the last pair are carinate dorsally.

Colours in spirit: porcelain white or pale yellow. M. A. Milne Edwards describes the colours as bright greenish grey with numerous specks of orange red.

Besides a specimen from Upolu purchased from the Museum

Godeffroy, there are, in the Indian Museum collection two apparently adult males dredged, one off the south coast of Ceylon in 34 fathoms, and the other from the Persian Gulf.

The carapace of the latter is 8·5 millim. long and 8·5 millim. broad.

59. *Leucosia hæmatosticta*, Adams and White.

*Leucosia hæmatosticta*, Adams and White, Zool. 'Samarang,' Crust. p. 54, pl. xii. fig. 2: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 289, and Cat. Leucos. Brit. Mus. p. 8: Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 160: Miers, P. Z. S. 1879, pp. 20 and 40: A. O. Walker, Journ. Linn. Soc., Zool., Vol. XX. 1890, p. 111.

Carapace sharply hexagonal, elegantly urn-shaped, its breadth equal to its length; its surface smooth except for a strip of thick short harsh white fur, which extends from the lateral epibranchial angle along the whole length of the *true* posterior border; its antero-lateral borders slightly concave and smooth, or very faintly milled; its *true* postero-lateral border ending abruptly at the level of the base of the second pair of legs (3rd pereopods); its thickened milled epimeral edge, which is continuous with the posterior margin and ends at a sharp tooth just behind the base of the chelipeds, is visible, dorsally, in all its extent, when the carapace is held, without any inclination, straight in front of the observer's eyes; its posterior margin perfectly straight, with the outer angles well defined, and with the deflexed surface below it perfectly smooth.

The thoracic sinus is a simple cavity, defined in front by the smooth, very oblique, slightly convex edge of the pterygostomian plate: it is more or less filled with hair and is devoid of granules large enough to be seen with the naked eye.

The front is prominent, dorsally convex, much broader than long, and has its sinuous front margin strongly deflexed.

The chelipeds in the adult male are about one half as long again as the carapace. The upper surface of the trigonal arm has a single line of tubercles along its inner border, and a partly-fused double row along its outer border; at its base are some small tubercles hidden in a well-defined patch of encrusting spongy pubescence, of a whitish colour, from which two or three tubercles run forward to the inner border. The ventral border of the arm is tubercular, the tubercles arising somewhat profusely in a dense patch of spongy pubescence; the inner and under surfaces are quite smooth. The wrist is smooth, except for one or two tiny granules along its inner edge. The hand is a little longer than broad, its inner surface has a single row of granules, which is continued some way along the immobile finger. The fingers are about as long as the hand, and are somewhat hairy: their opposed edges

are crenulate along the distal two-thirds, the crenulation being most marked on the immobile finger.

The legs have the meropodites compressed, and concave on the ventral surface, the concavity being defined by two prominent longitudinal lines of granulation; the carpopodites dorsally subcarinate, but not dilated; the propodites carinate both dorsally and ventrally, but not dilated; and the dactyli narrowly lanceolate, and nearly as long as their carpopodites and propodites combined.

The abdomen of the male consists of 4 pieces, the third piece having a strong tooth in the middle line: that of the female consists of only 3 pieces.

Colours in life and in spirit: front pinkish-grey; the rest of the carapace ivory white covered with roundish crimson spots, which may be scattered, or may form a definite network: thoracic sterna, abdominal terga and external maxillipeds with similar spots; and a few similar but larger spots on the upper surface of all the joints of the chelipeds: legs banded with crimson.

In the Museum collection are two adult males and a half-grown female from the Madras side of Palk Straits, in 12 fms. and upwards.

The carapace of the largest male is 12.5 millim. long and 12.5 millim. broad.

#### 60. *Leucosia margaritata*, A. Milne Edwards.

*Leucosia margaritata*, A. Milne Edwards, Nouv. Archiv. du Mus. X. 1874, p. 42, pl. ii. fig. 3.

Differs from *L. hæmatosticta*, Ad. and Wh., only in the following particulars:—

1. Its size is even smaller, the carapace in the adult of either sex measuring only 8.5 millim. in length and 8.5 millim. in breadth.

2. The spongy pubescence on the base of the chelipeds, and the fur along the postero-lateral edge of the carapace are coal-black.

3. The hepatic regions are indicated by faint bulgings above the antero-lateral border.

4. The thoracic sinus is much shallower, being, in fact, almost obsolete.

5. The upper surface of the arm is bounded both in front and behind by *two* rows of pearly tubercles.

6. On the ventral surface of the basal joint of the external maxillipeds there is a sharp stout tooth, and another on the ventral surface of the ischium joint of the female.

7. Colours in spirit: old ivory white, the carapace and chelipeds elegantly reticulated with bright reddish brown.

In the Indian Museum collection are two adult males and an adult female laden with eggs. All came from an encrusted bottom of shells and shingle; one from the Andamans, one from the Malabar coast at 26-31 fms., and one from the Coromandel coast at 18 fms.

61. *Leucosia craniolaris*, (Herbst.)

?? *Cancer craniolaris*, Linnæus, Mus. Lud. Uir. p. 431, and Syst. Nat., 12th ed., p. 1041.

*Cancer craniolaris*, Herbst, Krabben, I. ii. 90, pl. ii. fig. 17; and (?) Fabr. Ent. Syst. II. 441.

*Leucosia craniolaris*, Fabr. Ent. Syst. Suppl. p. 350: Leach, Zool. Misc. III. p. 21: Milne Edwards, Hist. Nat. Crust. II. 122: Bell, Trans. Linn. Soc. 1855, p. 283, and Cat. Leucos. Brit. Mus. p. 6: Miers, 'Challenger' Brachyura, p. 325, pl. xxvii. fig. 3: A. O. Walker, Journ. Linn. Soc. Zool. Vol. XX. 1890, p. 111: J. R. Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 397.

*Leucosia craniolaris*, var. *levimana*, Miers, Zool. H. M. S. Alert, pp. 184 and 250, pl. xxvi. fig. A.

Carapace rather sharply hexagonal, about six-sevenths as long as broad: its surface perfectly smooth and devoid of hair: its antero-lateral borders finely beaded, almost straight, and gradually converging to join the sides of the truncate-triangular front without any abrupt break: its *true* postero-lateral border beaded, the beading ending rather abruptly at the level of the base of the first pair of legs (2nd pereopods): its thickened milled epimeral edge, which is continuous with the posterior margin and ends at a sharp tooth just behind the base of the chelipeds, is visible, dorsally, in all its extent when the carapace is held, without any inclination, straight in front of the observer's eyes: its posterior margin is almost straight and finely beaded, and the deflexed surface below it is covered with rows of sharp granules.

The thoracic sinus is a deep cavity full of hair, and—when denuded—is devoid of any tubercles or granules visible to the naked eye: it is bounded in front by the finely beaded, or milled, convex edge of the pterygostomial plate, so as to end in two broad notches of nearly equal size. The convexities of the hepatic regions are an indistinguishable part of the general convexity of the carapace.

The front is prominent, dorsally convex, and truncate triangular; its length is less than its breadth; and it ends in five prongs, the outer of which on either side are the sharp external orbital angles, and the middle one of which is by far the most prominent.

The ventral surface of the ischium of the external maxillipeds, in the female, is strongly convex up to a strong terminal tooth.

The chelipeds, in the adult male, are two-thirds longer than the carapace: the trigonal arm has beaded edges, the beading failing at the distal end of the outer border, and being spread out and profuse at the

proximal end of the ventral border : all the surfaces of the arm, however, are practically smooth, for although there are a few small tubercles at their proximal ends, these are covered and almost concealed by a dense adherent encrusting spongy pubescence, which is specially well marked on the upper surface. The surface of the wrist is quite smooth, except for two or three tiny granules along the inner edge of the upper surface. The hand is nearly as broad as long, and its inner surface is bounded by two prominent longitudinal rows of sharp-cut bead-like granules, which are continued some way along the immobile finger. The fingers are nearly as long as the hand, and are stoutly denticulate along the whole extent of their opposed edges.

The legs have the meropodites much compressed, those of the first three pairs being sharply squared, with four sharp longitudinal lines of granules, and those of the last pair being broadened and carinated ventrally as well as dorsally ; the carpopodites, in all, are compressed and strongly carinate dorsally ; the propodites are compressed and strongly carinate both dorsally and ventrally ; and the dactyli are broadly lanceolate.

The abdomen, in the male, to external view, consists of only 3 distinct pieces, the second piece bearing a tiny denticle in the middle line.

Colours in spirit : stone blue with indefinite longitudinal stripes of darker hue ; chelipeds, above, livid purplish-blue ; legs yellowish.

The carapace of an adult male is 23 millim. long and 20 millim. broad ; of an adult female, 21·5 millim. long and 19 millim. broad.

In the Museum collection are 2 adult males and 3 adult females from the mouth of the R. Hooghly.

## 62. *Leucosia vittata*, Stimpson.

*Leucosia vittata*, Stimpson, Proc. Acad. Nat. Sci. Philad., 1858, p. 159.

Differs from *L. craniolaris*, adults of both sexes being compared, only in the following particulars :—

1. The antero-lateral borders are distinctly emarginate behind the hepatic regions, the emargination being caused by the encroachment of the outer limb of the thoracic sinus, and being plainly visible, dorsally, when the carapace is held, without any inclination, straight in front of the observer's eyes.

2. The hand is very appreciably longer than broad, and the fingers are every bit as long as the hand.

3. The colours in spirit are : carapace blackish blue, or nearly black, with flame-coloured stripes ; chelipeds from the distal fourth of the arm to near the tips of the fingers, smoky flame-coloured on both surfaces, as are also the legs ; under surface of body ruddy brown.



In size similar to *L. craniolaris*.

Two adult males, an adult female, and a young female from the Andamans are in the Indian Museum collection.

In the young one the posterior margin of the carapace is perfectly straight, with the outer angles dentiform.

### 63. *Leucosia pubescens*, Miers.

*Leucosia pubescens*, Miers, Trans. Linn. Soc., Zool., (2) I. 1875-79 (1877), p. 238, pl. xxxviii. figs. 22-24: Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 46, and Cat. Austral. Crust. p. 119: de Man, Archiv. für Naturges. LIII. i. 1887, p. 390.

? *Pseudophilyra hoedtii*, de Man, Notes Leyden Mus. III. 1881, p. 125.

*Pseudophilyra hoedtii*, de Man, Journ. Linn. Soc. Zool. Vol. XXII. 1883, p. 198.

Differs from *L. craniolaris* Herbst, only in the following particulars:—

1. The front is as long as broad, and its sides meet the anterolateral borders of the carapace at an angle.

2. The inflexed surface below the posterior margin of the dorsum of the carapace is quite smooth.

3. The thoracic sinus, when denuded of its hair, is a shallow cavity, and the edge of the pterygostomian region which bounds the sinus anteriorly is thickened, smooth, and little convex.

4. The inner edge of the hand is almost devoid of granules.

5. The meropodites of the first three pairs of legs are rounded, not sharply squared, and usually have only a single longitudinal row—ventral in position—of minute granules: those of the last pair, though compressed, are not carinate, except that ventrally, about the middle, they bear a serrated lobule.

6. The carpopodites of the legs are inflated and non-carinate, and the propodites are but slightly carinate.

7. In fresh spirit specimens the carapace is light slate blue, traversed longitudinally by four broken longitudinal stripes of greenish brown which are so far continuous as to form a treble loop something like an incomplete pair of spectacles or a rather fantastic U: the chelipeds and legs with bands of yellowish brown, and the base of the fingers yellowish brown. In old spirit specimens the markings are not found on the carapace.

The carapace of an adult male is 18 millim. long and 15 millim. broad, that of an adult female is 18.5 millim. by 15 millim.

In the Indian Museum collection are 3 adult males and 2 adult females from the Madras Coast, two adult females and a young male from the Persian Gulf, an adult and a half-grown male from the

Andamans, and young males from Palk Straits, Mergui (and Hong-kong).

The young male from Mergui has been named *Pseudophilyra hoedtii* by Dr. de Man.

64. *Leucosia truncata*, n. sp. Plate VI. fig. 6.

Differs from *L. pubescens*, ovigerous females compared, only in the following characters :—

1. The front is broad and so extremely short that its free edge does not project beyond, indeed barely projects as far as, the epistome.
2. The thoracic sinus is extremely shallow, but yet is a distinct sinus, with a row of minute granules above the base of the chelipeds.
3. The dactyli are palmulate.
4. A distinct line of sharp cut beads bounds the inner edge of the wrist and of the hand.

Two adult (ovigerous) females from the Orissa coast. The colouration is exactly similar to that of *L. pubescens*, but darker.

The first specimen that I saw I regarded, after careful examination, as either a malformation of *L. pubescens*, or a specimen of *L. pubescens* that had had its front broken and imperfectly repaired. But a second ovigerous female of exactly similar form, from another dredging station, now leads to the conclusion that, instead of being malformations, these two specimens must represent either a new species of the *L. craniolaris* and *rhomboidalis* type, or possibly may belong to the *L. porcellana* of Fabricius, which de Man states definitely is a true *Leucosia*.

At any rate the species here under consideration is a genuine *Leucosia*, and not a *Pseudophilyra* or *Philyra*.

65. *Leucosia rhomboidalis*, De Haan.

*Leucosia rhomboidalis*, DeHaan, Faun. Japon. Crust. p. 134, pl. xxxiii. fig. 5: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 284, and Cat. Leucos. Brit. Mus. p. 6: F. Muller, Verh. Ges. Basel, VIII. p. 472: A. Ortmann, Zool. Jahrbüch. Syst. etc., VI. 1892, p. 586.

? *Leucosia craniolaris*, Desmarest, Consid. Gen. Crust., p. 167, pl. xxvii. fig. 2.

*Leucosia maculata*, Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 159.

Differs from *L. craniolaris* Herbst, only in the following particulars, adults of both sexes being compared :—

1. Its size is very much smaller: the carapace of the adult, in our series of 23 specimens, is never more than 16 millim., and is usually about 14 millim. long.
2. The front, which is as long as broad, has its sides subparallel

and hence forming a very abrupt angle with the antero-lateral borders of the carapace: it ends in 3 teeth, of which the two outer are small and deflexed and only the middle one is large and prominent. As, also, the external orbital angles are inconspicuous, the front, when examined without a lens, seems to end in a single sharp point, as shown in De Haan's figure.

3. The thoracic sinus, when denuded of its hair, is a shallow cavity, and the edge of the pterygostomian region that forms its anterior boundary is thickened, smooth, and almost straight.

4. The chelipeds of the adult male are less than half again as long as the carapace.

5. The inner surface of the wrist is bounded both above and below by a line of granules.

6. Colours in spirit: carapace and dorsal surface of chelipeds blue-black; the carapace with two divergent crescents of dark red spots in its anterior half, following the anterior boundary of the epibranchial regions; tips of arms hands and fingers sometimes nearly white, bases of fingers sometimes yellow.

17 adults of both sexes (including females with eggs) from the Coromandel coast in 13 to 23 fathoms, and an adult male and female from the Andamans (besides 4 adults from Hongkong) are in the Indian Museum collection.

#### 66. *Leucosia phyllochira*, Bell.

*Leucosia phyllocheira*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 291, pl. xxxi. fig. 5, and Cat. Leucos. Brit. Mus. p. 9.

This species has a piriform carapace, and is distinguished from all its congeners by the following characters:—

1. The chelipeds are shorter than the carapace.
2. The arms have their upper surface much expanded.
3. The hands are broader than long, are foliaceous, and have both their inner and outer edges strongly carinate.

A single small specimen from Palk Straits is in the Indian Museum collection.

#### *Onychomorpha*, Stimpson.

*Onychomorpha*, Stimpson, Proc. Acad. Nat. Sci., Philadelphia, 1858, p. 162.

Carapace shaped much like a human nail, depressed, with all its margins, behind the front, forming a continuous laminar brim, increasing in breadth from before backwards and beneath which the true legs are almost entirely concealed in flexion: the expansion of the posterior

margin is particularly broad: the regions of the carapace are not delimited. Front short, hardly projecting beyond the general outline of the carapace, but projecting well beyond the edge of the buccal cavern. Eyes minute: orbits with a long suture in the roof, and a small gap at the inner canthus, but complete and affording complete concealment to the eyes: the floor of the orbit is closely appressed to the roof of the buccal cavern. Antennules folding a little obliquely. Antennæ obsolete.

Buccal cavern longer than broad: the exopodite of the external maxillipeds is elongate, and not much broader than the endognath, and has its outer edge a little curved: the acutely triangular merus of the endognath projects beyond the exognath, and is much longer than the ischium, measured along the inner edge.

The chelipeds, compared with the legs, are very massive: they are depressed and laminar, and are about the same length as the carapace: the fingers are stout, compressed, and very short.

The legs are slender and compressed, and when flexed are almost entirely concealed beneath the expanded edge of the carapace.

#### 67. *Onychomorpha lamelligera*, Stimpson.

*Onychomorpha lamelligera*, Stimpson, Proc. Acad. Nat. Sci. Philad., 1858, p. 162: A. O. Walker, Journ. Linn. Soc. Zool. XX. 1890 (1887), p. 111, pl. viii. fig. 3.

Carapace triangular with the sides slightly curved, a little longer than broad; depressed, laminar, and unguiform owing to the preponderance of the broad laminar brim, to which the true carapace (the part lodging the viscera) forms a low convex circular crown.

The surface of the carapace is smooth, without any indication of regions: the edge of the brim is elegantly striated. The under surface of the body is also quite smooth, except for the striations all round the edge of the carapace.

The front is a little recurved upwards.

The chelipeds, in the female, are a very little longer than the carapace: the arm is sharply trigonal, with the outer edge cristiform, the edge of the crest being finely striated like the edge of the carapace: the outer edge of the wrist is carinate, and a ridge traverses the upper surface of the wrist: the hand is laminar with the edges sharp and striated beneath a copious spongy pubescence; it is rather more than half again as long as broad, and more than twice as long as the compressed fingers.

The legs are short and slender, with the merus, carpus and propodite carinated, and the dactylus almost filiform.

In the female all the segments of the abdomen except the last appear to be fused together, although the first and second can be recognized.

The carapace of an apparently adult female is 7 millim. long, and 6.5 millim. in greatest breadth.

A single female occurs in the collection of the Indian Museum,—from Palk Straits.

### *Philyra*, Leach.

*Philyra*, Leach, Zool. Miscell. III. p. 18.

*Philyra*, Milne Edwards, Hist. Nat. Crust. II. 131.

*Philyra*, Bell, Trans. Linn. Soc., Vol. XXI. 1855, p. 299, and Cat. Leucos. Brit. Mus. p. 13.

*Philyra*, Miers, 'Challenger' Brachyura, p. 320.

*Philyra* can be at once distinguished from *Leucosia* by the absence of a thoracic sinus, and from *Pseudophilyra* by the fact that the front is broad and either not all produced to form a *Leucosia*-like snout, or if so produced (as it is, to some extent, in *Philyra platychira*) then the side-wall of either hepatic region forms an independent marginal facet.

Carapace usually circular and somewhat depressed, with the epistome projecting beyond the broad front; the dorsal surface of the carapace is generally bounded by a continuous beaded line; the hepatic and branchial regions usually fairly well defined by grooves or creases.

Buccal orifice transversely oblong, with the anterior angles broadly rounded: the exognath broadly dilated, usually foliaceous, the outer and anterior borders forming parts of one wide curve: the merus of the endognath narrowly and acutely triangular, the length of its inner border being not less, or not much less, than that of the inner border of the broad ischium.

Orbits small and sunken, with two sutures in the upper and outer wall, and a hiatus at the inner angle, where the minute antennal flagellum stands. The antennules fold transversely.

Chelipeds symmetrical and, relatively to the legs, very massive; longer in the male—about twice the length of the carapace—than in the female: true legs small.

The abdomen of the male consists of 3 or 4 pieces, that of the female of 4.

Key to the Indian species of *Philyra*.\*

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- I. Carapace circular, never carinate or covered with pubescence dorsally: upper surface of chelipeds never longitudinally carinate:—
1. The epistome and the lower border of the marginal hepatic facet form a lobe that projects far beyond the front, like the lower jaw of a bulldog:—
    - i. Carapace as long as broad, its surface only partly, and very variably granular: chelipeds of adult male more than twice as long as the carapace ..... *P. scabriuscula*.
    - ii. Carapace a little broader than long, its surface always completely covered—except sometimes on the tip of the front—with beadlike granules: chelipeds of the adult male much less than twice the length of the carapace..... *P. verrucosa*.
  2. The epistome projects either very slightly in all its extent, or not in its entire extent, beyond the front:—
    - i. The sidewall of the hepatic region forms, on either side, an independent facet on the antero-lateral margin of the carapace: the margin of the epistome is deeply cleft on either side, below the eye; hands between 2 and 3 times as long as broad, fingers with their opposed edges toothless..... *P. platychira*.
    - ii. The sidewall of the hepatic regions is not flattened to form a facet: the margin of the epistome not cleft below the eye: hands never twice as long as broad, fingers denticulate:—
      - a. The carapace is almost smooth to the naked eye: the regions of the carapace are hardly defined:—
        - a. The whole of the epistome projects beyond the front, which is hardly pubescent: the beads on the line that defines the circumference of the carapace are of uniform small size: terminal segment of the exognath roughly semicircular: hands not inflated, fingers not strongly bent inwards in the male: sixth abdominal tergum quite smooth..... *P. globosa*, (Fabr.)
        - β. Only the internal angles of the afferent branchial orifices project beyond the front, which is hairy: some of the marginal granules of the carapace are enlarged and almost dentiform, at fairly regular intervals: terminal segment of the exognath ovally, and very elegantly, foliaceous: fingers, in the male, strongly bent inwards: sixth abdominal tergum, in the male, with a small median denticle ..... *P. globulosa*, Edw.
      - b. The regions of the carapace form independent swellings, the convexities of which are closely covered with large vesiculous granules..... *P. corallicola*.
- II. Carapace sharply hexagonal, the posterior margin quite straight and the posterior angles dentiform: traversed fore and aft by a median carina, and with an oblique carina on either branchial region: upper surface of chelipeds traversed—from base of arm to finger-cleft—by a sharp ridge..... *P. sexangula*.

\* Dr. Henderson includes *Philyra adamsii* Bell (Trans. Linn. Soc. Vol. XXI. 1855, p. 301, pl. xxxiii. fig. 1) in the Indian Fauna. I have not given it a place in this Key because, from the figures and description, I cannot satisfy myself that it is really a *Philyra*. It seems to me to be, rather, a *Pseudophilyra*.

68. *Philyra scabriuscula*, (Fabr.)

Seba, III. pl. xix. figs. 10, 11.

? *Cancer cancellus*, Herbst, Krabben, I. ii. 94, pl. ii. fig. 20.

*Leucosia scabriuscula*, Fabricius, Ent. Syst. Suppl. p. 349: Latreille, Hist. Nat. Crust. et Ins. VI. 116.

*Philyra scabriuscula*, Leach, Zool. Miscell. III. p. 22: Desmarest, Consid. Crust. p. 167: Milne Edwards, Hist. Nat. Crust. II. 132, pl. xx. figs. 9, 10: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 299, and Cat. Leucos. Brit. Mus. p. 14: Heller, 'Novara' Crust. p. 70: de Man, Notes Leyden Mus. III. 1881, p. 126: Lenz and Richters, Abh. Senck. Ges. XII. 1881, p. 425: Muller, Verh. Ges. Basel, VIII. 1886. p. 473: de Man, Journ. Linn. Soc., Zool., Vol. XXII. 1888, p. 201: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 399.

The epistome and the subhepatic regions form a dorsally-flattened, marginally-crenulate, rounded lobe, which is separated from the anterior curve of the carapace by a groove and projects far beyond the front, like the lower jaw of a bulldog.

The carapace is discoidal, with the margin beaded and the dorsal surface very variably ornamented with vesicular granules visible to the naked eye: these, however, never completely cover the carapace, and are rarely altogether absent, but are generally confined to the outer part of the branchial regions and to the branchio-cardiac grooves, which are broadly defined. The hepatic regions also are defined, by a slight marginal indentation and by a dorsal wrinkle.

The front is divided into two lobes by a deep broad groove, and the roof of the orbit is deeply fissured, so that the external orbital angle is acutely emphasized.

The edges of the thoracic sterna and the basal edge of the abdomen, as well as the greater part of the pterygostomial regions, are ornamented with polished granules; but the surface of the external maxillipeds is perfectly smooth, except in the female, where there are traces of granulation on the endopodite.

The chelipeds in the adult male are about  $2\frac{1}{2}$ , in the adult female about  $1\frac{1}{2}$ , times the length of the carapace: the arms bear rows of beadlike granules running along the upper and inner surfaces but fading away distally; the under surface of the arm is almost smooth: the inner edge of the wrist has a single row, and the inner edge of the hand several rows, of minute vesicular granules, which are hardly visible to the naked eye even in the male, and are obsolescent in the female. The hands are twice as long as broad: the fingers, although they meet only at their extreme tip, are denticulate all along the opposed edges; the mobile finger is nearly as long as the hand.

The legs are slender and smooth, except for a line of microscopic granulation along the under surface of the meropodites.

The abdomen of the adult male consists of two linear and hidden basal pieces, a triangular apical piece, and a long triangular middle piece in which the division of the 6th tergum is marked by a faint transverse groove.

The diameter of the carapace of the adult male is 12 to 14 millim., of the adult female about 10 millim.

Colours in spirit: carapace mottled with dull brown and greenish shades; chelipeds distinctly and legs indistinctly banded with dull brown.

In the Indian Museum collection are 110 specimens from Tavoy, Mergui, Madras coast, Travancore coast, Karáchi, Mekrán coast, and Persian Gulf.

1. A variety from Madras—represented by a single male—has the greater part of the carapace covered with granules, four of which—one in the mid-gastric, one in the mid-cardiac, and one on either branchial region—are much enlarged; and has chelipeds a good deal less than twice the carapace in length.

2. A variety from the Nicobars—also represented by a single male—has the whole carapace, except the front and the anterior limit of the gastric region, very closely covered with large granules much as in the next species.

#### 69. *Philyra verrucosa*, Henderson.

*Philyra verrucosa*, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 399, pl. xxxvii. figs. 10-12.

Differs from *P. scabriuscula*, (Fabr.), adults of both sexes being compared, only in the following characters:—

1. The carapace is irregularly oval rather than discoidal, especially in the female, owing to the greater lateral bulging of the branchial regions.

2. The whole dorsal surface of the carapace, except sometimes the front, is closely covered with beadlike granules, which are larger posteriorly, and one of which—somewhere near the middle—is usually enlarged.

3. A slight transverse dorsal indentation separates the hepatic from the branchial region on either side, but there is no independent dorsal bulging of the latter.

4. The branchio-cardiac grooves are narrow and deep.

5. The front is divided into two lobes by a broad shallow groove: the fissure in the roof of the orbit is indistinct, so that the external orbital angle is not sharply pronounced.

6. The whole surface of all the thoracic sternæ is closely beaded, and the surface of the exopodite as well as of the outer half of the endopodite of the external maxillipeds is granular.



7. The chelipeds, in the adult male, are less than twice the length of the carapace: the distal end of the upper surface of the arm is covered with granules, and the greater part of the under surface of the arm is granular: the wrist and hand of the male have, along their inner edge, a row of granules quite visible to the naked eye: the hand is only half again as long as broad.

8. The size is a good deal smaller—the carapace of the adult male being about 9 millim. long and 10 millim. broad, that of the adult female being about 8 millim. long and 9 millim. broad.

9. Colours in spirit: dorsum blue-black, with a coppery tinge which is most marked on the chelipeds.

12 adults (male and female) from off Puri, 10 fathoms, from Madras, and from Karáchi, are in the Indian Museum.

70. *Philyra sexangula*, n. sp. Plate VII. fig. 2.

The whole exoskeleton, excluding the tips of the fingers and dactyli, is closely covered with a short close microscopic velvet-like pubescence—both dorsally and ventrally.

Carapace as long as broad, sharply hexagonal, traversed fore and aft by an interrupted median carina: the branchial regions are also traversed obliquely backwards each by a carina which terminates on either postero-lateral margin at a sharp eminence. The straight posterior margin has its outer angles strongly dentiform.

The side wall of either hepatic region forms an independent facet, which also involves the front and thus presents a condition intermediate between that of *P. platychira* and *P. scabriuscula*.

The edge of the front is straight and bilobed, and the straight edge of the epistome projects beyond it. There is a slight notch in the edge of the epistome beneath the eye on either side.

The chelipeds in the adult male are nearly  $2\frac{1}{2}$  times as long as the carapace; their upper surface, from the base of the arm to the finger cleft, is traversed by a sharp ridge; they are devoid of any granules visible through the general velvet: the hand is twice as long as broad, and the fingers are rather over two-thirds the length of the hand and have their opposed edges finely denticulate and hairy: the inner edge of the upper surface of the hand is traversed by a second sharp ridge.

The legs are slender and compressed, the under edge of their propodites and dactyli being fringed with long hairs.

The abdomen of the male appears to consist of only two pieces, namely a small apical piece, and a long triangular plate in which the 6th tergum is marked off by a groove and bears a strong median tooth.

The diameter of the carapace of the male is 8 millim.

Colours uniform blackish brown everywhere above and below.

*Loc.* Godávári coast, Sacramento shoal, 6 fms., a single male : and Persian Gulf, a male.

In the specimen from the Persian Gulf the surface of the carapace beneath the velvet-like pubescence is uniformly punctulate in honey-comb fashion ; and the edges of the carapace, the epibranchial carinæ, and the edges of the chelipeds and of their longitudinal ridge, as also of the second ridge along the inner edge of the hand, are all evenly granular. A near ally of this little species appears to be *P. punctata*, Bell.

#### 71. *Philyra platychira*, De Haan.

*Philyra platychira* De Haan, Faun. Japon. Crust. p. 132, pl. xxxiii. fig. 6 : Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 300, and Cat. Leucos. Brit. Mus. p. 15 : Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 160 : E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 49 (*gastric teeth*) : Miers, 'Challenger' Brachyura, p. 321 : de Man, Journ. Linn. Soc., Zool., XXII. 1888, p. 201 : J. R. Henderson, Trans. Linn. Soc. Zool., (2) V. 1893, p. 400.

*Philyra longimana*, A. Milne Edwards, Nouv. Archiv. du Mus. X. 1874, p. 43, pl. ii. fig. 4 : Miers, 'Challenger' Brachyura, p. 321.

Carapace convex, subcircular, but pinched in to form an independent marginal facet in either hepatic region : the circumference is beaded, as also—but less distinctly—are the margins of the lateral hepatic facets : the surface of the carapace, to the naked eye, is almost always quite smooth : the branchio-cardiac grooves are distinct.

The edge of the front is almost straight and is broadly bilobed, the whole of the epistome projects beyond it. The edge of the epistome is deeply cleft just below the eye, on either side.

The thoracic sterna have the edges, and the first sternum the surface also, beaded or granular.

The external maxillipeds have the surface smooth, and the edges of certain of their segments finely and inconspicuously fringed as in *P. globosa* (Fabr.), only the hairs on the inner edge of the endognath of the female being conspicuous : the distal segment of the exognath is less dilated than in any other Indian species.

The chelipeds in the adult male are  $2\frac{1}{2}$  times, in the adult female  $1\frac{3}{8}$  times, the length of the carapace : the arms have a few rather distant small vesicular granules on the basal third of, and also along the inner border of, the upper surface, and on the base and along the lower border of the inner surface, besides other tiny granules only visible with a lens : the surfaces of the wrist and hand are smooth. The hand is thin—

almost lamellar—with sharp edges, the inner of which is finely crenulate; in the adult male its length is nearly three times its breadth. The fingers, which are not as long as the hand, are also very thin and lamellar, and are elegantly curved: their opposed edges are sharp and *entire*, the cutting edge of the immobile finger being rather thickly fringed with hair.

The legs are slender and smooth, except for a line of tiny granules along the under surface of the meropodites.

The abdomen of the male consists of a single linear and concealed basal piece and a small triangular terminal piece, and, between the two, a long smooth triangular piece, which is bilobed and granular at base and has the sixth tergum demarcated by a deep groove.

The colour in spirit is uniform coppery.

The carapace of the adult male is 13 or 14 millims. in either diameter, that of the female 12 or 13.

In the Indian Museum collection are 40 specimens, adults and young of both sexes, from the Andamans, Mergui, Karáchi, and the Persian Gulf.

The Persian Gulf specimens, which are quite adult, have the dorsal surface much mottled with green and brown, and the immobile finger denticulate beyond the line of hair.

## 72. *Philyra globosa*, Fabr., de Man.

*Philyra globosa*, de Man, Journ. Linn. Soc., Zool., Vol. XXII. 1888, p. 203: *only that part referring to Fabricius' female type and to the Mergui specimens*. This reference is placed first because Dr. de Man has examined Fabricius' types, male and female, of *P. globosa*, and the species here under consideration corresponds with Fabricius' female type as re-described by de Man.

?? Rumph, Amboin. Rariteitk. pl. x. fig. D.

*Cancer globosus*, Fabr., Sp. Insect. I. 497 and Ent. Syst. II. 441.

? *Cancer globus*, Herbst, Krabben, I. ii. 90.

*Leucosia globosa*, Fabr. Ent. Syst. Suppl. p. 349: Latreille, Hist. Nat. Crust. et Ins. VI. 117.

? *Philyra globosa*, Leach, Zool. Miscell. III. 22 (reference to male); and (?) Desmarest, Consid. Crust. p. 168.

? *Cancer porcellanus*, Herbst, Krabben I. ii. 92 (*nec syn.*), pl. ii. fig. 18.

*Philyra porcellana*, Milne Edwards, Hist. Nat. Crust. II. 133: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 303, and Cat. Leucos. Brit. Mus. p. 14 (*nec syn.*)

*Philyra polita*, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 401, pl. xxxviii. figs. 1-3.

The whole exoskeleton (when not incrustated with *Hydrozoa*, &c., as it commonly is) has, to the naked eye, the appearance of glazed porcelain, although when examined with a lens it is minutely punctulate and granular.

The carapace is subcircular, the anterior portion being an arc of a smaller circle than the posterior; its dorsum is defined all round, behind the hardly at all pubescent front, by a line of fine beads all of equal size.

The epistome projects well beyond the edge of the front, which is deflexed, the deflexed portion being slightly acuminate downwards in the middle line.

None of the regions of the carapace are in any way defined.

The thoracic sterna and the base of the abdomen are bordered by granules, which are flattened and depressed.

The *surface* of the external maxillipeds is quite devoid of hair, though the edges of the exopodite have a fringe of exceedingly short hair, and the inner edge of the endopodite is, in the female, fringed with hair that is somewhat longer. The expanded exopodite is very broad anteriorly and has the inner edge quite straight (not curved).

The chelipeds in the adult male are a little more than twice the length, in the adult female about  $1\frac{3}{4}$  times the length, of the carapace. The arms are covered with close-set flattened pearly granules on the upper surface except near the tip, on the whole of the inner surface, and on the basal half or third of the under surface. The wrist and hand are quite smooth, and only very occasionally in old males the inner surface of the hand is, under the lens, but not to the naked eye, roughened. The hand in both sexes is a little more than half again as long as broad, and is not inflated.

The fingers have much the same form in both sexes: they are almost in the same straight line with the hand; they meet closely only at tip, although they are faintly denticulate along the greater part of their extent; they do not, in the male, bear any enlarged dentiform tubercle; and the length of the dactylus is hardly greater than that of the outer border of the hand.

The true legs are not much longer than the male arm; their meropodites have every surface quite smooth, their propodites are bluntly carinate, and their dactyli laucolate.

The abdomen of the male consists of two linear basal pieces and a triangular apical piece, and, between the two, a long narrow triangular plate which has no median denticle and is divided by a transverse groove of no great depth.

Colours in spirit: smoky bluish brown above, the blue deepest on the carapace.

The diameter of the carapace of the adult male does not exceed 20 millim., that of the adult female does not exceed 17 to 18 millim.

In the Indian Museum collection are 110 specimens, both young and adult, of both sexes, from the East coast, from the mouth of the Hooghly to Madras—and also from Karáchi.

Besides these there are 4 specimens (two males more than half-grown, a younger male, and one very young specimen) from Mergui. These have been compared by Dr. de Man with Fabricius' types of *P. globosa* from the Kiel Museum, and are stated by him to agree with Fabricius' female type.

They do not however, as Dr. de Man appears to suspect, agree with Fabricius' male type, and this involves a delicate question of synonymy.

From Dr. de Man's description it is evident that Fabricius' male is a species quite distinct from his female: as a matter of fact it appears to be the species named by Milne Edwards—and named probably with foresight—*P. globulosa*.

It seems therefore preferable to apply Milne Edwards name, *P. globulosa*, to Fabricius' male type, and to leave the name *P. globosa* in possession of Fabricius' female type.

The only other alternative is to make use of Dr. Henderson's name *P. polita* for Fabricius' female, and to let *P. globosa* stand for Fabricius' male. But this, I think, would be a little unjust to Dr. de Man, upon whose prior work the present attempt to clear up the confusion between the two species is based, and a little wanting in respect to the memory of the founder of modern carcinology.

### 73. *Philyra globulosa*, Edw.

?? *Cancer anatum*, Herbst, Krabben, I. ii. 93, pl. ii. fig. 19.

*Philyra globulosa*, Milne Edwards, Cuvier Règne An. Crust. pl. xxiv. fig. 4, and Hist. Nat. Crust. II. 132 (*nec syn.*): Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 300, and Cat. Leucos. Brit. Mus. p. 14 (*nec syn.*)

? *Philyra globosa*, Leach, Zool. Miscell. III. p. 22 (female only): ? Desmarest, Consid. Crust. p. 168 (part).

*Philyra globosa*, de Man, Journ. Linn. Soc., Zool., Vol. XXII. 1888, p. 203: only that part relating to Fabricius' male type, and not the part relating to Fabricius' female type and to the Mergui specimens.

? *Philyra heterograna*, Ortmann, Zool. Jahrbuch. Syst. etc. VI. 1892, p. 582, pl. xxvi. fig. 17, (half-grown male).

The whole exoskeleton (when not incrustated with *Hydrozoa* &c., as it rarely is) has the somewhat greasy look and feel of unglazed porcelain, except the legs and abdomen, which are polished.

The carapace is circular, its dorsum is defined all round, behind the hairy front, by a line of granules, some of which, at fairly regular intervals, are much enlarged and may even, in young specimens, form distinct denticles.

The epistome can be scarcely said to project beyond the front, since only the inner angles of the afferent branchial canals do so.

The edge of the front is emarginate in the middle line, so as to make the front, when denuded of hair, broadly bilobed.

An indentation of the margin of the carapace separates the hepatic from the branchial regions, and a broad groove separates the branchial regions from the cardiac and intestinal regions, on either side.

A band of granules visible to the naked eye is always found

on either pterygostomian region, bounding the buccal cavern; and almost always in females and young males, and often but by no means always in adult males, the hepatic regions and the outer and posterior parts of the epibranchial regions are distinctly granular to the naked eye.

The exposed parts of the thoracic sterna are more or less covered with granules, and there are granules on the base of the abdomen. But the greater part of the abdomen, in contrast with the sternum, is polished.

The edges of the maxillipods are hairy in the same manner as, but much more coarsely than, those of *P. globosa* Fabr., and the surface also is in large part covered with hair: the foliaceous exopodite has an elegantly oval shape, owing to the fact that its inner edge is curved and enters the common curve of the outer and anterior edges without any abrupt transition.

The chelipeds in the adult male are a little more than twice the length, in the female only about  $1\frac{1}{3}$  times the length, of the carapace. The arms bear numerous sharpish granules (speaking of those visible to the unaided eye alone) on the basal third (male) or basal half (female) of the upper surface, all along both the inner and outer borders of the upper surface, and on the basal third and inner border of the lower surface. The wrist has a row of granules along the upper border of its upper surface, and commonly also along the under border of the same surface; and the inner surface of the hand is defined above by a row of prominent granules, and below by several lines of smaller granules—all continued on to the base of the immobile finger, and all being very much less distinct in the female than in the male. The fingers are fluted, with the outer borders granular at base. The hand in the female is hardly longer, and in the male is only about one-fifth longer, than broad, and is considerably inflated. The fingers differ considerably according to sex, but both sexes agree in having the dactylus very markedly longer than the outer border of the hand, in the male they are bent inwards at an angle of about  $145^\circ$  with the hand, and the edge of the basal half of the dactylus is a good deal hollowed to make room for a strong dentiform tubercle on the opposed edge of the immobile finger; and it is only beyond this tubercle and its corresponding hollow that the fingers are denticulate: in the female the fingers are not bent inwards strongly, and their opposed edges are unbroken, and are denticulate in the greater part of their extent.

The true legs resemble those of *P. globosa*, except that (1) the under surface of the mesopodites is granular—a line of granules on

the first pair, in the male only, being much enlarged, and (2) that the dactyli are distinctly palmulate.

The abdomen of the male consists of a single linear basal piece and a triangular apical piece, and, between the two, a long triangular plate which is divided in its distal fourth by a deep transverse groove, the piece so cut off bearing a median denticle in its distal half.

Colours in spirit: light yellowish-pinkish-brown to coppery, with a bluish tinge over a large part of the dorsum of the carapace.

The diameter of the carapace of the adult male is 29 to 30 millim., that of the adult female 22 to 24 millim.

In the Indian Museum collection there are 160 specimens collected all along the East coast, from the mouth of the Hooghly to Point Calimere, and on the coasts of Travancore, the Andamans, and the Persian Gulf.

74. *Philyra corallicola*, n. sp. Plate VII. fig. 1.

Carapace perfectly circular, convex: the hepatic regions form a pair of distinct dorsal swellings, and the branchial regions are separated from the median regions by deepish grooves: the summits of the hepatic regions, the posterior part of the gastric region, and the convexities of all the other regions are closely covered with vesiculous granules like those of *P. verrucosa*, but the grooves and hollows of the carapace are quite smooth. The front is divided longitudinally, from edge to base, into two tumid lobes by a deepish groove: its edge is straight and the tips of the mouth-parts can only just be seen beyond it in a dorsal view. The entire margin of the carapace is finely evenly and sharply crenulate. The sternum and convexities of the pterygostomial regions are finely granular, as are also the outer and distal parts of the external maxillipeds.

The external maxillipeds are shaped as in *P. globulosa*, Edw.

The chelipeds in the male are about  $1\frac{1}{4}$  times the length of the carapace: the arm is closely covered, everywhere except on a distal patch of the inner surface, with vesiculous granules, which are largest on the upper surface: the wrist and hand are finely granular; there is a raised row of granules on the outer edge of the wrist, which becomes a granular crest on the outer edge of the hand; and there are two raised rows of granules along the inner surface of the hand: the fingers are about as long as the hand. The abdomen of the male consists of 3 pieces, the broad base of the long triangular second piece being granular: at the distal end of the second piece is a stout denticle.

Diameter of the carapace of an apparently adult male, 6 millim.

*Loc.* off Malabar Coast, 29 fms. on a bottom of "hard flat coral slabs" (Alfred Carpenter).

At first sight this species resembles *P. verrucosa*, Henderson, from which it is easily distinguished on close examination.

#### *Pseudophilypa*, Miers.

*Pseudophilypa*, Miers, P. Z. S., 1879, p. 40.

Of the small forms grouped together in the genus *Pseudophilypa* some present the greatest resemblance to the smaller species of *Leucosia*, and others to the smaller species of *Philypa*. All, however, may be distinguished from *Leucosia* by the absence of any trace of a "thoracic sinus"; and all may be distinguished from any Indian species of *Philypa* by the following characters:—(1) either the whole free edge of the front, or at least the tip of its median tooth, projects beyond the level of the epistome; (2) the buccal cavity is either longer than broad and shaped as in *Leucosia*, or only a very little broader than long; (3) the exognath of the external maxillipeds is never broadened, and never has the outer and anterior borders forming one unbroken sweep; (4) the front has always the form of a distinct snout, convex, and pinched off, at base, from the hepatic regions. Now in the only Indian species of *Philypa* in which this to some extent occurs, the side wall of either hepatic region forms an independent marginal facet to the carapace—a thing never seen in *Pseudophilypa*.

The whole exoskeleton porcellanous.

Carapace subcircular or subpiriform, convex, with the regions usually not defined; produced in front to form a short upturned snout, similar in all its relations except length to that of *Leucosia*. The carapace is defined all round behind the front by a continuous raised and usually beaded line: its epimeral edge is not appreciably thickened, and is not approximated to the true lateral margin, so that there is no infolding of the lateral wall of the carapace or "thoracic sinus": nor is the epimeral edge of the carapace continuous with the line that defines the dorsum of the carapace posteriorly, as it is in *Leucosia*.

The buccal cavern is truncate-triangular: its length is usually greater than, but sometimes slightly less than its greatest breadth: the outer margin of the exognath meets the anterior margin abruptly, the exognath not being dilated.

The chelipeds are symmetrical and, relatively to the legs, very massive: in the male they are nearly twice the length of the carapace: a large part of the surface of the arms is ornamented with beadlike and vesicular granules: the hands are broad, but usually not so broad as long: the fingers are usually somewhere about the same length as the hand.

The abdomen of the male usually consists of 4 pieces, but the two



basal pieces are usually linear and hidden. The abdomen of the female consists of 3 or 4 pieces.

*Key to the Indian species of Pseudophilypira.*

- I. Front tridentate, the whole of its free edge projecting well beyond the epistome: carapace strongly convex: buccal cavern elongate, truncate-triangular, quite as in *Leucosia*:—
  - 1. Carapace closely and coarsely punctulate: hepatic regions defined: thoracic sterna of male normal ... .. *P. tridentata.*
  - 2. Carapace smooth and polished: third thoracic sternum of male with two processes or teeth,—one on either side of the abdomen:—
    - i. Hepatic regions defined: hands longer than broad: processes of third thoracic sternum stout, and projecting only on to the second sternum ..... *P. pusilla.*
    - ii. Hepatic regions not defined: hands as broad as long: processes of third thoracic sternum laminar, and projecting well on to the first sternum ... *P. wood-masoni.*
- II. Front divided almost from the base by a deep longitudinal groove, its free edge straight and projecting just beyond the epistome: carapace strongly convex, with most of the regions well defined and tumid; the branchial, cardiac, post-gastric, and to a less extent the hepatic regions are, at any rate in the male, conspicuously granular in their tumid portion: buccal cavern a little broader than long ..... *P. blanfordi.*
- III. Front with a single median tooth, the tip of which alone projects beyond the epistome: carapace moderately convex, with the hepatic regions defined: buccal cavern as long as broad ..... *P. melita.*

75. *Pseudophilypira tridentata*, Miers.

*Pseudophilypira tridentata*, Miers, P. Z. S. 1879. pp. 20, 41, pl. ii. fig. 4.

Carapace subpiriform, its dorsum coarsely closely and uniformly punctulate everywhere except near the tip of the front, and defined all round behind the antero-lateral margins by a minutely-beaded line.

The front projects well beyond the margin of the buccal cavern and ends in three laminar teeth, the middle one of which is much the largest. The external orbital angles are acute, but do not reach the level of the frontal teeth. Posteriorly the frontal region extends straight backwards, between the hepatic regions, as a ridge, which is particularly conspicuous in the male. On either side of this ridge the hepatic regions are much depressed, but behind the depressions they form distinct mamillary elevations.

In the male the anterior and lateral margins of the sternum are indistinctly punctate, and the edges of the fossa in the first segment that lodges the tip of the abdomen are very finely beaded: in the female only the front border of the sternum is punctulate.

The chelipeds in the adult male are about  $1\frac{2}{3}$  times the length of the carapace: the upper surface of the arm is irregularly granular in its basal half, punctulate in its distal half; the inner surface is covered with tiny vesicular granules in its basal half, the under surface is smooth: the wrist and hand are smooth, the hand about half as long again as broad: the fingers, which are as long as the hand is broad, meet only at tip and have the opposed edges almost smooth.

The first pair of true legs exceed the arms in length by almost the last two joints.

The male abdomen is narrow and triangular and consists of 4 pieces, but the two proximal pieces are linear and concealed: the long third piece has a median tooth near the distal end.

The carapace of the male measures 10 by 8 millim., that of the female 11.5 by 10 millim.

Colours in spirit: pinkish grey mottled with reddish and yellowish brown; spotted cross-bands of brown on arms and hands, and a cross-band of reddish brown on the fingers.

In the Indian Museum collection are two adult males and four adult females from the Persian Gulf.

76. *Pseudophilypira wood-masoni*, n. sp. Plate VI. fig. 3.

Carapace subpiriform, perfectly smooth and polished, its dorsum defined all round behind the hepatic regions by a faintly raised, smooth (microscopically granular) line.

The front projects beyond the margin of the buccal cavern and ends in three teeth of nearly equal size, but it is not prolonged backwards as a ridge between the hepatic regions. The external orbital angles are not acute.

The hepatic regions have no convexity distinct from the general convexity of the carapace.

In the male the third thoracic sternal segment is produced, on either side of the abdomen, to form a laminar tooth which projects forwards, across the second segment, well on to the first. And the margins of the fossa in which the tip of the abdomen is lodged are finely beaded.

The chelipeds in the adult male are twice the length of the carapace, and are exceptionally massive—the arm being between a half and a third as broad as long: the arm has its inner border and proximal half of upper surface beaded, its inner surface completely covered with vesicular granules, and its under surface smooth: the wrist and hand are quite smooth, the hand of the adult male being as broad as long: the fingers are stout, as long as the hand, and meet only at tip: the dactylus in the male has one of its teeth—situated near the middle—of very conspicuous size; the fingers in the female are without teeth.

The true legs exceed the arm in length almost by their last two joints.

The male abdomen resembles that of the last species, and its long second piece has a stout tooth at its extreme distal end.

The carapace of the male measures 7.5 by 6.5 millim., that of the female 8 by 7 millim.

Colours in spirit: uniform yellowish pinkish brown.

In the Indian Museum collection are 2 males (one adult) and 6 females (four ovigerous) from the Audamans, and an adult male from off Cape Comorin, 39 fathoms.

#### 77. *Pseudophililyra pusilla*, Henderson.

*Pseudophililyra pusilla*, Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 398, pl. xxxvii, figs. 13-15.

Differs from *Pseudophililyra wood-masoni* in the following particulars only:—

1. Its size is even more diminutive, the carapace of the largest male in the Indian Museum—an undoubted adult—measuring 6 by 5 millim.

2. The edge of the front is straight, slightly deflexed and concave in the middle line, this deflexed portion being again produced horizon-

tally forwards as a median tooth. Posteriorly a faint carina runs straight backwards from the front, separating the hepatic regions, much as in *P. tridentata*.

3. The tooth on the third thoracic sternum, on either side of the abdomen, though more outstanding, is much shorter, projecting forwards only about halfway across the second sternum.

4. The chelipeds of the adult male are not more massive than usual, the arms being only about a quarter as broad as long, and the hands being more than half again as long as broad.

5. The fingers in the adult male, as in the female, are almost smooth, and there is no big tooth near the middle of the mobile finger.

6. There is but the faintest trace of a denticle on the male abdomen, in the middle line.

7. The colours are altogether different, even in a specimen that has been over 20 years in spirit in the same bottle with specimens of *P. wood-masoni*.

In good spirit specimens the dorsal surface is light grey with elegantly speckled markings of various shades of greenish and yellowish brown, as follows:—a band across the tip of the front: a V-shaped collar at base of front: a crescent on either branchial region, joining a stripe down the middle of the postgastric and cardiac regions, the whole looking like a scorpion with extended chelæ: a broad band across middle of arm and a narrow band across distal end of arm: a broad band across middle of hand, and a narrow stripe along both fingers. The ventral surface of the external maxillipeds and the tip of the abdomen closely speckled and mottled with dark brown.

Locality—Andamans, whence the Indian Museum collection has 3 adult males.

The foregoing three species have more the general facies of *Leucosia* than of *Philyra*.

78. *Pseudophilyra blanfordi*, n. sp. Plate VI. fig. 7.

Carapace circular, its dorsal surface defined all round behind the eyes by a finely beaded line; its regions are tumid and well demarcated, the tumid surfaces being very distinctly granular (excepting the front part of the gastric region) in the male, but in the female more punctate than granular. The front is distinctly pinched off at base from the hepatic regions, as in all the species of *Leucosia* except *L. truncata*, and as in all other species of *Pseudophilyra*: it is divided into two rather tumid lobes by a longitudinal groove that extends almost to its base: its anterior edge is straight, and projects just beyond the edge of the epistome.

In the male the whole surface of the sternum, except the segment belonging to the external maxillipeds, as also the pterygostomian region and extreme base of abdomen, is finely beaded, and the surface of the exognath is granular: in the female the outer border of the endognath also is granular, and the basal abdominal terga.

The exognath is not dilated in any part, and the buccal cavern is narrowed in front and is at least as long as broad.

The chelipeds in the male are less than twice, though more than  $1\frac{1}{2}$  times, the length of the carapace; in the adult female they are not much longer than the carapace. The arms are cylindrical and are roughly granular everywhere except a very small part of the under and of the inner surface. The upper surfaces of the wrist and hand are slightly granular along the inner half. The hand is not greatly longer than broad. The fingers are as long as the hand, and are strongly bent inwards, much as in *Philyra globulosa*, Edw. On the immobile finger in the male there is a strong tooth, and on the opposed edge of the mobile finger a notch, beyond which the opposed edges are denticulate.

The abdomen of the male consists of 3 pieces, including a linear basal piece and a small apical piece: on the large middle piece the 6th tergum is marked by a shallow groove, and bears a stout median tooth at its distal border.

Diameter of carapace of male between 7 and 8 millim., of female the same.

Two males and four ovigerous females from the Mekrán Coast, 25 fathoms.

This little species bears a considerable resemblance to *Philyra adamsii*, Bell; but may be distinguished by its perfectly circular and strongly convex carapace, by its short chelipeds, and by the stout tooth on the abdomen of the male.

#### 79. *Pseudophilyra melita*, de Man.

*Pseudophilyra melita*, de Man, Journ. Linn. Soc. Zool., Vol. XXII. 1888, p. 199: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 397.

Carapace in the adult almost circular, moderately convex; its dorsal surface defined all round, behind the front, by an elegantly beaded line; its surface, to the naked eye, smooth and polished.

The hepatic regions are defined by a slight dorsal acuminate bulge, or wrinkle.

The anterior margin of the front, which does not reach the level of the anterior margin of the buccal cavern, is concave and deflexed in the middle line, so as to appear somewhat bilobed, but the deflexed

concave portion is horizontally produced to form an acute tooth, the tip of which projects beyond the margin of the buccal cavern.

In the male the sternum is elegantly beaded along the anterior and lateral borders, and round the line of contact with the tip of the abdomen: in the female only the anterior border is beaded.

The chelipeds in the adult male are nearly twice the length of the carapace: the arms are cylindrical, and have the upper surface in its proximal half or two-thirds beaded in longitudinal lines; the under surface is granular, except at the distal end and along the outer border: wrist smooth: hand half again as long as broad in the adult male, about twice as long as broad in the female; its inner surface, in old males only, with numerous vesicular granules: fingers in both sexes as long as the hand is broad, meeting only at tips, and having the opposed edges distantly and inconspicuously dentate.

The first pair of true legs exceed the arm in length by their dactylus.

The abdomen of the male is narrowly triangular, and is devoid of any median denticle: it consists of 5 pieces, but the joint between the 3rd and 4th pieces is rigid.

The carapace of the male is 11 millim. long and 10 millim. broad; that of the female is slightly larger.

Colours in spirit: pearly grey with numerous darker mottled markings. The confluent gastric and cardiac regions are defined by a brown line, which forms with an ill defined ring of the same colour on either branchial region a pair of spectacles; the hepatic regions edged with brown: broad cross-bands of brown across middle of arm, base of hand, and middle of fingers; wrist brown: legs with yellowish brown cross-bands.

Common along Coromandel coast. Also from Mergui.

This species has more the facies of *Philyra* than of *Leucosia*.

#### *Myrodes*, Bell.

*Myrodes*, Bell, Trans. Linn. Soc. Vol. XXI. 1855 p. 298, and Cat. Leucos. Brit. Mus. p. 13.

*Myrodes*, Miers, 'Challenger' Brachyura, p. 297.

Closely resembles *Myra* in all details of form, but differs conspicuously in the following characters:—

(1) the chelipeds are much shorter, their length being hardly  $1\frac{2}{3}$  times that of the carapace:

(2) the hands are not  $\frac{1}{4}$  longer than broad and are inflated and subglobular:

(3) the fingers are much longer than the hand, are extremely slender and not much compressed, and are of about the same diameter

from their base to near their hook-like tip: the tip of the dactylus moves through an arc of over  $120^\circ$ .

(4) the merus of the external maxillipeds is hardly more than half the length of the ischium measured along its inner border.

#### 80. *Myrodes eudactylus*, Bell.

*Myrodes eudactylus*, Bell. Trans. Linn. Soc. Vol. XXI. 1855, p. 299, pl. xxxii. fig. 6, and Cat. Leucos. Brit. Mus. p. 13.

*Myra eudactyla*, A. Milne Edwards, Nouv. Archiv. du Mus. X. 1874, p. 46, pl. iii. fig. 3: Haswell, Cat. Austral. Crust. p. 123.

*Myrodes gigas*, Haswell, P. L. S., N. S. Wales, Vol. IV. 1880, p. 52, pl. v. fig. 5.

*Myrodes eudactylus*, Miers, 'Challenger' Brachyura p. 298: A. Ortmann, Zool. Jahrbuch., Syst. etc., VI. 1892, p. 576.

Carapace convex, longitudinally-ovoidal, with a carina—indistinct or obsolete in large adults—down the middle line; its surface generally smooth to the naked eye in large adults, but with numerous scattered bead-like granules in the young; its short posterior margin with a petaloid tooth at either end, and overhung in the middle line by a horizontal recurved spine; its lateral margins defined by a finely-beaded line.

The front is truncated and broadly bidentate, and the subhepatic region forms an independent facet, the raised pterygostomial edge of which ends posteriorly at a sharp tooth. Between the hepatic and branchial regions, on either side, is a shallow notch which is in continuity with a longitudinal groove in the side wall of the carapace.

The external maxillipeds are closely scabrous, especially distally.

The chelipeds are hardly  $1\frac{2}{3}$  times the length of the carapace (without spine), and though generally smooth to the naked eye in the adult, have, in the young, the base of the arm, the outer edge of the wrist, hand and dactylus, and the inner two-thirds of the upper surface of the hand finely but distinctly granular: the arm is subtrigonal, and the hand subglobular but much smaller at the distal end than at the base: the fingers are slender and hook-like, much longer than the hand, finely granular, of almost the same diameter from the base to the hook-like tip, and are armed on the opposed edges with fine teeth with larger lancet-like teeth at distant intervals: the movable finger opens in a horizontal plane, but it moves through an arc of between  $120^\circ$  and  $130^\circ$ .

The legs are slender, and have both edges of the dactylus, and the dorsad edge of the propodite, fringed with close shortish stiffish hairs.

The abdomen of the male is four-jointed, the penultimate piece carrying a subterminal denticle: that of the female consists of 5 separate pieces.

Numerous specimens—adults and young of both sexes—from the Andamans.

*Iphiculus*, Adams and White.

*Iphiculus*, Adams and White, 'Samarang' Crustacea p. 57.

The whole body and its appendages, except only the fingers, covered with a dense spongy or woolly tomentum, beneath which, when denuded, the surface is rough granulous or pustulous, and beneath which the regions of the carapace—especially the cardiac and intestinal—are demarcated by grooves.

Carapace transversely somewhat oval, its lateral margins spinate.

The front is narrow and is sunk behind the level of the edge of the buccal cavern, and appears still more sunken because the hepatic and sub-hepatic regions are puffed out beyond it at the sides and in front.

The orbits are obliquely elongate and completely conceal the eyes, in the denuded carapace three sutures can be made out in the emarginate roof. There is a gap at the inner canthus in which stands the basal joint of the antenna, the largish flagellum of which appears to be inside the orbit. The antennules fold very obliquely. There is a broad vertical space between the lower edge of the orbit and the edge of the buccal cavern.

The buccal cavern is triangular: the merus of the external maxillipeds is half the length of the ischium measured along the inner border.

The chelipeds are about  $1\frac{2}{3}$  the length of the carapace: the hand is short and globular: the fingers are slender and hook-like, much longer than the hand, and open in a somewhat oblique plane, the tip of the mobile finger moving easily through an arc of  $120^\circ$ . Legs rather large.

Abdomen of male with the 3rd and 4th segments fused: that of the female with all the segments distinct.

81. *Iphiculus spongiosus*, Adams and White.

*Iphiculus spongiosus*, Adams and White, 'Samarang' Crustacea, p. 57, pl. xiii. fig. 5: Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 161: Miers, Zool. H. M. S. 'Alert' pp. 185, 253.

Carapace convex, transversely ovoidal, much broader than long, the surface when denuded of its woolly covering granulous with numerous larger pustulous tubercles, and showing the cardiac and intestinal regions tumid and very well demarcated by grooves. On the anterolateral margins are four large coarse close spines, increasing in size from before backwards; on the postero-lateral margins are two coarse denticiform tubercles separated by a wide interval.



The broad front is coarsely bilobed : there is a strong tooth at the outer angle of the orbit against which the retracted eye impinges, and another at the outer angle of the buccal cavern, on either side—only visible on the denuded carapace.

Except that they are densely tomentose up to the base of the fingers, and that the fingers are even more slender, the chelipeds are a repetition of those of *Myrodes*.

In the Indian Museum are numerous specimens, from the Andamans, the Mekrañ Coast, and from the Bay of Bengal up to 65 fms.

*Pariphiculus*, n. gen.

Closely allied to *Iphiculus*, but differing in several important characters and in the whole form of the carapace. The appendages are as densely tomentose as in *Iphiculus*, but the carapace is covered with a finer and sparser tomentum which does not quite conceal the texture of the surface.

The carapace is circular and globular, with its margins coarsely spinate, and its surface vesiculous : the intestinal region is very distinctly isolated, but the other regions are almost lost in the general convexity of the carapace.

The front is narrow : in one species it projects as a distinct snout, in the other the angle of the afferent branchial canal can be seen beyond it in a dorsal view, but the whole mouth can never be seen beyond it as it can in *Iphiculus*.

The orbits are obliquely elongate and completely conceal the eyes : two distinct fissures are plainly visible in the emarginate roof besides a fissure in the lower part, and there is a gap at the inner canthus where the basal joint of the antenna—the flagellum of which is large—stands. The antennules fold very obliquely. There is a space of varying width between the edge of the orbit and the edge of the buccal cavern.

The buccal cavern is rather elongate triangular, and the merus of the external maxillipeds is half the length of the ischium measured along the inner border.

The chelipeds are from  $1\frac{1}{4}$  to  $1\frac{2}{3}$  times the length of the carapace : the hand is short, cylindrical with the base inflated, or is subglobular, but not nearly so swollen as in *Iphiculus* or *Myrodes* : the fingers are slender, much longer than the hand and somewhat hooked ; they open in an obliquely vertical plane, and the tip of the mobile finger moves through the usual arc of about 75°. The legs are moderately stout. The abdomen of the male has the 3rd, 4th and 5th segments fused : that of the female has all the segments distinct.

Key to the Indian species of *Pariphiculus*.

- I. Carapace a little broader than long: front not at all prominent: a spiniform tubercle on the cardiac region between one on either branchial region: chelipeds about  $1\frac{2}{3}$  the length of the carapace ..... *P. coronatus*.
- II. Carapace longer than broad: front markedly prominent: cardiac region and branchial regions immediately on either side of it unarmed: chelipeds about  $1\frac{1}{4}$  the length of the carapace ..... *P. rostratus*.

82. *Pariphiculus coronatus*, Alcock & Anderson.

*Randallia coronata*, Alcock & Anderson, J. A. S. B., Vol. LXIII. pt. 2, 1894, p. 177.

*Pariphiculus coronatus*, Alcock & Anderson, Ill. Zool. 'Investigator,' Crust. pl. xxiv. fig. 2 (in the press).

Carapace globular, just broader than long, its surface closely covered with large vesiculous granules beneath a dense fine-textured pubescence: the intestinal region forms an independent circular swelling, bounded by a deepish groove, and surmounted by two spiniform tubercles, one behind the other: the gastric region is partly defined anteriorly by two creases, and the cardiac region is partly defined posteriorly by two grooves, and a narrow and indistinct groove separates the hepatic from the branchial region on either side: on either lateral margin are 5 spiniform tubercles, not including the dentiform prolongation of the outer angle of the buccal cavern, and at either end of the short posterior margin is a dentiform tubercle: 3 similar tubercles occur, one in the middle of the cardiac region and one on either side of it on the after part of the branchial regions—these three, along with the last on the lateral borders and the two on the posterior margin, forming a ring round the tumid intestinal region: the side-wall of the carapace is grooved longitudinally just above the epimeral edge.

The front is bidentate, its tips just projecting beyond the level of the buccal cavern.

The chelipeds in the female (male unknown) are  $1\frac{2}{3}$  times the length of the carapace: the hand is inflated, cylindrical, and about  $\frac{3}{4}$  the length of the fingers: the fingers are very slender, almost hairless, hooked at tip, finely denticulate with a few slightly larger denticles at distant intervals, and they open in an obliquely vertical plane.

Length of carapace of female (apparently adult) 16 millim., breadth 17 millim.

*Loc.* Bay of Bengal, off Coromandel coast, 112 fms.

83. *Pariphiculus rostratus*, n. sp. Plate VIII. fig. 2.

Carapace globular, a little longer than broad, with the front prominent and projecting in the form of a snout; its surface covered with very small, distant vesicles, beneath a dense fine pubescence: the intestinal region exactly resembles that of *P. coronatus*, and the gastric and cardiac regions are incompletely defined in the same way: on either lateral border are six sharpish tubercles, the first of which—situated about the middle of the pterygostomial ridge—and the third—situated near the anterior limit of the branchial region—are enlarged and spiniform: at either end of the short posterior margin is a dentiform tubercle: the side-wall of the carapace is traversed longitudinally by two grooves, one just above the epimeral edge, the other just below the lateral margin, and the surface between the grooves is tumid.

The very prominent front is sharply bidentate, the tips of the teeth being somewhat sharpened and thickened: the space between the edge of the orbit and the edge of the buccal cavern is much reduced.

The chelipeds are similar in both sexes and are about  $1\frac{1}{4}$  times the length of the carapace, sometimes less than this: the hand is subglobular but not so swollen as in *Iphiculus* and is only about half the length of the fingers: the fingers are slender, hooked at tip, and finely denticulate, the denticulations, however, being obscured by a thick growth of short colourless hairs; they open in an obliquely vertical plane.

The largest specimen—an apparently adult female—has the carapace 32 millim. long and 27 millim. broad.

*Loc.* Off Malabar coast 28 to 45 fms., off Coromandel coast 25 to 30 fms., on soft muddy bottoms.

*Nursilia*, Bell.

*Nursilia*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 308, and Cat. Leucos. Brit. Mus. p. 20.

Carapace broader than long, bluntly polygonal, with the lateral borders sharp, thin, laminar, somewhat turned up, and with the surface broken by some definitely-placed ridges and distant spines. Front prominent, bidentate: orbits with two distinct sutures, their lower edge not distinct from the edge of the buccal cavern. Antennæ with longish flagella, their basal joint occupying the very much restricted space between the eye and the obliquely folding antennules.

Buccal cavern elongate-oval, the hairy tips of the external maxillipeds projecting beyond the edge of the buccal cavern: the merus much hidden in hair (more so than in *Lea*) and considerably less than half the length of the ischium.

Chelipeds somewhat slender, about half again as long as the carapace: hands swollen, especially towards the inner side and the base: fingers much longer than the hand, slender, hook-like; the tip of the dactylus moves through an arc of more than  $130^{\circ}$ .

In the abdomen of both sexes all but the first and last segments are intimately fused.

As the name indicates, this form has the carapace and front shaped very much as in *Nursia*, though approaching *Ilia*—or rather *Myrodes*—in the form of the chelipeds and mouth-parts.

#### 84. *Nursilia dentata*, Bell.

*Nursilia dentata*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 309, pl. xxxiv. fig. 6, and Cat. Leucos. Brit. Mus. p. 20: Stimpson, Proc. Acad. Nat. Sci. Philad. 1853, p. 161: Haswell, P. L. S., N. S. Wales, IV. 1879, pp. 56, 404, and Cat. Austral. Crust. p. 128: Miers, Zool. H. M. S. 'Alert,' pp. 158, 253, 518, 548: R. I. Pocock, Ann. Mag. Nat. Hist. (6) V. 1890, p. 73.

Carapace broader than long, distinctly polygonal in the male, but with the angles more rounded off in the female. The lateral margins are thin, sharp, slightly turned up, and sinuous (lacinate in the young): the ends of the short posterior margin are dentiform in the male, but indistinctly so in the female.

The carapace is traversed by a longitudinal carina, on the posterior half of which are 3 large vertical spines with the tips often curved forwards: an oblique ridge ending in a sharpish tooth separates the gastric from the hepatic region on either side: another oblique ridge, with a sharpish tooth at each end, runs across the after part of the branchial region to the postero-lateral margin on either side: there are always one or two teeth on either side of the longitudinal carina in the gastro-cardiac region. In the young the oblique gastro-hepatic ridge is connected by a longitudinal ridge with the oblique branchial ridge, the branchial ridges more or less meet across the carapace, and the spines are more numerous and more distinct.

The chelipeds have the arm very sharply trigonal: the fingers are slender and hook-like and are twice the length of the much swollen hand: they are finely denticulate with enlarged teeth at distant intervals, and as in *Myrodes*, the dactylus is remarkable for the great range of its mobility.

Adult females have the carapace about 9 millim. long and about 10.5 millim. broad: adult males are a good deal smaller.

A large number of specimens are in the Indian Museum Collection, from the Andamans, from off Ceylon at 32 to 34 fms., from the Madras coast in the neighbourhood of Palk Straits, from off the Malabar coast at 26 to 31 fms., and from off the Maldives at 20 to 30 fms.

85. *Nursilia tonsor*, n. sp.

This species is distinguished (1) by its smaller size,—ovigerous females having the carapace only 7 millim. long and 7.25 millim. broad, and adult males being a good deal smaller: (2) the gastro-cardiac region is defined posteriorly on either side by an oblique dentigerous ridge, which meets the oblique ridge that traverses either branchial region at an obtuse angle—the whole forming a sharply defined W reversed: (3) the hand is less swollen and the outer edge of the fingers is cristiform—the cristiform lamina being of extreme thinness and delicacy: (4) the serrations of the lateral margins and the ridges and spines of the carapace are all much sharper-cut.

*Loc.* Andaman Sea up to 40 fms., off Ceylon 34 fms.

*Heterolithadia*, Wood-Mason, (name only).

Carapace broader than long, transversely somewhat oval, its surface nodular, coarsely granular, convex except the hepatic regions which are hollowed; all the regions well delimited by grooves.

Front distinct, moderately prominent, broadly bidentate. Orbits with very indistinct sutures in the outer wall, and with very little space between their lower edge and the edge of the buccal cavern. The antennules fold obliquely. The antennæ have a short flagellum and occupy the much restricted space between the antennules and the eye.

Buccal cavern triangular with the sides curved somewhat as in *Nursilia*: merus of external maxillipeds half the length of the ischium measured along the inner border.

Chelipeds stout, about half again as long as the carapace: hand very short, swollen, half the length of the fingers: fingers slender, of nearly the same diameter from base to near the hook-like tip, opening in a nearly vertical plane, the tip of the dactylus being movable through an arc of about 75°.

The abdomen of the male has the 3rd–6th segments fused.

*Heterolithadia* has a strong external resemblance to *Lithadia*, but has the *Ilia* fingers and external maxillipeds. Its nearest ally is *Nursilia*.

86. *Heterolithadia fallax*, (Henderson).

*Ebalia fallax*, J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 402, pl. xxxviii. figs. 4–6.

The posterior half of the carapace is a segment of a broad ellipse, the anterior half is broadly triangular.

The carapace is broader than long, and its surface, like the whole under surface of the body and the whole surface of the arms, is closely covered with large flat-topped pearly granules, except in the deeply-excavated hepatic areas where the granules are small and rather distant.

The regions are well demarcated by grooves, and (except the hepatic regions, which are markedly excavated inside of the rather prominent antero-lateral borders) are tumid. A broadish median ridge extends from the front to near the middle of the cardiac region, where it ends in a stout tubercle, and in continuation of the same line, on the intestinal region, are two similar tubercles: there are also four similar tubercles on the gastric region,—two on either side of the median ridge.

The front is broadly bidentate: behind it the pterygostomian ridge, which ends at a coarse denticle, can be seen in front of the antero-lateral margin in a dorsal view: the hepatic portion of the antero-lateral margin is thickened and ends abruptly at a very prominent granular swelling; behind this the lateral margin is most elegantly curved. The posterior margin is rather prominent and is bilobed, the apex of one of the intestinal tubercles being seen between the lobes in a dorsal view.

The chelipeds are rather more than half again as long as the carapace: the arm is coarsely granular like the carapace, the wrist and hand are granular under the lens: the hand has the outer edge somewhat thickened and raised and the inner side swollen: the fingers are hooked, are twice the length of the hand, and open in a nearly vertical plane; their opposed edges are finely denticulate with larger denticles at distant intervals and with a good many hairs.

The abdomen of the male has a tooth at the penultimate segment.

In the Indian Museum is a specimen from the Audamans and one from the Orissa Coast.

#### *Arcania*, Leach.

*Arcania* and *Iphis*, Leach, Zool. Miscell. III. p. 19.

*Arcania* and *Iphis*, Milne Edwards, Hist. Nat. Crust. II. 133, 138.

*Arcania* and *Iphis*, Bell, Trans. Linn. Soc., Vol. XXI. 1859, pp. 309, 311, 312.

*Arcania*, A. Milne Edwards, Nouv. Archiv. du Mus. X. 1874, p. 48.

*Arcania*, Miers, 'Challenger' Brachyura, p. 299.

Carapace globular, ovoid, or rhomboidal, with the lateral and posterior margins armed with definitely-situated large spines (except in *Arcania gracilipes* Bell, in which large tubercles take the place of spines, and *A. orientalis* Miers, in which spines are absent), and with

the surface, usually, crisply granular, spiny, or tubercular, but sometimes almost smooth to the naked eye.

Front bilobed and prominent, or if not prominent then distinctly pinched off from the gastric and hepatic regions.

Orbits with three sutures in the upper and outer wall, with a cleft in the inner wall, and usually with the inner canthus prolonged into a spine: eyes small.

The antennules fold very obliquely. The antennæ are small, and their basal joint loosely fills the cleft in the inner wall of the orbit.

The buccal cavern is elongate-triangular: the external maxillipedes have the ischium from  $2\frac{1}{2}$  to 3 times the length of the bluntly-triangular merus: their exognath is narrow, with the outer border nearly straight.

The chelipeds are very slender and are usually about twice the length of the carapace—either a little more or a little less; their joints are cylindrical, the palm alone being a little swollen at base: the fingers are long and very slender, their opposed edges being finely ctenoid, with larger denticles at long intervals; they open in a nearly vertical plane.

The legs are slender.

The abdomen of the male usually consists of 5 pieces, that of the female of 4 or 5.

*Key to the Indian species of Arcauia.*

I. Margins of the carapace with spines, hepatic regions dorsally convex: abdomen of adult male consisting of 5 pieces:—

1. Fingers longer than the hand: surface of carapace either smooth (microscopically granular), or with small granules all of one size:—

i. Lateral median epibranchial spines nearly straight, far longer than any of the other spines, their length often being equal to the breadth of the carapace:—

a. Seven spines on margins of carapace,—3 very large, 4 smaller..... *A. septemspinosa*,  
(Fabr.)

b. Five spines on margins of carapace,—3 very large, 2 smaller ..... *A. quinquespinosa*.

ii. Median lateral epibranchial spines claw-like, not longer than the spines on the posterior part of the carapace, their length being not a quarter the breadth of the carapace:—

a. Nine spines on margins of carapace,—3 large and 6 smaller: regions of carapace very ill-defined

*A. novemspinosa.*

b. Eleven spines on margins of carapace,—none of them very large: regions of carapace well defined .....

*A. undecimspinosa.*

2. Fingers shorter than the hand: surface of carapace covered with spines, or with granules and larger tubercles:—

i. Carapace longer than broad: chelipeds less than twice the length of the carapace:—

a. Carapace densely spiny: eleven large marginal spines .....

*A. erinaceus.*

b. Carapace with granules and claviform tubercles: eleven marginal prominences, of which only 4 or 5 can be called spines

*A. tuberculata.*

ii. Carapace broader than long: chelipeds a little over twice the length of the carapace: carapace with granules and large tubercles .....

*A. pulcherrima.*  
(=*A. septemspinosa*,  
Bell.)

II. Margins of carapace with large tubercles in place of spines, hepatic regions dorsally sunken and flat: abdomen of adult male consisting of 4 pieces, and the second piece sunk almost out of sight .....

*A. gracilipes.*



87. *Arcania septemspinosa*, (Fabr.), Leach, Edw.

*Cancer septemspinus*, Fabr., Mant. Ins. I. 325, and Ent. Syst., II. 463 : Herbst, Krabben, I. ii. 259, pl. xx. fig. 112.

*Leucosia septemspinosa*, Fabr., Ent. Syst. Suppl., p. 351 : Bosc, Hist. Nat. Crust. I. 237 : Latreille, Hist. Nat. Crust. et Ins. VI. 119.

*Iphis septemspinosa*, Leach, Zool. Miscell. III. p. 25 : Desmarest, Consid. Gen. Crust., p. 170 : Milne Edwards in Cuvier Règne Animal, Crust., pl. xxv. fig. 4, and Hist. Nat. Crust. II. 139 : Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 311, and Cat. Leucos. Brit. Mus. p. 22 : Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 161 : Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 317 : Sluiter, Tijdschr. Nederl. Ind. XL. 1881, p. 159, fig. 1.

*Arcania septemspinosa*, Miers, 'Challenger' Brachyura, p. 300 : Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 403.

Carapace bluntly rhomboidal, the anterior blunt angle of the rhomb forming the elegantly bilobular, slightly projecting, front, and the lateral and posterior angles being all produced to form huge slightly-curved spines—the lateral ones being the longest. Besides these, there are four other smaller spines in the posterior part of the carapace, namely one on either side at the level of, and one on either side below, the large posterior spine. The surface of the carapace is finely granular in irregular patches, the granules being most distinct on the large spines. The hepatic regions are separated from the branchial regions on either side by a transverse crease or pucker, but otherwise the regions of the carapace are not clearly demarcated. The summit of the (antero-lateral) convexity of the hepatic region is, usually, faintly acuminate. The chelipeds are symmetrical and slender, and are more than twice the length of the carapace (posterior spine excluded) in both sexes: the long cylindrical arms are very finely and uniformly granular: the almost filiform fingers are a little longer than the slender tapering hand. The true legs are slender and smooth, and the dactyli are thickly fringed with rather long hair: the first pair exceed the arm in length by their dactylus and rather more than half their propodite.

Colours streaky and patchy red.

The carapace of an average adult of either sex is about 20 millim. long, and about 20 millim. broad.

*Localities*: Andamans, Arakan, Gangetic and Mâhânaddi Deltas, Madras coast, Persian Gulf. It is commonest on muddy bottoms at about 25 fathoms.

Of 92 specimens in the Indian Museum the lateral spines are found to vary a good deal in length: they are usually, in adults, about as long as the arm, and sometimes a good deal longer; but in the young they are usually much shorter than the arm.

88. *Arcania quinquespinosa*, Wood-Mason MS. name,  
Alcock and Anderson.

*Arcania quinquespinosa*, Alcock and Anderson, J. A. S. B., Vol. LXIII. pt. 2, 1894, p. 206, and Ill. Zool. B. I. M. S. "Investigator," Crust., pl. xxiv. fig. 6 (*in the press*).

? *Arcania septemspinosa*, var. *gracilis*, Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, pp. 403, 404.

Differs from *A. septemspinosa* (Fabr.) only in the following particulars:—

1. It is a much smaller species, the carapace of the adult being less than 12 millim. long, and less than 14 millim. broad.
2. The outline of the carapace is broadly conical, owing to the bulging, obliquely backwards, of the brauchial regions.
3. The front is sharply bidentate, instead of bilobular.
4. The large spines of the margins of the carapace are relatively smaller, and the spine on the postero-lateral border, on either side, is either altogether wanting or is represented only by a granule.
5. The regions of the carapace, with the single exception of the boundary between the gastric and cardiac regions, are distinctly delimited by fine grooves.
6. The fingers are nearly twice the length of the hand.
7. The cardiac region in life, and even in fresh spirit specimens, shows as a large bright red milk-white-edged ocellus. The rest of the carapace is delicate pink in life.

In the Indian Museum collection are 27 specimens—chiefly adult males and egg-laden females—from the coasts of Arakan, Ganjam, Vizagapatam, Ceylon, and the Persian Gulf.

89. *Arcania undecimspinosa*, De Haan.

*Arcania undecimspinosa*, De Haan, Faun. Japon. Crust., p. 135, pl. xxxiii. fig. 8 : Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 309, and Cat. Leucos. Brit. Mus. p. 21 : Miers, Zool. H. M. S. 'Alert' pp. 518, 548 : (?) A. O. Walker, Journ. Linn. Soc., Zool., Vol. XX. 1890, p. 111 : Ortmann, Zool. Jahrbüch., Syst. etc., VI. 1892, p. 577 : J. R. Henderson, Trans. Linn. Soc., Zool. (2) V. 1893, p. 404.

*Arcania granulosa*, Miers, Trans. Linn. Soc., Zool., (2) I. 1875-79, p. 240, pl. xxxviii. fig. 29 (*fide* Miers, P. Z. S. 1879, p. 44) : Haswell, P. L. S., N. S. Wales, IV. 1879, p. 53, and Cat. Austral. Crust. p. 131.

? ? *Arcania novemspinosa* var. *aspera*, Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 317.

Carapace longitudinally ovoid in the male, nearly globular in the adult female, uniformly covered either with rather distant miliary granules or with close-set short prickles, amid which the fine smooth grooves that define the regions of the carapace are very distinct,—the

only one wanting being that between the gastric and cardiac regions. The margins of the carapace are armed with eleven spines of moderate size, situated as follows:—one, pointing obliquely forwards, in either antero-lateral border, at the culmination of the sub-hepatic region; one on either side just behind the groove that separates the hepatic from the branchial region; one, claw-like, at either (median) lateral epibranchial angle; one, pointing obliquely backwards, just abaft the middle of either postero-lateral border; one at either end of the posterior border; and one, pointing straight backwards, in the middle of the intestinal region. The front ends in two sharp-cut laminar teeth.

The slender chelipeds, in the adult male, are just over twice the length of the carapace (spine excluded); the arm is usually, but not always, covered in all or the greater part of its extent with miliary granules similar to those on the carapace; the almost filiform fingers are as long as the hand and rather more than half the wrist combined. The true legs are slender and smooth; their dactyli are scantily fringed with hair in their distal half: the first pair exceed the arm in length by their last two joints.

The length of the carapace of the adult male is about 16 millim., and the breadth about 14 millim.; of an adult female the dimensions are 18 millim. by 16 millim.

In the Indian Museum collection are young and adults of both sexes, from the Andamans and from the Madras side of Palk Straits.

#### 90. *Arcania novemspinosa*, Adams & White.

*Iphis novemspinosa*, Adams & White, 'Samarang' Crust. p. 56, pl. xiii. fig. 1.

*Arcania novemspinosa*, Bell, Trans. Linn. Soc., Vol. XXI. 1855, p. 309, and Cat. Leucos. Brit. Mus. p. 21: Haswell, P. L. S., N. S. Wales, IV. 1879, p. 58, and Cat. Austral. Crust. p. 131: de Man, Archiv für Naturges. LIII. 1887, i. 392.

Differs from *A. undecimspinosa*, De Haan, only in the following characters:—

1. The surface of the carapace, in the adult, is almost smooth—at any rate is without isolated miliary granules or prickles.

2. The marginal spines are very much larger, with the single exception of the spine on either side situated at the junction of the sub-hepatic and branchial regions, which is a mere denticle or granule.

3. With the exception of a faint groove between the hepatic and branchial regions, and of a still more indistinct break of level between the branchial and intestinal regions on either side, the regions of the carapace are not defined.

4. The front is more prominent.

5. The chelipeds in the adult male are  $2\frac{1}{3}$  times the length of the carapace, and the arm is only very finely granular, and at the base only.

6. The carapace in the adult male is a little more elongate.

Two adult males and a half-grown female from the Andamans are in the Indian Museum collection.

The differences above noted are plain enough in extreme forms, but their sum is not constant, as it is in the case of the differences between *A. 7-spinosa* and *A. 5-spinosa*, so that it seems doubtful whether *A. 9-spinosa* is really distinct from *A. 11-spinosa*.

#### 91. *Arcania erinaceus*, (Fabr.)

*Cancer erinaceus*, Fabricius, Mantiss. Insect. I. 325, and Ent. Syst. II. 460: Herbst, Krabben, I. ii. 258, pl. xx. fig. 111.

*Leucosia erinaceus*, Fabr., Ent. Syst. Suppl. p. 352: Latr., Hist. Nat. Crust. et Ins. VI. 119.

*Arcania erinaceus*, Leach. Zool. Miscell. III. p. 24: Desmarest, Consid. Gen. Crust., p. 170, pl. xxviii. fig. 1: Milne Edwards in Cuvier Règne An., Crust., pl. xxiv. fig. 2, and Hist. Nat. Crust. II. 134: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 309, and Cat. Leucos. Brit. Mus. p. 20.

Carapace globular, everywhere thickly covered with thorns and spine-like granules, amid which the smooth shallow sulci that define the branchial and hepatic regions are visible. Round the margin of the carapace are eleven large spines, similar in position to but larger in size than those of *A. undecimspinosa*, and covered with secondary spinelets. The ventral surface of the external maxillipeds, the thoracic sterna, and the abdominal terga are all also sharply granular. The front ends in two prominent sharp teeth.

The chelipeds and the true legs have their meropodites covered with thorns, and the other joints—except the dactyli, the distal half of the hand, and the fingers—sharply granular. The chelipeds, even in the adult male, are only about  $1\frac{2}{3}$  times the length of the carapace (spine excluded), and the fingers are a little shorter than the palm. The first pair of true legs exceed the arms in length by their last  $2\frac{1}{2}$  joints.

The carapace of the adult male is 16 millim. long and 14 millim. broad; that of the adult female is 21 millim. long and 19 millim. broad.

*Loc.* East coast, from the Hooghly to Pondicherry. In the Indian Museum collection are an adult male and a young and three adult females.

#### 92. *Arcania tuberculata*, Bell.

*Arcania tuberculata*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 310, pl. xxxiv. fig. 8, and Cat. Leucos. Brit. Mus. p. 21.

? *Arcania levimana*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 310, pl. xxxiv.

fig. 10, and Cat. Leucos. Brit. Mus. p. 22: A. Milne Edwards, Nouv. Archiv. X. 1874, p. 48, pl. iii. fig. 4.

Carapace subglobular with an abruptly prominent bidentate front; closely covered everywhere, except in the anterior half of the front, with elongate granules some of which are large and claviform. The regions of the carapace are fairly well defined. In the position of the marginal spines of *A. undecimspinosa* there are 11 marginal prominences, of which only 4 or 5 in the posterior part of the carapace deserve the name of spines, the others being denticles not vastly larger than the enlarged claviform tubercles of the dorsal surface. These spines and denticles are covered with secondary granules in all or part of their extent.

The chelipeds, even in the adult male, are not  $1\frac{2}{3}$  times the length of the carapace: the arms are elegantly granular; the wrists have a few granules and, on their outer surface, a tooth; the hands are nearly smooth: the fingers are little shorter than the hand.

The legs are slender and perfectly smooth.

The carapace of the adult male is 8 millim. long and 6 millim. broad, that of the adult female is 10 millim. long and 9 millim. broad.

*Loc.* Andamans and Maldives. In the Indian Museum collection are 11 specimens—young and adults of both sexes, including ovigerous females.

### 93. *Arcania pulcherrima*, Haswell.

*Arcania septemspinosa*, Bell *nec* Fabricius, Bell, Trans. Linn. Soc., Vol. XXI. 1855, p. 310, pl. xxxiv. fig. 7, and Cat. Leucos. Brit. Mus. p. 21.

*Arcania pulcherrima*, Haswell, P. L. S., N. S. Wales, IV. 1879, p. 58, and Cat. Austral. Crust. p. 131: Miers, Zool. H. M. S. 'Alert' p. 253 (*ubi synonym.*), and 'Challenger' Brachyura, p. 299 (footnote).

Carapace transversely ovoid, the front not breaking beyond the general outline: its surface everywhere covered with miliary granules, amid which stand out 13 or 14 granule-covered tubercles arranged in five incomplete longitudinal rows. Round the margin of the carapace are 10 granule-covered prominences, the first two of which on either side are mere denticles, while the remaining six are broad spines,—those at the lateral epibranchial angle on either side being much the longest. The regions of the carapace are ill defined. The inner canthus of the orbit is not prolonged into a spine as it is in all the preceding species.

The chelipeds are slender even for the genus, and in the adult male are just over twice the length of the carapace: the arm alone is elegantly granular: the fingers are a little shorter than the hand. The true legs are slender and perfectly smooth.

The carapace of the adult male is about 9 millim. long and 10 broad; that of the adult female is about 10 millim. long and 12 broad.

In the Indian Museum collection are 3 adult males and 2 adult females (one egg-laden) from off Ceylon, 34 fms.

#### 94. *Arcania gracilipes*, Bell.

*Arcania gracilipes*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 310, and Cat. Leucos. Brit. Mus. p. 22: (Haswell. P. L. S., N. S. Wales, Vol. IV. 1879, p. 58?)

Carapace globular, just as broad as long, with the hepatic regions dorsally sunken and flat, so as to throw the front—which does not otherwise project much—into strong relief. The circumference, like the dorsum of the carapace, is armed not with spines, but with numerous large tubercles, which, like the general surface between them, are closely covered with flat discoidal granules: there are altogether about 24 of these large tubercles. The regions of the carapace are fairly well defined. The front ends in two blunt teeth: the inner canthus of the orbit is not prolonged into a spine.

The chelipeds, in the adult male, are slightly over twice the length of the carapace: the arm wrist and hand are elegantly granular like the carapace, the granulation in the case of the wrist and hand being microscopic: the fingers are just equal in length to the hand. The true legs are slender, and are microscopically granular like the hand: the first pair exceed the arm by less than the length of their dactylus.

The abdomen of the male consists of only four pieces, but the second piece is hidden almost out of sight. The carapace of the adult male is 7 millim. long and broad, that of the female 10 millim.

An adult male and 5 females—three ovigerous—from the Andamans.

#### *Ixa*, Leach.

*Ixa*, Leach, Trans. Linn. Soc. Vol. XI. 1815, p. 334.

*Ixa*, Milne Edwards, Hist. Nat. Crust. II. 134.

*Ixa* Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 311, and Cat. Leucos. Brit. Mus. p. 23.

*Ixa*, Miers, 'Challenger' Brachyura, p. 300.

Carapace broadly rhomboidal, produced on either side, at the junction of the antero-lateral and postero-lateral borders, into a great sausage-shaped spine of enormous size often with an abruptly acuminate point. The median regions of the carapace are separated on either side from the branchial, either by a broad trench which bifurcates anteriorly to isolate the hepatic regions from the branchial regions and from the front, or by a shallow groove which has similar relations. The

front is broadish and broadly bilobed, and does not project as far as the salient edges of the afferent branchial canal.

The orbits are deep and completely conceal the eyes, their outer wall is marked by 3 closed sutures, the surfaces between which are very convex; there is a widish gap at the inner canthus where the antennæ with their small flagellum are found. The antennules fold obliquely.

The external maxillipeds are sunk altogether or in part a good deal below the level of the sharp edges of the buccal cavern: they are longitudinally hollowed or grooved along their inner border, the merus more deeply than the ischium: the last-named joint is about twice the length of the narrowly-triangular merus.

The chelipeds are hardly stouter than the slender legs: and are markedly less than twice the length of the carapace: the distal half of the hand is almost filiform: the fingers are hardly half the length of the hand, are filiform, and open in a vertical plane.

The abdomen of the male has the 3rd 4th and 5th segments coalescent, that of the female has the 3rd-6th coalescent.

*Key to the Indian species of Ixa.*

- I. Channels of carapace with very definite undermined edges: lateral processes with very abruptly acuminate tip: buccal frame distinctly triangular: exognaths with the surface concave and almost devoid of granules..... *I. cylindrus.*
- II. Channels of carapace simply grooves of no very remarkable appearance: lateral processes gradually tapering: buccal frame quadrangular: exognaths with the surface, in the basal three-fourths, tumid and covered with a mosaic of large granules ..... *I. inermis.*

95. *Ixa cylindrus*, (Fabr). Leach.

*Cancer cylindrus*, Fabricius, Mantiss. Ins. I. 323, and Ent. Syst. II. 456.

*Cancer cylindricus*, Herbst, Krabben, I. ii. 109, pl. ii. figs. 29-31.

*Leucosia cylindrus*, Fabricius, Ent. Syst. Suppl. p. 352: Bosc, Hist. Nat. Crust. I. 237: Latreille, Hist. Nat. Crust et. Ins. VI. 119.

*Ixa cylindrus*, Leach, Trans. Linn. Soc. Vol. XI. 1815, p. 334: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 311 (*part*): Miers, 'Challenger' Brachyura, p. 301 and footnote.

*Ixa canaliculata*, Leach, Zool. Miscell. III. p. 26, pl. 129, fig. 1: Desmarest, Consid. Crust. p. 171, pl. xxviii. fig. 3: Milne Edwards, Cuvier, Règne An., Crust. pl. xxiv. fig. 1, and Hist. Nat. Crust. II. 135: A. Milne Edwards, in Maillard's l'île Réunion, Annexe F, p. 10.

*Ixa megaspis*, Adams and White, 'Samarang' Crust. p. 55, pl. xii, fig. 1 : Miers, 'Challenger' Brachyura p. 301 (var. of *cylindrus*).

Carapace covered with vesiculous granules between which it is smooth and polished, and there are some largish smooth patches on the branchial regions: the channels of the carapace are deep and very well defined, with undermining edges, and have the floor more or less coated with pubescence: the huge cylindrical lateral processes are of almost the same diameter at their distal end as at their base, and their rounded end is abruptly surmounted by a spine: the distance between the edge of the raised plane of the gastric region and the free edge of the front is nearly equal to the anterior breadth of the front: the ends of the posterior margin are a little thickened and prominent, but are hardly dentiform even in the young.

The buccal cavern, though truncated, has a distinctly triangular shape: the exognath, when denuded of its distal pubescence, is found to have a smooth and longitudinally concave surface, the concavity falling along the inner border; and is seen to fall short of the raised anterior edge of the afferent branchial channel by a mean distance equal to nearly half the length of the merus: the raised outer border of the ischium has a narrow band of vesiculous granules, wanting at the basal end.

Four males and four females (three adult) are in the Indian Museum collection from the Andamans, and from the Madras coast in the neighbourhood of Palk Straits.

The largest female has the carapace 20 millim. long by 60 millim. in extreme breadth.

#### 96. ? *Ixa inermis*, Leach.

*Ixa inermis*, Leach, Zool. Miscell. III. p. 26, pl. 129, fig. 2: Desmarest Consid. Crust. p. 171: Milne Edwards, Hist. Nat. Crust. II. 135: Haswell, P. L. S., N. S. Wales, IV. 1879, p. 59, and Cat. Austral. Crust. p. 132.

Carapace covered with vesiculous granules between which it is distinctly rough: the channels of the carapace are merely grooves, and are devoid of pubescence: the lateral processes are curved forwards, and taper gradually to a point: the distance between the gastric region (no part of which region has the form of a definitely raised plane) and the free edge of the sharply bidentate front is much less than the anterior breadth of the front: there is a large granular petaloid tubercle at either end of the posterior margin.

The buccal cavern is distinctly quadrangular, owing to the eversion of the outer lip of the afferent branchial channel: the exognath in its basal three-fourths is very strongly convex, the surface of the convexity



being covered with large polished pearly granules polygonal by mutual appression; its hairy distal end is suddenly depressed and does not fall much short of the front edge of the afferent branchial canal: the ischium is grooved along its inner border, but the rest of its surface is tumid and granular just like the exognath.

In the Indian Museum collection is a single female with the carapace 17 millim. long by 42 millim. in extreme breadth, from 23 fathoms off the Orissa Coast.

I believe that this species must be Leach's *Ica inermis*, as it corresponds with Leach's figure. Unfortunately the mouth-parts are not figured or described. They are most characteristic in this species, which cannot be mistaken for *I. cylindrus*.

#### Family DORIPPIDÆ.

- Dorippiens*, Milne Edwards, Hist. Nat. Crust. II. 151 (*partim*).  
*Dorippidea*, De Haan, Faun. Japon. Crust. p. 120.  
*Dorippidæ*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 390.  
*Dorippidæ*, Miers, Challenger Brachyura, p. 326.

Carapace flat, generally broadest behind near the plane of the posterior border, hiding not much more than half of the abdominal terga, the first three of which are commonly visible in a dorsal view quite uncovered. The orbits are somewhat incomplete. The antennules are commonly too large to fold inside their fossettes. The antennæ are large. The mouth-parts somewhat resemble those of the *Calappidæ*: the buccal cavern is prolonged forwards to form an efferent branchial canal which is covered in below by a long lamellar process of the first maxillipeds. The first two pairs of true legs are remarkably long and stout: the last two pairs on the contrary are remarkably short and slender, and occupy a singular position in the dorsal plane of the body. The position of the afferent branchial canal varies. The vasa deferentia perforate the 5th thoracic sternum on either side. The branchiæ are less than nine in number on either side.

The Dorippidæ may be divided into two sections or subfamilies as follows:—

1. *Dorippinæ*, in which the external maxillipeds leave a considerable part of the buccal cavern uncovered, and in which the afferent branchial openings are situated either immediately or shortly in advance of the bases of the chelipeds.

2. *Tymolinæ*, in which the external maxillipeds almost completely cover the buccal cavern, and in which the afferent branchial openings may or may not be situated near the bases of the chelipeds.

The following is a list of known genera, Indian genera being printed in Roman type and genera known to me by autopsy being marked with an asterisk.

Family **Dorippidæ.**

Sub-family I. *Dorippinæ.*

\*Dorippe.

\*Ethusa (\*Ethusina).

? *Cymopolus*, A. Milne Edwards, Bull. Mus. Comp. Zool. VIII. 1880, p. 27.

Sub-family II. *Tymolinæ.*

*Tymolus*, Stimpson, Proc. Acad. Nat. Sci. Philad., 1858, p. 163.

*Cyclodorippe*, A. Milne Edwards, Bull. Mus. Comp. Zool. VIII. 1880, p. 24.

*Cymonomus*, A. Milne Edwards, Bull. Mus. Comp. Zool. VIII. 1880, p. 26.

\**Cymonomops*.

*Uncertain in position.*

*Corycodus*, A. Milne Edwards, Bull. Mus. Comp. Zool. VIII. 1880, p. 23.

It appears to me to be quite possible that further investigation may discover *Cyclodorippe* to belong to Stimpson's genus *Tymolus*. Ortmann, (Zool. Jahrbucher, Syst. VI. 1892, p. 559) has already suspected the identity of these two genera.

*Caphyra*, Guérin, which was included with the *Dorippidæ* by Milne Edwards, has by other authors been shown to belong to quite another section of the Brachynra; and I cannot think that *Cymopolia* either has any right to be classed with the *Oxystoma*. Previous authors also, such as Dana (U. S. Expl. Exped. Crust. pt. I. p. 403) and Miers ('Challenger' Brachyura p. 334) have suggested the advisability of removing *Cymopolia* from this group.

*Key to the Indian Genera of Dorippidæ.*

- I. The external maxillipeds leave all the anterior part of the buccal cavern uncovered:—
  1. The anterior extremity of the buccal cavern passes between the antennules to or even beyond the tip of the front: the afferent branchial apertures are

- situated in front of the bases of the chelipeds, a bridge of the carapace intervening ..... DORIPPE.
2. The anterior extremity of the buccal cavern either stops at, or does not reach as far as, the basal joint of the antennules: the afferent branchial openings are situated *immediately* in front of the bases of the chelipeds ..... ETHUSA.
- II. The external maxillipeds are greatly elongate and do not leave any appreciable portion of the buccal cavern uncovered: the afferent branchial openings are not situated in front of the bases of the chelipeds ..... CYMONOMOPS.

*Dorippe*, Fabricius.

*Dorippe*, Fabricius, Ent. Syst. Suppl. p. 361.  
*Dorippe*, Milne Edwards, Hist. Nat. Crust. II. 154.  
*Dorippe*, Miers, Challenger Brachyura, p. 327.

Carapace very flat, truncate-triangular and broadest behind, covering little more than the first two thoracic sterna, its regions well defined, the hepatic region small.

The front consists of two flat triangular teeth: on either side of it, in the same plane, are (1) a hood-like fold covering the base of the long completely exposed geniculate eyestalks, and separated by a deep narrow fissure from (2) a long flat triangular tooth, formed by the prolongation of the antero-external angle of the carapace, and forming the outer angle of the orbit. The floor of the orbit is even more incomplete than the roof, and is formed almost entirely by the base of a great projecting spine at the inner canthus, but even this spine may be rudimentary. The antennules fold longitudinally, they are too large to fold into the fossettes. The antennæ also are rather large: the basal joint is wedged in between the front and the spine at the inner canthus of the orbit.

The buccal cavern is abruptly narrowed anteriorly and prolonged as a deep well defined canal to, or even slightly beyond, the front: the canal is closed in below by long stout foliaceous processes of the first maxillipeds. The external maxillipeds do not cover this canal: their flagellum or palp arises at the outer angle of the long narrow merus and is completely exposed in flexion. The afferent branchial orifices are oblique pocket-like slits in the pterygostomian region.

The chelipeds in the adult male are commonly unequal, having the hand of one side much enlarged and swollen.

The first and second pairs of true legs are long stout and compressed: the last two pairs on the other hand are short and rather slight; they arise much dorsad of the other legs, and are subchelate,—the four subchelæ being so disposed as to enable the animal to hold over its back—as in a loose frame—some sort of defensive or protective object, such as a lamellibranch shell or an inhabited worm-tube.

The abdomen of both sexes consists of seven distinct segments, the first two and most of the third terga being visible in a dorsal view.

*Key to the Indian species of Dorippe.*

- I. The tips of the foliaceous processes that close the endostomial canal, but never the canal itself, may sometimes be seen between the frontal teeth in a dorsal view:—
  1. The greatest length of the carapace is slightly, but distinctly, more than the greatest breadth:—
    - i. Carapace nodular and wrinkled: spine at the inner canthus of the orbit pouderos, curved, serrated along the under surface: fourth (last) pair of true legs less than half the length of the second (longest) pair ..... *D. dorsipes.*
    - ii. Carapace smooth: spine at inner canthus of orbit rudimentary: fourth pair of true legs more than half the length of the second..... *D. astuta.*
  2. The greatest length of the carapace is less than the greatest breadth: spine at the inner canthus of the orbit long, slender, acute, straight: carapace smooth: fourth pair of legs from a little less than half to one-third the length of the second:—
    - i. Carapace and last two pairs of legs densely pubescent: both edges of merus and posterior edge of carpus and propodite of 1st and 2nd legs densely pubescent in the male ..... *D. facchino.*

ii. Carapace hardly pubescent: last two pairs of legs very slightly hairy: 1st and 2nd legs perfectly devoid of hair ..... *D. granulata*.

II. The roof of the endostomial canal projects considerably between the bases of the frontal teeth in a dorsal view: the greatest length of the carapace is hardly less than the greatest breadth: carapace smooth, it and all the appendages perfectly devoid of pubescence: spine at inner canthus of orbit rudimentary: last pair of legs much more than half the length of the second (longest) pair..... *D. polita*.

97. *Dorippe dorsipes*, (Linn.) Miers.

*Cancer dorsipes*, Linn. Mus. Lud. Ulr. p. 452, and Syst. Nat. ed. xii. I. ii. 1053 (*nec syn.*)

*Cancer frascone*, Herbst, Krabben, I. ii. 192, pl. xi. fig. 70.

*Cancer quadridens*, Fabricius, Ent. Syst. II. 464.

*Dorippe quadridens*, Fabricius, Ent. Syst. Suppl. p. 361: Bosc, Hist. Nat. Crust. I. 207: Latreille, Hist. Nat. Crust. et Ins. VI. 125, [and Encycl. pl. 306, fig. 1]: Desmarest, Consid. Crust. p. 135: De Haan, Faun. Japon. Crust. p. 121, pl. xxxi. fig. 3: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 163: de Man, Journ. Linn. Soc., Zool., XXII. 1888, p. 206.

*Dorippe quadridentata*, Milne Edwards, Hist. Nat. Crust. II, 156: Hilgendorf, MB. AK. Berl. 1878, p. 812: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 49 (*gastric teeth*): Haswell, Cat. Austral. Crust. p. 137.

*Dorippe dorsipes*, Miers, Zool. H. M. S. 'Alert,' pp. 185, 257: de Man, Archiv. für Naturges. LIII. 1887, i. 393: [Cano, Boll. Soc. Nat. Napol. III, 1889, p. 254]: Ortman, Zool. Jahrbuch., Syst., VI. 1892, p. 562: Honderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 404.

*Dorippe atropos*, Lamarck, Syst. Anim. sans. vert. p. 245 (1818).

*Dorippe nodulosa*, Lamarck, Syst. Anim. sans. vert. p. 245 (1818): Bosc, Hist. Nat. Crust. I. 208, pl. iv. fig. 2; Guérin, Icon. Règne Animal, pl. xiii. fig. 2.

Body and appendages (except the hands and fingers, and the propodites and dactyli of the 1st and 2nd true legs) rather thickly covered with hair.

Extreme length of carapace greater than extreme breadth. Surface of carapace wrinkled and uneven, with about a dozen nodules which are often granular; the regions well defined by grooves and puckers.

The spine at the outer angle of the orbit is long and acute, and usually projects well beyond the level of the frontal teeth: the spine at the inner canthus is huge, curved, serrated along the lower border,

and projects far beyond the frontal teeth: the hood-like fold, on either side of the front, that covers the base of the eyestalks, has its angles not pronounced.

The lateral margins of the carapace are denticulated up to a stoutish tooth near the middle of the branchial border.

The abdomen of the male has both on the second and on the third terga a transverse row of 3 tubercles, the middle one large rounded and polished, the lateral ones smaller and acute, and one stout tubercle in the middle line on the fourth tergum: in the female the third fourth and fifth terga are transversely carinate, the carinæ being denticulate, and one tooth on the third and 4th terga, in the middle line, being much enlarged; the second tergum is also transversely carinate, but bluntly and indistinctly.

The chelipeds of the adult male are asymmetrical, the hand of one side being greatly swollen and being a good deal broader than long: in both chelipeds the ischium merus and carpus have the outer surface covered with spinules and acute granules.

The second true leg is more than twice the length of the fourth, and nearly three times the length of the carapace: its carpus like that of the first is traversed longitudinally by two granular crests.

Large males have the carapace 36 millim. long, and 34 millim. in extreme breadth: ovigerous females have the carapace 25 millim. long by 24 millim. broad.

In the Indian Museum collection are very numerous specimens from Mergui, Andamans, East coast of India from Ganjam to Palk Straits, and Persian Gulf.

As Miers states, there can be little doubt that Linnæus' diagnosis (Mus. Lud. Ulr. p. 452) refers to this species. But De Haan long before (Faun. Japon. Crust. pp. 121, 139) had bespoken the identity of *D. dorsipes* and *D. quadridens* and had noticed the confusion by earlier authors of *Cancer dorsipes* of Linnæus with *Cancer dorsipes* of Fabricius.

#### 98. *Dorippe facchino* (Herbst), De Haan.

*Dorippe facchino*, Herbst, Krabben, I. ii. 190, pl. xi. fig. 68: De Haan, Faun. Japon. Crust. p. 123: Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 163: Miers, 'Challenger' Brachyura, p. 328: Ortman, Zool. Jahrbuch., Syst. VI. 1892, p. 561: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 405.

*Dorippe sima*, Milne Edwards, Hist. Nat. Crust. II. 157, pl. xx. figs. 11-14: Dana, U. S. Expl. Exp. Crust. pt. I. p. 398: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 317: A. O. Walker, Journ. Linn. Soc., Zool., XX. 1886-90, p. 111.

The body and appendages though on the whole very hairy, are not quite so hairy as in *D. dorsipes*; the chelipeds have the hair confined almost entirely to their borders, especially the upper border; the 1st and 2nd pairs of legs are almost hairless in the female, and in the male have the hair confined to the anterior border of the merus and the posterior border of the merus carpus and propodite; and hair is absent from the convexities of the thoracic sterna.

Extreme length of carapace considerably less than extreme breadth.

The surface of the carapace, when denuded, is either perfectly smooth, or smooth in the middle and finely granular at the sides and in front: the regions are well defined by grooves.

The hood-like fold covering the base of the eyestalks, on either side of the front, has its inner or anterior angle dentiform: the spine at the external orbital angle is broad and suddenly acuminate, and projects to but not beyond the level of the frontal teeth: the spine at the inner canthus is slender, straight, and acute, and projects well beyond the frontal teeth.

The lateral borders of the carapace are sometimes granular, but never denticulate.

The abdomen of the male is unarmed: in the female the 3rd-5th terga are coarsely and bluntly carinate, the carinæ of the 4th and 5th being finely granular. The chelipeds when denuded have all their joints quite smooth: those of the adult male are asymmetrical just as in *D. dorsipes*.

The second true leg is much more than twice, often three times, the length of the fourth, and  $2\frac{1}{2}$  to  $2\frac{2}{3}$  times the length of the carapace: its carpus, like that of the first is bicarinate, the carinæ being granular under the lens but not to the naked eye.

Large males have the carapace 29 millim. long and 34 millim. in extreme breadth: ovigerous females have the carapace 20 millim. long by 24 millim. broad.

In the Indian Museum are very numerous specimens from the East coast from the mouth of the Hooghly to Madras, and a few from the Andamans. It is common on soft muddy bottoms, and I have rarely found it without a protective bivalve shell and sea-anemone.

#### 99. ? *Dorippe granulata*, De Haan.

*Dorippe granulata*, De Haan, Faun. Japon. Crust. p. 122, pl. xxxi. fig. 2: Stimpson Proc. Acad. Nat. Sci. Philad., 1858, p. 163: [Targioni-Tozzetti, Zool. Record, 1877, Crust. p. 19]: Ortmann Zool. Jahrbuch., Syst., VI. 1892, p. 561.

Almost exactly resembles *D. facchino* (Herbst), but has the carapace a little more granular and with scanty or obsolete pubescence.

There is almost no hair on the carapace,—none sufficient to conceal its grooving and texture: on the chelipeds there is, on the upper edge, extending along basal part of finger, a narrow fringe of hair, and on the lower edge a narrow fringe extending as far as the end of the merus: on the first two pairs of true legs there is no hair at all in either sex; and on the last two pairs of legs there is not very much hair.

The chelipeds of males that are as big as the largest ovigerous females are hardly asymmetrical.

Ovigerous females have the carapace 14 millim. long and 16 millim. in extreme breadth.

In the Indian Museum collection are 21 specimens from various stations along the shores of the Bay of Bengal from Mergui to Madras, one of these—the smallest and most immature of all—belongs to Dr. Anderson's Mergui collection and is referred to in Dr. de Man's report (J. L. S., Zool., Vol. XXII) as allied to *D. granulata*.

If they are not De Haan's species, they are a mere variety of *D. facchino*.

#### 100. *Dorippe astuta*, Fabr.

*Dorippe astuta*, Fabricius, Ent. Syst. Suppl. p. 361.

*Cancer astutus*, Herbst, Krabben, III. iii. 45, pl. lv. fig. 6.

*Dorippe astuta*, Bosc, Hist. Nat. Crust. I. 208: Milne Edwards, Hist. Nat. Crust. II. 157: Haswell, Cat. Austral. Crust. p. 136: A. O. Walker, Journ. Linn. Soc., Zool., Vol. XX. 1886-90, p. 111: Ortmann, Zool. Jahrbuch., Syst., VI. 1892, p. 562: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 405.

Body and appendages not pubescent as in *D. dorsipes* and *facchino*, but covered with short distant hairs that are not very plainly visible to the naked eye: the hairs on the edges of the propodites and dactyli of the first two pairs of true legs, however, form a long thick fringe.

The carapace is extremely flat, almost laminar; its surface is smooth, and the regions are defined by grooves.

Extreme length of carapace a little greater than extreme breadth.

The spine at the outer angle of the orbit does not nearly reach to the level of the tip of the frontal teeth: the part of the carapace that covers the base of the eyestalk is not hood-like, and has not its angles pronounced: the spine at the inner canthus of the orbit is quite rudimentary.

The lateral margins of the carapace are smooth. The abdomen of the male is unarmed, that of the female has the 3rd and 4th terga bluntly and very inconspicuously carinate transversely.

The chelipeds are smooth when denuded; in the adult male they are asymmetrical just as in *D. dorsipes* and *facchino*.



The second true leg is three times as long as the carapace, and very much less than twice the length of the fourth leg.

The adult male has the carapace 12 millim. long and 11.5 millim. broad, as has also the apparently adult female.

In the Indian Museum collection are eight specimens from the Andamans, Mergui, Orissa coast, and Karáchi.

Several of them are encrusted with a small species of *Scalpellum*, and one carries across its back a large (inhabited) worm-tube, which is said by Dr. Giles to be a habit with this species.

#### 101. *Dorippe polita*, Alcock and Anderson.

*Dorippe polita*, Alcock and Anderson, J. A. S. B., Vol. LXIII. 1894, pt. 2, p. 208, and Ill. Zool. 'Investigator,' Crustacea, pl. xxiv. fig. 4 (*in the press*).

General surface of the body and appendages smooth hard polished and free of hairs: there are a few scanty hairs on the edges only of some of the joints of the chelipeds and external maxillipeds.

The extreme length of the carapace is a very little less than the extreme breadth: the grooves that define the regions are shallow and not very conspicuous. The end of the eudostomial channel projects between, and a little beyond the tips of the frontal teeth; and has its free edge emarginate, so that the front appears to consist of four sharp lobes, the median two of which are on a lower level than the other two.

The spine at the outer angle of the orbit is broadly triangular, its tip scarcely surpasses the level of the tips of the frontal teeth: the spine at the inner canthus is blunt and very small and inconspicuous: the portion of the carapace that covers the base of the eyestalk is, as in *D. astuta*, in simple continuity with the side of the front.

The abdominal terga of the female are smooth and polished.

The second pair of true legs are about  $2\frac{1}{3}$  times the length of the carapace and are very much less than twice the length of the fourth pair; their carpopodites, like those of the first pair, are faintly bicarinate. The pleura covering the bases of the last two pairs of legs are singularly large.

The larger of two ovigerous females in the Indian Museum collection has the carapace 11.5 millim. long and 12 millim. in extreme breadth.

#### *Ethusa*, Roux.

*Ethusa*, Roux, Crust. de la Méditerranée, pl. xviii. and text relating thereto.

*Ethusa*, Milne Edwards, Hist. Nat. Crust. II. 161.

*Ethusina*, S. I. Smith, 'Albatross' Crustacea, 1883, in Ann. Rep. U. S. Comm. Fish, &c., 1882 (1884).

*Ethusa*, Miers, 'Challenger' Brachyura, pp. 328, 331.

Carapace shaped much as in *Dorippe*. The front consists of two laminar teeth each of which again is bifid at tip: on either side of the front, and separated from it by a deep cleft, is a long flat tooth or spine formed by the prolongation of the antero-external angle of the carapace, and forming the outer angle of the orbit. There is practically no orbital floor. The antennules fold obliquely: they are large, but fold fairly well into their fossæ. The antennæ have a long flagellum: their basal joint is inserted between the eyestalk and the basal antennular joint, but on a slightly lower level.

The buccal cavern is elongate-triangular and does not extend to the front: the external maxillipeds cover only its basal three-fourths, or thereabout, somewhat as in *Dorippe*, but the distal part is closed in by stout foliaceous processes of the first maxillipeds. The flagellum or palp of the external maxillipeds arises near the antero-external angle of the rather broad merus, and is completely exposed in flexion.

The afferent branchial orifices are wide openings immediately in front of the bases of the chelipeds.

The chelipeds in the adult male are often unequal: the legs have the same form and relations as in *Dorippe*, but the last two small and dorsally placed pairs are not subchelate, although their little hook-like dactylus folds backwards. The dactyli of the 1st and 2nd pairs are palmulate and are very long and stout. The abdomen of the male usually consists of 5 pieces, the 3rd-5th terga being fused, that of the female consists of 7 separate terga. As in *Dorippe* the first three terga are visible in a dorsal view.

There is very little hair about the carapace and larger appendages.

In the Indian seas the species of this genus are, so far as is known, found only at depths of between 200 and 1,300 fathoms.

#### Key to the Indian species of *Ethusa*.

I. Carapace barely longer than broad: basal antennular joint not abnormally enlarged and swollen: eyestalks freely movable:—

1. Branchial regions much swollen, and causing a strong bulge of the lateral borders of the carapace posteriorly: external orbital spines long slender acute, and projecting obliquely:—

i. External orbital spines projecting beyond the frontal spines .....

*E. indica.*

ii. External orbital spines not projecting to the level of the frontal spines ...

*E. pygmaea.*

2. Lateral borders of the carapace gradually convergent without any strong bulge in their posterior (branchial) part: external orbital spines short broad flat triangular, with a mucronate tip ..... *E. andamanica*.
- II. Carapace manifestly longer than broad: basal antennular joint enormously enlarged and swollen, globular in shape, pushing the eyes permanently outwards:—
1. Eyes practically immobile: chelipeds in the male symmetrical..... *E. investigatoris*.
2. Eyes preserving good power of movement: one cheliped in the male very markedly larger than the other..... *E. desciscens*.

102. *Ethusa indica*, Alcock.

*Ethusa indica*, Alcock, Ann. Mag. Nat. Hist., May, 1894, p. 405, and Ill. Zool. 'Investigator,' Crust. pl. xiv. fig. 2, ♀.

Carapace convex; its extreme length, including the frontal teeth, in the male only just exceeds, and in the female equals, its extreme breadth; its surface is finely and closely granular almost everywhere, except sometimes on the cardiac-intestinal region.

The branchial regions are much swollen, both dorsally and laterally, the lateral swelling making the carapace more than one-third broader across the middle of the branchial regions than across the bases of the external orbital spines. The cardiac-intestinal region is small and well defined, and although it is tumid it is commonly sunk below the level of the branchial convexities. The anterior regions of the carapace are undefined.

The spine at the external orbital angle is broad-based, but long slender and acute: it projects obliquely outwards well beyond the tips of the frontal teeth. The two pairs of frontal teeth are longish and acute—the outer pair being somewhat the longer: they as well as the external orbital spine are a good deal concealed in a fringe of long hairs.

The eyestalks are short slender and freely movable: the eyes are often a little deficient in pigment.

The basal antennular joint is not abnormally enlarged.

The chelipeds in the adult male only are asymmetrical, all the joints of one side being enlarged in all dimensions: the smaller cheliped is hardly as stout as the first two pairs of legs.

The second pair of true legs are not very much longer than the first: in the adult male they are a little more than three times the

length of the carapace, and slightly more than three times the length of the 4th (last) pair; in the female they are not quite three times the length of the carapace, and about  $2\frac{3}{4}$  times the length of the 4th pair.

The abdomen of the male consists of 5 pieces, the 3rd-5th terga being fused together.

The extreme length of the carapace is in the fully adult male 16.5 millim., in the fully adult female 15 millim.; the breadth 16 millim. in the male, 15 millim. in the female.

Has been dredged in the Andaman Sea at 240 fms., in the "Swatch" of the Gangetic Delta at 409 and at 405 to 285 fms., in the Laccadive Sea at 696 fms., off the Maldives at 719 fms., and off both coasts of Ceylon at 406 to 296 fms.

#### 103. *Ethusa pygmaea*, Alcock.

*Ethusa pygmaea*, Alcock, Ann. Mag. Nat. Hist., May 1894, p. 406, and Ill. Zool. 'Investigator,' Crust. pl. xiv. fig. 5, ♀.

Distinguished from *E. indica* only in the following particulars:—

(1) its size is much smaller, the largest known specimen—an ovigerous female—having the carapace slightly over 6 millim. long and nearly 7 millim. broad:

(2) the external orbital spines, though of the same slender acute shape, are not so prominent, not reaching as far as the tips of the frontal teeth:

(3) the anterior regions of the carapace are plainly defined by grooves.

Andaman Sea 188 to 220 fathoms, and 240 to 220 fms.

#### 104. *Ethusa andamanica*, Alcock.

*Ethusa andamanica*, Alcock, Ann. Mag. Nat. Hist., May 1894, p. 405, and Ill. Zool. 'Investigator,' Crust. pl. xiv. fig. 8, young ♀.

Carapace flat, its extreme length only just exceeds its extreme breadth, its surface finely granular under the lens, but smooth to the naked eye.

The branchial regions are a little tumid dorsally, but do not bulge laterally, so that the convergent lateral borders are nearly straight.

The external orbital spine is broadly triangular, with a mucronate tip which does not quite reach to the tips of the frontal spines; these also are acutely triangular, and all are a good deal hidden by a fringe of long hairs.

The eyestalks are short and rather stout, movable, but not very freely so: the eyes are not deficient in pigment. The basal antennular joint is not enlarged.

The chelipeds of the adult male are unknown : in the female they are not so stout as the first two pairs of legs.

The second pair of legs in the female (adult male unknown) exceed the first almost by the length of the dactylus, they are three times the length of the carapace and about  $2\frac{1}{2}$  times the length of the 4th pair.

The extreme length of the carapace of the largest specimen, which is not adult, is 9.5 millim., the extreme breadth 9 millim.

Andaman Sea 188 to 220 fms., and 238 to 290 fms.

This species may possibly be only a variety of *Ethusa orientalis*, Miers, Challenger Brachyura, p. 330, pl. xxviii. fig. 4.

105. *Ethusa (Ethusina) investigatoris*, n. sp.

Carapace manifestly longer than broad, somewhat convex, smooth to the naked eye though finely granular under the lens.

The branchial regions are a good deal swollen both dorsally and laterally, bulging out the lateral margins and making the carapace a third broader across the middle of the branchial regions than across the bases of the external orbital spines.

The cardiac-intestinal region is well-defined and tumid, but not sunk below the level of the branchial convexities : the anterior regions of the carapace are fairly well defined.

The frontal portion of the carapace is separated from the rest of the carapace by a transverse groove or crease. The external orbital spine is long and needle-like, but its tip falls considerably short of the tips of the rather long acute frontal spines.

The basal antennal joint is huge and swollen, almost globular in shape. Owing to its size the eyes are pushed outwards until the eye-stalks have come to lie almost in the transverse axis of the carapace, with the tips of the eyes just visible, dorsally, beyond the lateral edge of the external orbital spine ; and in this position they are almost immovably fixed.

The chelipeds in the apparently adult male are symmetrical and are not much stouter, except as to the hands, than the first two pairs of legs ; the hands, however, are somewhat enlarged.

The second pair of true legs exceeds the first by about a third of the length of the dactylus ; they are more than three times the length of the carapace, and about  $2\frac{3}{4}$  times the length of the 4th pair.

The abdomen of the male consists of 5 pieces, the 3rd-5th terga being fused together.

Length of carapace of an adult male 12.3 millim., extreme breadth 11.3 millim.

Colours in life milk-white with the tip of the legs faint pink.

Bay of Bengal 1300 fathoms, Laccadive Sea 1200 fms.

This species may possibly be only a variety of *Ethusa* (*Ethusina*) *gracilipes*, Miers, Challenger Brachyura, p. 332, pl. xxix. fig. 1.

106. *Ethusa* (*Ethusina*) *desciscens*, n. sp.

Only differs from *E. investigatoris* (1) in its smaller size, (2) in having the eyestalks somewhat more mobile, and (3) in having the hand of one cheliped (in the male) much larger than the other.

I should have regarded it as a variety of *E. investigatoris* but that two specimens coming from very different localities and depths present the same peculiarities.

Length of carapace of largest specimen 9 millim., extreme breadth 8 millim.

Andaman Sea 265 fathoms, Laccadive Sea 912 to 931 fms.

*Cyonomops*, Alcock.

*Cyonomops*, Alcock, Ann. Mag. Nat. Hist., May 1894, p. 406.

Allied to *Cyclodorippe*, *Cyonomus*, etc.

Carapace of the *Dorippe* type (that is to say having its greatest breadth at its extreme posterior limit and leaving about half of the abdominal terga exposed to dorsal view), but arched anteriorly almost in a semicircle; its regions well defined in much the same way as *Dorippe*. The front is narrow and the whole fronto-orbital region lies well inside the semicircular curve of the antero-lateral margins: the narrow front ends in two little teeth between and beyond which can be seen the roof of the greatly prolonged buccal cavern, as in *Dorippe polita*. On either side of the front is a spine that forms the roof of the orbit, and outside of this spine, and separated from it by a deep notch, is a spine that forms the outer wall of the orbit.

The eyestalks are slender, moderately long, and freely movable: the eyes are almost without pigment.

The antennules have their basal joint lodged in a deep crevice between the edge of the anterior prolongation of the buccal cavern and the antennæ: their long flagellum cannot be concealed in flexion. The antennæ are large, but are much smaller than the antennules.

The buccal cavern is of great size,—not much less than half the length of the body, and is gradually narrowed anteriorly, and prolonged beyond the tip of the front: it is closed, except at its extreme frontal tip, by the long narrow external maxillipeds, the merus of which is not very much shorter than the ischium measured along the inner border and the flagellum of which is exposed in flexion: the long narrow pointed exognath is not much longer than the ischium: beneath the

external maxillipeds the anterior prolongation of the buccal cavern is closed in below by a lamellar process of the first maxillipeds.

The chelipeds in both sexes are short, massive, and equal and symmetrical: the hands are of the chopper-shaped, almost subcheli-form, Raninoid type, the stout fingers being almost at right angles to the long axis of the hand.

The first and second pairs of true legs are stout and are of great length, their merus being of relatively enormous length: the third and fourth pairs on the other hand, which are dorsal in position as in *Dorippe*, are extremely short and of filiform tenuity.

The abdomen in both sexes consists of six segments: in the male two or three of them are fused and the whole abdomen is very small, in the female the last segment is of great size.

[? The afferent branchial opening appears to lie in the deep crevice between the base of the antennæ and the edge of the buccal frame in which the basal joint of the antennules is lodged.]

#### 107. *Cymonomops glaucomma*, Alcock.

*Cymonomops glaucomma*, Alcock, Ann. Mag. Nat. Hist., May 1894, p. 406, and Ill. Zool. 'Investigator,' Crustacea pl. xiv. fig. 9.

Carapace subcircular; it and the appendages are very closely and finely granular beneath a dense pubescence. The front consists of three deeply cut lobes, the middle one of which is the true front and is the largest and most prominent. The middle lobe again is slightly cleft at the tip, and in the cleft is to be seen projecting the roof of the remarkably prolonged buccal cavity.

The external orbital angle, which is somewhat ventrad in position, also forms a projecting tooth, so that the orbito-frontal region, which is sharply delimited from the rest of the inflated carapace, has the form of a five-pronged crest or crown. The regions of the carapace are plainly delimited, excepting only in the case of the boundary between the gastric and cardiac regions. The pterygostomial regions are most remarkably puffed out.

The abdomen (in the female) is large, and the terminal segment has the form of a broad semicircular plate, broader than any of the other segments and nearly as long as all of them put together: in the male the abdomen is very small.

The orbits are capacious, but the eyestalks are slender and the eyes are unpigmented and semi-opaque.

The antennules, which are much larger and longer than the antennæ, are incapable of flexion beneath the front.

The external maxillipeds are of great length, in correspondence with

the remarkable trough-like prolongation of the buccal cavity, which they completely close in below; their meropodite, which is prolonged far beyond the insertion of the palp, covers the bases of the antennules and antennæ, their tips in fact being visible from above; the slender exopodite does not much surpass the ischium.

The chelipeds are short but massive, and are equal, the merus is curved, the carpus is very small, the palm is large and tumid, and the fingers which are set almost at right angles to the hand, are broad, compressed, pointed, very closely apposable, and have their cutting-edge very finely denticulated.

The second and third legs are of great length, being more than four times the length of the body, the merus forming more than half their extent; their dactylus is filiform and is not much longer than their protopodite. The fourth and fifth legs have the family position, but are mere rudiments, being of hair-like tenuity and only about three-fourths of the carapace in length; the fifth ends in a hook-like dactylus.

A female from the Andaman Sea, 405 fathoms, has the following dimensions:—Length of carapace 6·5 millim., breadth 6·5 millim., length of cheliped 9 millim., length of second leg 28·5 millim., of fourth leg 4·5 millim. A male from the Andaman Sea, 265 fathoms, is smaller.

Colour in the fresh state chalky pink.

#### Family RANINIDÆ.

*Raniniens*, Milne Edwards, Hist. Nat. Crust. II, 190.

*Raninoidea*, De Haan, Faun. Japon. Crust. p. 136.

*Raninidea*, Dana, U. S. Expl. Exp. Crust. pt. I. pp. 400, 403.

*Raninidea*, Henderson, 'Challenger' Anomura, p. 26.

Carapace much longer than broad, remarkably elongate and convex from side to side, commonly obconical or obovate in outline, the greatest breadth being at or close behind the level of the front. Abdomen narrow in both sexes, the greater number of the terga fully exposed in a dorsal view. The sternum is elongate, broad between the first pair or first two pairs of legs, and then becoming narrow and finally linear.

The true front is narrow: in the same plane with it the antero-external angle of the orbit is usually produced, somewhat as in *Dorippe*, to form a spine; and between the two is the orbit.

Except in the deep-sea forms the eyestalks are long. The orbits are very complete, except sometimes on the ventral aspect, where the large basal joints of the antennules and antennæ serve in large part as an orbital floor.



The antennules are large, but do not fold into fossettes. The antennæ also are large, and arise on a plane more or less ventrad of the antennules.

The buccal cavern is remarkably elongate, and is completely closed by the external maxillipeds. As in all other *Oxystoma* the efferent branchial channels form a canal in the middle of the endostome, which canal is covered by a lamellar prolongation of the exopodites of the first maxillipeds: as in *Dorippe* the canal is prolonged forwards between the bases of the antennules.

As in the *Leucosiidæ* the afferent branchial channels are not found in front of the bases of the chelipeds.

Somewhat in the same way as in the *Leucosiidæ* the palp of the external maxillipeds is small and arises at the far end of a groove along the inner edge of the merus, so as to be completely concealed in repose: the exognath is very narrow, and, as in the *Tymolinæ*, does not reach very far beyond the end of the ischium of the endognath.

Except in *Zanclifer* the chelipeds have the hand broad flat and somewhat chopper-shaped, the fingers (which form the head of the chopper) being at right angles, or nearly so, with the long axis of the hand; and as the immobile finger springs from a very broad base, the chelæ rather resemble subchelæ.

The legs commonly have the propodite broad or foliaceous, and the dactylus foliaceous or very broadly palmulate, somewhat as in *Matula*: the last pair of legs is in, and the penultimate pair approaches, the dorsal plane of the body.

The genital ducts of the male perforate, and protrude far beyond, the bases of the fifth pair of legs: those of the female perforate the bases of the third pair of legs.

The following genera belong to this family. Indian genera are printed in Roman type and those represented in the Indian Museum collection are marked with an asterisk:—

#### Family *Raninidæ*.

\* *Cosmonotus*.

\* *Lyreidus*.

\* *Notopus*.

*Notopoides*, Henderson, 'Challenger' Anomura, p. 29.

*Ranilia*, Milne Edwards, Hist. Nat. Crust. II. 195.

\* *Ranina*, Lamarek, Milne Edwards, Hist. Nat. Crust. II. 191.

\* *Raninoides*.

*Raninops*, A. Milne Edwards, Bull. Mus. Comp. Zool. VIII. 1880, p. 34.

*Zanclifer*, Henderson, 'Challenger' Anomura, p. 34.

## Key to the Indian genera of Raninidæ.

- I. Last pair of legs of normal size: antennæ with a very stout peduncle that hides the antennules: antennary flagellum long and stiff:—
1. A well-developed rostral spine..... *Notopus.*
  2. A V-shaped excision in the carapace in place of a rostrum..... *Cosmonotus.*
- II. Last pair of legs abnormally small and slender—almost filiform: antennary peduncle not completely hiding the antennules: antennary flagellum small:—
1. Fronto-orbital border more than half the width of the carapace: sternum broad as far as the third pereiopods: merus of the external maxillipeds shorter than the ischium ..... *Raninoides.*
  2. Fronto-orbital border less than half the width of the carapace: sternum broad only as far as the second pereiopods: merus of the external maxillipeds a little longer than the ischium ..... *Lyreidus.*

*Notopus*, De Haan.

*Notopus*, DeHaan, Faun. Japon. Crust. pp. 137, 138.

*Notopus*, Henderson, 'Challenger' Anomura, p. 31.

Carapace obovate or obconical in outline, strongly convex from side to side, nearly smooth: regions undefined. Fronto-orbital border more than half the breadth of the carapace. Eyes distinct, eyestalks long slender and cylindrical, orbits oblique.

Antennules much smaller than the antennæ. Antennæ with a long very stout peduncle and long stout flagellum, the peduncle concealing the antennular peduncle. Merus of the external maxillipeds a little shorter than the ischium, and having its inner border thickened and raised. Sternum broad between the chelipeds and then suddenly becoming very narrow. Last pair of legs of normal size, arising a little in advance of the penultimate pair.

The abdomen in both sexes has all 7 terga separate.

108. *Notopus dorsipes*, (Fabr.) De Haan.

*Pediculus marinus*, Rumph, Amboin. Rariteitk. I. 29, pl. x. fig. 3.

*Hippa dorsipes*, Fabricius, Ent. Syst. II. 475.

*Albunea dorsipes*, Fabricius, Ent. Syst. Suppl. p. 397.

*Ranina dorsipes*, Latreille, Hist. Nat. Crust. et Ins. VI. 133, [and Encycl. Method. X. 268, pl. 287, fig. 2]: Milne Edwards, Hist. Nat. Crust. II. 195.

*Notopus dorsipes*, DeHaan, Faun. Japon. Crust. p. 139, pl. xxxv. fig. 5: Studer, Abh. Ak. Berl. 1882 (1883) p. 17, pl. i. figs. 6 a-b and pl. ii. figs. 7 a-d.]

The greatest breadth of the carapace—at the fronto-orbital border—is about two-thirds the greatest length.

On the fronto-orbital border are 5 spines of about equal size, separated by deep bights, the middle spine being the true front or rostrum: the outermost spines on either side form the antero-external angles of the carapace, are on a different plane from the others, and are joined across the carapace by a serrated ridge.

The carapace is a good deal pitted in the centre: the lateral borders in their anterior half have, like the surface of the merus of the external maxillipeds and of the greater part of the pterygostomial region, numerous squamiform granules; in their posterior half the lateral borders are finely raised, and milled. A raised ridge traverses the carapace in the middle line from the tip of the front nearly to the posterior border. The trigonal ischium of the chelipeds is somewhat swollen and has its outer surface tattooed with linear dents with hairy edges; the carpus has its dorsal surface serrated; the hand has hairy linear dents and squamiform rows of serrations on both its surfaces, but especially on the outer; and the dactylus has a smooth cutting edge and closes against a single distinctly large tooth at the tip of the immobile finger.

The true legs have one or both edges of many of their joints scantily fringed with long stiff hairs: except in the case of the last pair—in which the carpopodites and propodites are foliaceously expanded—these joints are only moderately expanded; and except in the case of the penultimate pair—in which the dactylus is foliaceous—this joint is broadly palmulate.

In the Indian Museum collection are specimens from the Andamans, and from off the Malabar coast 45 fathoms.

#### *Cosmonotus*, Adams & White.

*Cosmonotus*, Adams & White, 'Samarang' Crust. p. 60, 1848.

*Cosmonotus*, Dana, U. S. Expl. Exp., Crust. pt. I. p. 404.

*Cosmonotus*, Henderson, 'Challenger' Anomura, p. 32.

Carapace elongate-heptagonal in outline, strongly convex, the summit of the convexity forming a sharp mid-dorsal ridge. *Instead of a "front" there is a V-shaped excision*, filled by the basal joints of the eyestalks. The eyes are distinct, the eyestalks are slender and are of remarkable length: each orbit forms a narrow trench just beneath and along almost the whole length of either anterior border of the carapace, the two orbits together forming a very perfect and obvious V.

The antennules are almost hidden by the much larger and stouter antennæ, as in *Notopus*.

The maxillipeds, legs, sternum and abdomen are as in *Notopus*.

109. *Cosmonotus grayii*, Ad. & Wh.

*Cosmonotus grayii*, Adams and White, 'Samarang' Crust. p. 60, pl. xiii. fig. 3 (P. Z. S. 1847, p. 227, fig., and Ann. Mag. Nat. Hist. (2) II. 1848, p. 287): Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 241: Henderson, 'Challenger' Anomura, p. 33: [Cano, Boll. Soc. Nat. Napol. III. 1889, p. 256].

The carapace is unevenly covered with pits and dents which give it, when examined with a lens, a somewhat squamiform appearance. There is a small denticle on either side of the frontal notch and a claw-like spinule at either antero-external angle of the carapace—this is all the armature. The pterygostomial region is granular. The outer edge of the exognath is thickly fringed with hair, the merus and the outer margin of the ischium of the endognath are granular.

The chelipeds are hairy along the dorsal edge, and the edges of the legs—of the last pair especially—are hairy. The chelipeds are also a good deal pitted and dented, like the dorsum of the carapace.

The movable finger is rather strongly curved, and owing to the prominence of a single tooth just beyond the middle of the cutting edge, is curiously sickle-shaped.

In the Indian Museum collection is a single male from the Persian Gulf.

*Raninoides*, Milne Edwards.

*Raninoides*, Milne Edwards, Hist. Nat. Crust. II. 196.

*Raninoides*, Henderson, 'Challenger' Anomura, p. 27.

Carapace remarkably elongate-obovate, strongly convex from side to side, about twice as long as broad, its surface for the most part smooth, the regions undefined. Fronto-orbital border slightly less than the greatest width of the carapace. Eyes small but distinct, eyestalks broadly dilated at base, orbits slightly oblique.

Antennules about equal in size to the antennæ: antennæ with a stout peduncle and a rather short slender flagellum, the peduncle not concealing the antennular peduncle. Merus of the external maxillipeds shorter than the ischium; its edges slightly thickened and raised. Sternum broad between the chelipeds and as far as the bases of the second pair of true legs, then becoming extremely narrow.

Last pair of legs abnormally short and slender, arising much in advance of the penultimate pair. The abdomen in both sexes consists of 7 separate segments.

110. *Raninoides personatus*, White, Henderson.

*Raninoides personatus*, White MS., Henderson 'Challenger' Anomura p. 27 pl. ii. fig. 5.

Carapace twice as long as broad. The lateral border in its posterior half is defined by a fine raised and milled line, and at either external orbital angle is prolonged into a spine, at a distance behind which equal to the distance between it and the rostrum is a second smaller, but still large, spine. The carapace between the two latter spines is finely punctate and in places granular, elsewhere it is smooth and polished.

The front consists of three teeth, the middle one of which alone is large and prominent forming the true rostrum, the lateral teeth being small: between each of these small lateral teeth and the external orbital spine, and separated from both by a fissure, is an angular lobe that completes the roof of the orbit. The whole fronto-orbital border is hairy. The pterygostomian regions are densely granular in a well defined band that occupies much more than their outer half.

The chelipeds have the ischium armed distally, on its inner border with a sharp slender spine: two similar spines occur towards the distal end of the carpus—the larger one being on the outer border, the smaller on the dorsal surface: a similar spine is found towards the far end of the outer border of the hand, and three occur along the inner border of the hand: the dactylus has a smooth cutting edge, but the opposed edge of the immobile finger is very sharply lacinate up to a sharp terminal spine. There is no spine on the outer edge of the dactylus. The third pair of true legs has its merus on both edges and the other joints on the posterior edge fringed with long stiff hairs, the second pair has similar hairs on the posterior edge of merus carpus and propodite, the first pair on lower edge of propodite.

Excluding the filiform last pair, the other legs have the carpus dorsally carinate, and the propodite and dactylus foliaceous.

In the Indian Museum collection are numerous specimens from the coasts of the Bay of Bengal, from 12 to 70 fathoms.

111. *Raninoides serratifrons*, Henderson.

*Raninoides serratifrons*, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 408, pl. xxxviii. figs. 10-12.

Differs from *R. personatus* Henderson in the following particulars:—

(1) the rostrum is carinated, and it, as well as the dentiform lobe at either side of its base, has the edge sharply clearly and uniformly serrated:

(2) between the dentiform lobe at the base of the rostrum and the

external orbital spine is, not an angular lobe, but a sharp spine :

(3) the spine on the lateral border behind the external orbital spine is a mere spinule, and the carapace in front of a well defined transverse line that connects these spines is covered with small squami-form granules :

(4) there is no spine on the ischium of the chelipeds ; the wrist has its dorsal surface closely covered with somewhat scale-like granules ; the hand has its inner surface covered, but not nearly so closely, with rather larger granules and has its outer edge sharply bicarinate :

(5) the dactylus of the second and third pairs of true legs is sickle-shaped :

(6) the small last pair of legs are stouter.

In the Indian Museum collection are two specimens—a small female from off Ceylon 28 fms., and a large female from off the Malabar coast 45 fms.

#### *Lyreidus*, DeHaan.

*Lyreidus*, DeHaan, Fann. Japon. Crust. p. 138.

*Lyreidus*, Henderson, 'Challenger' Anomura, p. 33.

Carapace elongate-obovate, the antero-lateral margins independent and gradually convergent ; strongly convex from side to side and slightly convex from before backwards ; smooth and polished, with the regions undefined. Fronto-orbital border less than half the breadth of the carapace. Eyes small ; eyestalks short, broad at base, orbits hardly oblique.

Antennules about equal in size to the antennæ : antennæ with a stoutish peduncle and rather short slender flagellum, the peduncle not concealing the antennular peduncle.

Merus of the external maxillipeds a little longer than the ischium.

Sternum broad as far as the bases of the first pair of true legs, then becoming narrow. Last pair of legs abnormally short and slender, arising well in advance of the posterior pair. The abdomen in both sexes consists of 7 distinct segments.

#### 112. *Lyreidus channeri*, Wood-Mason.

*Lyreidus channeri*, Wood-Mason, P. A. S. B., August, 1885, p. 104, and J. A. S. B., Vol. LVI. 1887, pt. 2, p. 206, pl. i.

*Lyreidus gracilis*, Wood-Mason, J. A. S. B., Vol. LVI. 1887, pt. 2, p. 376.

The greatest breadth of the carapace—considerably in rear of the front—is a good deal more than half its greatest length, and is about  $2\frac{1}{2}$  times the width of the fronto-orbital border.

The rostrum consists of a simple flat acutely-triangular spine; on either side of it, projecting beyond it, separated from it by a deep bight, and parallel with its tip, is a long acicular spine forming the external orbital angle. The fronto-orbital region is hairy.

The gradually convergent antero-lateral borders are about two-fifths the length of the postero-lateral borders, the junction of the two borders being occupied by a long oblique acicular spine; and nearly midway between this spine and the spine at the external angle of the orbit on either side, is another similar but rather shorter spine. The postero-lateral borders are defined in more than their posterior half by a very fine raised line.

The surface of the carapace is finely and closely punctulate in all its anterior half, as are also the pterygostomian regions.

The eyestalks are broad and flat, and taper to the cornea, which has a somewhat lateral position and is a little deficient in pigment. The arms have a spine or two little spines near the middle of their dorsal surface: the wrist has a large spine in the distal half of its upper border: the hand has its outer (upper) edge carinate up to a subterminal denticle, and has its lower edge cut into two or three sharp teeth: the dactylus has its cutting edge faintly and irregularly sinuous, but by no means denticulate, and the opposed edge of the immobile finger is irregularly and rather bluntly jagged. The legs are almost free from hair, a few hairs occurring on the posterior edge of the propodite and dactylus of the third pair and on the last two joints of the rudimentary fourth pair only: in the first and third pairs the carpus is dorsally carinate and the propodite foliaceously expanded, in the first and second pairs the dactylus is little more than broadly palmulate, and in the third pair the dactylus is foliaceous. The third and fourth abdominal terga are armed each with a median recurved spine, in both sexes.

The largest female in the Indian Museum collection has the carapace 28.5 millim. long, a smaller ovigerous female has the carapace 26.5 millim. long.

Wood-Mason established his two species on two specimens, one of which—*L. channeri*—had suffered a good deal from breakage and imperfect re-growth about the frontal region.

A considerable series of the specimens since obtained shows that the two supposed species are really one.

In the Indian Museum collection are numerous specimens, from the Andaman Sea 220 to 271 fms., from the Bay of Bengal 200 to 405 fathoms, and from both sides of Ceylon 296 to 406 fms.

Uniform salmon-colour in life, white in spirit.

## EXPLANATION OF PLATES.

## PLATE VI.

- Fig. 1. *Calappa pustulosa*.  
 „ 2. *Calappa woodmasoni*.  
 „ 3. *Pseudophilyra woodmasoni*.  
 „ 4. *Leucosia corallicola*.  
 „ 5. *Leucosia sima*.  
 „ 6. *Leucosia truncata*.  
 „ 7. *Pseudophilyra blanfordi*.

## PLATE VII.

- Fig. 1. *Philyra corallicola*.  
 „ 2. *Philyra sexangula*.  
 „ 3. *Ebalia woodmasoni*.  
 „ 4. *Ebalia diadumena*.  
 „ 5. *Nursia blanfordi*.  
 „ 6. *Nursia nasuta*.  
 „ 7. *Nursia persica*.

## PLATE VIII.

- Fig. 1. *Heteronucia vesiculosa*.  
 „ 2. *Pariphiculus rostratus*.  
 „ 3. *Actæomorpha morum*.  
 „ 4. *Tlos patella*.

