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“It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish, if such communications shall be long intermitted; and it will die away, if they shall entirely cease.” SIR WM. JONES.  
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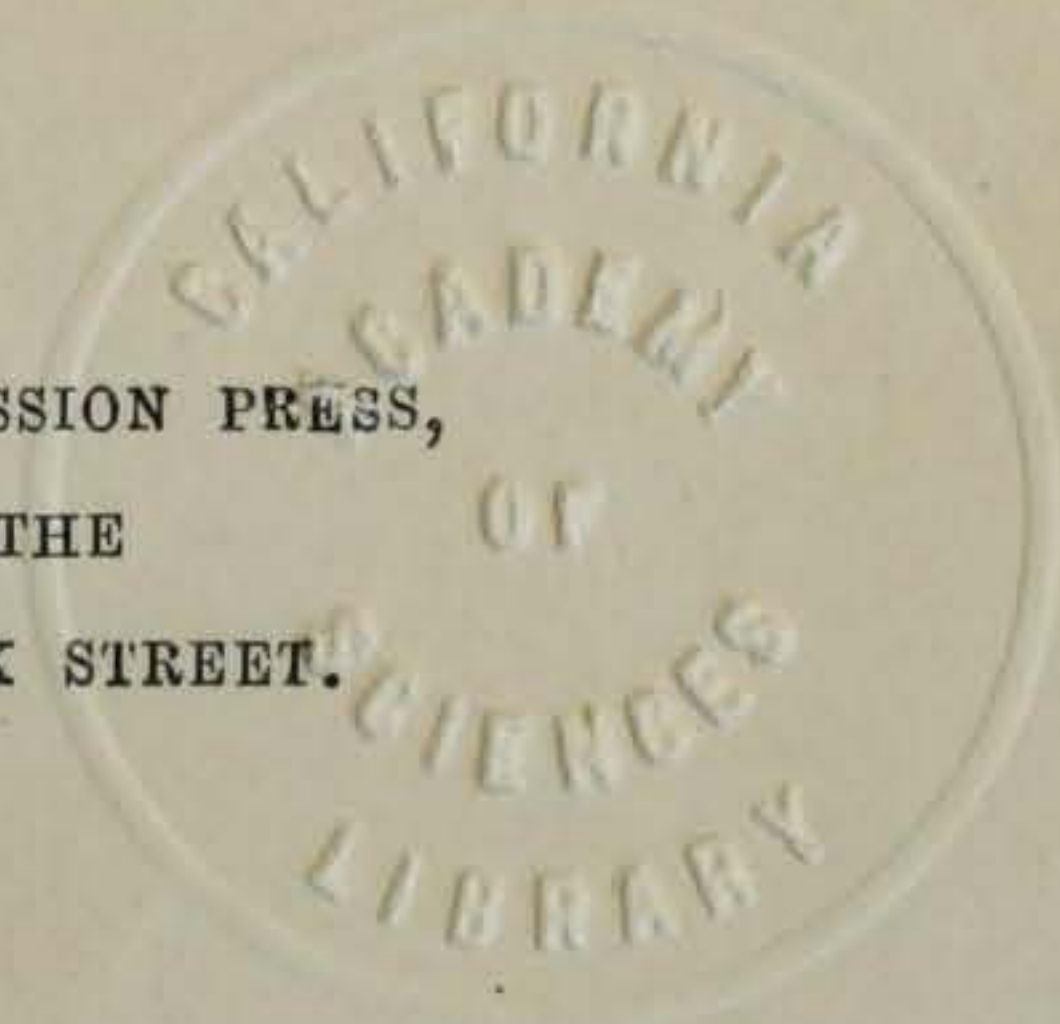
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a few hours afterwards, I removed a tooth rather over  $\frac{1}{20}$  inch long from the puncture in the lower eyelid. This, however, after being examined under the microscope by Dr. Alcock and myself, proved not to be a grooved one, so that this little experience throws no light on the possible effects of *Dryophis* fangs on the human subject; I think, however, that it may be fairly allowed, in connection with the belief above mentioned, to upset the reputation for gentleness which Dr. Boulenger awards to the species.\* I may say that I was not holding the snake roughly or maltreating it in any way, and that when confined afterwards in a glass case it repeatedly struck at anyone who came near, seeming to aim particularly at the face, though it soon recognized, apparently, the futility of attacking glass.

This intelligence in attack was again shown subsequently, when, having transferred the snake to a large cage of wire gauze, I endeavoured to make it attack a Gecko. This it would not do even when the lizard was thrown absolutely in its face, darting open-mouthed at me instead. It similarly refused to bite a handkerchief with which I teased it, though I have succeeded in getting *Dendrophis pictus* (a black Andaman variety) to do this.



*Materials for a Carcinological Fauna of India. No. 3. The Brachyura Cyclometopa. Part I. The Family Xanthidæ.—By A. ALCOCK, M.B., C.M.Z.S., Superintendent of the Indian Museum.*

[Received 20th March. Read 6th April, 1898.]

The family *Xanthidæ*, as here defined, includes the *Cancriidæ* (without *Cancer* and *Pirimela*) and the *Eriphiidæ* (without *Oethra*) of Dana's system.

It is a family which, as most authors have remarked, it is almost impossible to divide into groups that shall be at once natural and sharply defined, owing to the numerous intergradations of form that exist.

The Indian species of this family, so far as I have been able to discover, number 153, of which all but the following 14 are represented in the Indian Museum:—

*Carpilodes venosus* Edw., *Carpilodes margaritatus* A. M. Edw., *Lachnopus rodgersi* Stimpson, *Lophactæa fissa* Henderson, *Lophozozymus*

\* I hope this will not be taken as captious criticism of Dr. Boulenger's work, for which I entertain the sincerest admiration, especially since I know that gentleman to be in the habit of studying reptiles in life when opportunity offers.

*cristatus* A. M. Edw., *Hypocoelus rugosus* Henderson, *Cycloxanthus lineatus* A. M. Edw., *Halimede thurstoni* Henderson, *Cymo tuberculatus* Ortmann, *Pilumnus labyrinthicus* Miers, *Actumnus verrucosus* Henderson, *Actumnus nudus* A. M. Edw., *Heteropanope eucratoides* Stimpson, *Eurycarcinus maculatus* A. M. Edw.

The new species described in this paper have almost all been obtained by the "Investigator" and will be figured in the *Illustrations of the Zoology of the Investigator* for the year 1899, the original drawings for which are now in course of preparation.

### Tribe CYCLOMETOPA.

*Cyclométopes* Milne Edwards, Hist. Nat. Crust. I. 264, 363 (*part.*)

*Cancroidea*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 142 (*part.*)

*Cyclométopes*, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XIV. 1860, p. 183.

*Cyclometopa* or *Cancroidea*, Miers, Challenger Brachyura, p. 106 (*part.*)

*Cancroidea Portuninea* and *Cancroidea Cyclometopa* (*part.*) Ortmann, Zool. Jahrb., Syst., VII. 1893-94, pp. 65 and 411.

Carapace, almost without exception, broader than long, the anterolateral borders generally arched, sometimes very strongly so, the posterolateral borders generally convergent, sometimes very strongly so: the front broadish or broad, horizontal or obliquely deflexed, not rostrate.

Buccal cavern square-cut, commonly broader than long: the palp of the external maxillipeds articulating at or near the antero-internal angle of the merus.

Epistome transverse, short fore and aft.

The antennules generally fold nearly transversely.

The abdomen of the male occupies all the space between the last pair of legs.

Branchiæ nine pairs; their efferent channels opening on either side of the palate.

The genital ducts of the male open at the bases of the last pair of legs.

The *Cyclométopes* of Milne Edwards includes the genus *Æthra* which, following Miers, has been relegated to the Oxyrhyncha in this series of papers, and excludes the *Telphusidæ*, which by all subsequent writers have been regarded as true *Cyclometopes*.

The *Cancroidea* of Dana includes the genus *Acanthocyclus*. My only knowledge of this genus is derived from drawings and descriptions, which do not as yet satisfy me that *Acanthocyclus* is more nearly related to the *Cyclometopes* than to other groups.

The *Cyclometopa* of Miers includes not only *Acanthocyclus*, but,

following Claus, the *Corystoidea*. Now undoubtedly several of the forms included under the *Corystoidea* have very close relations with *Cancer* and *Pirimela*; and if *Cancer* and *Pirimela* are regarded as typical Catametopes then such (*Corystoid*) forms as *Atelecyclus* and *Hypopeltarium* may also be classed as Cyclometopes.

In this preliminary paper I prefer not to take *Cancer* as an ideal Cyclometope, and to leave the *Corystoidea* for future consideration.

The *Cyclometopa* of Ortmann includes the family *Parthenopidæ*, which in this series of papers has, in accordance with the views of other authors, been considered with the *Oxyrhyncha*; and also the *Corystoid* genera *Atelecyclus* and *Hypopeltarium*, the Cancrine affinities of which have been admitted. I cannot, however, think that the removal of the *Parthenopidæ* from their long approved position, as *Oxyrhynchs* showing a connexion between that type and the Cancrine type, serves any useful purpose.

For the purposes of this paper the *Cyclometopa* are divided into the following families:—

I. *Cancridæ*, in which the fold of the antennules is longitudinal or obliquely longitudinal, and the anterior boundary of the buccal cavern is somewhat indefinite, being more or less overlapped by the external maxillipeds.

Of this family, of which *Cancer* and *Pirimela* are types, no representative is known in the Indian Seas.

II. *Xanthidæ*, in which the fold of the antennules is transverse or obliquely transverse, and the anterior boundary of the buccal cavern is raised and sharply defined, so that the external maxillipeds commonly shut close against it unless they fall short of it.

III. *Portunidæ*, in which the fifth pair of legs is peculiarly modified for swimming and usually has the propodite and dactylus singularly broad thin and paddle-like.

IV. *Telphusidæ*, in which the form is Grapsoid, the branchial regions being much dilated. The members of this family inhabit fresh water and, sometimes, damp jungle.

The present paper refers to the family *Xanthidæ*.

#### Family XANTHIDÆ.

*Canceriens arqués et quadrilatères* Milne Edwards, Hist. Nat. Crust. I. 369.

*Cancridæ* (exc. *Cancrinæ* et ?*Polydectinæ*) and *Eriphidæ* (exc. *Oethrinæ*) Dana, U. S. Expl. Exp., Crust., pt. I. pp. 147, 228.

*Canceriens* (exc. *Oethra*, *Cancérides* et *Pirimélides*) A. Milne Edwards, Nouv. Archiv. du Mus. I. 1863, pp. 177-182.

*Cancridæ* (exc. *Cancer*), Miers, Challenger Brachyura, p. 106.

*Xanthini* (exc. *Thiidæ*), Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 412.

Carapace transversely oval or transversely hexagonal or subquadrate or (rarely) subcircular, but almost always broader than long. Front broadish or very broad, never in the form of a rostrum. The fold of the antennules is transverse or obliquely transverse. Antennary flagella short or slender. Anterior margin of buccal cavern very well defined, not overlapped by the external maxillipeds. Legs gressorial.

The *Xanthidæ* may be divided, according to the character of the palate emphasized by Dana, into two sections, as follows:—

I. *Hyperomerista*, in which the efferent branchial channel on either side is defined by a ridge on either side of the palate,—the ridge extending right up to the anterior border of the buccal cavern.

II. *Hyperolissa*, in which ridges defining the efferent branchial channels are either altogether absent or are present on the posterior part of the palate only.

I do not think that these sections, depending on a single variable character, should be considered as families, or even as subfamilies.

The section *Hyperolissa*, which corresponds to Dana's family *Canceridæ*, minus *Cancer* and *Pirimela* and *Polydectus*, is here subdivided into 3 subfamilies, hereafter characterized, namely, *Xanthinæ*, *Actæinæ*, and *Chlorodinæ*.

The section *Hyperomerista*, which corresponds to Dana's family *Eriphiidæ*, minus *Oethra*, is here subdivided into 4 subfamilies, hereafter characterized, namely, *Menippinæ*, *Oziinæ*, *Pilumninæ* and *Eriphiinæ*.

The genus *Platypilumnus*, Wood-Mason MS., Alcock, Ann. Mag. Nat. Hist. May 1894, p. 401, and Illustrations of the Zoology of the Investigator, Crustacea pl. xiv. fig. 6, probably belongs to this family and to the section *Hyperolissa*, and is probably related most nearly to *Galene*; but as I have only a single female specimen to go by its exact position must remain undecided.

The following artificial key is meant to serve for the discrimination of the Indian genera of this family:—

Key to the Indian Genera of the Family Xanthidæ.

- I. The ridges that define the efferent branchial channels, if present, are low and are confined to the posterior part of the endostome, never reaching to the anterior boundary of the buccal cavern :—
- i. The front and the antero-lateral borders together form a strongly convex arch; the postero-lateral borders markedly, and often very strongly, convergent; the posterior border, in consequence, short :—
1. Fronto-orbital border hardly ever (in adults) more than half, most usually much less than half, the greatest width of the carapace :—
- A. Carapace convex both fore and aft and from side to side across the branchial regions :—
- a. The abdomen of the male consists of seven distinct movable segments, the last of which is more than twice as long as the last but one :—
- x. Front *very* narrow and prominent, shaped like a pair of human incisors :  
carapace smooth ..... POLYCREMNUS.
- y. Front square-cut, narrow, the two lobes not strongly convex dorsally :  
carapace rugose and granular .. HALIMEDE.
- b. The abdomen of the male consists of five or six segments, owing to fusion of some, and the last is about the same length as the last but one :—
- x. A deep notch in the anterior border of the merus of the external maxillipeds (abdomen of male with the 7 segments distinct, but the 3rd, 4th and 5th move together) ..... DAIRA.
- y. No deep notch in the anterior border of the merus of the external maxillipeds :—
- p. A large oval or reniform cavity in either pterygostomian region... HYPOCOELUS.
- q. No cavity in the pterygostomian regions :—
1. Antero-lateral borders of carapace sharp, crest-like :  
upper border at least of arms, and of meropodites  
carpopodites and propodites of legs sharp and crest-  
like: basal antennal joint short, touching or clasping  
the turned down side-edge of the front; chelipeds  
equal :—
- \* Crest of antero-lateral border entire or slightly  
notched; carapace strongly convex in both direc-  
tions; fingers sharp pointed :—
- † Carapace perfectly smooth with the regions  
either not at all or only vaguely indicated... ATERGATIS.
- † Regions and subregions of carapace well  
sculptured, often granular ..... LOPHACTEA.

- q. 1. (continued). [Antero-lateral borders sharp and crest-like: upper border of meropodites crest-like]:—
- \* Crest of antero-lateral border cut into four sharpish lobes; carapace moderately convex, its regions much areolated; fingers blunt, hollowed out at tip ..... ZOZYMUS.
  - 2. Antero-lateral borders not cristiform, cut into several strong teeth: either the upper and lower inner angles of the orbit are in contact, or the outer angle of the basal antennal joint is prolonged into and completely fills the orbital hiatus:—
    - \* Antero-lateral borders prolonged beneath the orbits to the angles of the buccal cavern; chelipeds short, hands light and narrow, fingers pointed..... EUXANTHUS.
    - \* Antero-lateral borders normal; chelipeds long, hands very massive, fingers with broad hollowed-out (hoof-like) extremities ..... ETISUS.
  - 3. Antero-lateral borders not cristiform; the basal antennal joint runs up between the side-edge of the front and the orbital plate, but not into the orbital hiatus; front never deeply cleft into two lobes:—
    - \* Antero-lateral borders entire up to a strong lateral epibranchial tooth; carapace perfectly smooth, without trace of regions: chelipeds unequal, fingers pointed: front three-lobed, the middle lobe prominent with a concave edge ..... CARPILIUS.
    - \* Antero-lateral borders divided into four broad, shallow, rounded lobes; regions and sub-regions of the carapace well demarcated; chelipeds equal, fingers somewhat hollowed at tip: front rather prominent, somewhat convex, grooved and slightly notched in the middle line..... CARPILODES.
  - 4. Antero-lateral borders not cristiform, divided into four broad, blunt, shallow lobes, of which the first two are almost confluent; basal antennal joint simply touching the front:—
    - \* Carapace nearly twice as broad as long, barrel-like; legs smooth ..... LIOMERA.

- \* Length of carapace much more than half its breadth; upper border of meropodites of legs spiny.....
- 5. Antero-lateral borders divided into four more or less distinct lobes; regions of carapace usually profusely areolated and granular; front usually deeply and rather broadly cleft into two pointed rounded lobes: fronto-orbital border sometimes more than half the greatest width of the carapace:—
  - \* Fingers of ordinary form .....
  - \* Fingers compressed and very sharp, like blades of shears .....
- B. Carapace more or less convex fore and aft, at any rate in its anterior two-thirds, flat from side to side across the branchial regions:—
  - a. Basal antennal joint prolonged into the orbital hiatus: carapace three-fourths as long as broad: fingers hollowed out at tip .....
  - b. Basal antennal joint simply touching the front:—
    - x. Carapace three-fourths as long as broad, its antero-lateral border very distinctly prolonged beneath the orbit to the angle of the buccal cavern.....
    - y. Length of carapace usually less than three-fourths the breadth, the antero-lateral border not prolonged beneath the orbit to the angle of the buccal cavern:—
      - p. Antero-lateral border thin sharp, almost crest-like, either divided into 4 large triangular teeth or quite crest-like and only faintly notched: fingers not hollowed at tip:—
        - \* Antero-lateral borders divided into 4 large triangular teeth: 3rd—5th abdominal terga of the male fused together with or without obliteration of sutures ...
        - \* Antero-lateral borders ending, in one or both sexes, in a strong horizontal lateral epibranchial spine: all 7 abdominal segments distinct ...
      - q. Antero-lateral border not crest-like, divided into lobes or teeth which in some cases are indistinct—especially the first two of them:—
        - \* Fingers sharp-pointed, not hollowed at tip, antero-lateral border divided into 3 or 4 (usually 4) lobes or teeth:—

LACHNOPODUS.

ACTAEA, part.

BANAREIA.

ETISODES.

MEDÆUS.

LOPHOZOZYMUS.

HOPLOXANTHUS.



- \* Fingers sharp-pointed, not hollowed (*continued.*)
    - † Regions and subregions of carapace well defined, the lobes or teeth of the antero-lateral border very distinct:—
      - π. Either the front is sublamellar square-cut and prominent, or, if not, the carapace is smooth (non-granular) ..... XANTHO.
      - β. Antero-lateral borders very long and strongly arched ..... CYCLOXANTHUS.
      - φ. Front cleft into two round-pointed lobes, carapace granular ..... ACTAEA, *part.*
    - † Regions, save the gastric, not well defined and areolated: the 3 or 4 lobes of the antero-lateral border inconspicuous or almost obsolescent ..... LIOXANTHO.
  - \* Fingers blunt-pointed, hollowed at tip, antero-lateral border divided into 4 or more teeth ..... LEPTODIUS.
- ii. Fronto-orbital border much more than half the greatest width of the carapace:—
- A. Carapace roughly hexagonal:—
    - a. Fingers pointed; basal antennal joint very short, just touching the front ..... XANTHODES.
    - b. Fingers hollowed at tip, basal antennal joint of good length:—
      - x. Basal antennal joint running up between the turned down side-edge of the front and the orbital plate, carapace not granular or hairy:—
        - p. Regions and areolæ of carapace few and faint or absent altogether ..... CHLORODIUS.
        - q. Regions and areolæ of carapace well sculptured ..... PHYMODIUS.
      - y. Basal antennal joint prolonged into the orbital hiatus, regions and subregions of carapace well defined, granular or hairy, or both:—
        - p. Carapace less than three-fourths as long as broad ..... CHLORODOPSIS.
        - q. Carapace more than three-fourths as long as broad ..... CYCLODIUS.
    - B. Carapace sub-circular or elongate-pentagonal, leaving 2 or 3 abdominal terga always uncovered: one cheliped enormously larger than the other ..... CYMO.
  - 1. Carapace perfectly smooth, without trace of regions, antero-lateral borders entire ..... LIAGORE.
  - 2. Carapace more or less granular near the margins, regions defined though somewhat vaguely, antero-lateral border with lobes or teeth; basal antennal joint not reaching the front ..... GALENE.

- 3. Regions well defined, to some extent areolated; antero-lateral borders cut into four sharp teeth: carapace somewhat concave from side to side owing to swelling of the branchial regions above the level of the cardiac region.....
- ORPHNOXANTHUS.
- II. The ridges that define the efferent branchial channels extend to the anterior boundary of the buccal cavern, and are often very strong:—
  - i. Fronto-orbital borders half or less than half the greatest breadth of the carapace, which is broad and transversely-oval:—
    - 1. The basal antennal joint does not nearly reach the front:—
      - A. Carapace convex, the antero-lateral borders longer than the postero-lateral:—
        - a. Front less than a fifth the greatest breadth of the carapace: orbital hiatus open .....
        - MENIPPE.
        - b. Front nearly a fourth the greatest breadth of the carapace: no orbital hiatus, the orbit being a completely closed cavity .....
        - MYOMENIPPE.
      - B. Carapace nearly flat, the antero-lateral borders shorter than the postero-lateral .....
      - PSEUDOZIUS.
    - 2. Basal-antennal joint broadly in contact with the front:—
      - A. Antero-lateral border not thin and sharp: dactylus of smaller hand shorter than the lower border of the palm:—
        - a. Orbital hiatus open.....
        - OZIUS.
        - b. No orbital hiatus, the orbit being a completely closed cavity .....
        - EURUPPELLIA.
      - B. Antero-lateral border remarkably thin and sharp: dactylus of smaller hand as long as the entire lower border of the palm .....
      - EPIXANTHUS.
  - ii. Fronto-orbital border just about two-thirds the greatest breadth of the carapace: antero-lateral borders almost always shorter than the postero-lateral:—
    - 1. The basal antennal joint does not reach, or only just reaches, the front: the orbital hiatus is not closed:—
      - A. Carapace not tomentose, its regions ill defined, the first lobe of the antero-lateral border is a broad lobe confluent with the outer orbital angle:—
        - a. Antero-lateral border cut into 4 teeth:—
          - x. Indications of areolation on the carapace, anteriorly: front bilobed.....
          - HETEROPANOPE.
          - y. Carapace smooth, without any trace of areolæ or regions; front cut straight and square (with a median emargination) .....
          - EURYCARCINUS.
        - b. Antero-lateral border cut into 3 teeth; branchial regions defined by a strong dorsal bulge; front cut straight and square .....
        - NECTOPANOPE.
      - B. Carapace with regions usually rather well defined and areolated: it and the legs usually, but not always, tomentose:—
        - a. Carapace transversely oval, flattish or moderately convex, fairly well areolated...
        - PILUMNUS.
        - b. Carapace sub-circular with very concave postero-lateral borders, strongly convex, usually strongly areolated .....
        - ACTUMNUS.

- 2. Basal antennal joint broadly in contact with the front: the orbit is a completely closed cavity: foliaceous process of the 1st maxillipeds with its notched anterior margin prominent beyond the anterior margin of the external maxillipeds ... .. BAPTOZIUS.
- i. Fronto-orbital border much more than two-thirds the greatest breadth of the carapace: the antero-lateral borders meet the postero-lateral at a very wide and inconspicuous angle:—
  - 1. Chelipeds longer and stouter than the legs:—
    - A. Merus of external maxillipeds as long as or longer than broad:—
      - a. Basal antennal joint as broad as long, hardly touching the front: little or nothing is seen of the arm beyond the lateral border of the carapace in repose: the gastric region plainly delimited and areolated ... .. ERIPHIA.
      - b. Basal antennal joint slender. not or hardly touching the front: no trace of regions on the smooth polished carapace: at least half of the arm projects beyond the carapace:—
        - z. Carapace flat, or little convex: no orbital hiatus:—
          - p. Chelipeds not very greatly unequal; arm long,  $\frac{2}{3}$  visible beyond the carapace: front lobed or dentate ... .. TRAPEZIA.
          - q. Chelipeds very markedly unequal; arm short,  $\frac{1}{2}$  visible beyond the carapace: front nearly straight, finely denticulate ... .. TETRALIA.
          - n. Chelipeds subequal; arm very long, the whole of it projecting beyond the carapace: front acutely spinate ... .. QUADRELLA.
        - y. Carapace convex: an orbital hiatus present: front broadly bilobed: the whole arm projecting beyond the carapace..... SPHENOMERUS.
      - B. Merus of external maxillipeds about twice as broad as long ... .. DOMECIA.
    - 2. Chelipeds shorter and slenderer than the legs ... .. MELIA.

Appendix to Hyperolissa ?

Endostomial ridges sharp and salient posteriorly, very inconspicuous anteriorly. Carapace hexagonal, very thin, and perfectly flat; the postero-lateral borders longer than the spinate antero-lateral borders, and only moderately convergent; the regions very faintly delimited. Legs long and slender. The basal antennal joint does not nearly reach the front ..... PLATYPILUMNUS.

SECTION I. *Hyperolissa.*

*Xanthidæ* in which the efferent branchial channels are not defined by a complete ridge on either side of the palate.

## Subfamily I. XANTHINÆ.

Carapace usually much broader than long, usually transversely oval, sometimes transversely hexagonal. The front is contained from  $3\frac{1}{2}$  to  $5\frac{1}{2}$  times in the greatest breadth of the carapace.

Alliance I. CARPILIOIDA. Carapace broad, transversely oval, the antero-lateral border either entire, or divided into a few broad, shallow, rounded lobes. Legs sub-cylindrical. Abdomen of the male with the 3rd and 4th, or usually the 3rd, 4th and 5th segments fused together.

Alliance II. ZOZYMOIDA. Carapace broad, transversely oval, the antero-lateral border in the form of a sharp crest which may be either thin and entire (fissured only) or cut into 4 large teeth. Legs with at least the upper border of the merus carpus and propodus sharply cristiform. Abdomen of the male with the 3rd, 4th and 5th somites fused.

Alliance III. EUXANTHOIDA. Carapace broad, transversely oval, very profusely areolated in high relief; the antero-lateral borders are continued below the orbits to the outer angle of the buccal cavern. The basal antennal joint has its outer angle prolonged and impacted in the orbital hiatus, and the antennary flagellum, which is hardly visible without a lens, arises within the orbit. The abdomen of the male has the 3rd, 4th and 5th somites fused.

Alliance IV. XANTHOIDA. Front almost always prominent, square-cut (notched or fissured in the middle line) and sublaminar, and almost always separated from either supra-orbital margin by a deepish notch. Carapace broad (except *Medæus* and *Etisodes*), usually transversely oval, but sometimes more hexagonal; the antero-lateral border usually cut into sharp teeth. Male abdomen with segments 3-5 fused.

Alliance V. HALIMEDOIDA. Front prominent and square-cut. Carapace pentagonal, moderately broad. Abdomen of the male with all 7 segments distinct, the last segment being more than twice as long as any of the others.

Alliance VI. GALENOIDA. Carapace broad, pentagonal approaching the quadrilateral, the antero-lateral border hardly longer than the postero-lateral. The basal antennal joint does not nearly reach the front. The abdomen of the male has all 7 segments distinct. The sole type, *Galene*, is so singular that it might be separated as a distinct subfamily.

## Subfamily II. ACTAEINÆ.

Carapace usually much broader than long and usually very profusely and profoundly lobulated; the antero-lateral border is either divided into 4 blunt lobes, or crenated. The front is about a third the greatest breadth of the carapace, sometimes a little more, sometimes a little less, and is divided into two rather prominent usually round-pointed lobes.

## Subfamily III. CHLORODINÆ.

Carapace hexagonal or transversely oval, or subcircular (*Cymo*) or approaching the subcircular (*Cyclodius*). Front from a third to half the greatest breadth of the carapace—much broader than in the preceding subfamilies.

Alliance I. XANTHODEOIDA. Carapace transversely oval, front a third or little less than a third the greatest breadth of the carapace, fingers not hollowed at tip.

Alliance II. CHLORODIOIDA. Carapace transversely oval, front nearer half than a third the greatest breadth of the carapace, fingers hollowed at tip.

Alliance III. CYMOIDA. Carapace subcircular, flat; front about half the greatest breadth of the carapace: chelipeds remarkably unequal.

## Subfamily I. XANTHINÆ.

Alliance I. *Carpilioidea*.

Carpilius.	Liomera.	Liagore.
Carpilodes.	Lioxantho.	
	Lachnopodus.	

## CARPILIUS, Leach, Desmarest, A. M. Edw.

*Carpilius*, Leach, Desmarest Consid. Gen. Crust. p. 104 (footnote).

*Carpilius*, Rüppell, 24 Krabben roth. Meer. p. 13 (part).

*Carpilius*, Milne Edwards, Hist. Nat. Crust. I. 380.

*Carpilius*, De Haan, Faun. Japon. Crust. p. 16.

*Carpilius*, Dana, U. S. Expl. Exp. Crust. I. p. 159.

*Carpilius*, A. MILNE EDWARDS. ANN, SCI. NAT. ZOOL. (iv.) XVIII. 1862, p. 46, and NOUV. ARCHIV. DU MUS. I. 1865, p. 212, and Miss. Sci. Mex., Crust. p. 238.

*Carpilius*, Miers, Challenger Brachyura, p. 110.

Carapace broad, very convex in both directions, smooth (except for some coarse pitting inside the frontal and antero-lateral border), with no indication of regions; its antero-lateral borders strongly-arched, thick, entire, smoothly-moulded; its postero-lateral borders strongly-conver-

gent, straight, with a prominent tubercle at the angle of junction with the antero-lateral.

Front moderately broad, (less than a third the greatest width of carapace) deflexed, 3-lobed, the middle lobe prominent and bilobulate, the edges of all thickened.

Orbital margins entire, the upper margin thickened and forming a well-marked blunt tooth at its junction with the antero-lateral margin. Eyes on short thick stalks.

Antennules folding obliquely, almost transversely: inter-antennular septum broad.

Basal joint of antennæ long, flat, running up into an oblique cleft between the margin of the front and the infra-orbital plate; the antennary flagellum very small, less than half the diameter of the orbit and lodged in the said cleft.

Merus of the external maxillipeds with its anterior border very oblique.

Chelipeds massive, smooth, unequal in both sexes; the fingers bluntly pointed, those of the larger cheliped with a single pair of molariform teeth, those of the smaller cheliped with a blunt cutting-edge.

Legs smooth, sub-cylindrical.

Abdomen of male six-jointed—the 3rd and 4th somites fused with obliteration of sutures, the 5th somite also immovably adherent to the 4th. Large crabs.

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

- |  |     |                      |
|--|-----|----------------------|
| 1. Carapace with definitely disposed large red blots | ... | <i>C. maculatus.</i> |
| 2. Carapace irregularly marbled with red             | ... | <i>C. convexus.</i>  |

#### 1. *Carpilius maculatus*, (Linn.)

*Cancer ruber*, Rumph, Amboinsche Rariteitkamer, p. 18, pl. x. fig. 1.

*Cancer saxatile*, Seba, Thesaurus, III. 47, pl. xix. fig. 12.

*Cancer maculatus*, Linn. Syst. Nat. (xii.) p. 1042: Fabricius, Ent. Syst. II. 447, and Suppl. p. 338: Herbst, Krabben, I. ii. 135, pl. vi. fig. 41, and I. ii. 263, pl. xxi. fig. 118, and III. iv. 8, pl. lx. fig. 2: Desmarest, Consid. Gen. Crust. p. 104.

*Carpilius maculatus*, Milne Edwards, Hist. Nat. Crust. I. 382, and in Cuvier Règne Animal, Crust. pl. xi. fig. 2: De Haan, Faun. Japon., Crust. p., 7 (name only): Dana, U. S. Expl. Exp., Crust. pt. I. p. 160: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 32: Alph. Milne Edwards, in Maillard's l'île Réunion, Annexe F, p. 3, and Nouv. Archiv. du Mus. 1. 1865, p. 214 and IX. 1873, p. 175: Heller, Reise Novara, Crust. p. 9: Hess, Archiv. fur Naturges. XXXI. i. 1865, pp. 133 and 171: Hoffmann, in Pollen and Van Dam, Faun. Madagasc., Crust. p. 3; Richters in Mobius Meeresf. Maurit. p. 145: F. Muller, Verh. Ges. Basel. VIII. 1886, p. 473: Miers, Challenger Brachyura, p. 111: de Man, Archiv. f. Naturges. LIII. 1887, i. p. 231, and Zool.

Jahrbuch., Syst. VIII. 1895, p. 496: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 189: J. R. Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 353: Ortmann, Zool. Jahrbuch., Syst. VII. 1894, p. 469.

Front obliquely deflexed, the median lobe very decidedly bilobulate and separated from the lateral lobes on either side by a deep notch.

Carapace with not less than eleven large roundish dark-red blots (which seem never to competely fade even in very old Museum specimens) disposed as follows:—two on either side immediately behind the eye, the smaller and anterior one of these involving the orbital margin; three in a transverse curve across the middle of the carapace; four in another transverse line just in front of the posterior margin.

Eight specimens, from the Andamans, Nicobars, and Palk Straits.

## 2. *Carpilius convexus*, (Forsk.) Rüppell.

*Cancer convexus*, Forskal, Descr. Anim. p. 88.

*Cancer adpersus*, Herbst, Krabben, I. ii. 264, pl. xxi. fig. 1.

*Cancer marmarinus*, Herbst, Krabben, III. iv. 7, pl. lx. fig. 1.

*Carpilius convexus*, Ruppell, 24 Krabben roth. Meer. p. 13, pl. iii. fig. 2 and pl. vi. fig. 6: Milne Edwards, Hist. Nat. Crust. I. 382, pl. xvi. figs. 9, 10: DeHaan, Faun. Japon. Crust. p. 17 (name only): Dana, U. S. Expl. Exp. Crust. pt. I. p. 159, pl. vii. fig. 5: Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 32: Heller, SB. Ak. Wien XLIII. 1861, p. 319: Alph. Milne Edwards in Maillard's Pile Réunion Annexe F. p. 3, and Nouv. Archiv. du Mus. I. 1865, p. 215, and IX. 1873, p. 176: Hilgendorf in v. d. Decken's Reisen in Ost-Afrika III. i. p. 73: Hoffmann in Pollen and Van Dam, Faun. Madagasc., Crust. p. 3: Miers, P. Z. S. 1877, p. 133, and Ann. Mag. Nat. Hist. (5) II. 1878, p. 407: Richters in Möbius Meeresfauna Maurit. p. 145: E. Nauck, Zeitschr. Wiss. Zool. xxxiv. 1880, p. 56 (gastric teeth): Haswell, Cat. Austr. Crust. p. 41: F. Muller, Verh. Ges. Basel VIII. 1886, p. 473: de Man, Archiv. f. Naturges. liii. 1887, i. 232, and Zool. Jahrb. Syst. VIII. 1895, p. 496: Ortmann Zool. Jahrbuch., Syst. etc., VII. 1894, p. 469, and in Semon's Zool. Forschungsr. (Jena. Denkschr. VIII.) Crust., p. 51: Zehntner, Rev. Suisse Zool. II. 1894, p. 143.

*Carpilius lividus*, Gibbes, Proc. Amer. Ass. III. 1850, p. 174, is according to A. Milne Edwards, *vide* Nouv. Archiv. du Mus. I. 1865, p. 217, the young of *Carpilius convexus*. Miers also, Ann. Mag. Nat. Hist. (v) II. 1878, p. 407, considers *C. lividus* to be a synonym of *Carpilius convexus*.

Front vertically deflexed, the prominent median lobe is not decidedly bilobulate—in fact, it is sometimes but obscurely emarginate at tip—and is separated on either side from the lateral lobes by only a shallow excavation.

Carapace irregularly marbled with dark red, which in old spirit specimens sometimes fades entirely.

Seven specimens from the Andamans and Nicobars.

## CARPILODES, Dana, A. Milne Edwards.

*Carpilodes*, Dana, Silliman's Amer. Journ. Sci. and Arts, (2) XII. 1851, p. 126, and Proc. Acad. Nat. Sci. Philad. VI. 1852, p. 77, and U. S. Expl. Exp. Crust. pt. I. p. 192.

*Carpilodes*, Alph. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 224 (et synonym.)

*Carpilodes*, Miers, Challenger Brachyura, p. 133.

*Carpiloxanthus*, Alph. Milne Edwards in Maillard's l'île Réunion, Annexe F, p. 3. (A. M. E.)

Carapace very broad, convex in both directions, with the regions generally well demarcated and—especially in the anterior half—subdivided into lobular areolæ; its antero-lateral borders usually subdivided into four broad, shallow, rounded lobes; its postero-lateral borders straight, or a little concave, and strongly convergent.

Front broad (about a third the greatest breadth of the carapace) obliquely deflexed, grooved and slightly notched in the middle line, but not distinctly bilobed.

Orbits small, with entire margins, but usually with the three suture lines near the outer angle more or less distinct: eye-stalks short and thick.

Antennules folding obliquely, almost transversely. Basal antennal joint running up between the front and the lower orbital plate much as in *Carpilius*; the flagellum rather longer than the major diameter of the orbit.

Anterior edge of merus of external maxillipeds almost transverse.

Chelipeds equal or subequal in both sexes: fingers pointed, but distinctly grooved or hollowed near the tips.

Abdomen of the male five-jointed, the 3rd–5th somites fused.

Small crabs, easily recognizable by their short broad convex carapace, with its antero-lateral margins in the form of four broad shallow rounded lobes, its postero-lateral margins strongly convergent, and the broad deflexed rather prominent and convex front.

*Key to the Indian species of Carpilodes.*

I. Surface of carapace quite smooth to the naked eye:—

i. Upper border of meropodites of legs crest-like ... *C. lophopus.*

ii. Upper border of meropodites of legs not crest-like:—

1. Posterior part of carapace not lobulated:—

a. Gastric region subdivided into three lobules only ... .. *C. tristis.*

b. Gastric region subdivided into five lobules:—

a. Outer surface of wrist and hand smooth ... .. *C. venosus.*

β. Outer surface of wrist nodular, of hand granular... .. *C. stimpsoni.*

2. The whole of the carapace divided into a network of lobules by fine lines ... .. *C. pediger.*



II. Part or all of the surface of the carapace covered with vesiculous granules plainly visible to the naked eye:—

i. Posterior part of the carapace not lobulated:—

1. The whole of the carapace covered with granules ... .. *C. rugatus.*

2. Only the antero-lateral part of the carapace granular ... .. *C. vaillantianus.*

ii. Posterior part of the carapace more or less divided into lobules by transverse grooves: the whole surface of the carapace densely granular:—

1. A single transverse furrow behind the gastric region ... .. *C. margaritatus.*

2. Two transverse furrows (exclusive of one that helps to form the raised posterior margin) behind the gastric region:—

a. Branchial lobules few, long, roll-like... *C. monticulosus.*

b. Branchial lobules many, small, nodule-like ... .. *C. cariosus.*

### 3. *Carpilodes tristis*, Dana.

*Carpilodes tristis*, Dana, U. S. Expl. Exp. Crust. pt. I., p. 193, pl. ix. figs. 7a-d: Heller, Novara Crust. p. 17: Alph. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 225, and IX. 1873, p. 178: Haswell, Cat. Austr. Crust. p. 56: F. Muller, Verh. Ges. Basel, VIII. 1886, p. 474: de Man, Notes Leyden Mus. XII. 1890, p. 50: J. R. Henderson, Tr. Linn. Soc., Zool., (2) V. 1893, p. 353: Ortmann, in Semon's Zool. Forschungs. (Jena. Denkschr. VIII) Crust. p. 51.

Surface of carapace and appendages quite smooth to the naked eye, but with a dull look due to uniform microscopic miliary granulation. Gastric region delimited from the front, from the somewhat tumid supra-orbital margins, and posteriorly, by shallow grooves, and sharply demarcated from the branchial regions by fine sharp-cut lines; and subdivided into three lobules by a fine sharp-cut  $\Lambda$  shaped median incision.

Antero-lateral borders divided into four lobes, from the intervals between which fine sharp lines run obliquely inwards to incompletely subdivide the hepatic and branchial regions into lobules. Outer part of hepatic regions on a plane slightly lower than that of the rest of the carapace.

Colours in spirit: uniform dull brownish-buff, except the fingers and a large part of the lower border of the hand, which are black.

79 specimens from the Andamans and Nicobars.

### 4. *Carpilodes stimpsoni*, A. Milne Edwards.

*Carpilodes stimpsoni*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 232, pl. xi. figs. 2-2c, and IX. 1873, p. 181: de Man, Archiv. fur Naturges. LIII. 1887, i. p. 234, and Journ. Linn. Soc., Zool., vol. XXII. 1887-88, p. 25.

Differs from *Carpilodes tristis* Dana in the following more conspicuous particulars:—

(1) the surface of the carapace is of a shiny smoothness, except for some irregular pitting on the lobules of the anterior portion:

(2) the gastric region is subdivided into five longitudinal lobules (as in all the following species) by incisions running almost parallel with the limbs of the  $\Lambda$  shaped median incision:

(3) the chelipeds have the upper and outer surface of the wrist nodular and of the hand granular, and the upper surface of the corresponding joints and merus of the legs nodular:

(4) the colour in spirit is light yellowish.

A single specimen from Mergui.

It appears to me very doubtful whether this species is really distinct from *C. venosus*.

#### 5. *Carpilodes venosus*, (Edw.)

*Carpilius venosus*, Milne Edwards, Hist. Nat. Crust. I. 383.

*Carpilodes venosus*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 227, pl. xii. figs. 2-2b, and IX. 1873, p. 179: Miers, Zool. H. M. S. "Alert," pp. 183 and 213: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 353.

*Xantho obtusus*, De Haan, Faun. Japon. Crust., p. 47, pl. xiii. fig. 5: Krauss, Sudafr. Crust. p. 31.

Included in the Indian fauna on the authority of Dr. J. R. Henderson: there are no specimens in the Indian Museum referable to this species, unless (as, indeed, I believe) *C. stimpsoni* is synonymous.

From Milne Edwards' figures this species differs from *C. stimpsoni* in having the chelipeds and legs perfectly smooth.

#### 6. *Carpilodes pediger*, n. sp.

Allied to *C. venosus* and *stimpsoni*, from which it differs in having the whole of the carapace mapped out in lobules.

Most closely allied to *C. ruber* A. M. Edw., from which it conspicuously differs in the form of the male chelipeds.

Carapace extremely convex in both directions, its surface, like that of the appendages, being perfectly smooth to the naked eye though very finely granular under the lens: it is symmetrically and minutely subdivided by fine lines into very many little-convex and rather angular-outlined lobules. The antero-lateral borders are rather deeply four-lobed, the prominence of the outer angle of the orbit forming a small fifth lobule.

The chelipeds in the adult male are close upon twice the length of the carapace and have a very strong tooth on the inner upper border of

the wrist, and strongly-arched fingers which meet only at the tip, the movable finger bearing (in addition to the serrations of the hollow tip) a strong tooth near the base.

In the adult female the chelipeds are very little longer than the carapace and have only a small tooth on the wrist, and fingers which are not strongly arched but meet through the greater part of their extent.

Colours in spirit, light straw, fingers very light brownish: sometimes the wings of the carapace are light grey and then there is also a light grey stripe down the middle of the carapace, fore and aft.

Length of carapace 6·5 millim., breadth 10 millim.

Off Andaman Is. 10–41 fms., off Ceylon 26½ fms.

Seven specimens.

#### 7. *Carpilodes lophopus*, n. sp.

All parts are smooth to the naked eye, though under the lens the surface of the carapace and chelipeds is minutely pitted or eroded. The regions are demarcated and subdivided by very fine lines; and the lateral gastric areolæ (2 M of Dana) and the mid-branchial areolæ (4 and 5 L of Dana) are particularly, and rather angularly, convex.

The antero-lateral borders are four-lobed, the last two lobes being rather angular; the postero-lateral borders are markedly concave.

The front is broad and projects well beyond the orbits.

Chelipeds not very much longer than the carapace: two little tubercles, one above the other, at the inner angle of the wrist, and two at the distal end of the upper border of the hand.

The upper border of the meropodites of the legs is distinctly cristiform, that of the carpopodites is sinuous-cristiform, and both the upper and the lower edges of the propodites are cristiform—the lower more distinctly than the upper.

Colours in spirit, yellowish white.

Carapace about 5·5 millim. long, about 8·5 millim. broad.

Off south-east coast of Ceylon, 34 fms., a male and a female; a female from off Malabar coast, 29 fms.

#### 8. *Carpilodes rugatus*, (Latr.) A. Milne Edwards.

*Zoysmus rugatus*, Milne Edwards, Hist. Nat. Crust. I. 385, (A. M. E.)

*Zoysmus canaliculatus*, Lucas, Voy. Astrolabe, Crust. p. 21, pl. iii. fig. 2 (A. M. E.)

*Carpiloxanthus rugatus*, A. Milne Edwards in Maillard's l'île Réunion, Annexe F, p. 3. (A. M. E.)

*Carpilodes rugatus*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 230, pl. xii. figs. 3, 3b, and IX. 1873, p. 180: Richters in Möbius Meeresf. Maurit. p. 146: Miers, Zool. H. M. S. "Alert," pp. 517 and 529.

Surface of carapace uniformly covered with granules which are visible to the naked eye and on the antero-lateral parts of the carapace are vesiculous: the upper and outer surfaces of the wrist and hand, and of the corresponding joints of the legs, are closely granular to the naked eye, the granules of the hand being arranged in longitudinal series.

As in all the Indian species of *Carpilodes* except *C. tristis*, the frontal and supra-orbital borders are cut off from the rest of the carapace by a sinuous groove which also includes the two front lobes of the four-lobed antero-lateral border, and the gastric region is longitudinally 5-lobular.

Transverse grooves running from the last two intervals between the lobes of the antero-lateral border cut off, respectively, (1) the hepatic from the branchial regions, and (2) the first branchial lobule from the rest of the branchial region. All the lobules are strongly convex.

The cardiac region is not defined, and there is no lobulation of the posterior moiety of the carapace.

Colours in spirit—pink, fingers purplish-brown with white tips.

3 specimens from the Cocos Islands (Andamans).

#### 9. *Carpilodes vaillantianus*, A. Milne Edwards.

*Carpiloxanthus vaillantianus*, A. Milne Edwards, in Maillard's l'île Réunion Annexe F, p. 3. (A. M. E.)

*Carpilodes vaillantianus*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 231, pl. xi. figs. 3-3b. Haswell, Cat. Austral. Crust. p. 57: Miers, Zool. H. M. S. "Alert," p. 529: de Man, Archiv. f. Naturges. LIII. 1887, i. p. 235: Ortmann in Semon's Zool. Forschungsr. (Jenaische Denksch. VIII.), Crust. p. 51.

This species, if it is really distinct from *C. rugatus*, differs from the latter in the following particulars:—

(1) the granulation is confined to the antero-lateral parts of the carapace:

(2) the lobules of the carapace are less convex:

(3) the furrow that cuts off the anterior branchial lobule does not meet the furrow that bounds the gastric region.

Among 17 specimens in the Indian Museum there is a good deal of variation of these characters; so much so, that some of the specimens might almost be referred to *C. rugatus*, especially to the "Astrolabe" figure.

Five specimens from the Andamans, three from Muscat, two from Mergui; (the others from Mauritius, Samoa, and Viti).

#### 10. *Carpilodes margaritatus*, A. Milne Edwards.

*Carpilodes margaritatus*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873,

p. 182, pl. v. fig. 2: Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 353: Whitelegge, Mem. Austral. Mus. III. 1897, p. 131.

Carapace and legs covered with pearly granules plainly visible to the naked eye. The carapace is much lobulate, the anterior branchial lobe being itself trilobulate, and the region behind the gastric region being crossed transversely by a furrow. The antero-lateral borders are *indistinctly* four-lobed. *The hands are not longitudinally furrowed.*

Colours; red, fingers black.

No specimens in the Indian Museum collection. Included here on the authority of Dr. J. R. Henderson.

### 11. *Carpilodes cariosus*, n. sp.

Allied to *C. margaritatus*.

Carapace strongly convex, its whole surface intricately cut up, by deep grooves, into many small strongly-convex lobules, the surface of which is pitted and granular, so as to give the carapace as a whole a somewhat worm-eaten appearance.

The legs also have the extensor surfaces of the long joints granular and nodular: the outer surface of the wrist is nodular: the outer surface of the hand is granular and furrowed.

The antero-lateral borders are very distinctly four-lobed.

The space between the gastric region and the posterior border of the carapace is broken by two (or three, counting the groove inside the raised posterior border) deep transverse grooves, the space between the grooves being Cupid's-bow-shaped. A transverse groove also cuts off a narrow piece from the posterior extreme of the mesogastric lobule.

Colours in spirit; whitish with pink spots on carapace, legs pink, fingers sometimes black with white tips, sometimes pinkish white.

Length of carapace about 5 millim., breadth about 7 millim.

Off Ceylon  $26\frac{1}{2}$  to 34 fms., 13 specimens including several ovigerous females: off Andamans 10 to 15 fms., 2 specimens.

### 12. *Carpilodes monticulosus*, A. Milne Edwards.

*Carpilodes monticulosus*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 181, pl. v. fig. 1: de Man, Archiv. f. Naturges. LIII. 1887, i. p. 233: Ortmann in Semon's Forschungsreisen (Jena. Denkschr. VIII.) Crust. p. 51.

Carapace very broad (not far short of twice as broad as long), its surface everywhere closely covered with elegant vesiculous granules. The whole of the carapace is divided, by deep broadish grooves, into elongate lobules of an elegant smooth roll-like form (quite unlike any other Indian species). A narrow beaded lobule forms the posterior limit of the mesogastric lobe (much as in *C. cariosus*), and two

furrows cross transversely the region between the latter and the posterior border of the carapace. On the branchial regions, on either side of the mesogastric lobule, is a small dimpled lobule. The wrist and hand are closely covered with granules like those on the carapace, the wrist being dimpled and the hand longitudinally furrowed.

The extensor surfaces of the legs are also closely, but much more finely, granular, the carpus in all being dimpled.

Antero-lateral borders four-lobed, the lobes narrow, rather shallow, rounded, and the last three of nearly equal size.

Colours in spirit; dark purplish-red, legs lighter, fingers white with brownish base.

Two specimens, from Gt. Coco I. (Andamans) and East I., Andamans are in the Indian Museum.

Carapace not quite 6 millim. long, 10 millim. broad.

#### LIOMERA, Dana.

*Liomera*, Dana Silliman's Amer. Journ. Sci. and Arts (2) XII. 1851, p. 124; Proc. Acad. Nat. Sci. Philad. 1852, p. 73; and U. S. Expl. Exp. Crust. pt. I. p. 160.

*Liomera*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 218, and Exp. Sci. Mex. Crust. p. 239.

Carapace extremely broad, strongly convex in both directions, transversely barrel-like, either smooth or with the regions very faintly indicated; its antero-lateral borders thick, either entire or divided into four broad shallow rounded lobes, of which the first two are almost coalescent; its postero-lateral borders very strongly convergent, straight or a little concave.

Front narrow (from a third to less than a fourth the breadth of the carapace), obliquely deflexed, grooved and slightly notched in the middle line, but not distinctly bilobed.

Orbits small, with the three suture lines near the outer angle usually distinct; eye-stalks short and thick.

The antennules fold nearly transversely. Basal antennal joint broad and short, merely touching the front; the flagellum, which is short, lodged in the orbital hiatus.

Anterior edge of merus of external maxillipeds a little oblique.

Chelipeds equal or subequal in both sexes; fingers somewhat hollowed at tip. Legs sub-cylindrical.

Abdomen of the male five-jointed, the 3rd—5th somites being fused.

Small or medium-sized crabs, easily recognized by their short, very broad, strongly convex, barrel-like carapace.

13. *Liomera cinctimana*, (White), Dana.

*Carpilius cinctimanus*, White, in Jukes Voyage H. M. S. "Fly," Vol. II. p. 336, pl. ii. fig. 3, and Samarang Crust. p. 37, pl. vii. fig. 4.

*Liomera cinctimana*, Dana, Silliman's Journ. (2) XII. 1851, p. 124, and U. S. Expl. Exp. Crust. pt. I. p. 161: A. Milne Edwards Nouv. Archiv. du Mus. I. 1865, p. 219, and IX. 1873, p. 176, pl. v. fig. 4, and Exp. Sci. Mex. Crust. p. 240: Stimpson, Ann. Lyc. New York, X. 1874, p. 103.

*Carpilodes cinctimanus*, Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 234: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 354.

*Liomera lata*, Dana, Proc. Ac. Nat. Sci., Philad. 1852, p. 73, and U. S. Expl. Exp. Crust. pt. I. p. 161, pl. vii, figs 6a-d: Stimpson, Proc. Acad. Nat. Sci. Phil. 1858, p. 32, and Ann. Lyc. New York, X. 1874, p. 104: Heller, Novara Crust. p. 9: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 220, and Exp. Sci. Mex., Crust. p. 240: F. Muller, Verh. Ges. Basel. VIII. p. 474.

Carapace extremely broad—its length only about  $\frac{8}{15}$  of its breadth—its surface, like that of the appendages, everywhere smooth and polished, showing only the faintest indications of a gastro-cardiac region and of oblique lobulation of the branchial regions: the antero-lateral border is divided into three coarse lobes, the anterior of which is again obscurely divided into two.

Front obliquely deflexed, with a rather prominent convex edge cleft in the middle line. Orbital margin with three radiating suture-lines near the outer angle. Chelipeds equal.

Colours in spirit; orange-red, fingers black, hand with a broad black cross-band merging with the black of the immobile finger.

3 specimens from the Andamans and Muscat (besides specimens from Mauritius and South Sea Is.).

14. ?*Liomera sodalis*, n. sp.

Carapace broad (length about  $\frac{2}{3}$  breadth) very strongly convex, perfectly smooth, without any indication of regions, its margins smooth, entire. Front nearly vertically deflexed, its edge cleft in the middle line. Eyes large, supra-orbital margin without any suture-lines. Chelipeds a little unequal; the upper and outer surfaces of the carpus and hand of the smaller cheliped covered with prickly granules, but in the larger cheliped the granulation has a very much worn appearance: fingers hardly hollowed at tip.

Legs (those that are present in the unique specimen) somewhat hairy; none of the joints are carinate though some have prickly granules on the upper surface.

Colours in spirit—of the same blotchy orange and reddish colour as that of a species of *Solenocaulon*, in the hollow stem of which the crab was found.

Length of carapace 6 millim., breadth 9 millim.

Off south-east corner of Ceylon, 32 fms.

This species resembles a small *Atergatis*, but has sub-cylindrical legs and has no margin to the carapace.

#### LACHNOPODUS, Stimpson.

*Lachnopus*, Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 32 : A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 233 : Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 452.

“Carapax laevis, regione posticâ transversim convexâ. Orbita margine externâ trifissâ vel trilobatâ, lobis parvis, obtusis. Antennæ ut in *Carpilio* (ut in *Liomerâ* ?). Gnathopoda intima laciniâ ad apicem non furcatâ. Hectognathopoda ischio longitudinaliter sulcato; mero superficie versus angulum internum excavatâ, margine anteriore concavâ. Chelopoda manu facie externâ sulcatâ. Pedes ambulatorii valde setosi, mero compresso, superne spinoso.

“*Liomeræ* affinis, sed carapace angustiore, pedibus setosis spinosisque.”

This genus is not represented in the Indian Museum.

#### 15. *Lachnopus rodgersii*, Stimpson.

*Lachnopus rodgersii*, Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 32.

*Liomera rodgersii*, Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 231, pl. xiii. fig. 3, (orbit and antennæ only): de Man, Archiv. für Naturges. LIII. 1887, i. p. 237 : J. R. Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 354.

“Carapace transverse, about once and a half as broad as long, smooth, glabrous, and shining, with the interregional sutures almost obsolete; the two posterior teeth of the antero-lateral margins are the only ones developed, and are very obscurely marked and obtuse. The front is somewhat produced, and is divided by a median and two lateral incisions into four lobes, of which the two median are broad and truncated, and the lateral (or inner orbital lobes) are small and denti-form. On the upper orbital margin are three small obtuse teeth (including that of the outer orbital angle); the tooth at the inner and lower orbital angle is rather prominent. The merus-joint of the outer maxillipeds is rather small and transverse; and this joint has a shallow pit on its outer surface. The anterior legs (in the male) are robust, smooth; arm or merus-joint with a series of spinules on its upper margin; carpus smooth, with an antero-internal tooth; penulti-



mate joint or palm slightly rugose externally, and with two longitudinal and parallel grooves on its outer surface; fingers short, robust, toothed on their inner margins and with the apices not excavated. The ambulatory legs are somewhat compressed and clothed with long fulvous hairs; their merus-joints are spinulose on their upper margins. The postabdomen of the male is five-jointed, the third to fifth joints being coalescent. Length  $8\frac{1}{2}$  lines, breadth nearly 1 inch 1 line.

This species has been hitherto known only from the very short generic definition of Dr. Stimpson, which, however, embraces all the characteristic peculiarities of the species, and which agrees exactly with the example before me, except in one point. Stimpson says (l. c.), "Antennae ut in *Carpilio*." In the specimen now before me the antennae are of the same structure as in *Liomera*, the basal joint being very short and united at its summit to an inferior prolongation of the front, and not, as in *Carpilius*, joined to the front along its inner margin. I have little doubt that Stimpson erroneously wrote *Carpilius* for *Liomera*, as he does not say that *Lachnopodus* is distinguished from *Liomera* by any peculiarity in the structure of the antennæ.

I do not think that *Lachnopodus* is generically distinct, as Milne Edwards has described a *Liomera* (*L. longimana*) with hairy ambulatory legs." (Miers.)

#### Genus LIOXANTHO.

Carapace broad, moderately or strongly convex in its anterior two-thirds, flat posteriorly; the gastric region is fairly or faintly delimited, and one or two short furrows may pass on to it obliquely from the intervals between the lobes of the antero-lateral margin, but beyond this there is no distinct division of the carapace into regions or sub-regions.

The antero-lateral borders are much like that of *Liomera*, being divided into 4 broad blunt lobes, of which the first two are so much coalescent as to really form but one.

Front somewhat deflexed, bilobed, or sinuous and notched in the middle line. Fronto-orbital border less than half the greatest width of the carapace.

Orbital margin and antennæ as in *Xantho*.

Anterior edge of merus of external maxillipeds a little more oblique than in *Xantho*.

Chelipeds either subequal or unequal in both sexes, fingers pointed. Legs subcylindrical.

Abdomen of male five-jointed, the 3rd-5th somites coalescent.

*Key to the species of the genus Lioxantho.*

- I. Chelipeds unequal, outer angles of front separated from the supra-orbital margin by a notch; regional markings of carapace almost obsolete ... .. *L. tumidus.*
- II. Chelipeds equal, outer angles of front fused with supra-orbital margin:—
- i. Carapace chelipeds and legs smooth as wax ... *L. punctatus.*
- ii. Carapace chelipeds and legs uniformly closely and finely granular ... .. *L. asperatus.*

16. *Lioxantho punctatus*, (Edw.)

*Xantho punctatus*, Milne Edwards, Hist. Nat. Crust. I. 396: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 199, pl. vii. fig. 6: Miers, Challenger Brachyura, p. 125: de Man, Zool. Jahrb. Syst. IV. 1889, p. 420, and Notes Leyden Mus. XII. 1890, p. 52, pl. iii. fig. 1.

*Liomera punctata*, Miers, Zool. H. M. S. Alert, pp. 517, 528: de Man, Archiv. fur Naturges. LIII. 1887, i. p. 238: J. R. Henderson, Trans. Linn. Soc. Zool., (2) V. 1893, p. 354: Ortmann, Zool. Jahrb., Syst. VII. 1893-94, p. 451.

Carapace moderately convex in the anterior two-thirds, flat posteriorly, its surface smooth. The gastric region is fairly well defined antero-laterally, and the fronto-orbital region marked off, by distinct grooves; and two short grooves (of which the anterior is the longer) pass in obliquely from the notches between the 2nd and 3rd, and 3rd and 4th lobes of the antero-lateral margin; but this is all the areolation that exists.

Antero-lateral border moulded into four broad shallow lobes, of which the first two are almost coalescent.

Front bilobed, the outer angle of each lobe fused with the supra-orbital border, as in *Xantho impressus* and as in no other Indian species of *Xantho*: the width of the front is about a fourth the greatest breadth of the carapace.

Chelipeds equal in both sexes, perfectly smooth, although a very indistinct groove sometimes runs about half way along the outer surface of the hand near the upper border.

Legs thickish, smooth, the dactylus with some fur and a few short hairs.

Colours in spirit; pinkish yellow or buff, with small red spots on carapace, and ill-defined pinkish-brown patches on chelipeds and legs; fingers black, with light brown tips.

In the Indian Museum are 3 specimens from Ceylon, (as well as 8 from Mauritius and 2 from Samoa).

17. *Lioxantho tumidus*, n. sp.

Carapace in its anterior two-thirds strongly convex from before

backwards and a little convex from side to side, flat in its posterior third; perfectly smooth and polished. The limits of the gastric region, and its division into three sub-regions, are faintly apparent as mere markings, not grooves; and the fronto-orbital region is marked off by a faint groove.

The antero-lateral border is divided into four broad shallow lobes, of which the first two are almost confluent; from the notch between the second and third a short groove runs obliquely inwards on to the carapace, and a still shorter one from the notch between the third and fourth.

Front much less than a fourth the greatest width of the carapace, bilobed, the outer angle of each lobe separated from the supra-orbital margin by a notch and groove.

Chelipeds unequal, smooth and polished.

Legs rather thick, smooth; a few scattered hairs along the upper border of the last three and along the lower border of the last two joints, the dactylus also furred. The upper border of the meropodites of all the legs, as well as of the arm, is microscopically serrulate or crenulate.

Colours in spirit pinkish yellow, fingers black with light brown tips.

In the Indian Museum are 3 specimens from the Andamans, (and one from Samoa).

This species exactly resembles a quite smooth and strongly-inflated *Xantho bidentatus*, and but that I have 4 specimens, representing both sexes and different ages, I should have regarded it as an abnormality of that species.

It also has a remarkable resemblance to the *Xantho (Lachnopodus) tahitensis* figured and described by de Man in Zool. Jahrb. Syst. IV. 1889, p. 418, pl. ix. fig. 4; but it has not the row of strong spines along the upper border of the meropodites of the chelipeds and legs, that are characteristic of that species.

#### 18. *Lioxantho asperatus*, n. sp.

Carapace very slightly convex fore and aft in its anterior two-thirds, quite flat posteriorly and from side to side, very closely sharply and uniformly granular everywhere except the posterior median portion, where the granulation is visible only under a lens. The gastric region is faintly delimited, a short bifurcating groove runs in from the frontal notch, and two very faint grooves run in obliquely from the two notches of the antero-lateral margins, but this is all the attempt at areolation that exists.

Antero-lateral border granular and rather sharp, very obscurely divided into three most inconspicuous lobes, the first of which hardly shows a trace of subdivision.

Front not quite a fourth the greatest breadth of the carapace, obliquely deflexed, emarginate and faintly grooved in the middle line, its outer angles not separated from the supra-orbital margin.

Chelipeds equal, the upper corner of the outer surface of the arm, the upper and outer surfaces of the wrists and hands, closely covered with little pearly granules like those on the antero-lateral parts of the carapace.

Legs stout: the upper edge of the merus and the dorsal surface of the next two joints granular like the chelipeds, the dactylus hairy.

Colours in spirit orange-yellow.

In the Indian Museum are a male and female probably from Karáchi.

#### LIAGORE, De Haan.

*Liagore*, De Haan, Faun. Japon. Crust. p. 19.

*Liagora*, Dana, Amer. Jour. Sci. and Arts (2) XII. 1851, p. 124; and U. S. Expl. Exp. Crust. pt. I. p. 148.

Carapace somewhat approaching the quadrilateral, strongly convex fore-and-aft, little convex from side to side, smooth, without any indication of regions.

Antero-lateral border moderately arched, entire; postero-lateral border very moderately convergent, straight, about as long as the chord of the antero-lateral; posterior border long,—about half the greatest width of the carapace in length, or more.

Fronto-orbital border about half, front about quarter, the greatest width of the carapace in extent. Front a little deflexed, broadly bilobed. Orbital margin thin entire, the outer angle of orbit a little thickened. Eyes on very short thick stalks.

The antennules fold nearly transversely. Basal antennal joint very short and broad, but passing up between the side of the front and the inner angle of the orbit; the flagellum, which is about as long as the major diameter of the orbit, lodged in the orbital hiatus.

Anterior edge of merus of external maxillipeds somewhat oblique.

Chelipeds massive, equal in both sexes, the fingers pointed.

Legs subcylindrical, rather long, smooth.

Abdomen of male five-jointed, the 3rd–5th somites fused.

#### 19. *Liagore rubromaculata*, De Haan.

*Cancer (Liagore) rubromaculatus*, De Haan, Faun. Japon. Crust. p. 49, pl. v. fig. 1.

*Liagore rubromaculata* Miers, Ann. Mag. Nat. Hist. (5) II. 1878, p. 407 (note); and Challenger Brachyura, p. 111, (footnote).

Carapace transversely somewhat oval, approximating the quadrilateral type, with long posterior and only moderately convergent postero-lateral borders; its surface devoid of sculpture and perfectly smooth to the naked eye, microscopically pitted and granular: pterygostomian region somewhat hairy.

Antero-lateral border moderately sharp, entire. Front broadly and rather faintly bilobed, the outer angles of each lobe pronounced, prominent, and separated from the supra-orbital margin by a short shallow groove. A little pimple-like thickening at the outer angle of the orbit.

Chelipeds equal, smooth and polished: both borders of the arm hairy, the upper border with a few blunt denticles; both the inner and the outer angles of the wrist strongly pronounced; fingers long, pointed, with the opposed edges strongly but bluntly serrate.

Legs long, subcylindrical, smooth and polished, the dactyli most elegantly plumed.

Colours in spirit yellowish with numerous large livid red spots.

In the Indian Museum is a single specimen dredged off the Irrawaddy Delta in 20 fms., (besides 8 from Hongkong).

#### Alliance II. *Zozymoida.*

Atergatis.

Lophactæa.

Zozymus.

Lophozozymus.

#### ATERGATIS, De Haan, A. Milne Edw.

*Atergatis*, De Haan, Faun. Japon. Crust. p. 17.

*Atergatis*, Dana, Silliman's Journ. Sci. and Arts (2) XII. 1851, p. 124, and U. S. Expl. Exp. Crust. pl. I. p. 57.

*Atergatis*, A. MILNE EDWARDS, ANN. SCI. NAT. Zool. (4) XVIII. 1862, p. 49, and NOUV. ARCHIV. DU MUS. I. 1865, p. 231.

*Atergatis*, Miers, Challenger Brachyura, p. 111.

*Platypodia*, Bell, Trans. Zool. Soc. I. 1835, p. 336.

Carapace externally broad, convex in both directions, regional boundaries absent or quite inconspicuous, surface either quite smooth or somewhat pitted; its antero-lateral borders strongly arched and *with an independent keel-like edge*; the postero-lateral strongly convergent, straight. The under surface of the wings of the carapace is a good deal hollowed to receive the wrists and hands in flexion.

Front narrow (from a fourth to less than a fifth the greatest breadth of the carapace) more or less deflexed, its edge shaped like cupid's bow (*i.e.*, not bilobed).

Orbital margin with the three suture-lines near the outer angle fine and faint but distinct: eyestalks short and thick, eyes small.

Antennules folding transversely, inter-antennular septum broad.

Basal joint of antennæ short, touching the front only at their antero-external angle; flagellum lodged in the orbital hiatus, short (less than the major diameter of the orbit).

Merus of external maxillipeds with the anterior border almost transverse.

Chelipeds subequal in both sexes; fingers pointed, not distinctly hollowed at tip.

Legs with the upper border of the merus carpus and propus, and the lower border of the merus and propus, sharply carinate or cristate.

Abdomen of the male five-jointed, the 3-5th somites being fused.

Medium-size and large crabs.

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

- I. Edge of antero-lateral borders of carapace sharp and crest-like, forming a tooth or ridge at the lateral epibranchial angle:—
  - i. Carapace with an even surface, without indications of regions:—
    1. Surface of external maxillipeds almost devoid of hair; no comb-like tufts of hair on the legs ... .. *A. integerrimus.*
    2. Surface of external maxillipeds like a doormat; comb-like tufts of thick hair on the under surface of some of the joints of the legs ... .. *A. dilatatus.*
  - ii. Carapace with the surface somewhat lumpy; variegated with spots and confluent blotches ... *A. floridus.*
- II. Edge of antero-lateral borders of carapace thick and blunt; no ridge or tooth at the lateral epibranchial angle ... .. *A. roseus.*

#### 20. *Atergatis integerrimus* (Lam.)

*Cancer integerrimus*, Lamarck, Hist. Nat. Anim. sans Vert. V. Crust. p. 272: Milne Edwards, Hist. Nat. Crust. I. 374 and in Cuvier's Règne An. Crust. pl. xi bis., fig. 1.

*Atergatis integerrimus*, De Haan, Faun. Japon. Crust. p. 45, pl. xiv. fig. 1: Dana U. S. Expl. Exp. Crust. pt. I. p. 158: Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 32: A. Milne Edwards, Nouv. Arch. du Mus. I. 1865, p. 235: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 231: Richters, in Möbius Meeresf. Maurit. p. 145: F. Muller, Verh. Ges. Basel, VIII. 1886, p. 474: de Man, Archiv. fur Naturges. LIII. 1887, i. p. 244, and Journ. Linn. Soc., Zool., XXII. 1888, p. 24, and Zool. Jahrbuch. Syst. VIII. 1895, p. 496: A. O. Walker, Journ. Linn. Soc., Zool., XX. 1890 p. 109:

J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 352 : Ortmann, Zool. Jahrbuch Syst. VII. 1894, p. 462.

*Atergatis subdivisus*, White, Ann. Mag. Nat. Hist. (2) 1848, p. 284, and Samarang Crust. p. 38, pl. viii. fig. 3.

?*Atergatis subdentatus*, De Haan, Faun. Jap. Crust. p. 46, pl. iii. fig. 1 : A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 236.

Carapace, length from about  $\frac{4}{7}$  to about  $\frac{3}{5}$  the breadth; its surface in the anterior third or half irregularly and rather distantly pitted, especially near the front and antero-lateral borders: except for two faint creases that partly show the cardiac region, there are no other traces of regional divisions.

The crest-like edge of the antero-lateral border turns in at the lateral epibranchial angle to form a stout ridge there: this edge sometimes shows traces of two or three fissures.

The front, which is little prominent, meets the antero-lateral borders at a wide but very distinct angle.

Orbits very small, their width being much less than a third the width of the front.

Surface of the external maxillipeds either quite smooth or with short and scanty hair. Sternum smooth to the naked eye, or with a little scattered pitting.

Chelipeds equal; the upper edge of the merus sharply, the upper edge of the hand and finger strongly but more bluntly, crested; the upper outer surface of the hand with some scale-like roughening.

The outer surface of the legs is hardly pitted; the claw, in all the legs, is hairy, and there is a little tuft of hair near the far end of the lower edge of the propodite, but all the other joints are generally free of hair.

Colours in spirits, pinkish ochre, fingers blackish brown, with whitish tip and teeth.

30 specimens from Mergui, the Andamans, Ceylon and Singapore.

## 21. *Atergatis dilatatus*, De Haan, A. Milne Edwards.

*Atergatis dilatatus*, De Haan, Faun. Jap. Crust. p. 46, pl. xiv. fig. 2 : A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 238, and Nouv. ARCHIV. DU MUS. IX. 1873, p. 183, pl. v. fig. 6 : E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 57, pl. i. figs. 19-21 (*gastric teeth*) : F. Müller, Verh. Ges. Basel, VIII. 1886, p. 474 : Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 353.

Closely resembles *A. integerrimus*, but easily recognized by the following constant differences:—

- (1) the carapace is even broader, and has a sharper edge:
- (2) the surface of the carapace is much more closely and extensively

pitted, no part being free from pitting except a small area in the mid-gastric region: the outer surface of the chelipeds and legs also is quite rough, from pitting:

(3) the creases that serve to show the cardiac region are much larger and deeper:

(4) the crest that bounds the endostome in front is higher:

(5) the external maxillipeds are closely covered, like a door-mat, with long thick bristles; and remarkable comb-like tufts of long stiff bristles are found along the front border of the ischium of the chelipeds and along the lower border of the ischium and merus of all the legs:

(6) the surface of the sternum is closely covered with confluent granules visible to the naked eye.

All these differences are to be noted in a large male with a carapace 119 millim. broad from Ceylon, in a medium-sized male (70 millim. broad) from the Andamans, and in two small females (59 and 44 millim. respectively) from widely different parts of the Andaman group — these four specimens being in the Indian Museum collection.

## 22. *Atergatis roseus* (Rüppell).

*Carpilius roseus* and *marginatus* Rüppell, 24 Krabben roth. Meer. p. 13, pl. iii. fig. 3 and pl. vi. fig. 7; p. 15, pl. iii. fig. 4.

*Cancer roseus* and *marginatus*, Milne Edwards Hist. Nat. Crust. I. 374, 375.

*Atergatis roseus* and *marginatus*, De Haan, Faun. Japon. Crust. p. 17 (names only):

*Atergatis roseus*, Heller SB. AK. Wien, XLIII. 1861, p. 309: A Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 239: Kossmann, Reise roth. Meer. Crust. p. 19: Richters in Möbius Meeresf. Maurit. p. 145: Haswell, Cat. Austr. Crust. p. 42: Cano, Boll. Soc. Nat. Nap. III. 1889, p. 189: Ortmann, Zool. Jahrb., Syst., VII. 1894, p. 461.

*Atergatis marginatus*, Krauss, Sudafr. Crust. p. 28: Dana U. S. Expl. Exp. Crust. pt. I. p. 158: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 240.

*Atergatis laevigatus*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 241, pl. xv. figs. 4-4a: Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 352.

*Atergatis scrobiculatus*, Heller, Abhand. zool.-bot. Ges. Wien, XI. 1861, p. 5, and SB. AK. Wien, XLIII. 1861, p. 310: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 242.

Carapace of much the same proportions as *A. integerrimus*, but with a perfectly smooth dull surface; no indication whatever of regions; the crest of the antero-lateral borders blunt and ending smoothly, without any ridge or tooth, at the lateral epibranchial angle.

Front, orbits, external maxillipeds and legs as in *A. integerrimus*. Fingers fluted, but upper edge of hand rounded, not crested.

Colours in spirit, brownish yellow, fingers blackish brown with whitish teeth and tips.

22 specimens from Karáchi, and Madras coast.



23. *Atergatis floridus*, (Rumph).

*Cancer floridus*, Rumph, Amboinsch. Rariteitk. p. 16, pl. viii. fig. 5: Linnæus, Syst. Nat. (xii) p. 1041.

*Cancer ocyroe*, Herbst, Krabben, III. ii. 20, pl. liv. fig. 2: Milne Edw. Hist. Nat. Crust. I. 375.

*Atergatis floridus*, De Haan, Faun. Jap. Crust. p. 46: Krauss, Sudafr. Crust. p. 27: Dana, U. S. Expl. Exp. Crust. pt. I. p. 159, pl. vii. fig. 4: Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 32: Heller, Novara Crust. p. 8: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 243; and IX. 1873, p. 186: Targioni Tozzetti, Magenta Crust. p. 24: Miers, P. Z. S. 1877, p. 133, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 231, and Zool. H. M. S. Alert, pp. 182, 207, and Challenger Brachyura, p. 112: Haswell, Cat. Austral. Crust. p. 41: F. Muller, Verh. Ges. Basel VIII. 1886, p. 474: de Man, Arch. fur Naturges. LIII. 1887, i. 245, and Journ. Linn. Soc. Zool., XXII. 1888, p. 24, and Weber's Zool. Ergeb. Niederl. Ost.-Ind. II. 1892, p. 277: A. O. Walker, Journ. Linn. Soc., Zool., XX. 1890, p. 109: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 352: Ortmann, Zool. Jahrb. Syst. VII. 1894, p. 460, and in Semon's Forschungsr. (Jena. Denkschr. VIII) Crust. p. 51.

Carapace, length about  $\frac{7}{10}$  breadth; its surface of perfectly smooth texture, but rendered lumpy by broad shallow depressions that faintly define and subdivide the regions; the crest of the antero-lateral border is sharp and ends at a very distinct tubercle at the lateral epibranchial angle.

The front forms with the antero-lateral borders a semicircle. The orbits are rather large, their width being more than one-third that of the front.

External maxillipeds free from hair on the surface: the sternum and the surface of all parts of the appendages except the hands (which have some rough reticulations on the outer surface) are smooth.

Chelipeds equal, the upper edge of the merus and hand strongly and sharply carinate; the fingers fluted as usual. Legs with crested edges to the long joints, as in *A. integerrimus*.

Colours in spirit, yellow; carapace covered with symmetrically disposed brown spots and confluent blotches, chelipeds and legs with a few faint brown spots, fingers blackish with whitish teeth and tips.

86 specimens from the Andamans, Mergui, Ceylon, Laccadives and Karáchi.

24. *Atergatis* sp.

There is, in the Indian Museum, a little specimen of an *Atergatis*, which may perhaps be the *A. asperimanus* insufficiently characterized by White in the P. Z. S. 1847, p. 224 and in the Annals and Magazine of Natural History, 1848, Vol. II. p. 285, as follows:—

“Carapace with its latero-anterior sides with a cutting edge, part

“ of carapace behind this punctate; the rest of the surface almost quite smooth with three or four impressed lines in front.

“ Hands rugose, especially above; fingers, both movable and fixed, deeply channelled.

“ Pale yellowish red; feet darker; fingers pale horn-coloured.

“ Philippines.”

Our little specimen, from off Ceylon, 34 fms., agrees with this description; but the “impressed lines,” which define the gastro-cardiac region, are so faint as to be only just visible.

It has the crested legs of *Atergatis*.

#### LOPHACTÆA, A. Milne Edwards.

*Lophactæa*, A. Milne Edwards, Ann. Sci. Nat. Zool. (4) XVIII. 1862, p. 43; and Nouv. Archiv. du Mus. I. 1865, p. 245, and IX. 1873, p. 187.

*Lophactæa*, Miers, Challenger Brachyura, p. 113.

“ The Lophactæas are distinguished from *Atergatis* by their narrower and always deeply lobulated carapace.”

Carapace moderately broad, convex in both directions, with the regions generally well delimited and subdivided into lobes, and the surface generally (not always) granular; the antero-lateral borders have an independent crest-like edge, generally thin and sharp and distantly fissured; the postero-lateral borders are rather concave.

Front a little deflexed, about a fourth the greatest breadth of the carapace in extent, grooved and emarginate in the middle line, but not distinctly bilobed. Orbits large, the three suture lines near the outer angle distinct. Eyes on short thick stalks.

Antennules folding nearly transversely, inter-antennular septum broad. Basal joint of antennæ short, touching the front only; the flagellum lodged in the orbital hiatus. Merus of the external maxillipeds with the front edge a little oblique.

Chelipeds equal in both sexes; fingers not hollowed at tip. Long joints of legs with sharp crest-like upper borders much as in *Atergatis*.

Abdomen of the male five-jointed, the 3rd-5th somites being fused.

Small crabs.

*Lophactæa*, except that the fingers are pointed instead of broad and hollowed-out at tip, appears to me to be as closely as possible related to *Zozymus*. In *Lophactæa*, besides the difference in the fingers, the carapace is more convex and less cut up into lobules, and its surface is generally granular.

*Key to the Indian species of Lophactæa.*

- I. Regions and sub-regions of the carapace very distinct; postero-lateral borders slightly concave, but not definitely marked off from the rest of the carapace:—
- i. Surface of carapace more or less covered with pearly granules:—
    1. Hand sharply crested along upper border:—
      - a. Pearly granules over the whole of the carapace, and over the outer surface of the carpus and propus of the walking legs ..... *L. cristata.*
      - b. Pearly granules absent from part of the post-cardiac region and from the walking legs ..... *L. semigranosa.*
    2. Upper border of hand not crested:—
      - a. Crest-like margin of antero-lateral border of carapace simply cleft ..... *L. granulosa.*
      - [b. Crest-like margin of carapace deeply eroded ..... *L. fissa.*]
  - ii. Surface of carapace and of appendages perfectly smooth..... *L. anaglypta.*
- II. Regions and sub-regions of the carapace so faint as to be visible only on close inspection; postero-lateral borders remarkably concave, and defined by a row of sharp beads or teeth ..... *L. corallina.*

25. *Lophactæa cristata*, A. Milne Edwards.

*Lophactæa cristata*, A. Milne Edwards, *Nouv. Archiv. du Mus.* I. 1865, p. 246, pl. xvi. fig. 1: de Man, *Notes Leyden Mus.* III. 1881, p. 95, and *Arch. fur Naturges.* LIII. 1887. i. p. 246: F. Müller, *Verh. Ges. Basel* VIII. p. 474: Ortmann, *Semon's Forschungsr.* (Jena. Denkschr. VIII.), *Crustacea*, p. 50.

Carapace symmetrically intersected by broad smooth rather deep furrows, which delimit and subdivide the regions, the strongly marked convexities of the regions and subregions being closely studded with pearl-like granules: similar, but larger, granules occur in linear series on the outer surface of the wrist and hand; and similar, but smaller, granules are found on the outer surface of the corresponding segments of the legs. The under surface of the carapace is finely granular and more or less furred.

The whole supra-orbital border is tumid, with a row of pearly granules.

The crest of the antero-lateral border is divided into four broad segments by three narrow fissures.

Upper border of the arm and hand strongly and sharply crested, fingers fluted.

Legs with a few scattered bristles on most of the joints, and with the claws covered with short fur: the upper edge of the merus carpus and propus is strongly crested, as are the lower edges of the merus.

Colours in spirit, yellowish or greenish brown, fingers blackish brown.

One specimen from the Madras coast is in the Indian Museum collection. (There are other specimens from Mauritius).

26. *Lophactæa semigranosa*, (Heller) A. M. Edw.

*Atergatis semigranosus*, Heller, Abhand. zool.-bot. Ges. Wien, XI. 1861, p. 6, and SB. AK. Wien, XLIII. 1861, p. 313.

*Lophactæa semigranosa*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 248: Miers, Zool. H. M. S. Alert, pp. 517 and 527: de Man, Archiv. fur Naturges. LIII. 1887, i. p. 246, pl. viii. fig. 4: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 355: Ortmann, Zool. Jahrb. Syst. VII. 1894, p. 459.

Closely resembles *L. cristata* Heller, from which it is, perhaps, not specifically distinct. It differs chiefly in having the pearly granules not only less sharply sculptured and less closely studded, but quite absent from a part of the post-cardiac region, from the supra-orbital border, and from the outer surface of the walking legs. Its appearance, in short, is that of *L. cristata* with the sculpturing worn.

7 specimens from the Andamans, Mergui, and Ceylon.

27. *Lophactæa granulosa*, Rüppell, A. M. Edw.

*Xantho granulatus*, Rüppell, 24 Krabben roth. Meer. p. 24, pl. v. fig. 3.

*Aegle granulatus*, De Haan. Faun. Japon. Crust. p. 17 (name only).

*Cancer limbatus*, Edw., Hist. Nat. Crust. I. 377, pl. xvi. fig. 14.

*Atergatis limbatus*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 157: Heller, Novara Crust, p. 8: Streets, Bull. U. S. Nat. Mus. VII. 1877, p. 105.

*Lophactæa granulosa*, A. MILNE EDWARDS, NOUV. ARCHIV. DU MUS. I. 1865, p. 247, and IX. 1873, p. 187: Brocchi, Ann. Sci. Nat. (6) II. 1875. Art. 2, p. 71, pl. xvii. fig. 138 (male appendages): Hilgendorf, MB. AK. Berl. 1878, p. 787: de Man, Notes Leyden Mus. III. 1881, p. 95, and Archiv. fur Naturges. LIII. 1887, i. p. 246: Haswell, Cat. Austr. Crust. p. 43: Miers, Challenger Brachyura, p. 114: Cano, Boll. Soc. Nat. Nap. III. 1889, p. 190: J. R. Henderson, Tr. Linn. Soc., Zool., (2) V. 1893, p. 354: Ortmann, Zool. Jahrb. Syst. &c. VII. 1894, p. 459.

Closely resembles the two preceding species, from which it differs most conspicuously in having no crest to the upper border of the hand: the granulation of the carapace is not nearly so sharp-cut and pearl-like. In the Indian Museum are specimens from Australia and Samoa, but none from India. It is included in the Indian Fauna on the authority of Dr. J. R. Henderson.

28. *Lophactæa anaglypta* (Heller), A. M. Edw.

*Atergatis anaglyptus*, Heller, Abhandl. zool.-bot. Ges. Wien, 1861, p. 6, and SB. Ak. Wien, XLIII. 1861, p. 312, pl. ii. figs. 11, 12.

*Lophactæa anaglypta*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 251, and IX. 1873, p. 190: Ortmann, Zool. Jahrb. Syst. VII. 1893, p. 459: de Man, Zool. Jahrb. Syst. VIII. 1895, p. 498.

Carapace with the regions separated and symmetrically subdivided by broad but well cut grooves, but with the texture of the surface—as of the appendages—perfectly smooth, the only roughness of any sort being a few lines and impressions on the outer surface of the hand.

Crest of the antero-lateral border narrow, divided into four lobes by three insignificant notches or dents. Supra-orbital border not tumid throughout its extent. Crest of the upper border of the hand low and rather blunt: crests of the leg-joints distinct but rather low.

One specimen from Galle, one from the Persian Gulf.

29. *Lophactæa corallina*, n. sp.

Carapace broadly semioval, with remarkably concave postero-lateral borders, the crest of the antero-lateral border very thin and sharp and a little angular, the postero-lateral and posterior borders bounded by a line of sharp beads or teeth. Front obliquely deflexed, with a sharp broadly-bilobed edge.

The whole surface of the carapace is very finely granular, but the division and subdivision of the regions, though undoubtedly existent, is hardly perceptible, so faint are the inter-regional depressions: some long stiff hairs occur here and there.

The under surface of the carapace and the surface of the external maxillipeds and male sternum is finely granular.

The chelipeds and legs are rather hairy and are beautifully sculptured: at the distal end of the arm is a petal-like crest, and three series of larger petaloid granules or crests traverse the outer surface of the wrist longitudinally: the outer surface of the hand is closely granular, the granules becoming linear in arrangement and laminar in form towards the upper part.

The outer surfaces of the legs are covered with granules and teeth, two crests on the carpopodites of all being very distinct.

Colours in spirit, yellowish or whitish with a pink blush: fingers with a black cross-band at the base.

Length of carapace 6 millim., breadth 9 millim.

A male and female from off Ceylon, 34 fms.

30. *Lophactæa fissa*, Henderson.

*Lophactæa fissa*, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 355, pl. xxxvi. figs. 8, 8a.

It appears to me possible that this, which seems to be founded on a single specimen, is only an individual variation of *L. granulosa*.

*Lophactæa* sp.

From Inglis I. (Andamans) a single small specimen, not agreeing with any described species, which in the circumstances I forbear to describe.

It belongs to the *L. cristata* and *semigranosa* group, but has the inter-regional furrows much shallower and less distinct, and the pearly granules absent from all but the front part of the gastric region and the lateral parts of the epibranchial region: those on the chelipeds are also much fewer and more scattered. The legs are very hairy.

## ZOZYMUS, Leach.

*Zozymus*, Leach, [Dict. Sci. Nat. XII. p. 75. Miers]: and in Desmarest, Consid. Gen. Crust. p. 105.

*Zozymus*, Milne Edwards, Hist. Nat. Crust. I. 383 (part).

*Zozymus*, Dana, U. S. Expl. Exp., Crust. pt. I. p. 189.

*Zozymus*, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XX. 1863, p. 302.

*Zozymus*, Miers, Challenger Brachyura, p. 134.

Carapace moderately broad, moderately convex in both directions, with the regions well delimited and subdivided into numerous lobules, the surface of which is not usually granular.

The antero-lateral borders are sharp and crest-like, and are cut into lobes (usually four in number); the postero-lateral borders are straight and strongly convergent.

Front about a fourth the greatest breadth of the carapace, obliquely deflexed, grooved and emarginate in the middle line: orbits large, the tumid edge with the three suture lines near the outer angle distinct; eyes on short thick stalks.

Antennules folding nearly transversely, inter-antennular septum broad. Basal joint of antennæ short, touching the front only at the (produced) antero-internal angle; the flagellum short (less than the major diameter of the orbit), lodged in the orbital hiatus.

Merus of the external maxillipeds with the front edge a little oblique.

Chelipeds equal in both sexes; fingers with broad hollowed-out

tips. Long joints of legs with sharp crest-like upper borders much as in *Atergatis*.

Abdomen of the male five-jointed, the 3rd–5th somites being fused.  
Rather large crabs.

*Key to the Indian species of Zozymsus.*

- I. All parts of carapace rugose : inter-regional and inter-lobular furrows smooth and naked except, perhaps, near the margin of the carapace ... .. *Z. aeneus*.
- II. Posterior third of carapace hardly at all rugose : inter-regional and inter-lobular furrows for the most part full of short close hair ... .. *Z. pilosus*.

31. *Zozymsus aeneus*, (Linn.)

*Cancer incomparibilis*, Seba, Thesaurus III. 48, pl. xix. fig. 18.

*Cancer aeneus*, Linn., Mus. Lud. Ulr. p. 451, and Syst. Nat. (ed. xii) p. 1048.

*Cancer floridus*, Herbst, Krabben, I. ii. 132, 264, pl. iii. fig. 39, pl. xxi. fig. 120.

*Cancer amphitrite*, Herbst, Krabben, III. ii. 5, pl. liii. fig. 1.

*Cancer aeneus* and *floridus*, Fabricius, Ent. Syst. II. 455, 445, and Suppl. p. 335, 338.

*Cancer aeneus*, Latreille, Hist. Nat. Crust. V. 375 : Lamarck, Hist. Nat. Anim. sans Verteb. V. 271 : Desmarest, Consid. Gen. Crust. p. 104 : [Quoy et Gaimard, Voy. Uranie, pl. lxxvi. fig. 1. Edw.].

*Zozymsus aeneus*, Milne Edwards, Hist. Nat. Crust. I. 385.

*Aegle aeneus*, De Haan, Faun. Japon. Crust. p. 17.

*Zozymsus aeneus*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 192, pl. x. fig. 3 : Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 32 : Heller, SB. AK. Wien, XLIII. 1861, p. 326 : A. Milne Edwards, in Maillard's l'île Réunion, Annexe F. p. 4, and Nouv. Archiv. du Mus. IX. 1873, p. 207 : Miers, Ann. Mag. Nat. Hist. (5) II. 1878, p. 407, and Phil. Trans. Vol. 168, 1879, p. 486, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 234, and Challenger Brachyura, p. 134 : Richters in Möbins Meeresf. Maurit. p. 146 : Haswell, Cat. Austral. Crust. p. 58 : F. Muller, Verh. Ges. Basel VIII. p. 474 : de Man, Archiv. fur Naturges. LIII. 1887, i. p. 273 : Cano, Boll. Soc. Nat. Napoli III. 1889, p. 199 : J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 359 : Ortman, Zool. Jahrb. Syst. VII. 1893-94, p. 458, and Semon's Forschungsr. (Jena. Denk. VIII) Crust. p. 50 : Whitelegge, Mem. Austral. Mus. III. 1897, p. 131.

Carapace with the regions well delimited and very strongly rugose, the rugosities being small in the postero-lateral regions but everywhere smooth and polished, and everywhere symmetrical. The crest-like antero-lateral borders are 4-scalloped, the three anterior lobes being rounded and the fourth being dentiform.

The tumid orbital margins are marked by four suture lines. The front hardly projects beyond the level of the orbit.

The wrist has its outer surface made rugose by meandering furrows, one of which runs fore and aft, the others transversely. The

hand carries a blunt but well-marked crest along its upper border, below which the surface is rugose much as the wrist: the lower part of the outer surface of the hand is tuberculous, the tubercles tending to a linear arrangement. The fingers are fluted, bear strong molariform teeth and tufts of hair on their cutting edge, and have blunt-pointed, hollowed out (spoon-like) tips. The furrows of the wrist and hands, as well as those of the legs, are filled with close short fur.

The merus carpus and propus have the upper edge strongly carinate, the inner surface of each crest bearing a thick fringe of long somewhat silky hair: the dorsal surface of these joints is furrowed longitudinally, with many more or less plain transverse impressions also: the dactyli are hairy up to the claw.

In life the animal is beautifully spotted and ocellated with chocolate brown on a bluish-grey ground. In spirit the animal has a chinaware look and a dull yellowish-white colour, with darker yellow and dull brownish spots and markings.

In the Indian Museum are 30 specimens from the Andamans and Laccadives.

### 32. *Zozymus pilosus*, A. Milne Edwards.

*Zozymus pilosus*, A. Milne Edwards, Ann. Soc. Ent. France (4) VII. 1867, p. 271; and Nouv. Archiv. du Mus. IX. 1873, p. 208, pl. vii. fig. 2.

Carapace having the regions and lobules well defined in its anterior two-thirds only: the lobules have a flattened semi-imbricate look, wavy edges, and a rough or granular surface; and the grooves that separate them are filled with small short close-set bristles, especially along the anterior contours of the lobules.

All four lobes of the antero-lateral borders are rounded and not dentiform. The orbital margin is not very tumid and is marked by three suture lines. The front projects beyond the orbit.

The wrist and hand are closely nodular: the nodules (those on the hand especially) have a granular surface, and the grooves that separate them are full of short close hair: the upper edge of the hand is not crested. Fingers short, stout, blunt-pointed, hollowed at tip: they are strongly fluted, the ridges being beaded in their basal half.

The legs have the upper edge of the merus, carpus, and propodite strongly crested: the crest of the merus and carpus may be subserrate, and is always notched near the distal end. The dorsal surface of the carpus and propodite is grooved and nodular—the nodules having a flat, subimbricate look.

Colours in spirit—yellowish-white, with a faint bluish or purplish blush; the crest-like margin of the carapace lighter than other parts; fingers dark brown with white tips.



In the Indian Museum is a specimen from Port Blair Harbour (Andamans), and one from the Angrias Bank (Malabar Coast) in 15 fms.

Although the chelipeds and antero-lateral margins make this species easily recognizable from *Lophozozymus incisus* (Edw.) de Man, I am inclined to suspect that this is the young of *L. incisus*.

#### LOPHOZOZYMUS, A. Milne Edwards.

*Lophozozymus*, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XX. 1863, p. 276 ; and Ann. Soc. Entom. France (4) VII. 1867, p. 272.

*Lophozozymus*, Miers, Challenger Brachyura, p. 114.

Differs from *Zozymus* in having (1) the crest of the antero-lateral border sharp-edged and (2) the fingers not spooned at tip. To avoid unnecessary disturbance of accepted nomenclature the name is here maintained as a subgenus of *Zozymus*.

#### *Key to the Indian species of the subgenus Lophozozymus.*

- I. Front lobe of the antero-lateral border confluent and fused with the orbit : [size moderate or small]:—
  - . Regions and lobules of carapace well defined ; the lobules pitted or dented, the grooves between them hairy : chelipeds and legs shaggy ..... *L. incisus*.
  - i. Regions and lobules of carapace ill defined and faint : surface of carapace smooth and bare : legs with a few lank scattered hairs ... . . . . . *L. dodone*.
- II. Front lobe of antero-lateral border separated from the orbit by a gap ; carapace smooth, the regions (but not the subregions) fairly well defined : [size large]:—
  - i. Hands smooth and bare ... . . . . . *L. octodentatus*.
  - ii. Outer surface of hand granular and hairy ..... *L. cristatus*.

#### 33. *Lophozozymus octodentatus*, Edw.

*Cancer saxatilis*, Rumph, Amboinsch. Rariteitk. p. 9, pl. v. fig. M.

*Cancer rumphii*, Guérin, Icon. Règne An. pl. ii. fig. 1, (*nec* Herbst.)

*Xantho octodentatus*, Milne Edwards, Hist. Nat. Crust. 1. 398 : Lucas in Jäcquinot's Voyage Astrolabe, Zool., Crust., p. 23, pl. ix. fig. 1 : E. Nauck, Zeits. Zool. XXXIV. 1880, p. 51 (*gastric teeth*) : Haswell, Cat. Austral. Crust. p. 58.

*Lophozozymus epheliticus* Linn., Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 231, and Zool. H. M. S. Alert, pp. 182, 207 : A. O. Walker, Journ. Linn. Soc., Zool., XX. 1890, p. 109 : de Man, Zool. Jahrb., Syst., VIII. 1895, p. 518.

Carapace perfectly smooth and polished ; the gastric region delimited on all sides and partly subdivided, and the hepatic separated from the branchial regions, by broad smooth shallow depressions. Underside of carapace hairy.

Front gently convex beyond the orbits, finely cleft in the middle line. Orbital border sharp, somewhat puckered by three sutures near the outer angle. The crest-like antero-lateral border is sharp and is cut into four teeth, of which the first is separated from the orbit by a gap, the third and fourth are keeled, and the third strongly acuminate.

Chelipeds equal, their surface perfectly smooth: the upper edge of the arm is strongly crested, the crest at its distal end being foliaceously expanded and deeply cleft; wrist with a strong double tubercle at its inner angle; upper edge of hand crested, but rather coarsely; fingers large, long, pointed.

Legs smooth: upper edge of merus carpus and propodite strongly crested, the inner face of the crest with tufts of long hair; dactylus furred up to the claw.

Colours in spirit: a bright orange-red network on a dull yellow-ochre ground, fingers black.

In the Indian Museum are two specimens from Singapore.

#### 34. *Lophozozymus cristatus*, A. Milne Edwards.

*Lophozozymus cristatus*, A. Milne Edwards, Ann. Soc. Entom. France (4) VII. 1867, p. 272, and Nouv. Archiv. du Mus. IX. 1873, p. 203, pl. vi. fig. 4: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 361: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 456.

This species appears to differ from *L. octodentatus* only in having the first lobe or tooth of the antero-lateral margin acute instead of rounded and the outer surface of the hands granular and hairy.

There are no specimens in the Indian Museum; and the species — if it be distinct — is included in the Indian fauna on the authority of Dr. J. R. Henderson.

#### 35. *Lophozozymus incisus* (Edw.) Haswell, de Man.

*Xantho incisus*, Milne Edwards, Hist. Nat. Crust. I. 397: Hess, Archiv. f. Nat. XXXI. 1865, i. p. 133: F. Muller, Verh. Ges. Basel, VIII. 1886, p. 474.

? *Xantho superbus*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 74, and U. S. Expl. Exp. Crust. pt. I. p. 167, pl. viii. figs. 5a-b, (nec A. Milne Edwards) de Man.

*Lophozozymus incisus*, Haswell, Cat. Austral. Crust. p. 58: de Man, Archiv. für Naturges. LIII. 1887, i. p. 268, pl. x. fig. 1: Thallwitz, Abh. u. Ber. Mus. Dresden, 1890-91, no. 3, p. 48.

Carapace with the regions well delimited, and having the branchial regions (and to a less extent, the gastric region also) subdivided into lobules which have their anterior margins sinuous and sharply undermined so as to have a semi-imbricate look. The surface of these lobules is a little dented and uneven, and the grooves that separate them are full of hair.

The crest-like antero-lateral border is cut into 4 lobes, of which the first is confluent with the orbit, and the last two are pointed and strongly keeled. Front little convex beyond the orbits, distinctly bilobed. Orbital border sharp, salient, with three suture-lines.

Chelipeds equal: upper edge of arm with a strong crest, which is foliaceously expanded and cleft at its distal end; upper border of hand and dactylus crested; outer surface of wrist and hand covered with large granules, which stand in more or less distinct linear series and are a good deal concealed by long shaggy hairs. Fingers stout, of good length, pointed.

Legs with the upper edge of merus carpus and propodite strongly crested and shaggy, and the surfaces of the dactylus and of most of the propodite shaggy.

Colours in spirit yellow with many orange-red patches; fingers dark brown.

In the Indian Museum are 2 specimens, one from the Orissa Coast, 15-35 fms., the other from the Angrias Bank (Malabar Sea) 15 fms.

### 36. *Lophozozymus dodone* (Herbst) Hilgendorf, de Man.

*Cancer dodone*, Herbst, Krabben, III. ii. 37, pl. lii. fig. 5.

*Lophozozymus dodone*, Hilgendorf, MB. Ak. Berl. 1878, p. 789: Miers, Zool. H. M. S. Alert, pp. 517, 527: de Man, Archiv. für Naturges. LIII. 1887, i. p. 270, pl. x. figs. 2, 2a: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 361: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 457.

*Xantho radiatus* (? *C. dodone* Herbst) Milne Edwards, Hist. Nat. Crust. I. 398: A. Milne Edwards, in Maillard's l'île Réunion, Annexe F. p. 4.

*Atergatis lateralis*, White P. Z. S. 1847, p. 225; Ann. Mag. Nat. Hist. (2) II. 1848, p. 285; and Samarang Crust. p. 39, pl. viii. fig. 1.

*Xantho lamelligera*, White, ll. cc. p. 225, p. 285, p. 40 (*fide* A. Milne Edwards *infra*).

*Xantho nitidus*, Dana, Proc. Ac. Nat. Sci. Phila. 1852, p. 74, and U. S. Expl. Exp. Crust. pt. I. p. 166, pl. viii. figs. 4a-b.

*Atergatis elegans*, Heller, Novara Crust. p. 7, pl. i. fig. 4 (*fide* de Man).

*Lophozozymus radiatus*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 206.

Carapace smooth with the regions very faintly indicated and with very few and faint traces of lobulation: sometimes a few lank hairs on the antero-lateral border.

The crest-like antero-lateral border is trenchant and somewhat cockled, and is cut into 4 shallow scallops, the last two of which are acuminate and carinate, and the first of which is confluent with the orbit. Front slightly convex beyond the orbits and a little emarginate in the middle line. Orbital border sharp with the suture lines faint and indistinct.

Chelipeds equal; outer surface of wrist and hand finely granular or rugose under the lens; upper edge of arm crested but not foliaceously expanded; both upper and lower edge of hand crested. Fingers very short and stumpy, pointed.

Legs smooth: upper edge of merus carpus and propodite crested and having a few scattered hairs; also a few scattered hairs on the surface and lower edge of propodites.

Colours in spirit yellow, with diffused orange-red patches; fingers brown, white at tip.

In the Indian Museum are three specimens from the Andamans.

### Alliance III. *Euxanthoida.*

*Euxanthus.*      *Hypocoelus.*

#### EUXANTHUS, Dana.

*Euxanthus*, Dana, Silliman's Amer. Journ. Sci. and Art. (2) XII. 1851, p. 125; Proc. Ac. Nat. Sci. Phila. 1852, p. 75; and U. S. Expl. Exp. Crust. pt. I. p. 173.

*Melissa*, Strahl, Archiv. fur Naturges. XXVII. 1861, i. p. 101.

*Euxanthus*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 289.

Carapace very broad, strongly convex in both directions, with the regions well delimited and subdivided into convex lobules.

The antero-lateral borders are sharp and somewhat irregularly scalloped, the lobes often subpyramidal or dentiform: they do not terminate at the orbit, but are prolonged, beneath the orbit, to the buccal cavern. The postero-lateral borders are very short and very concave.

The front is of no great breadth (about a fifth the greatest breadth of the carapace), bilobed, and prominent. The supra-orbital border and the inner angle of the lower border of the orbit are tumid, and the rest of the orbital margin is very low and forms an unbroken curve, with only one closed suture line. The eyes have short thick stalks.

The antennules fold nearly transversely. The basal antennal joint is prolonged right into the orbit, and the short flagellum is therefore placed inside the orbit. The outer border of the merus of the external maxillipeds is oblique.

The chelipeds are equal in both sexes, and are relatively small and light. The fingers are rather long-pointed, and have the tip slightly but distinctly hollowed out.

Abdomen of the male five-jointed, the 3rd-5th somites being fused.

Crabs of medium size, easily recognized by the peculiar form of the basal joint of the antennæ and the course of the antero-lateral margin of the carapace.

*Key to the Indian species of Euxanthus.*

1. Lobules of carapace almost smooth; outer angle of orbit not marked by a denticle ..... *E. melissa.*
2. Lobules of carapace rough; outer angle of orbit marked by a denticle ..... *E. sculptilis.*

37. *Euxanthus melissa*, (Herbst).

*Cancer exsculptus*, Herbst, Krabben, I. ii. 265, pl. xxi. fig. 121.

*Cancer melissa*, Herbst, Krabben, III. ii. 7, pl. li. fig. 1.

*Euxanthus melissa*, Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 33: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 293: Targioni Tozzetti, Magenta Crust. p. 27, pl. iii. figs. 1-7: F. Muller, Verh. Ges. Basel, VIII. p. 474: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 359: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 466, pl. xvii. fig. 9.

*Cancer mamillatus*, Milne Edwards, Hist. Nat. Crust. I. 376.

*Melissa mamillata*, Strahl, Archiv. für Naturges. XXVII. 1861, i. p. 103.

*Euxanthus mamillatus*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 292, pl. xv. figs. 2-2b; and IX. 1873, p. 196: Haswell, Cat. Austral. Crust. p. 48: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 30.

*Euxanthus nitidus*, Dana, Proc. Ac. Nat. Sci. Phila. 1852, p. 75; U. S. Expl. Exp., Crust. pt. I. p. 174, pl. viii. figs. 9a-b. (young).

*Melissa nitida*, Strahl, Archiv. für Naturges. XXVII. 1861, i. p. 103.

*Cancer exsculptus*, Hoffmann in Pollen and Van Dam, Faun. Madagasc. Crust. p. 38.

?*Euxanthus exsculptus* var. *rugosus*, Miers, Zool. H. M. S. Alert, pp. 517, 527 (? young.)

The lobules of the carapace are extremely convex, and though some of them may be a little dimpled, especially in the young, they are commonly smooth.

The antero-lateral borders are cut into five teeth, but there is often a tubercle — which may be incompletely double — between the 4th and 5th teeth; between the 3rd and 5th teeth the margin is finely granular.

The curve of the orbit is unbroken by any denticle at the outer angle, and is smooth, not granular.

The outer surfaces of the wrist and hand, as of the corresponding joints of the legs, are nodular, the nodules and the hollows between them being smooth: on the lower outer surface of the hand are two longitudinal wrinkles which also have a smooth surface. The fingers have their surfaces smooth, and their cutting edges strongly toothed, with the tip distinctly hollowed out.

Colours of good spirit specimens: stone grey or yellowish, with numerous tiny chocolate-brown or purplish specks, and some large blotches of the same colour on the gastric, hepatic and branchial regions. These markings have faded in spirit specimens that have been preserved

over ten years. Fingers blackish brown, this colouration extending along the lower border and inner surface of hand.

In the Indian Museum are 17 specimens from the Andamans, Mergui, and Ceylon (besides a specimen from Samoa).

### 38. *Euxanthus sculptilis*, Dana.

*Euxanthus sculptilis*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 75, and U. S. Expl. Exp. Crust. pt. I. p. 173, pl. viii. figs. 8a-d : A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 291 : Ortmann, Zool. Jahrbuch., Syst., VII. 1893-94, p. 466.

*Cancer huonii*, Lucas in Jacquinet's Voy. Astrolabe, Crust. p. 16, pl. iv. fig. 1.

*Euxanthus huonii*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 290, pl. xv. figs. 1-1c : Haswell, Cat. Austral. Crust. p. 47 : Miers, Zool. H. M. S. Alert, pp. 182, 204 : de Man, Archiv. für Naturges. LIII. 1887, i. p. 263.

Lobules of carapace moderately convex, their surface so much wrinkled and dented transversely as to give them an almost scaly look.

Antero-lateral borders cut into six teeth, the edge between all the teeth being granular.

The orbital margin is granular, and there is a denticle to mark the outer angle of the orbit.

The nodules of the wrists and hands—and, to a less strongly marked extent, those of the corresponding joints of the legs—are granular, as are the hollows between the nodules; and the two wrinkles along the lower outer surface of the hand are granular. The fingers resemble those of *E. melissa*, except that their surfaces are strongly granular.

Colours of well-preserved spirit specimens : yellowish with purplish spots and blotches, many of which are confluent; fingers and hand coloured as in *E. melissa*.

In the Indian Museum are 3 specimens from Persian Gulf and Andamans, (besides one from Samoa).

### HYPOCÆLUS, Heller.

*Hypocælus*, Heller, Abh. zool-bot. Ges. Wien, 1861, p. 7; and SB. AK. Wien, XLIII. 1861, p. 319.

*Hypocælus*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865. p. 295.

Differs from *Euxanthus* chiefly in having a large oval or reniform cavity excavated in either pterygostomian region.

It is not represented in the Indian Museum.

### 39. *Hypocælus rugosus*, Henderson.

*Hypocælus rugosus*, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 358, pl. xxxvi. figs. 9-11.

Alliance IV. *Xanthoida.*

Xantho.	Etisus.	Orphnoxanthus.
Leptodius.	Etisodes.	
Medæus.		
Cycloxanthus.		
Hoploxanthus.		

## XANTHO, Leach.

*Xantho*, Leach, Malac. Pod. Britt. pl. xi and text, 1815; and Trans. Linn. Soc. XI. 1815, p. 320.

*Xantho*, Desmarest, Consid. Gen. Crust., p. 104.

*Xantho*, (part) and *Eudora* (part), De Haan, Faun. Japon. Crust. pp. 18 and 22.

*Xantho*, (part) Milne Edwards, Hist. Nat. Crust. I. 387.

*Xantho*, (part) Dana, U. S. Expl., Exp., Crust. pt. I. p. 166.

*Xantho*, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XX. 1863, pp. 275 and 294 and Miss. Sci. Mex., Crust. p. 251.

*Xantho*, Miers, Challenger Brachyura, p. 124.

## [Type XANTHO FLORIDUS, Leach.]

Carapace broad, moderately convex anteriorly, flat in the posterior half; the regions generally well delimited and fairly well lobulated in the anterior two-thirds, but not posteriorly.

Antero-lateral borders arched, usually cut into four teeth or lobes: postero-lateral borders moderately convergent, not concave.

Extent of fronto-orbital border half, or less than half, the greatest width of the carapace: front about a fourth the greatest breadth of the carapace.

Front little deflexed, rather prominent, usually sublaminar, notched in the middle line, usually separated from the supra-orbital margin by a notch or groove.

Orbital margin with two (often indistinct) suture lines above and one (more distinct) just below the outer angle: usually a prominent tooth at the inner angle of the lower edge of the orbit. Eyes on short thick stalks.

Basal antennal joint short, meeting the front at the inner angle: the flagellum, which is about as long as the orbit, lodged in the orbital hiatus.

Anterior edge of merus of external maxillipeds nearly transverse, with commonly a small tooth near the antero-internal angle.

Chelipeds either unequal in both sexes, or less commonly equal in both sexes (*Xantho impressus*, *Xantho scaberrimus*); fingers pointed.

Legs subcylindrical, with the upper edges often sharp (crested in *Xantho scaberrimus*.)

Abdomen of male five-jointed, the 3rd-5th somites fused; (in *X. impressus* the sutures are so distinct that the abdomen may appear 7-jointed).

*Key to the Indian species of the Genus Xantho.*

- I. Chelipeds equal, or almost equal, in both sexes:—
- i. Legs crested, the crest sharp, or serrate, or crenate: length of carapace a good deal more than two-thirds the greatest breadth: lobules of carapace covered with convex subsquamiform tubercles ..... *Xantho (Lophozanthus) scaberrimus.*
  - ii. Legs thick, sub-cylindrical, length of carapace less than two-thirds the greatest breadth: lobules of carapace smooth ..... *Xantho (Eudora) impressus.*
- II. Chelipeds unequal in both sexes: length of carapace two-thirds, or a little more than two-thirds, the greatest breadth: the 'legs may have sharp, but never distinctly crested edges:—
- i. First two teeth of the antero-lateral margin faint, obsolescent; carapace and chelipeds smooth (non-granular)..... *Xantho bidentatus.*
  - ii. Either the last three, or all four, teeth of the antero-lateral margin distinct; a large part of the carapace and of the exposed surfaces of the chelipeds wrinkled and granular ..... *Xantho distinguendus.*

40. *Xantho distinguendus*, De Haan.

*Cancer (Xantho) distinguendus*, De Haan, Faun. Japon. Crust. p. 48, pl. xiii. fig. 7: Heller, SB. Ak. Wien, XLIII. 1861, p. 323.

*Chlorodius distinguendus*, Stimpson, Proc. Ac. Nat. Sci. Phila., 1858, p. 34.

*Xantho macgillivrayi*, Miers, Zool. H. M. S. Alert, pp. 183, 211, pl. xx. fig. c.

*Lophozozymus (Lophozanthus) bellus*, var. *leucomanus*, Miers, Challenger Brachyura, p. 115, pl. xi. fig. 1.

*Medæus distinguendus*, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 31: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 359.

Regions of carapace well delimited, fairly well divided into lobules: the anterior and lateral parts of the carapace are covered with granular transverse wrinkles which have almost a scaly look.

Front cleft into two rather prominent, square-cut, sub-laminar lobes. Antero-lateral margin cut into four sharply granular teeth, which may be all sharply acuminate, or the first may sometimes be rather indistinct.



The under surface of the carapace, below and external to the orbit is, like the first lobe of the antero-lateral margin, eroded and granular.

Chelipeds unequal in both sexes: upper part of the outer surface of arm with some fine transverse granular wrinkles; upper and outer surface of wrist and hand closely granular, the wrist and the upper part of the hand being also eroded or pitted, most usually in a peculiar honey-comb fashion; fingers stout, fluted.

Legs rather thin: upper edge of merus sharp (almost subcristiform), often finely granular: carpus and propodite usually grooved and ridged longitudinally (the propodite most distinctly so, and on both surfaces): dactylus covered with close short fur. The sculpture of the carpus and propodite, as of the chelipeds, is variable, even in specimens from the same locality.

Abdomen of male 5-jointed, the sutures between the 3rd-5th somites nearly or quite obliterated.

Colours in spirit: light yellow, fingers blackish brown with whitish tips.

In the Indian Museum besides specimens from Hongkong, there are 16 specimens from Mergui, Persian Gulf, and Karáchi. Fourteen little specimens from the Malabar Coast, 28 fms., are also probably referable to this species.

If this species is to be removed to *Medæus* on account of the erosion and consequent indefiniteness of the orbital end of the antero-lateral margin, *Xantho floridus* and more certainly *Xantho tuberculatus* must share the same fate, and *Medæus* must then be absorbed in *Xantho*.

#### 41. *Xantho bidentatus*, A. Milne Edwards.

*Xantho bidentatus*, A. Milne Edwards, Ann. Soc. Ent. France (4) VII. 1867, p. 266: Miers, Challenger Brachyura, p. 126, pl. xi. fig. 4: Ortmann, Zool. Jahrb. Syst., VII. 1893-94, pp. 444, 449.

Surface of carapace and appendages smooth (non-granular): gastric region well defined by fine shallow grooves, and very faintly lobulated: branchial regions imperfectly separated from the hepatic regions and very faintly and imperfectly areolated.

Of the four lobes of the antero-lateral margin the first two are faint, broadly-rounded and coalescent, and the last two possess a small acumination.

Front prominent, notched in the middle line, to form two lobes, which have the edge a little concave and the outer angle well pronounced.

Under surface of carapace smooth to naked eye: the side wall, above the articulations of the legs hairy.

Chelipeds unequal in both sexes, smooth like the legs.

Abdomen of male five-jointed.

Colours in spirit: dull yellowish brown, fingers almost black.

In the Indian Museum are four specimens from the Andamans.

42. *Xantho impressus*, (Lamk.) Edw.

*Cancer impressus*, Lamarck, Hist. Nat. Anim. sans. Vertebr. V. 272.

*Xantho impressus*, Milne Edwards, Hist. Nat. Crust. I. 393: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 198, pl. vi. fig. 2: F. Muller, Verh. Ges. Basel VIII. 1886, p. 474: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 30: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 359: Ortmann, Zool. Jahrb., Syst. VII. 1893-94, pp. 444, 449.

*Eudora impressa*, De Haan, Faun. Japon. Crust., p. 23: A. Milne Edwards in Maillard's I'le Réunion, Annexe F. p. 4: Richters in Möbius Meeresf. Maurit. p. 146, pl. xv. figs. 15, 16.

Carapace very short and broad, little convex in the anterior half, quite flat in the posterior half.

Gastric and cardiac regions separated from the wings of the carapace by very broad and deep furrows, the wings of the carapace being thrown into massive smooth lobules by furrows not quite so deep, but the gastric region being slightly and imperfectly areolate except quite anteriorly.

Front somewhat declivous, bilobed, not laminar. The four lobes of the antero-lateral margin are thickened and blunt, the first lobe being on a level lower than that of the orbit. Close in front of the thickened posterior border is a smooth transverse wrinkle.

The tooth and notch at the antero-internal angle of the merus of the external maxillipeds are very distinct.

Chelipeds equal in both sexes: outer surface of arm with a groove following the contour of the distal border; outer surface of wrist with a faintish Y-shaped dimple, and a strong double-crowned tubercle at the inner angle of the wrist; upper surface of hand with an incomplete, longitudinal, pitted furrow; fingers with cutting-edge coarsely crenulate.

Legs thick, subcylindrical, smooth; both edges of the dactylopodites covered with thick short fur.

Abdomen of male 5-jointed, with the sutures between the 3rd-5th joints persistent.

Colours in spirit: waxy white, fingers blackish brown. The whole animal has a smooth waxy look.

In the Indian Museum are two specimens, from Mergui and the Andamans (besides three from Mauritius.)

This is a curious form, connecting *Xantho* with several other genera.

Sub-genus *LOPHOXANTHUS*, A. Milne Edwards.

*Lophoxanthus*, A. Milne Edwards, Miss. Sci. Mex. Crust. p. 256.

Differs from typical *Xantho* (*Xantho floridus* etc.) chiefly in having at least the upper edge of the legs distinctly crested: the carapace, moreover, is longer and narrower.

43. *Xantho* (*Lophoxanthus*) *scaberrimus*, Walker.

*Xantho scaberrimus*, A. O. Walker. Journ. Linn. Soc., Zool., XX. 1886-90, pp. 109, 115, pl. vii. figs, 1-4.

Carapace about  $\frac{7}{9}$  as long as broad, moderately convex in the anterior two-thirds; regions and subregions strongly defined by broad deep smooth channels, convex, and covered with smooth well-defined tubercles that are pea-like in the posterior third, somewhat scale-like in the anterior two-thirds, and pointed along the antero-lateral border.

Fronto-orbital border less than half the width of the carapace: front two-lobed, the lobes having an oblique and slightly concave margin and a well-defined external angle.

Antero-lateral border four-lobed, the first lobe blunt and non-prominent, the other three prominent and acuminate, all four with the edges serrulate. Postero-lateral margin not concave, granular; posterior margin beaded.

The whole under surface of the carapace, and the surfaces of the external maxillipeds, male sternum and male abdomen, are closely covered with large granules.

Chelipeds equal, uniformly closely covered (except upper surface of arm and inner and outer surfaces of fingers) with sharpish tubercles, which are largest on the hand, where they fall into raised longitudinal parallel series, most marked on the lower part of the outer surface: fingers fluted in continuation of the ridges on the hand, the ridges of the dactylus being rough in their basal part. Two tubercles, the anterior of which is the larger, at the inner angle of the wrist: and two somewhat foliaceous excrescences terminating the crest-like upper edge of the arm.

First three pairs of legs with the edges of the merus (but especially the upper edge) sharply crested, the upper edge of the carpus and propodite strongly serrated, and the dorsal surface of the carpus and propodite furnished with squamiform granules in series parallel with this serrated crest. The last pair of legs resembles the others, except that the crest of the merus is serrated, and the dorsal surface of the merus is granular.

Colours in spirit uniform ashy white.

In the Indian Museum besides a specimen from Japan is one from off the Orissa coast, 11 fms.

*Xantho (Lophoxanthus) scaberrimus* var. *baccalipes*.

Differs from the type in the following particulars:—

(1) the characteristic tubercles have everywhere a worn appearance, especially in the middle of the carapace and on the chelipeds and the ischium of the external maxillipeds:

(2) the dorsal crest of the arm and of the meropodites of the legs have each become a row of berry-like teeth, and the serrated crest and granular ridges of the carpopodites and propodites of the legs have become merely low rough elevations.

In the Indian Museum are three large males from Ceylon: the largest has the carapace 47 millim. long and 61 millim. broad.

*Xantho (Lophoxanthus) scaberrimus* var. *cultripes*.

Differs from the type in the following particulars:—

(1) the characteristic tubercles are still more "worn," especially on the mesogastrum, and near the inner angle of the wrist, and near the base of the thumb, where they are almost worn away:

(2) the dorsal crest of the arm (with its foliaceous terminal lobes), and the crests of the merus carpus and propodite in all the legs, are greatly developed sharp and entire, and the raised rows of granules on the dorsal surfaces of the leg joints have almost disappeared.

In the Indian Museum is a single male from Singapore, with a carapace 50 millim. long and 64 broad.

Sub-genus LEPTODIUS, A. Milne Edwards.

*Leptodius*, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XX. 1863, p. 284: Nouv. Archiv. du Mus. IX. 1873, p. 221: Miss. Sci. Mex., Crust. p. 267, *ubi synonym.*

*Leptodius*, Miers, Challenger Brachyura, p. 136.

*Leptodius* (e.g. *Leptodius exaratus*) resembles *Xantho* (e.g. *Xantho floridanus*) in general form and proportions, but differs most conspicuously in having the fingers hollowed out "*en cuillère*" at tip. But this divergence is almost bridged by *Leptodius crassimanus*, in which the spooning of the fingers is indistinct.

*Leptodius* further differs from the type of *Xantho* (1) in the greater convergence of the postero-lateral borders, (2) in the often—but not always—more than four-lobed antero-lateral border, and (3) in the often more extensive contact of the basal antennal joint with the front.

*Key to the Indian species of the sub-genus Leptodius.*

- I. Carpus (and sometimes the propodite also) of the four last pairs of legs strongly bicarinate dorsally—the crests enclosing a trough-like cavity ..... *L. cavipes.*
- II. Carpus and propodite of last four pairs of legs normal:—
- i. Four teeth (exclusive of the orbital angle) on the antero-lateral border: postero-lateral border not or hardly shorter than the chord of the antero-lateral border ..... *L. exaratus.*
- ii. More than four teeth on the antero-lateral border: postero-lateral border distinctly shorter than the chord of the antero-lateral border:—
1. Front bilaminar, the lobes having a slightly concave edge: 5 teeth on the antero-lateral margin ..... *L. sanguineus.*
2. Front bilaminar, the lobes so deeply concave as to make the front almost quadridentate:—
- a. Five teeth on the antero-lateral margin: finger-tips often rather indistinctly hollowed out:—
- a. Carapace cut up into numerous strongly convex lobules: upper surface of wrist and hand strongly and sharply rugose and nodular..... *L. euglyptus.*
- β. Lobules of carapace not very numerous, not very convex, smooth: upper surface of wrist and hand somewhat rough ... *L. crassimanus.*
- b. Eight to ten irregular teeth on the antero-lateral margin ..... *L. nudipes.*

44. *Xantho (Leptodius) exaratus* (Edw.) A. M. Edw.

*Chlorodius exaratus*, Milne Edwards, Hist. Nat. Crust. I. 402; and in Cuvier Règne An. Crust. pl. xi. fig. 3: Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 79; and U. S. Expl. Exp. Crust. pt. I. p. 208: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 34.

*Leptodius exaratus*, A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71; and IX. 1873, p. 222: Kossmann, Reise roth. Meer. Crust. p. 32, pl. ii. fig. 1-6: Hilgendorf MB. Ak. Berl. 1878, p. 790: Richters in Möbius Meeresf. Maurit. p. 148: Haswell, Cat. Austral. Crust. p. 60: Miers, Zool. H. M. S. Alert, pp. 183 and 214: de Man, Archiv. f. Naturges. LIII. 1887, i. p. 285, and Journ. Linn. Soc., Zool., XXII. 1887-88, p. 33; and in Weber's Zool. Ergebn. Niederl. Ost. Ind. II. 1892 p. 278, and Zool. Jahrb., Syst., VIII. 1894-95, p. 521: Cano, Boll. Soc. Nat. Napoli, III. 1889, p. 202: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 362; Whitelegge, Mem. Austral. Mus. III. 1897, p. 137.

*Xantho affinis*, De Haan, Faun. Japon. Crust. p. 48, pl. xiii. fig. 8: Krauss, Sudafr. Crust. p. 30.

*Xantho lividus*, De Haan, *O.c., l.c.* fig. 6: Miers, Zool. H. M. S. Alert, pp. 183, 214.

*Cancer inæqualis*, Audouin and Savigny Descr. Egypte pl. v. fig. 7 (*vide* A. M. E.)

*Xantho exaratus* var. *typica*, Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 445: and in Semon's *Forschungsr.* (Jen. Denk. VIII) Crust. p. 50.

Carapace moderately broad, moderately convex in the anterior two-thirds, nearly flat in the posterior third, where also it is not areolated. Gastric region well-defined, convex, fairly well areolated anteriorly, the wings of the carapace on either side of it divided into about 5 low lobules, three of which follow the contour of the antero-lateral border. The surface of the carapace is non-granular, except sometimes in the young.

Front not very prominent, but projecting beyond the inner angle of the orbit, from which it is separated by a notch; bilaminar, the lobes cut square, but with a slightly concave margin.

Antero-lateral border cut into 4 acuminate teeth, not including the outer angle of the orbit, or a small denticle below it. Postero-lateral border equal in length to the chord of the antero-lateral border.

Side wall of carapace, edges of upper surface of arm, and edges of legs—but especially the upper edge of the meropodites—with a good deal of hair.

Chelipeds unequal in both sexes. Upper and outer surface of wrist more or less dimpled or wrinkled; a strong tubercle at inner angle of wrist. Hands usually smooth, but the upper surface has, very commonly, some low fine transverse or reticulating wrinkles. Fingers large, thick, more or less fluted, not strongly toothed, meeting at tip only (in the adult) where they are broadened and hollowed out.

Legs with meris subcylindrical and smooth, carpus and propus nearly smooth and sometimes very faintly grooved, dactylus granular and furred along both edges as far as the claw.

Abdomen of male five-jointed.

Colours in spirit: dirty yellow or dirty green, sometimes mottled; fingers black.

In the Indian Museum are more than 130 specimens, chiefly from the Andamans, Mergui, Karáchi, also from the Persian Gulf, Bombay, Ceylon, Akyab and Penang.

#### 45. *Xantho (Leptodius) sanguineus* (Edw.) A. M. Edw.

*Chlorodius sanguineus*, Milne Edwards, Hist. Nat. Crust. I. 402: Dana Proc. Ac. Nat. Sci. Philad. 1852, p. 79, and U. S. Expl. Exp. Crust. pt. I. p. 207, pl. xi. figs. 11a—d: Heller, Novara Crust. p. 18: Streets, Bull. U. S. Nat. Mus. VII. 1877. p. 105.

*Leptodius sanguineus*, A. Milne Edwards, *Nouv. Archiv. du Mus.* IV. 1868, p. 71, and IX. 1873, p. 224: Richters in Möbius, *Meeresf. Maurit.* p. 147: Haswell, *Cat. Austral. Crust.* p. 60: F. Muller, *Verh. Ges. Basel*, VIII. 1886, p. 474: de Man, *Zool. Jahrb., Syst.* VIII. 1894-95, p. 521: Whitelegge, *Mem. Austral. Mus.* III. 1897, p. 137.

*Leptodius exaratus*, var. *sanguineus*, Miers, *P. Z. S.* 1877, p. 134; *Ann. Mag. Nat. Hist.* (5) V. 1880, p. 234; Challenger *Brachyura*, p. 138: Cano, *Boll. Soc. Nat. Napoli*, III. 1889, p. 203.

*Lagostoma nodosa*, Randall, *Journ. Ac. Nat. Sci. Philad.* 1839, p. 111.

*Chlorodius nodosus*, Dana, *Proc. Ac. Nat. Sci. Philad.* 1852, p. 79, and *U. S. Expl. Exp. Crust.* pt. I. p. 210, pl. xi. figs. 14a—g.

*Chlorodius edwardsi*, Heller, *Abh. zool.-bot. Ges. Wien*, 1861, p. 10, and *SB. Ak. Wien XLIII.* 1861, i. p. 336: Hilgendorf in v. d. Decken's *Reis. Ost. Afr.* III, i. p. 74.

*Xantho exaratus* var. *sanguinea*, Ortmann, *Zool. Jahrb. Syst.* VII. 1893-94, p. 447.

Differs from *Xantho (Leptodius) exaratus* in the following particulars:—

(1) the carapace is more convex anteriorly, and the branchial lobules also are more convex:

(2) there are five teeth on the antero-lateral margin, not including the external orbital angle and a small denticle below it:

(3) the postero-lateral border is a good deal shorter than the chord of the antero-lateral border:

(4) the front is distinctly narrower.

In the Indian Museum are 123 specimens chiefly from the Andamans and Laccadives, also from the Nicobars, Ceylon, and Persian Gulf.

#### 46. *Xantho (Leptodius) crassimanus*, A. M. Edw.

*Xantho crassimanus*, A. Milne Edwards, *Ann. Soc. Ent. France* (4) VII. 1867 p. 267.

*Leptodius crassimanus*, A. Milne Edwards, *Nouv. Archiv. du Mus.* IX. 1873, p. 226, pl. xi. fig. 4: Haswell, *Cat. Austral. Crust.* p. 61: Muller, *Verh. Ges. Basel*, VIII. 1886, p. 474: de Man, *Archiv. für Naturges.* LIII. 1887, i. p. 287, and *Notes Leyden Mus.* XV. 1893, p. 284, and *Zool. Jahrb., Syst.* VIII. 1894-95, p. 522.

*Xantho exaratus* var. *crassimana*, Ortmann, *Zool. Jahrb. Syst.* VII. 1893-94, p. 448.

Differs from both *exaratus* and *sanguineus* in the following particulars:—

(1) the two lobes of the front have the free edge not merely emarginate, but deeply concave, so that the front appears to be formed of four little teeth:

(2) the carapace, anteriorly, is much more convex, the regions are more convex and their areolæ are more convex:

(3) the fingers are not so broad at tip and not so sharply hollowed out:

(4) the upper surface of the wrist and hand is more rugose. It resembles *sanguineus* in having 5 teeth on the antero-lateral margin, but differs from it further in having

(5) the front even narrower, it being less than one-fifth the breadth of the carapace.

It can at once be distinguished by the *very narrow* quadridentate front.

In the Indian Museum are 22 specimens, from the Andamans, Karáchi, Galle (and Australia).

#### 47. *Xantho (Leptodius) nudipes* (Dana), A. M. Edw.

*Chlorodius nudipes*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 79, and U. S. Expl. Exp. Crust. pt. I. p. 209, pl. xi. figs. 12a-c.

*Leptodius nudipes*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 225 : Miers, Cat. Crust. New Zealand, p. 17 : Filhol, Crust. New Zealand, p. 374 : de Man, Journ. Linn. Soc. Zool., XXII. 1887-88, p. 33, and Zool. Jahrb. Syst. 1894-95, p. 523.

*Xantho exaratus* var. *nudipes*, Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 447.

The whole surface of the carapace is very finely pitted or granular. The antero-lateral border is divided into four acute lobes or teeth, but each of the first three teeth have, at base, either one or two (one on either side) small additional cusps, and the fourth tooth is generally double, so that altogether there are from 8 to 11 teeth on the antero-lateral margin. The fingers are broad and deeply hollowed at tip. The upper surface of hand and wrist is granular and rugose. The lobes of the front are deeply concave.

In the convexity of the carapace and of its regions and subregions it resembles *sanguineus*; but the front is much broader than in *sanguineus*, being more than one-fourth the breadth of the carapace, and the fingers are typical spoons.

In the Indian Museum are 17 specimens from the Andamans and 3 from Mergui.

#### 48. *Xantho (Leptodius) euglyptus*, n. sp.

Form of carapace much resembling that of *sanguineus*, but much more convex.

Carapace  $\frac{2}{3}$  as long as broad, rather strongly convex in its anterior two-thirds, flat posteriorly: its regions well delimited, convex, and as completely areolated as any *Actæa*—the areolæ being strongly convex and somewhat pitted transversely.

Front projecting beyond the orbit, from which it is separated by a notch, cut into two lobes of which the outer angle is prominent much as in *crassimanus*; its breadth is not quite a third that of the carapace.



Antero-lateral border cut into five conical teeth between which are granules or little denticles; postero-lateral borders strongly convergent, shorter than chords of antero-lateral borders.

Chelipeds unequal: upper and outer surfaces of wrist strongly wrinkled and pitted; upper surface of hand nodular, upper half or more of outer surface of hand longitudinally ridged and transversely wrinkled: fingers short, stout, hollowed (but not broadened) at tip.

Legs with carpus and propodite longitudinally ridged and grooved above — the carpus more distinctly so — and dactylus furred.

Sidewall of carapace, edges of upper surface of arm, and edges of legs — but especially upper edge of meropodites — hairy.

Colours in spirit: yellow, fingers and front lower corner of hand blackish brown.

Length of carapace 10.5 millim., breadth 16 millim.

In the Indian Museum are 45 specimens from Galle and 1 from Mergui (Marine Survey).

This species, though strongly resembling *nudipes* and *crassimanus*, is at once recognized by the sharp-cut Actæa-like sculpture of the carapace. It is possible that it may be the *Chlorodius eudorus* of Milne Edwards. It has the closest possible resemblance to the *Xantho quinquentatus* of Krauss, Sudafr. Crust. p. 30, pl. i. fig. 3, but that species is described and figured as having sharp fingers.

#### 49. *Xantho (Leptodius) cavipes* (Dana).

*Chlorodius cavipes*, Dana, Proc. Ac. Nat. Sci. Phila., 1852, p. 79; and U. S. Expl. Exp. Crust. pt. I. p. 212, pl. xii. figs. 1a-b: Stimpson, Proc. Ac. Nat. Sci. Phila., 1858, p. 34.

*Leptodius cavipes*, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 34.

Carapace convex in anterior two-thirds, flat behind. Gastric region convex, well delimited and areolated by fine smooth rather deep channels; wings of carapace divided into about five lobules by less deep-cut and less smooth channels: the whole carapace (except the channels) covered with miliary granules, which on the lateral lobes of the gastric region are arranged in lines that have an imbricate look.

Front bilaminar, the fore edge of the lobes thickened and granular. Antero-lateral border thickened and granular, cut into small irregular teeth — 8 or 9 in number — which fall into 4 sets. Undersurface of carapace with short fur.

Chelipeds unequal: upper and outer surface of wrist and hand wrinkled and granular, outer surface of hand covered with granules in more or less distinct lines: fingers little toothed, incurved, blunt-pointed and hollowed (but not broadened) at tip.

Legs rough, but not very hairy: upper edge of meropodites finely serrated, distally sharply notched: *upper surface of carpopodites with two high longitudinal crests enclosing a trough-like space*; the propodites are similarly sculptured, but the sculpture is a good deal concealed by fur: dactyli furred.

Colours in spirit: dirty yellow or dirty greenish, fingers nearly black in distal  $\frac{3}{4}$  only.

In the Indian Museum are 4 specimens, from the Andamans, Mergui and Ceylon.

#### MEDÆUS, Dana.

*Medæus*, Dana, Silliman's Amer. Journ. Sci. and Arts, (2) XII. 1851, p. 125; Proc. Ac. Nat. Sci. Philad. 1852, p. 76; U. S. Expl. Exp. Crust. pt. I. p. 181.

*Medæus*, A. Milne Edwards, Ann. Sci. Nat. Zool. (4) XX. 1863, p. 279; Miss. Sci. Mex. Crust. p. 249.

*Medæus*, Miers, Challenger Brachyura, p. 116.

Carapace not very broad, hexagonal, little convex, the regions well defined and well areolated.

Antero-lateral borders cut into teeth and *very distinctly continued beneath the orbits to the angles of the buccal cavern.*

Fronto-orbital border half, or a little more than half, the greatest breadth of the carapace.

Front about a fourth, or a little more, the greatest breadth of the carapace, horizontal, rather prominent, square-cut, notched in the middle line, separated from the supra-orbital margin by a notch.

Orbits, eyes, basal antennal joint and antennary flagellum as in *Xantho*.

Chelipeds either unequal or subequal, the wrists and hands commonly covered with large nodules, the fingers pointed.

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

*Medæus* closely resembles *Xantho*, but is distinguished by the narrower carapace and by the relations of the antero-lateral border. In some species of *Xantho* (e.g., *X. distinguendus*) the antero-lateral border is broken and eroded near the orbit, so that it may be imagined to be continued to the angle of the buccal cavern, but in *Medæus* there is no ambiguity whatever.

#### 50. *Medæus nodosus*, A. M. Edw.

*Medæus nodosus*, A. Milne Edwards, Ann. Soc. Ent. France, (4) VII. 1867, p. 271; Nouv. Archiv. du Mus. IX. 1873, p. 212, pl. viii. fig. 2: Haswell, Cat. Austral. Crust. p. 52.

Carapace shaped much as in *Polycremnus*, hexagonal, more than  $\frac{3}{4}$

as long as broad, the regions well demarcated, well areolated, finely and closely granular.

Front horizontal, square-cut, prominent, sublaminar, notched and grooved in the middle line.

Antero-lateral borders cut into four blunt-pointed rather coarse granular teeth, of which the two posterior are the strongest.

Chelipeds subequal: wrist and hand covered with granular fungi-form tubercles, which are arranged in regular longitudinal series on the hand.

Upper border of meropodites of legs without spinules.

In the Indian Museum is a single small male from off the Ganjam coast,  $7\frac{1}{2}$ – $9\frac{1}{2}$  fms.

Henderson (Trans. Linn. Soc. (2) V. 1893, p. 360) appears to consider this species to belong to the genus *Halimede*, but it has not—if my identification be correct—the curious male abdomen which distinguishes that genus from every other Xanthoid except *Polycremnus*.

#### CYCLOXANTHUS, A. Milne Edwards.

*Cycloxanthus*, A. Milne Edwards, Ann. Sci. Nat., Zool. (4) XX. 1863, p. 278; Nouv. Archiv. du Mus. IX. 1873, p. 209; Miss. Sci. Mex., Crust. p. 258.

Carapace relatively long: front horizontal, prominent, and divided by a median fissure into two lamellar lobes, and separated from the internal orbital angles by a deepish notch.

Orbits small: two fissures in the supra-orbital margin: external orbital angles inconspicuous, continuous with the antero-lateral borders.

Antero-lateral borders very long, strongly curved, extending far backwards.

Basal antennal joint short, but touching the front at its inner angle: the flagellum inserted in the orbital hiatus.

Merus of the external maxillipeds subquadrilateral.

The abdomen of the male consists of five movable pieces.

This genus is not represented in the Indian Museum.

#### 51. *Cycloxanthus lineatus*, A. Milne Edwards.

*Cycloxanthus lineatus*, A. Milne Edwards, Ann. Soc. Entom. France, (4) VII. 1867, p. 269, and Nouv. Archiv. du Mus. IX. 1873, p. 209, pl. vi. fig. 5: Miers, Zool. H. M. S. Alert, pp. 183, 212: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 360.

Carapace broad, very depressed, smooth; the regions little defined; antero-lateral borders prolonged far backwards and obscurely divided into four dentiform lobes.

Outer orbital angle inconspicuous, orbits small, the upper margin with a narrow cleft.

Front very prominent, lamellar, a little sinuous at the sides, prominent towards the middle where there is a linear fissure.

Chelipeds unequal: the hand has the inner surface flattened, the upper border obtusely crested, and the outer surface rugose: the wrist, which has its outer border much dilated, is equally rugose.

The legs are weak and smooth, the dactylus being a little compressed.

Carapace yellowish, very symmetrically marked with numerous reddish-brown lines, some of which run obliquely from the antero-lateral borders towards the front and towards the middle line, while others run from the posterior border forwards to the cardiac region.

There are no specimens in the Indian Museum collection.

#### HOPLOXANTHUS, n. gen.

Carapace hexagonal, moderately broad, moderately convex fore and aft, its regions all well defined, and to a certain extent subdivided.

The antero-lateral borders are thin and crest-like and are on a much lower plane than the rest of the carapace, *they end either in both sexes or in the female only, in a large horizontal lateral epibranchial spine,* and may either be cut into large triangular teeth or may be only obscurely notched.

Postero-lateral borders straight, moderately convergent, about as long as the antero-lateral.

Front lamellar, prominent, horizontal, notched in the middle line, about a fourth to two-sevenths the greatest breadth of the carapace.

Orbital margin with two faintish notches or suture lines above, and with a small triangular gap just below the outer angle: the inner angle of the lower orbital margin forms a strongly-projecting tooth: the outer orbital angle is confluent with the antero-lateral margin.

The antennules fold obliquely. The basal antennal joint is rather slender and meets the front: the flagellum, which is about as long as the major diameter of the orbit, is lodged in the orbital hiatus.

The anterior edge of the external maxillipeds is almost transverse.

Chelipeds unequal, fingers sharp pointed: legs rather slender.

No ridges, defining the efferent branchial channels, on the plate.

The abdomen of the male consists of seven separate segments, the last segment being no longer than the longest of the others.

This genus is closely allied to *Xantho* and *Cycloxanthus*, it is also related not distantly to *Halimede* and to *Lophozozymus*.

52. *Hoploxanthus hextii*, n. sp.

The whole of the carapace, legs, and outer surface of chelipeds is covered with a dense, darkish, extremely short, velvety or branny pubescence.

Carapace hexagonal, moderately broad, moderately convex, the regions well defined, tumid, their convexities granular.

Front prominent beyond the orbits and separated from them by a notch, square-cut, bilaminar.

Antero-lateral border thin sharp, cut into four triangular laciniate teeth, the last of which—in the female but not in the male—is an acute salient spine.

The edges of all the teeth, of the front, and of the orbit are finely granular.

The postero-lateral border is elegantly granular and quite straight: dorsal to it the wall of the carapace forms a distinct postero-lateral facet, sharply marked off from the general surface of the carapace.

Chelipeds a little unequal in both sexes: wrist with a small somewhat cristiform expansion at the outer angle and a tooth at the inner angle: upper surface of hand with two or three longitudinal raised sculptured lines, the innermost of which consists of a blunt cristiform lobule followed by one or two blunt denticles, the outer one or two being simply crenulate and granular; the outer surface of the smaller hand is everywhere granular, that of the larger hand is granular in part—in both cases some of the granules form slightly-raised longitudinal lines.

Legs long, slender.

Colours in spirit yellowish brown.

Carapace of male 10 millim. long, 13 millim. broad; of female, 11 millim. long, 17 millim. broad.

In the Indian Museum are 3 specimens from the east coast of India and 2 from the Nicobars.

53. *Hoploxanthus cultripes*, n. sp.

Carapace hexagonal: the three gastric subregions (lateral and post-medial), the cardiac region, and two (smaller) median epibranchial regions stand out as very prominent granular bosses, and the convexity of the lateral epibranchial spine, and the postero-lateral border and its neighbourhood are granular,—otherwise the carapace is quite smooth.

Front prominent, sublaminar, with a curved convex finely granular edge, faintly notched in the middle line and hardly separated from the supra-orbital angles.

Antero-lateral borders very thin and sharp, obscurely divided by faint notches and fainter grooves into 3 broad inconspicuous lobes, and ending in a strong horizontal pyramidal lateral epibranchial spine.

The chelipeds in the unique specimen are lost; but the legs are remarkable in having the upper edge of the merus and carpus sharply carinate, the carpal joints having a second blunter and lower keel along the dorsal surface.

The legs and the undersurface of the body are covered with the same dense extremely short pubescence as occurs in *H. hextii*.

The single imperfect male in the Indian Museum comes from Karáchi, and is 9 millim. long and 13 millim. broad.

#### ORPHNOXANTHUS, n. gen.

Carapace, owing to the inflation of the branchial regions almost quadrilateral in outline and almost concave from side to side, but very decidedly convex fore and aft, broad, the regions well defined but not to any great extent areolated.

Fronto-orbital border a little more than half the greatest breadth of the carapace in extent. Front about a third the greatest width of the carapace, lamellar, projecting horizontally beyond the orbits, broadly and faintly bilobed. Orbital margin entire: orbits and eyes small.

Antero-lateral border cut into four teeth; postero-lateral borders convergent only in the posterior half; posterior border long.

The antennules fold almost transversely. The basal antennal joint is very short and only just touches the turned down edge of the front; the flagellum which is very long (between 2 and 3 times the length of the orbit) is lodged in the narrow orbital hiatus.

Owing to the bulge of the outer wall of the efferent branchial canal and the consequent puffing out of the pterygostomian regions, the front edge of the merus of the external maxillipeds is quite transverse or even slightly oblique from without inwards.

The chelipeds are massive and unequal; the fingers are compressed and pointed. The legs are very slender.

The abdomen of the male consists of 5 segments, the 3rd-5th somites being fused.

Owing to the inflation of the pterygostomian regions the efferent branchial channels are permanently open, but the low crests that define them are confined to the posterior part of the endostome.

This genus appears to represent one of the links between *Galene* and *Xantho*. The single known species comes from the Bay of Bengal, 105-350 fms.

54. *Orphnoxanthus microps*, Alcock and Anderson.

*Xanthodes microps*, Alcock and Anderson, J. A. S. B. LXIII. pt. 2, 1894, p. 183.

Carapace about  $\frac{2}{3}$  as long as broad, almost quadrilateral in outline, strongly convex fore and aft, but, owing to the inflation of the branchial regions, a little *concave* from side to side; it is rather closely covered with a very fine short fur, beneath which the surface may be granular or nearly smooth, but the margins are always granular. The regions are all well defined and are slightly tumid: the gastric region is divided into 3 gently tumid subregions, the branchio-hepatic regions are subdivided transversely into three areas, and the fronto-orbital margin is also marked off.

The antero-lateral border is thin and sharp and is cut into four sharp finely granular teeth, the first of which runs by a long nearly transverse margin, into the (undefined) angle of the orbit. The front is laminar and projects beyond the supra-orbital margin; it is square-cut and is slightly notched in the middle line, so as to form two broad shallow lobes. The eyes are small and are to a variable extent deficient in pigment.

The chelipeds are unequal—very much more so in the male than in the female: the arm to a variable extent, the entire surface of the wrist, and the upper border of the hand are scabrous and more or less hairy; the other surfaces of the hand may be smooth and polished, or the outer surface may be to a variable extent granular: the fingers are large, compressed and pointed.

In the male the larger cheliped is about  $2\frac{1}{2}$  times the length of the carapace (the hand and fingers forming slightly more than half the length) and nearly half the arm projects beyond the carapace in repose.

The legs are long slender and finely and sparsely hairy: the upper edge of the meropodites is scabrous or closely spinulate.

Colours in spirit; chestnut brown with blackish fingers. Length of carapace (average) 11 millim., breadth 15 to 16 millim.

In the Indian Museum are 29 specimens from the Bay of Bengal, 105–350 fms.

## ETISUS, Milne Edwards.

*Etisus*, Milne Edwards, Hist. Nat. Crust. I. 410.

*Etisus*, Dana, Silliman's Amer. Journ. Sci. and Art. (2) XII. 1851, p. 126; and U. S. Expl. Exp. Crust. pt. I. p. 183.

*Etisus*, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XX. 1863, p. 291; and Nouv. Archiv. du Mus. IX. 1873, p. 233.

*Etisus*, Miers, Challenger Brachyura, p. 131.

Carapace broad, moderately convex in both directions, with the

regions delimited by broad shallow rather indistinct depressions and having a slightly uneven but not definitely lobulated surface.

The front is laminar and narrow; it projects well beyond the supra-orbital border from which it is separated by a deep notch, and is split by a suture in the middle line. The orbital margin is broken by three sutures or actual fissures, and the tooth at the inner angle of the lower border is very prominent.

The antero-lateral borders, which are a good deal longer than the postero-lateral, are cut into from 4 to 8 lobes or procurved spines.

The basal antennal joint has its outer angle produced and tightly wedged into the internal orbital gap, which it fills; but the flagellum, which is of good length, does not arise within the orbit but at the base of this process.

The outer border of the merus of the external maxillipeds is oblique.

The chelipeds, which are very massive and rather long, are a little unequal in the male: the fingers are very stout and strongly arched, and they meet only at the tip, which is broad expanded and hollowed out almost like a horse's hoof.

The abdomen of the male is five-jointed, the 3rd-5th somites being fused.

*Key to the Indian species of Etisus.*

- I. More than four teeth on the antero-lateral border, excluding the external angle of the orbit: free edge of front not convex: the process of the basal antennal joint completely separates the lower from the upper inner angle of the orbit: legs spiny:—
  - i. Seven or eight uneven unequal-sized claw-like teeth on the antero-lateral border ..... *E. dentatus.*
  - ii. Seven evenly arranged broad compressed procurved teeth of almost uniform size on the antero-lateral margin ..... *E. utilis.*
- II. Four teeth (excluding the external angle of the orbit) on the antero-lateral border: free edge of front bow-shaped: the tooth at the inner canthus of the orbit in contact with the eave of the orbit beyond the tip of the process of the basal antennal joint: legs not spiny ..... *E. lævimanus.*

55. *Etisus dentatus*, (Herbst) Edw.

*Cancer dentatus*, Herbst, Krabben, I. ii. 186, pl. xi. fig. 66.

*Etisus dentatus*, Milne Edwards, Hist. Nat. Crust. I. 411: Dana, U. S. Expl. Exp. Crust. pt. I. 185, pl. x. figs. 2a-b: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 233: Miers, P. Z. S. 1877, p. 134: Richters in Möbius, Meeresf. Maurit.

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p. 146: Lenz and Richters, *Abh. Senck. Ges.* XII. 1881, p. 421: Haswell, *Cat. Austral. Crust.* p. 53.

*Etisodes dentatus*, Ortmann, *Zool. Jahrb. Syst.* VII. 1893-94, p. 472.

Carapace smooth (non-granular): gastric region well defined except at cardiac end, its surface broken, but not definitely lobulated; similarly with the branchio-hepatic regions.

The antero-lateral border bears 7 or 8 (exclusive of the external orbital angle) pro-curved claw-like teeth, uneven both as to size and place, though four of them—which correspond to the 4 lobes of so many other Cancroids—are much of one size and much larger than the other 3 or 4.

The front is lamellar with the free edge slightly and angularly emarginate, and is cleft in the middle line by a fine sharp groove that extends well on to the gastric region. The orbital margin has three teeth, separated by fissures, in its outer part. The tooth at the inner angle of the lower edge of the orbit is sharp, and does not come into contact with the eave of the orbit.

Chelipeds in the adult male a little more, in the adult female a little less than twice the length of the carapace: the arm has a few spinules and a good deal of hair along the upper border, and some granules or blunt spinules along its lower and its distal borders; the wrist has a strong spike at its inner angle; the hand may or may not have a few pimple-like granules on its upper outer surface; and the fingers are fluted, the ridges on the dactylus being crenulate or dentate. Otherwise the chelipeds are smooth.

In the legs, the merus has both the dorsal and the ventral edges thickly fringed with long stiff hairs, the dorsal edge being also granular; the carpus has at least three series of spinules along its dorsal surface; the propodite has a rather granular surface with about four (dorsal) series of spinules, and has much of its lower edge fringed with long stiff hairs; and the dactylus is spiny above and hairy below.

Colours of a specimen 7 years in spirit: upper surface bright maroon fading to yellow near the posterior border; fingers black.

In the Indian Museum are a young female from Port Blair (Andamans), and three large males (carapace 72 millim. by 111 millim.) from Great Coco I. (Andamans) and East I. Andamans.

#### 56. *Etisus utilis*, Lucas.

*Etisus utilis*, Lucas in Jacquinot, *Voy. Astrolabe, Crust.* p. 27, pl. ii. fig. 6: Heller, *Novara Crust.* p. 16: A. Milne Edwards, *Nouv. Archiv. du Mus.* IX. 1873, p. 233: E. Nauck, *Zeits. Wiss. Zool.* XXXIV. 1880, p. 58 (gastric teeth): Lenz and Richters, *Abh. Senck. Ges.* XII. 1881, p. 421: Ortmann, *Zool. Jahrb. Syst.* VII, 1893-94, p. 472.

Carapace smooth (non-granular), distantly pitted in the anterior and lateral parts. Gastric region fairly well defined, except at the cardiac end, its surface showing indistinct traces of lobulation: branchio-hepatic regions with the surface a little uneven.

Antero-lateral border with 7 (exclusive of the external orbital angle) regular, even, nearly uniform, compressed, procurved teeth.

Front as in *Etisus dentatus*, but with the angles a little sharper cut. The edge of the orbit is trenchant, and near the outer angle are 3 not very distinct suture-lines: the tooth at the inner angle of the lower border of the orbit is prominent, and does not come into contact with the eave of the orbit.

Chelipeds in the adult male twice to twice-and-a-half, in the adult female once-and-a-half to once-and-two-thirds the length of the carapace: upper and lower edges of arm coarsely and unevenly granular, much of the upper edge also hairy; distal end of wrist with 4 or 5 teeth, the inner two of which are long and large; the hand has, along its upper border, a double crest of strong teeth, continued in blunter form along the finger, and on the outer surface of the hand there may be a few pimple-like granules.

In the legs, both the upper and lower edges — but most the upper edge — of the merus, carpus and propodite are thickly fringed with long bristles, as also is the lower edge of the dactylus; the upper edge of the merus has also a row of small spines, and the upper edge of the carpus, propus and dactylus a double row of increasingly larger spines: the lower edge also of the propus and dactylus is spiny.

Colours in spirit: dull yellowish pink, fingers black.

In the Indian Museum are a male and a female from the Singapore Museum, and supposed to have come from Singapore. (Heller *l.c.* records this species from the Nicobars).

#### 57. *Etisus laevimanus*, Randall.

*Etisus laevimanus*, Randall, Journ. Acad. Nat. Sci. Philad. 1839, p. 115: Dana, Proc. Ac. Nat. Sci. Phila. 1852, p. 76, and U. S. Expl. Exp. Crust. pt. I. p. 185, pl. x. figs. 1a-b: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 234: Kossmann, Reise roth Meer. Crust. p. 30: T. Tozzetti, Magenta Crust. p. 29: Streets, Bull, U. S. Nat. Mus. VII. 1877, p. 105: Hilgendorf, MB. Ak. Berl. 1878, p. 791: Richters in Möbius Meeresf. Maurit. p. 146: de Man, Notes Leyden Mus. III. 1881, p. 99; and Archiv. für Naturges. LIII. 1887, i. p. 289; and Zool. Jahrb. Syst. VIII. 1894-95, p. 527: Haswell, Cat. Austral. Crust. p. 54: Miers, Zool. H. M. S. Alert, pp. 183, 217; and Challenger Brachyura, p. 132: F. Muller, Verh. Ges. Basel VIII. 1886, p. 474: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 362: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 473: Whitelegge, Mem. Austral. Mus. III, 1897, p. 131.

*Etisus macrodactylus*, Lucas in Jacquinot's Voy. Astrolabe, Crust. p. 30, pl. ix. fig. 2, (A. M. E.)

*Etisus convexus*, Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 31.

*Etisus maculatus*, Heller, Abh. zool.-bot. Ges. Wien XI. 1861, p. 9; and SB. Ak. Wien, XLIII. 1861, p. 332: de Man, Notes Leyden Mus. II. 1880, p. 173.

Gastric region well defined on all sides, its anterior part distinctly lobulated; branchio-hepatic regions with three lobules following the curve of the antero-lateral margins.

Antero-lateral border with 4 broad teeth (exclusive of the external orbital angle), the last two of which culminate in procurved points.

The front is cleft in the middle line by a groove; its free edge is bow-shaped. The orbital margin has, in its outer half, three lobular constrictions defined by three grooves.

The tooth at the inner angle of the lower edge of the orbit is blunt, and it comes into contact with the eave of the orbit beyond the tip of the process of the basal joint of the antenna.

Chelipeds in the adult male about twice and a half, in the adult female a little less than twice the length of the carapace; the wrist has a blunt spine at the inner angle, otherwise they are smooth and unsculptured.

Legs with both edges of all the long joints hairy, most so on the lower edge of the dactylus and on the upper edge of the other joints: the upper edge of the propodite and dactylus is also sharply granular, but there are no spines.

Colours in spirit variable: dull yellow, or dull greenish-brown, or sea-green, often with cinnamon coloured patches or small spots.

In the Indian Museum are 20 specimens, from Persian Gulf, Karáchi, Bombay, Laccadives, Andamans, and Singapore, (besides specimens from Celebes and Mauritius).

#### ETISODES, Dana.

*Etisodes*, Dana, Silliman's Amer. Journ. Sci. and Arts, (2) XII. 1851, p. 126 (footnote); Proc. Ac. Nat. Sci. Phila. 1852, p. 77; and U. S. Expl. Exp. Crust. pt. I. p. 184.

*Etisodes*, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XX. 1861, p. 291; and Nouv. Archiv. du Mus. IX. 1873, p. 235.

The genus *Etisodes* resembles *Etisus* in the characteristic form and lie of the basal joint of the antennæ, and in the characteristic relation of the front to the orbits; but it differs in the following particulars:—

The carapace is much longer and narrower; it is less convex, especially in its posterior third; its regions are clearly defined, and are definitely sculptured into lobules in the anterior two-thirds of the carapace: the

chelipeds are much shorter, the difference in length being chiefly in the arm; and the fingers though well hollowed out at tip are not so hoof-like.

58. *Etisodes anaglyptus*, (Edw.)

*Cancer anaglyptus*, Milne Edwards in Cuvier, Règne An. Crust. pl. xi. fig. 4.

*Etisus anaglyptus*, Milne Edwards, Hist. Nat. Crust. I. 411: Hess, Archiv. für Naturges. XXXI. 1865, i. p. 134: de Man, Notes Leyden Mus. XIII. 1891, p. 7.

*Etisodes anaglyptus*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 235: Haswell, Cat. Austral. Crust. p. 55: Miers, Zool. H. M. S. Alert, pp. 183, 218: Ortman, Zool. Jahrb. VII. 1893-94, p. 471.

Length of carapace nearly three-quarters the breadth.

The regions are all convex and well defined, and the gastric and branchio-hepatic regions are subdivided into convex lobules, the surface of which is somewhat dented transversely.

The antero-lateral border is cut into four (excluding the external angle of the orbit) procurved teeth, the last two of which are claw-like.

The front projects strongly, and is divided into two dorsally-convex lobes, of which the free edge may either be cut obliquely inwards, or be so excised as to give the front a four-pronged look.

The orbital margin has, in its outer half, three grooves separating three blunt teeth: the tooth at the lower inner angle does not come in contact with the eave of the orbit.

Chelipeds in the male not much more than half again as long as the carapace: upper and anterior borders of arm hairy; upper surface of wrist nodular, with two teeth (one large) at the inner angle; upper outer surface of hand with rather irregular longitudinal series of little nodules and granules; dactylus fluted, the ridges being crenulated.

Legs very shaggy, the hairs almost concealing some lines of sharp granules or spinules on the propodite and dactylus.

In the Indian Museum is a specimen from the Persian Gulf (besides one from Samoa).

59. *Etisodes electra* (Herbst), Miers.

*Cancer electra* and ? *metis*, Herbst, Krabben, III. ii. 34 and 36, pl. li. fig. 6, and pl. liv. fig. 3.

*Etisus rugosus*, Lucas in Jacquinot's Voy. Astrolabe III. Crust. p. 33, pl. iv. fig. 2 (*vide* A. M. E., *infra*).

? *Chlorodius dentifrons*, Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 34.

*Etisodes sculptilis*, Heller, Abh. zool.-bot. Ges. Wien XI. 1861, p. 10, and SB. Ak. Wien XLIII. 1861, p. 333: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 236, pl. ix. fig. 2: Kossmann Reise roth. Meer., Crust. p. 30.

*Chlorodius samoensis*, Miers, Ann. Mag. Nat. Hist. (4) XVI. 1875, p. 341 (Miers *infra*.)

*Etisodes electra*, Miers, Zool. H. M. S. Alert, pp. 183, 217, 517, 532: de Man, Archiv. für Naturges. LIII. 1887, i. p. 290: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 362.

Closely resembles *E. anaglyptus*, from which it is distinguished by the following characters:—

(1) the carapace is even longer and narrower, the length being quite  $\frac{3}{4}$  the breadth;

(2) the whole surface of the lobules of the carapace and of the nodules of the wrist and hand is closely granular;

(3) the front is cut into four teeth of nearly equal size;

(4) the legs, though hairy, are not so shaggy.

In the Indian Museum are 4 specimens from the Andamans and Nicobars, (besides three from Upolu and Mauritius).

Alliance V. *Halimedoida*.

Halimede.

Polycremnus.

POLYCREMNUS, Gerstaecker.

*Polycremnus*, Gerstaecker, Archiv. für Naturges. XXII. 1856, p. 120.

Carapace approaching the pentagonal, not very much broader than long, distinctly convex fore-and-aft, slightly convex from side to side, the regions rather indistinctly defined and to a certain extent subdivided by broad shallow depressions.

The antero-lateral border is elegantly four-lobed and is continued beneath the orbits to the outer angle of the buccal cavern. The postero-lateral borders are moderately convergent and are about equal in length to the antero-lateral borders and also to the posterior border.

The fronto-orbital border is less than half the greatest width of the carapace in extent. The front is narrow (less than a fourth the greatest breadth of the carapace), sublaminar or hood-like, bilobed, and projects well beyond the orbits. The three grooves in the vicinity of the outer angle of the orbit are distinct. Eyes on short thick stalks. The inner angle of the lower edge of the orbit is strongly produced.

The antennules fold obliquely. The basal antennal joint is long, rather slender, and well in contact with the front: the flagellum is long (a good deal longer than the major diameter of the orbit) and is lodged in the narrow orbital hiatus.

Anterior edge of merus of external maxillipeds almost transverse.

Chelipeds unequal in both sexes. Legs stout.

Abdomen of the male with all 7 joints distinct and separate: the last segment unusually long and acute.

60. *Polycremnus ochtodes*, (Herbst) Gerstaecker.

*Cancer ochtodes*, Herbst, Krabben, I. ii. 158, pl. viii. fig. 54: Fabricius, Ent. Syst. II. 455, and Suppl. p. 337.

*Galene ochtodes*, Adams and White, Samarang Crust. p. 43, pl. x. fig. 2.

*Polycremnus ochtodes*, Gerstaecker, Archiv. fur Naturges. XXII. 1856, p. 121: A. O. Walker, Journ. Linn. Soc., Zool., XX. 1886-90, p. 110: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 359.

Carapace oval-pentagonal, its surface smooth, a little lumpy owing to the broad shallow depressions that somewhat indistinctly separate and to a certain extent subdivide the regions.

All the borders are of about equal length: the antero-lateral is divided into four rounded deep-cut lobes, decreasing in size from behind forwards, and is continued beneath the slightly tumid lobe of the orbital angle to the angle of the buccal cavern: on the postero-lateral border just behind the junction with the antero-lateral are usually a few granules.

The front projects horizontally forward beyond the orbits and consists of two unguiform lobes separated in all their extent by a deep narrow groove: it is a distinct rostrum.

The chelipeds are unequal, most markedly so in the male. The upper border of the arm is elegantly cut into teeth or pisiform or pearl-like tubercles: two similar tubercles stand, one below the other, at the inner angle of the wrist, and the upper and outer surfaces of the wrist are more or less covered with papule-like or pustulous tubercles: the upper border of the hand, and of the basal half of the finger bears a row of pisiform tubercles, and there are numerous pustulous tubercles on the upper surface and on the proximal part of the outer surface of the hand: fingers sharp pointed.

The legs are smooth, but the upper border of the meropodites of all, or of the first three pairs, is distantly serrate or spinulous: the dactylus and the neighbouring part of the lower border of the propodite is furred.

Colours in spirit leaden grey, or yellowish with livid markings.

In the Indian Museum are 2 specimens from the Madras Coast and one from Penang.

## HALIMEDE, De Haan.

*Halimede*, De Haan, Faun. Japon. Crust. p. 35: Dana, Amer. Journ. Sci. and Arts, (2) XII. 1851, p. 125, and U. S. Expl. Exp. Crust. pt. I. p. 149.

Closely allied to *Polycremnus*, having the same form of male abdomen.

The genus is not represented in the Indian Museum.

61. *Halimede* (?) *thurstoni*, Henderson.

*Halimede thurstoni*, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 360, pl. xxxvi. figs. 13, 14.

It appears to me doubtful whether this is a true *Halimede*.

Alliance VI. *Galenoidea*. [or Subfamily GALENINÆ].

## GALENE, De Haan.

*Galene*, De Haan, Faun. Japon. Crust. p. 19.

*Galene*, Miers, Challenger Brachyura, p. 118 (footnote.)

Carapace approaching the quadrilateral, strongly convex fore and aft, little convex from side to side; its surface granular in parts, or nearly smooth, and with the regions more or less distinctly shown by broad shallow rather vague depressions.

Antero-lateral border moderately arched, indistinctly four-lobed—the last 2 or 3 lobes in the typical species being marked by spine-like teeth: postero-lateral borders very slightly convergent, rather longer than the chord of the antero-lateral: posterior border long.

Fronto-orbital border less than half the greatest width of the carapace. Front obliquely deflexed, less than one-fifth the greatest width of the carapace in extent, bilobed or quadridentate. Orbital margin with the three grooves in the vicinity of the outer angle distinct: eyes on thick stalks of moderate length. The antennules fold nearly transversely.

Basal antennal joint broad, extremely short, not nearly reaching the front; flagellum longish (longer than the major diameter of the orbit) lodged in the broad orbital hiatus.

Anterior edge of merus of external maxillipeds a little oblique. Chelipeds massive, unequal in both sexes, fingers pointed. Legs long, stoutish.

Abdomen of male with all 7 joints separate and distinct.

No crests, delimiting efferent branchial canals, on the endostome.

62. *Galene bispinosa* (Herbst) De Haan.

*Cancer bispinosus*, Herbst, Krabben, I. ii. 144, pl. vi. fig. 45, and III. ii. 11, pl. liv. fig. 1: Fabricius, Ent. Syst. II. 446, and Suppl. p. 337.

*Cancer (Galene) bispinosus*, De Haan, Faun. Japon. Crust. p. 49, pl. v. fig. 2.

*Galene bispinosa*, A. O. Walker, Journ. Linn. Soc., Zool., XX. 1886-90, p. 110.

Carapace moderately broad, somewhat pentagonal, its surface for the greater part smooth, but usually scabrous near the borders—especially the postero-lateral borders; its surface is also somewhat lumpy,

owing to the very broad depressions which somewhat vaguely delimit and to a certain extent subdivide the regions. Pterygostomian region more or less hairy.

The antero-lateral borders are very indistinctly 4-lobed, the first lobe being almost obsolete, the second being usually marked by a granular denticle, and the third and fourth by two coarse granular spines. The postero-lateral borders, which are little convergent, are slightly longer than the chord of the antero-lateral. The posterior border is about half the greatest width of the carapace.

Front really bilobed, but with both the inner and the outer angles of each lobe so equally prominent as to appear 4-dentate.

Chelipeds unequal: exposed surfaces of arm either smooth, or more or less scabrous, both borders of arm uneven and hairy, the distal end of the upper border with two strong teeth: both the inner and the outer angles of the wrist well pronounced, or even spiniform; the exposed surfaces of the wrist may be almost smooth, but are usually studded, to a variable extent, with sharp little tubercles; the upper outer and lower surfaces of the hand may be almost smooth, but are usually studded, in the proximal third to three-quarters, with similar tubercles, in more or less distinct lines: fingers long, sharp-pointed, the apposed edges with strong molariform teeth.

Legs long, stoutish; upper border of the meropodites scabrous and spinulate, upper border of last 3 joints, and lower border of last 2, plumose.

Colours in spirit, leaden white or yellowish.

In the Indian Museum are 3 specimens from the Vizagapatam coast and 1 from Tennasserim, (besides one from Hongkong): the amount of granulation of the borders of the carapace and of the chelipeds is different in all.

## Subfamily II. ACTÆINÆ.

### ACTÆA, De Haan, A. Milne Edwards.

*Actæa*, De Haan, Faun. Jap. Crust. p. 18.

*Actæa* and *Actæodes*, Dana, U. S. Expl. Exp. Crust. pt. I. pp. 162, 194.

*Actæa*, Heller, Crust. Sudl. Europ. p. 69.

*Actæa*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, pp. 259, 260.

*Psaumis*, Kossmann, Crust. roth. Meer. p. 26.

*Actæa* and *Actæodes*, Miers, Challenger Brachyura, pp. 118, 135.

Carapace convex fore and aft, slightly convex or flat from side to side, usually broad, the regions well demarcated by deep grooves, and again subdivided into lobules, which are usually convex and granular. Antero-lateral borders usually four-lobed, but the lobes are shallow and often indistinct. Postero-lateral borders usually concave, always short, not strongly convergent.



Front between a third and a fourth the greatest width of the carapace, deflexed, cleft in the middle line into two lobes. Upper edge of orbit tumid, usually with two fissures or sutures; a third below the outer orbital angle: eyestalks short and thick.

Antennules folding obliquely or nearly transversely. Basal antennal joint usually stopping at the angle of the deflexed front, but often prolonged beyond this, towards or nearly into the orbit; the flagellum is about as long as the orbit, and is lodged in the orbital hiatus.

Merus of the external maxillipeds with the anterior border little oblique.

Chelipeds equal in both sexes; fingers usually blunt-pointed, sometimes hollowed-out at tip.

Abdomen of the male five-jointed, somites 3, 4, 5 fused.

Small crabs, distinguished by the elaborate lobulation of the carapace, and by the form of the front, which is usually deep-cleft in the middle line to form two prominent round-pointed lobes.

*Key to the Indian species of Actæa.*

I. Legs of ordinary form:—

i. The lobules of the carapace, and the legs, when granular, bear miliary or vesiculous granules of nearly uniform size, not tubercles:—

1. Length of the carapace two-thirds or less than two-thirds the breadth, postero-lateral borders extremely short and concave:—

a. Carapace and legs covered with a short dense fur, which does not, however, conceal the lobules or their granules:—

a. Fingers hollowed at tip, fur black ... *A. tomentosa.*

β. Fingers long and pointed, fur light brown ..... *A. areolata.*

b. Carapace and legs with numerous bristles, which do not form a coat; fingers blunt-pointed, but not appreciably hollowed at tip. *A. hirsutissima.*

2. Length of the carapace rather more than two-thirds the breadth, postero-lateral borders slightly concave:—

a. Legs and chelipeds lobulated in the same style as the carapace:—

a. Lobules of the carapace very markedly isolated and very convex, interlobular grooves very broad and deep, and hairy ..... *A. rufopunctata.*

β. Lobules of the carapace not remarkably isolated, the grooves with a short almost invisible fur ..... *A. speciosa.*

- b. Wrist and hands sublobular, corresponding joints of legs only a little dimpled (areolation of carapace complete) ..... *A. ruppellii.*
- c. Chelipeds and legs with a plain granular surface, areolation of carapace faint anteriorly, incomplete posteriorly :—
- a. Lobulation of antero-lateral border very indistinct, no hairs on the carapace, which is thick and convex ..... *A. obesa.*
- β. Lobulation of antero-lateral border fairly distinct the lobules being granular ; a thin coat of hair :—
- α. Carapace of ordinary Actæa form ..... *A. pulchella.*
- γ. Carapace more than  $\frac{3}{4}$  as long as broad ; its posterior half remarkably flat..... *A. parvula.*
- ii. Carapace covered with tubercles, legs with tubercles or spines :—
1. Carapace with plain isolated tubercles :—
- a. Carapace with pearly tubercles and granules ; front bilobed, but each lobe so deeply excised as to appear itself bilobed..... *A. nodulosa.*
- b. Carapace with coarse spine-like tubercles ; front broadly bilobed ..... *A. echinus.*
- c. Carapace and chelipeds with pedicled pisi-form tubercles, legs with thorns ..... *A. peronii.*
- d. Carapace, chelipeds and legs with pedicled, flat-topped tubercles which at the margins become petaloid ; front bilobed, each lobe cut into four petaloid teeth..... *A. flosculata.*
2. Carapace closely covered with confluent tubercles the surfaces of which are themselves formed of confluent granules :—
- a. Tubercles of carapace very rough, raspberry-like, some of those on the legs often spiny : carapace about seven-ninths as long as broad. *A. granulata.*
- b. Tubercles of carapace smooth though pitted, those of the legs never spiny : carapace about two-thirds as long as broad..... *A. calculosa.*
- II. Propodites and carpopodites of legs dorsally bicarinate in such a way that the space between the crests appears like a trough or a series of cups :—
- i. Propodites and carpopodites each with one trough ; lobules of carapace granular ; front not projecting much. *A. cavipes.*
- ii. Carpopodites with at least two cups ; lobules of carapace pitted as well as granular ; front projecting far beyond the inner angle of the orbit..... *A. fossulata.*

63. *Actæa tomentosa*, (Edw.) A. Milne Edwards.

*Zozymus tomentosus*, Milne Edwards, Hist. Nat. Crust. I. 385, and in Cuvier. Règne An. Crust. pl. xi. bis, fig. 2.

*Actæa tomentosa*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 262, and IX. 1873, p. 191 : A. Targioni Tozzetti, "Magenta" Crust. p. 35, pl. iii. figs. 14 &c. : Hilgendorf, MB. Ak. Berl. 1878, p. 788 : Richters in Möbius Meeresf. Maurit. p. 145 : Haswell, Cat. Austral. Crust. p. 44 : Ortmann, Zool. Jahrbuch., Syst. &c., VII. 1893-94, p. 453, and in Semon's Zool. Forschungsr. (Jena. Denkschr. VIII) Crust. p. 50.

*Actæodes tomentosus*, Dana U. S. Expl. Exp. Crust. pt. I. p. 197 : Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 32 : Heller, SB. Ak. Wien, XLIII. 1861, p. 328, and Novara Crust. p. 17 : Miers, P. Z. S. 1877, p. 134 ; and 1879 pp. 20 and 30 ; and Phil. Trans. Vol. 168, 1879, p. 486 ; and Ann. Mag. Nat. Hist. (5) V. 1880, p. 234 ; and Zool. H. M. S. Alert, pp. 517 and 530 ; and Challenger Brachyura, p. 135 : de Man, Archiv. fur Naturges. LIII. 1887, i. p. 252 ; and in Weber's Zool. Ergeb, Niederl. Ost. Ind. II. 1892, p. 278 ; and Zool. Jahrb., Syst. &c., VIII. 1894-95, p. 499 : Cano, Boll. Soc. Nat. Napol. III. 1889, p. 199.

Carapace ovoid and very broad, its greatest length less than two-thirds its greatest breadth, its dorsal surface—like that of all the surfaces of the chelipeds and legs that are exposed in repose—covered, as closely and evenly as possible, with a dense short blackish felt through which peep the shiny tops of very numerous large vesiculous granules. This felt is not so long as to obscure the areolation of the carapace which is very perfect and in bold relief, but it obscures the fact that the deep-cut grooves that separate the lobules are smooth.

The lobules—excluding those of the antero-lateral and supra-orbital margins and those on the front—are 21 in number, the anterior 8 with the long diameter fore-and-aft, the posterior 5 with the long diameter transverse.

The front, which is vertically deflexed and does not break the wide even sweep of the antero-lateral borders, appears nearly equally four-lobed, the outer lobe on either side being formed by the tumid supra-orbital border.

The antero-lateral borders are long and beautifully arched ; when undenuded they look entire, but when denuded they are seen to be cut by narrow clefts into four very shallow lobes of unequal size,—the clefts being continued as grooves on to the under surface of the carapace. The very short postero-lateral borders are extremely concave.

The tumid supra-orbital border is cleft into lobules by two fissures similar to the grooves of the carapace, and there is a third fissure at the outer angle of the orbit.

The whole under surface of the carapace, and the surfaces of the sternum and external maxillipeds and abdominal terga, are covered with a dense felt that obscures all the granulation that exists.

The basal antennal joint is broad, and its outer angle does not fall very far short of the inner angle of the floor of the orbit.

The legs, besides the felt and the granules (which are conical rather than vesiculous) already spoken of, have their edges—but chiefly the anterior edge—fringed with coarse tufted hair: similar hair occurs on the edges of the arm.

The fingers are short, with broadly-rounded hollowed-out tips.

Colours in spirit, as in life, blackish.

In the Indian Museum are 115 specimens from the Nicobars, Andamans, Palk Str., and Laccadives (besides 31 from Mauritius, Australia and the South Sea Is.).

#### 64. *Actæa areolata*, Dana.

*Actæa areolata*, Dana, Proc. Acad. Nat. Sci. Philad. 1852, p. 73, and U. S. Expl. Exp. Crust. pt. I. p. 162, pl. viii. figs. 1a-b: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 264: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880. p. 54 (gastric teeth): ? Miers, Zool. H. M. S. Alert, pp. 182, 209: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 25: Zehntner, Rev. Suisse Zool. II. 1894, p. 147.

Carapace in proportions and outline almost exactly similar to *A. tomentosa*. Its surface and the exposed surfaces of the chelipeds and legs is also covered as densely as possible with felt; but this felt is of a lighter colour, and it almost conceals the granulation, excepting 3 or 4 lines of granulation on the lower outer surface of the hands: the felt also obscures, though it does not conceal, the areolation of the carapace, owing to the lobules being less convex.

Unlike *A. tomentosa* the upper surface of the wrist and hand are nodular (as well as granular), and the fingers are long and pointed, without any hollowing of the tip.

In other respects this species closely resembles the preceding.

One specimen from Mergui.

#### 65. *Actæa hirsutissima* (Rüppell), De Haan, Dana.

*Xantho hirsutissimus*, Ruppell, 24 Krabben roth. Meer, p. 26, pl. v. fig. 6: Milne Edwards, Hist. Nat. Crust. I. p. 389.

*Actæa hirsutissima*, De Haan, Faun. Japon. Crust. p. 18: Dana, U. S. Expl. Exp. Crust. pt. I. p. 164: Heller, SB. Ak. Wien, XLIII. 1861, p. 314; and Novara Crust. p. 9: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 263, and IX. 1873, p. 191: Kossmann, Reise roth. Meer., Crust. p. 23: Targioni Tozzetti, Magenta Crust. p. 37, pl. iii. fig. 26: Richters in Möbius, Meeresf. Maurit. p. 145: de Man, Notes Leyden Mus. II. 1880, p. 173, and III. 1881, p. 96: Cano, Boll. Soc. Nat. Napoli, III. 1889, p. 189: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 453.

Length of carapace =  $\frac{2}{3}$  breadth.

Carapace of much the same proportions and outline as *A. tomentosa*, but the frontal outline is more convex, and the postero-lateral borders are a little less concave.

The surface of the carapace is very completely areolated by deep smooth grooves, the lobules being exceedingly numerous, strongly convex, and closely covered with pearly granules; and between and around the bases of the granules are many short black bristles which do not form a coat or conceal the texture of the carapace.

The exposed surfaces of the chelipeds and legs are granular and bristly, like the carapace; and the carpal joints, and to a less extent the propodites are dimpled, but not distinctly nodular, above.

Under surface of carapace granular, hairy, and furrowed by grooves continued from fissures that subdivide the antero-lateral borders into four shallow lobes. The surfaces of the external maxillipeds and distal abdominal terga are bristly, those of the sternum and proximal abdominal terga are hairy.

Fingers bluntly pointed but not hollow at tip.

Colours in spirit, yellowish, fingers and greater part of hand black.

In the Indian Museum are a specimen from Samoa, a specimen without locality, and a specimen from the Andamans or Nicobars.

#### 66. *Actæa rufopunctata*, (Edw.) Heller.

*Xantho rufopunctatus*, Milne Edwards, Hist. Nat. Crust. I. 389: Lucas, Expl. Sci. Algerie, Anim. Artic. p. 11, pl. ii. fig. 1: A. Milne Edwards in Maillard's Pile Réunion Annexe F, p. 4.

*Actæa rufopunctata*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 268, pl. xviii. figs. 1, 1a: Richters in Möbius Meeresf. Maurit. p. 145: de Man, Notes Leyden Mus. II. 1880, p. 172 and III. 1881, p. 96: Miers, P. Z. S. 1881, pp. 63, 68; and Zool. H. M. S. Alert, pp. 517, 528; and Challenger Brachyura, p. 122: Carus, Prodr. Faun. Medit. I. p. 513: R. I. Pocock, Ann. Mag. Nat. Hist. (6) V. 1890, p. 75: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 357: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 454; and in Semon's Forschungsr. (Jena. Denk. VIII.) Crust. p. 50.

*Actæa nodosa*, Stimpson, Ann. Lyc. Nat. Hist. N. Y. VII. 1862, p. 203; and Bull. Mus. Comp. Zool. II. 138: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 266, pl. xvii. figs. 6-6c; and Exp. Sci. Mex., Crust. p. 245; and Bull. Mus. Comp. Zool. VIII. p. 11: Desbonne and Schramm, Crust. Guadeloupe, p. 25: J. S. Kingsley, Proc. Acad. Philad. XXXI. 1879, p. 393.

Carapace broad, ovoid, its extreme length not quite  $\frac{3}{4}$  but more than  $\frac{2}{3}$  its extreme breadth: its surface is broken, by deep and broad grooves, into numerous (about 27 excluding those round the orbits and the front) very convex lobules, which are covered very closely with large vesiculous granules; the grooves are filled with a dense short

felt—with longer hairs sometimes interspersed—against which the lobules stand out like islands. (Occasionally there are some tufts of long hair on the edge of some of the lobules).

The exposed (dorsal) surfaces of the carpal and propodal joints of the chelipeds and legs are lobulated in the same style as the carapace, the lobules being granular and being isolated by deep felted grooves.

The front is strongly deflexed, but somewhat prominent, and is rather sharply bilobed. The tumid supra-orbital margin is broken by two cross grooves, and is separated from the lower margin of the orbit by a fissure. The antero-lateral borders are cut into four rounded lobules of nearly equal size, by deepish fissures. Postero-lateral borders not appreciably shorter than the antero-lateral, and little concave.

The parts seen on the under surface are not conspicuously granular or hairy.

The basal antennal joint has its outer angle almost in contact with the inner angle of the lower edge of the orbit.

The edges of the legs (especially the upper edge) are fringed with coarse hair—as also of the arm.

The lower outer surface of the hand has the granules arranged in lines, as is the case with most species of *Actæa*. Fingers blunt-pointed, hollowed out at tip.

Colours of well-preserved spirit specimens, yellow with the convexities of some of the lobules orange-red; the felt in the grooves brown; fingers dark brown with white tips.

Five specimens from Ceylon, up to 34 fms., and four from the Andamans, up to 36 fms.

#### 67. *Actæa speciosa* (Dana), Ortmann.

*Actæodes speciosus*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 198, pl. xi. figs. 4a-c: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 32.

*Actæa speciosa*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 274: Ortmann, Zool. Jahrb. Syst. VII, 1893-94, p. 455.

*Actæodes nodipes*, Heller, Abhandl. zool.-bot. Ges. Wien, XI. 1861, p. 9, and SB. Ak. Wien, XLIII. 1861, p. 329, pl. ii. fig. 19, and Novara Crust. p. 17: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 274: de Man, Notes Leyden Mus. II. 1880, p. 172.

? *Psaumis glabra*, Kossmann, Reise roth. Meer., Crust. p. 27, pl. i. fig. 4.

This species has a general resemblance to *A. rufopunctata*, but the carapace is relatively longer and narrower, its lobulation is much less complete and bold, and it is devoid of hairs.

Length of carapace =  $\frac{3}{4}$  the breadth.

Surface of carapace broken up by shallow grooves into numerous

lobules, which fall into series that appear to radiate from the midcardiac region. The lobules are closely covered with miliary granules, they are nowhere very convex, and on the posterior third of the carapace they are indistinct. Although the carapace looks quite bare to the naked eye, yet its whole surface—both between the granules and in the grooves between the lobules—is covered with a fine, extremely short and inconspicuous felt.

The exposed surfaces of the carpal and propodal joints of the legs and chelipeds (except the lower outer surface of the hand, which is granular in lines) has exactly the same style of sculpture and texture as the antero-lateral part of the carapace.

Two fissures in the upper edge of the orbit, but none between this and the lower edge of the orbit.

Antero-lateral borders four-lobed,—the lobes subequal and shallow. Postero-lateral borders distinctly shorter than the antero-lateral and distinctly concave.

The basal antennal joint falls far short of the inner angle of the floor of the orbit.

Edges of legs and chelipeds quite free from hair.

Fingers pointed, very slightly hollowed at tip.

Colours in spirit, yellow.

3 specimens from the Persian Gulf, Ceylon, and Andamans are in the Indian Museum.

#### 68. *Actæa ruppellii* (Krauss) Hilgendorf.

*Aegle ruppellii*, Krauss, Südafr. Crust. p. 28, pl. i. fig. 1. 1843.

*Actæa ruppellii*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 270: Hilgendorf in v. d. Decken's Reisen Ost Afr. III. i. p. 73, and MB. Ak. Berl. 1878, p. 787: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 232, and Zool. H. M. S. Alert, pp. 183, 209: A. O. Walker, Journ. Linn. Soc., Zool., XX. 1886-90, p. 109: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 358: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 454: de Man, Zool. Jahrb., Syst., VIII. 1894-5, p. 499.

*Aegle rugata*, Adams and White, Samarang Crust. p. 43, pl. viii. fig. 5.

*Actæa rugata*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 269, and IX. 1873, p. 192: R. Etheridge jr., Mem. Austral. Mus. No. 2, 1889, pp. 33, 35: de Man, Notes Leyden Mus. XIII. 1891, p. 1, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 277: Whitelegge, Mem. Austral. Mus. III. 1897, p. 129.

*Actæa rufopunctata*, de Man (*nec* Edw.) Archiv. fur Naturges. LIII. 1887, i. p. 261, and Journ. Linn. Soc., Zool., XXII. 1887-88, p. 26 (see Notes Leyden Mus. XIII. 1891, p. 1).

Carapace  $\frac{3}{4}$  as long as broad; it and the exposed surfaces of the legs covered with a shaggy coat—consisting of a sponge-work of short bristles amid which are numerous long silky tangled hairs—which has

to be removed before the sculpture and texture of the carapace can be properly made out.

On the denuded carapace the lobules are numerous, are arranged in series which appear to radiate from the cardiac region, and are somewhat indistinct quite posteriorly, but are elsewhere distinct, moderately convex, and separated by broad smooth furrows.

Front obliquely deflexed, rather sharply bilobed. Supra-orbital margin moderately tumid, narrow, cut by two fissures and separated from the lower edge of the orbit by a fissure. Antero-lateral borders four-festooned, the first and last lobes much smaller than the others. Postero-lateral borders shorter than the antero-lateral, moderately concave.

Exposed (dorsal) surfaces of the chelipeds and legs granular and shaggy: the wrist and upper surface of the hand are also subnodular, but the corresponding joints of the legs are but indistinctly grooved. Lower outer surface of hand with granules in lines that are not so definite as usual. Fingers blunt-pointed, slightly hollowed at tip.

Basal antennal joint broad: it falls short of the inner angle of the orbit.

Colours in spirit yellow, fingers dark brown with white tips: in some specimens faint orange-red spots exist on some of the lobules of the carapace.

Carapace markedly more convex in the female than in the male.

In the Indian Museum are 30 specimens from Malacca Str., Andamans, Meigui, Ceylon, and Persian Gulf.

#### 69. ? *Actæa obesa*, A. Milne Edwards.

*Actæa obesa*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 272, pl. xvii. figs. 2-2b.

This species, if my identification be correct, differs from *Actæa ruppellii*, which it closely resembles, in the following characters:—

(1) the carapace and legs are not shaggy, and though they bear some hairs these do not in any way conceal the texture of the carapace:

(2) the lobulation is quite absent from the posterior third of the carapace; and elsewhere though quite distinguishable, is extremely faint, owing to the fineness of the grooves:

(3) the entire surface of the carapace—grooves as well as lobules—is covered with crisp granules, which are largest in the middle of the branchial regions:

(4) the lobulation of the antero-lateral borders, though distinguishable, is extremely indistinct, especially in the case of the first lobe:



(5) the postero-lateral borders are more concave :

(6) the dorsal surfaces of the chelipeds and legs are crisply granular, but the carpal joints show almost no dimpling and the propodal joints none at all.

In the Indian Museum are 2 specimens from the Malacca Straits and one from Bombay.

70. ? *Actæa pulchella*, A. Milne Edwards.

*Actæa pulchella*, A. Milne Edwards, *Nouv. Archiv. du Mus.* I. 1865, p. 273, pl. xvii. figs. 5-5b.

? *Actæodes modestus*, de Man, *Archiv. für Naturges.* LIII. 1887, i. p. 257, pl. ix. fig. 3.

This species, if my identification be correct, resembles *Actæa ruppellii* and *obesa*, but has the following differential characters:—

(1) the carapace is altogether less convex :

(2) the lobulation of the carapace is defective posteriorly, and is faint anteriorly owing to the fineness of the grooves :

(3) the entire surface of the carapace and dorsal surface of legs and chelipeds is covered (though not crowded) with crisp granules, most of which carry a short bristle— but these bristles are not close enough to form a coat :

(4) the antero-lateral borders are sharply granular, but their lobulation is very indistinct :

(5) except for a furrow across the wrist parallel with the articulation of the hand, the sharply granular surface of the chelipeds and legs is unbroken.

In the Indian Museum are three specimens from Mergui, the Andamans, and Ceylon.

71. *Actæa parvula*, (De Haan), de Man.

*Menippe parvulus*, De Haan, *Faun. Japon. Crust.* p. 21 : Krauss, *Sudafr. Crust.* p. 34, pl. ii. fig. 2.

*Actæa parvula*, de Man, *Journ. Linn. Soc., Zool.*, XX. 1887-88, p. 27.

Carapace more than  $\frac{3}{4}$  as long as broad, with the posterior third or more *depressed, perfectly flat*, and almost or quite devoid of areolation ; its surface is everywhere covered with vesiculous granules, which become very small posteriorly, and with a fine short velvety hair : the areolation is fairly profuse and quite distinct in the anterior two-thirds.

Antero-lateral borders divided into four granular lobes : postero-lateral borders less convergent than in any other species of *Actæa*, giving the flattened posterior part of the carapace a most abnormal look

for an *Actæa*. Front deeply cleft into two round-pointed lobules. The three grooves near the outer angle of the orbit are fairly distinct.

Upper and outer surface of wrist and hand covered with pearly granules and velvet: fingers pointed, not hollowed at tip.

The exposed parts of the dorsal surface of the legs are also covered with velvet which conceals their sharply granular sculpture. Last pair of legs rather short.

Colours in spirit yellow or brownish, fingers brown.

In the Indian Museum are 3 specimens, from the Andamans and Mergui.

This species may be distinguished from all its congeners by the very moderate difference between the two diameters of the carapace, which also has its posterior part quite flat.

## 72. *Actæa cavipes*, (Dana), A. Milne Edwards.

*Actæodes cavipes*, Dana, Proc. Acad. Nat. Sci. Philad., 1852, p. 78, and U. S. Expl. Exp., Crust. pt. I. p. 199, pl. xi. figs. 5a-b.

*Actæa cavipes*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 280, and IX. 1873, p. 193: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 456, and in Semon's Zool. Forschungsr. (Jena. Denk. VIII) Crust. p. 50.

Carapace about  $\frac{3}{5}$  as long as broad, completely lobulated, the lobules being covered with miliary granules and being separated by broad but not very deep grooves: the posterior part of the carapace sometimes has a worm-eaten appearance.

Front obliquely deflexed, with a cupid's-bow-shaped edge, hardly projecting beyond the prominent inner angle of the lower edge of the orbit. Orbital margin unfissured and unbroken. Antero-lateral borders 4, or indistinctly 5, lobed, the lobes granular and uneven, but not pitted. Postero-lateral borders very much shorter than the antero-lateral, concave.

Outer surface of wrist with numerous pits and craters, upper outer surface of hand worm-eaten.

The upper edges of the carpal and propodal joints of the legs have each a double longitudinal crest, and in every joint the ends of the crests meet so as to leave a trough-like space between them.

The basal antennal joint almost touches the inner angle of the orbit.

Fingers long, pointed, slightly hollow at tip.

In the Indian Museum are four specimens from the Andamans, Mekrân Coast, and Persian Gulf (besides specimens from Upolu and Mauritius).

73. *Actæa fossulata* (Girard) A. M. Edw.

*Cancer fossulatus*, Girard, Ann. Soc. Entom. France (3) VII. 1859, p. 149, pl. iv. figs. 2-2b.

*Actæa schmardæ*, Heller, Abh. zool.-bot. Ges. Wien, 1861, p. 6 and SB. Ak. Wien, XLIII. 1861, p. 318, pl. i. fig. 13.

*Actæa fossulata*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 279, and IV. 1868, p. 71 : Richters in Möbius Meeresf. Maurit. p. 145.

*Psaumis fossulata*, Kossmann, Reise roth. Meer., Crust. p. 27, pl. i. fig. 3.

Closely resembles *Actæa cavipes*, but has the following difference:—

(1) the front projects far beyond the inner angle of the orbit :

(2) the lobes of the carapace have their convexity distinct but boundaries somewhat indistinct ; and in addition to being granular, they are deeply pitted, and this gives the whole carapace a worm-eaten look :

(3) the antero-lateral borders are four-lobed, but the first lobe is very indistinct, and the lobes are marked with rather large pits :

(4) the upper edge of the hand is bluntly crested and the neighbouring surface is pitted rather than eroded :

(5) the crest of the carpal joints of the legs do not only meet at their ends, but are also more or less completely joined across the middle by dissepiments, so that instead of enclosing a single trough they form at least two irregular cup-like cavities.

In the Indian Museum are two specimens from Great Coco I. (Andamans), and East I., Andamans.

74. *Actæa nodulosa*, White.

*Actæa nodulosa*, White, P. Z. S. 1847, p. 224 : Ann. Mag. Nat. Hist. (2) II, 1848, p. 224 ; and Adams and White, Samarang Crust. p. 39, pl. viii. fig. 4 : A. Milne Edwards, in Maillard's Pile Réunion, Annexe F, p. 5 ; and Nouv. Archiv. du Mus. I. 1865, p. 277 : Miers, Challenger Brachyura, p. 120 : Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 356.

Carapace  $\frac{2}{3}$  as long as broad, much subdivided by smooth well cut grooves into numerous small lobules. These lobules are rather irregularly studded with pearly tubercles and granules, the slight irregularity in size and distribution of which gives the lobules themselves a somewhat irregular look. On several of the lobules of the gastric cardiac and branchial regions are, sometimes, symmetrically disposed tussocks of long coarse whitish hair.

The obliquely deflexed front is sharply four-lobed or four-toothed, the outer lobe on either side (standing at the orbital angle) being small. The beaded supra-orbital margin is broadly fissured twice and is separated from the infra-orbital margin by a fissure. The antero-

lateral borders are sharply four-lobed, each lobe being rasp-like. The postero-lateral borders are a little concave. The posterior border is formed by a row of bead-like granules, in front of which is another row—broken in the middle—of larger beads. The sternum, and the under surface of the carapace as far as the beaded epimeral suture, are covered with vesiculous granules.

Those surfaces of the chelipeds and legs that are exposed in repose are closely and crisply granular, many of the granules being pearl-like or bead-like, and those along the dorsad border being spine-like: the edges of the legs, especially the upper edge, are hairy. The granules on lower outer surface of hand are arranged as usual in lines.

Fingers short, pointed, not hollow at tip.

The basal antennal joint falls far short of the inner angle of the floor of the orbit.

Colours in spirit, white.

In the Indian Museum are 3 specimens from off the Malabar Coast, 28-29 fms., one from the Persian Gulf, and one from the Andamans.

*Actæa nodulosa* var. *bullifera*.

In this well-marked and very ornamental variety the lobulation of the carapace—both of its surface and of its antero-lateral borders—is as deeply cut, as convex, and as regular as it is in *Actæa rufopunctata*; the tubercles are more of one size, and have a distinct constricted base and a swollen spherical pearl-like top; the front row of pearly granules of the posterior border is unbroken; the front is more bilobed with sinuous edges than four-lobed, and its edge is elegantly denticulated or beaded; and all the parts of the under surface of the body are finely granular, except the sternum, which has a pitted worm-eaten look.

Length of carapace 10 millim., breadth 14·5 millim.

A single female from the Audamans.

75. *Actæa echinus*, n. sp.

Closely resembles *Actæa nodulosa* White, but has the following difference:—

(1) instead of pearly tubercles we find coarse conical tubercles or tooth-like spines with denticulated tops; and on the chelipeds and antero-lateral borders of the carapace are coarse serrated spines:

(2) the front is broadly bilobed, the angles of the lobes being sharp:

(3) the lobulation of the antero-lateral borders is irregular and indistinct:

(4) the legs are thin and compressed, the dorsad border of the carpal and propodal joints forms a serrated crest, and the slightly

granular sculpture of the upper surfaces of these joints and of the meropodites is concealed by a close short spongy growth of hair.

Colours in spirit yellow, fingers brown.

Length of carapace 17·5 millim., breadth 26 millim.

A single male from off the Malabar Coast 29 fms.

This species (?) may perhaps be only a variety of *A. nodulosa*. I have noticed it separately, and have figured it, on account of the resemblance it bears to Herbst's *Cancer polydora* (Krabben III. ii. 33, pl. lii. fig. 2).

#### 76. *Actæa peronii*, (Edw.) Haswell.

*Xantho peronii*, Milne Edwards, Hist. Nat. Crust. I. 392: Hess, Archiv. für Naturges. XXXI. 1865, i. pp. 133, 171.

*Xantho spinosus*, Hess, Archiv. für. Nat. XXXI. 1865, pp. 132, 171: de Man, Zool. Jahrb., Syst., II. 1887, pp. 690, 692.

*Actæa peronii*, Haswell, Cat. Austral. Crust. p. 46: Miers, Challenger Brachyura, p. 122: de Man, Zool. Jahrb. Syst., II. 1887, pp. 690, 692: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 357.

? *Chlorodius polyacanthus*, Heller, Abh. zool.-bot. Ges. Wien, 1861, p. 11; SB. Ak. Wien, XLIII. 1861, p. 339, pl. ii. fig. 21.

Carapace  $\frac{2}{3}$  as long as broad, only moderately convex, the lobulation distinct but not convex, covered with strongly convex well-isolated smooth polished tubercles, which are largest on the branchial regions and are smallest posteriorly, where also they become somewhat squamiform. On the antero-lateral borders are four (excluding a tubercle of the supra-orbital series) large tubercles, much similar to those on the branchial regions, but more prominent (almost stalked) and with larger tops (almost pisiform).

Exposed surfaces of wrist and hand covered with tubercles much like those of the branchial regions, but more prominent: on the lower outer surface of the hand they become almost squamiform: a few tubercles at the distal inner corner of the arm.

Exposed surfaces of carpal and propodal joints of legs covered with stout thorns: smaller thorns on upper edge of meropodites, and still smaller ones on surface of dactyli except on the claw.

Front broadly bilobed: each lobe with an **S**-shaped curve to the edge and with the outer angle pronounced.

Fingers short, blunt pointed, hardly hollow at tip.

The basal antennal joint stops far short of the inner angle of the floor of the orbit.

Colours in spirit light yellow, fingers dark brown.

In the Indian Museum are 3 specimens from Australia but none from India. It is included here on the authority of Dr. J. R. Henderson.

77. *Actæa flosculata*, n. sp.

Nearest to *Actæa acantha*, A. M. E., and *A. hystrix*, Miers.

Characterized by the close investment (carapace, chelipeds and legs) of peculiarly ornamental fungiform tubercles which become petaloid at the margins.

Carapace  $\frac{3}{4}$  as long as broad, convex; all the regions well defined by conspicuous grooves, and convex; the regions again subdivided into few convex lobules by less conspicuous grooves. The whole carapace, except the broader grooves between the regions, closely covered with very elegant tubercles which have constricted stalk-like bases and thin broad oval or kidney-shaped tops. The exposed surfaces of the chelipeds and legs are covered with ornaments similar to those on the carapace, except at the edges, where they become petaloid.

Front broadly bilobed, the edge of each lobe being deeply cut into four projecting petals. Supra-orbital margin deeply scalloped: antero-lateral borders ornamented like the surface, obscurely lobed: postero-lateral borders about equal in length to the antero-lateral, straight.

The terminal abdominal terga and the sternum of the male pitted and worm-eaten, but with a glazed appearance: under surface of carapace, as far as the epimeral suture, covered with pearly granules.

The basal antennal joint stops far short of the inner angle of the floor of the orbit.

Fingers short, blunt pointed, slightly hollow at tip.

Colours in spirit light yellow, fingers brown with white tips.

In the Indian Museum are two specimens from off Ceylon, 34 fms. and one from off Maldivé Is. 28 fms. The carapace of the larger one is 8 millim. long and 12 millim broad.

The ornamentation of this species gives it a strong resemblance to *Chlorodius fragifer* White, with which it may probably prove to be identical.

78. *Actæa granulata* (Audoin).

*Cancer granulatus*, Savigny and Audouin, Description de l'Égypte, Crust. pl. vi. fig. 2.

*Cancer savignyi*, Milne Edwards, Hist. Nat. Crust. I. 378.

*Cancer (Actæa) granulatus*, De Haan, Faun. Japon. Crust. p. 47.

*Actæa carcharias*, White, P. Z. S. 1847, p. 224, Ann. Mag. Nat. Hist. (2) II. 1848, p. 284: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 276.

*Actæa pura*, Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 32.

*Actæa granulata*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 275, and IX. 1873, p. 192: Miers, Cat. Crust. New Zealand, p. 16; and P. Z. S. 1879, pp. 20, 30; and Challenger Brachyura, p. 120: Haswell, Cat. Austral. Crust. p. 44:

Filhol, Crust. New Zealand, p. 373 : J. R. Henderson, Trans. Linn. Soc., Zool. (2) V. 1893, p. 356 : Ortmann, Zool. Jahrb., Syst. VII. 1893-94, p. 455.

*Actæa Savignii*, Kossmann, Reise roth. Meer., Crust. p. 25 : Hilgendorf, MB. Ak. Berl. 1878, p. 787 : Cano, Boll. Soc. Nat. Napol. III. 1889, p. 189.

Carapace nearly  $\frac{7}{9}$  as long as broad, of a mulberry-like appearance, owing to its entire surface being covered with rough tubercles in the closest possible contact with one another by the base. Each individual tubercle again has a mulberry-like appearance, since it is formed of a number of faceted granules confluent by their bases.

The lobulation of the carapace is very complete, but is almost lost in the polygonal mosaic of tubercles.

The 4-lobulation of the antero-lateral borders is inconspicuous.

The postero-lateral borders are shorter than the antero-lateral, and are markedly concave.

Front sharply bilobed, the lobes projecting far beyond the well pronounced orbital angle. Orbital margin with three closed sutures.

The exposed surfaces of the chelipeds are covered with the same strong many-faceted tubercles as the carapace ; but on the legs the tubercles have sharper points and are many of them spiny, especially those on the dactyli.

The abdominal terga and the greater part of the sternum are covered with a mosaic of smooth-worn tubercles : the under wall of the carapace, as far as the epimeral suture, is granular.

Fingers short, blunt pointed, hardly hollow at tip.

Basal antennal joint prolonged between front and orbit almost to the inner angle of the orbit, very much as in *Carpilius* etc.

Colour in spirit light reddish brown, fingers black with white tips : in life the colour is uniform purplish black.

In the Indian Museum are 10 specimens from the Persian Gulf, Karáchi, Pedro Shoal, Ceylon, Ganjam Coast, Mergui, and Malacca (besides 14 specimens from Australia and Hongkong).

#### 79. *Actæa calculosa*, (Edw.) A. M. Edw.

*Cancer calculosus*, Milne Edwards, Hist. Nat. Crust. I. 378.

*Actæa calculosa*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 276, pl. xviii. figs. 3-3a : Haswell, Cat. Austral. Crust. p. 45 : J. R. Henderson, Trans. Linn. Soc., Zool. (2) V. 1893, p. 356.

Not very easily distinguishable from *Actæa granulata* at first sight, but the following difference is constant :—

(1) the carapace is shorter and broader, its length being only about two-thirds its breadth :

(2) the tubercles of the carapace and chelipeds are much smoother

and are hardly faceted, owing to the granules of which they are formed being more intimately confluent; and on the posterior part of the carapace the tubercles themselves are confluent, small, and little convex: the tubercles of the legs are never spiny:

(3) the regions and lobules of the carapace are much more distinctly delimited, and the 4-lobulation of the antero-lateral borders is more distinct.

Colours in spirit much as in *A. granulata*.

In the Indian Museum are 8 specimens from the Persian Gulf, Karáchi, and Mergui.

#### BANAREIA, A. Milne Edwards.

*Banareia*, A. Milne Edwards, Ann. Soc. Entomol. France (4) IX. 1869, p. 168, and Nouv. Archiv. du Mus. IX. 1873, p. 193.

Strongly resembles *Actæa* in all points but has the following difference:—

(1) in the fore edge of the buccal cavern is, on either side, a deep gap, not a mere suture or fissure such as is seen in some species of *Actæa*:

(2) the fingers are compressed and extremely trenchant, resembling shears.

#### 80. *Banareia armata*, A. Milne Edwards.

*Banareia armata*, A. Milne Edwards, Ann. Soc. Ent. Fr. (4) IX. 1869, p. 168, pl. viii; and Nouv. Archiv. du Mus. IX. 1873, p. 193: Ortmann, Zool. Jahrb., Syst., VII. 1893, p. 456: de Man, Jahrb. Hamb. Wiss. Anst., XIII. (Brachyuren des Hamb. u. Paris Mus.) 1896, p. 75.

Outwardly, from the dorsal view, might almost be mistaken for *Actæa ruppellii*.

All exposed parts of the carapace and appendages, except the fingers and lower outer surface of the hand are concealed by a dark shaggy covering consisting of a dense under-fur with numerous tufts of long hair.

The carapace is a little more than  $\frac{2}{3}$  as long as broad, and when denuded, is seen to be divided into very numerous small lobules by broad smooth grooves. The lobules are convex and closely covered with pearly granules.

The front is formed of two small pointed lobes which do not break beyond the common curve of the antero-lateral borders: the supra-orbital border is fissured twice, and is separated from the lower border of the orbit by a fissure: the antero-lateral borders, when denuded, are seen to be divided into four granular lobes of unequal size, and a



(fifth) granular tubercle exists just behind the orbit: the postero-lateral borders are very distinctly concave, and are much shorter than the antero-lateral borders.

The outer surface of the wrist, when denuded, has much the same sculpture as the carapace. An oblique patch of the lower outer surface of the hand is smooth and polished and quite devoid of hair, as are the fingers except the basal half of the upper edge of the dactylus. The upper outer surface of the hand, when denuded, shows about six longitudinal lines of granules, the three upper of which are a little diffuse.

The fingers are compressed and trenchant, resembling shears: the cutting edge of the dactylus is entire, but that of the thumb has three incisiform teeth of unequal size at the base. In marked contrast to all other parts, the fingers are smooth and polished.

In the Indian Museum are 3 specimens from the Andamans.

It appears to me to be quite consistent at present to separate this species from *Actæa* while uniting *Actæodes* with that genus, for the good reason that in this case there are no known transitional forms.

#### DAIRA, De Haan.

*Daira*, De Haan, Faun. Japon. Crust. p. 18.

*Lagostoma*, Milne Edwards, Hist. Nat. Crust. I. 387.

*Daira*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 202.

*Daira*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 297; and Miss. Sci. Mex., Crust. p. 248.

Carapace broad, strongly convex in both directions, the regions well delimited and subdivided into very numerous convex lentil-like lobules; its antero-lateral borders strongly arched, crenulate; its postero-lateral borders concave, very short.

Front deflexed, two-lobed—the lobes being conspicuous and prominent.

Orbital margin thickened and smoothly crenulate; a strong suture line in the lower margin. Eyes on short thick sub-globular stalks.

Antennules folding obliquely owing to the large size of the basal joint: interantennular septum broad.

Basal antennal joint hardly touching the front, the next joint and the very short flagellum wedged in the gap between the orbit and the front.

*Merus of the external maxillipeds with a wide and deep notch in the anterior margin.*

The chelipeds are unequal in both sexes; the fingers are blunt-pointed and hollowed-out at tip.

Upper edge of merus of chelipeds and legs crest-like and elegantly serrated, upper edge of the succeeding joints of the legs with a crest of stout sharp spines; but all this ornamentation is concealed by a broad thick fringe of long coarse hair.

Abdomen of male with all seven joints distinct, but the 3rd-5th segments are not movable on one another.

On either side of the endostome is an oblique septum defining the efferent branchial canal, but this septum extends only about half-way across the palate.

### 81. *Daira perlata*, (Herbst) De Haan.

*Cancer perlatus*, Herbst, Krabben, I. ii. 265, pl. xxi. fig. 122.

*Cancer daira*, Herbst, Krabben, III. ii. 6, pl. liii. fig. 2.

*Cancer variolosus*, Fabricius, Ent. Syst. Suppl., p. 338.

*Daira perlata*, De Haan, Faun. Japon. Crust. p. 18.

*Lagostoma perlata*, Milne Edwards, Hist. Nat. Crust. I. 387.

*Daira variolosa*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 202, pl. x. figs. 4a-d.

*Daira perlata*, Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 32: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 298; and IX. 1873, p. 196: Heller, Novara Crust. p. 18: Miers, Cat. Crust. New Zealand, p. 18; and Phil. Trans. Vol. 168, 1879, p. 487: Richters, in Möbius Meeresf. Maurit. p. 147: Filhol, Crust. New Zealand, p. 374: R. I. Pocock, Ann. Mag. Nat. Hist. (6) V. 1890, p. 74: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 474; and in Semon's Forschungsr. (Jena. Denk. VIII.) Crust. p. 52: Whitelegge, Mem. III. Austral. Mus., 1897, p. 131.

Carapace oval, strongly convex, subdivided into very numerous polished lentil and pea-shaped lobules which have their surface finely pitted. Antero-lateral borders 11 or 12-crenulate: postero-lateral borders very short, concave.

Upper and outer surface of wrist lobulated almost like the carapace; of hand and dactylus covered with coarse sharp tubercles, which become almost spiniform on the upper edge: upper part of inner surface of wrist and hand covered with a mosaic of flat markings that look like ground-down tubercles: much the same sort of mosaic occurs on the outer surface of the arm and legs, but on the dactyli and propodites of the legs the tubercles are either spiny or acute, and at the distal end of the carpus there is a spine.

Fingers short and thick, with blunt hollowed-out tips, those of the larger cheliped have the cutting-edge toothed, those of the smaller cheliped have a plain sharp cutting-edge.

Lower edge and surface of meropodites of legs much excavated in their distal half to receive the bulging distal end of the carpus in flexion.

Upper edge of legs fringed thickly with coarse long hair which

conceals their serrated and spiny sculpture. Two brushes of hair on the under surface of the dactyli.

Colours in spirit—mottled shades of warm brown.

In the Indian Museum are 11 females and 3 small males from the Laccadive reefs (besides 5 females and 1 small male from Mauritius and 2 females from Samoa).

### Subfamily III. CHLORODINÆ.

#### Alliance I. *Xanthodioda*.

#### XANTHODES, Dana.

*Xanthodes*, Dana, Proc. Acad. Nat. Sci. Philad. 1852, p. 75; and U. S. Expl. Exp. Crust. pt. I. p. 175.

*Xanthodes*, A. Milne Edwards, Ann. Sci. Nat. Zool. (4) XX. 1863, p. 227; Nouv. Archiv. du Mus. IX. 1873, p. 200; and Miss. Sci. Mex., Crust. p. 259.

*Xanthodes*, Miers, Challenger Brachyura, p. 127.

[Type *Xanthodes lamarckii* (Edw.)]

Carapace thick but somewhat depressed, moderately broad, somewhat hexagonal, the regions delimited and to a certain extent areolated in the anterior two-thirds.

Fronto-orbital border considerably more than half the greatest width of the carapace in extent.

Front broad (contained about  $3\frac{1}{2}$  times in the greatest width of the carapace) bilobed.

Antero-lateral border cut into four lobes or teeth. Orbital margin with the three grooves either fairly distinct, or quite indistinct.

Basal antennal joint broad and very short; the flagellum, which is rather longer than the orbit, lodged in the orbital hiatus.

Anterior edge of merus of external maxillipeds almost transverse.

Chelipeds either equal or unequal in both sexes; the arm in repose is nearly or quite hidden beneath the carapace; fingers pointed, not hollowed at tip.

Legs stoutish, more or less hairy and granular or spiny along the upper border.

Abdomen of the male five-jointed.

Of the two Indian species included in this genus, one (*Xanthodes lamarckii*) has a certain resemblance to *Lioxantho punctatus*, from which it is easily distinguished by the breadth of the fronto-orbital margin; the other (*Xanthodes notatus*) has a strong resemblance to *Phymodius sculptus*, from which it is at once distinguished by the sharp-pointed fingers, not hollow at tip.

*Key to the Indian species of Xanthodes.*

- I. Chelipeds equal, hands and wrists closely granular, outer surface of hand with three deep parallel longitudinal furrows ..... *X. lamarckii.*
- II. Chelipeds markedly unequal, hands and wrists, at any rate of the smaller cheliped, studded with sharp spine-like tubercles ..... *X. notatus.*

82. *Xanthodes lamarckii* (Edw.).

*Xantho lamarckii*, Milne Edwards, Hist. Nat. Crust. I. 391 : A. Milne Edwards, in Maillard's l'île Réunion, Annexe F, p. 4 : Heller, Novara Crust. p. 10 : Ortmann, Zool. Jahrb. Syst. VII. 1893-94, pp. 444, 448.

*Xanthodes lamarckii*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 200, pl. vii. fig. 3 : Hilgendorf, MB. Ak. Berl. 1878, p. 789 : Miers, Zool. H. M. S. Alert, pp. 517, 529 : F. Muller, Verh. Ges. Basel, VIII. 1886, p. 474 : de Man, Archiv. für Naturges. LIII. 1887, i. p. 263 ; and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 278 ; and Zool. Jahrb. Syst. VIII. 1894-95, p. 513 : Whitelegge, Mem. Austral. Mus. III. 1897, p. 130.

*Xanthodes granosomanus*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 75 ; and U. S. Expl. Exp. Crust. pt. I. p. 175, pl. viii. figs. 10a-c.

*Xantho granosomanus*, Heller, Novara Crust. p. 11.

The anterior and antero-lateral parts of the carapace are to a variable extent granular, the posterior part is generally quite smooth.

Fronto-orbital region marked off by a sinuous groove, gastric region well delimited and fairly distinctly divided into 3 sub-regions, branchio-hepatic regions incompletely traversed by 2 grooves proceeding from the 2nd and 3rd intervals of the antero-lateral border : no other grooves on the carapace.

Outer angle of front not very pronounced, separated from the supra-orbital margin by a faintish groove. The grooves of the orbital margin are almost indistinguishable.

Antero-lateral border divided into four broadish granular lobes, the last two of which are more acuminate (but bluntly) than the others.

Chelipeds equal in both sexes, stout, rather short (less than twice the length of the carapace) ; arm hidden beneath the carapace in repose, its anterior and posterior edges hairy, the upper part of its posterior surface granular : upper and outer surfaces of wrists and hands as closely as possible covered with pearly granules, the wrist also has a few indistinct dimples, and the outer surface of the hand is deeply scored by three parallel longitudinal furrows : fingers rather long, pointed.

Upper edge of meropodites of legs very finely serrulate : surfaces of next three joints closely granular in the vicinity of the upper (anterior)

edge: some longish hairs scattered along the upper border of the last four, and also along the ventral (posterior) borders of the last two joints.

Colours in spirit: yellowish white, fingers blackish-brown. In well preserved spirit specimens the legs are banded with bluish green, and large confluent bluish green blotches occur on the carapace.

In the Indian Museum are 15 specimens, from the Andamans, Madras coast and Ceylon, (besides 6 from parts outside India).

### 83. *Xanthodes notatus*, Dana.

*Xanthodes notatus*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 76, and U. S. Expl. Exp. Crust. I. p. 178, pl. viii. figs. 12a-b: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 201: Haswell, Cat. Austral. Crust. p. 49: de Man, Archiv. f. Naturges. LIII. 1887, i. p. 264.

*Xantho notatus*, Heller, Novara Crust. p. 10.

Surface of carapace, except for the characteristic deep cut areolation, quite smooth to the naked eye. Deep well-cut grooves separate the fronto-orbital region, define the gastric region, and subdivide the branchio-hepatic regions into 3 or 4 lobules; and the gastric region is divided into 3 sub-regions by fine but well-cut lines.

Front bilobed, the outer angle of each lobe being well defined and separated from the supra-orbital margin by a notch and groove. The 3 grooves of the orbital border are distinct.

Antero-lateral border cut into 4 teeth, of which the last two are procurved and spine-like.

Chelipeds markedly unequal, the larger one more than twice the length of the carapace: the arm in both is not quite concealed by the carapace, is devoid of hair, and has the distal end of the upper border spinate: in the smaller cheliped, the upper and outer surfaces of the wrist and the upper and a large part of the outer surface of the hand are studded with sharp spine-like tubercles; but in the larger cheliped the tubercles are larger, less numerous, and are low and worn, not spine-like: the fingers are pointed, not hollowed at tip, and in the smaller cheliped are fluted, the ridges of the dactylus having a few sharpish tubercles at the basal end.

The upper edge of the meropodites of the legs is spiny, with a few long fine bristles: the upper borders of the next two joints have each two rows of spines and a good many long bristles, the carpus having also a third row of sharp granules: the dactylus is granular and bristly, and the lower edge also of the propodite has some bristles.

Colours of well-preserved spirit specimens: purplish brown, the purplish tinge very distinct on the chelipeds, the last 3 joints of the legs are greenish.

In the Indian Museum are 17 specimens, from the Andamans, Palk Str. and Ceylon.

This species has a strong likeness to *Phymodius sculptus*.

Alliance II. *Chlorodioida*.

Chlorodius.

Chlorodopsis.

Phymodius.

Cyclodius.

CHLORODIUS, A. Milne Edwards.

*Chlorodius*, (part) Milne Edwards, Hist. Nat. Crust. I. 399.

*Chlorodius*, (part) Dana, Silliman's Amer. Journ. Sci. and Arts (2) XII. 1851, p. 126, and U. S. Expl. Exp. Crust. pt. I. p. 204.

*Chlorodius*, A. Milne Edwards, Ann. Sci. Nat. Zool. (4) XX. 1863, p. 283; Nouv. Archiv. du Mus. IX. 1873, p. 212; Miss. Sci. Mex., Crust. p. 265.

[Type *Chlorodius niger* (Forsk.)]

Carapace depressed, flat, hexagonal, the regions faintly or not at all demarcated, the surface smooth and almost unbroken, except sometimes on the branchio-hepatic region, near the antero-lateral border, where there may be some broad transverse wrinkles.

Fronto-orbital border more than three-fourths the greatest breadth of the carapace. Front almost straight, faintly emarginate in the middle line, extremely broad (between a third and half the greatest breadth of the carapace), its outer angles separated from the supra-orbital margin by a groove.

Antero-lateral borders cut into four lobes or teeth, the first being in very close approximation to the angle of the orbit. Postero-lateral borders rather longer than the antero-lateral.

Orbit with two suture lines above, and one at the outer angle: eyes on short thick stalks.

Basal antennal joint large, extending upwards and outwards into the gap between the front and the orbit; the flagellum situated in the crevice-like orbital hiatus.

Merus of the external maxillipeds with the anterior border almost transverse.

Chelipeds unequal, long, more than twice the length of the carapace, half or more of the arm projecting beyond the edge of the carapace; fingers large, broadened and deeply hollowed at tip (horse-shoe shaped).

Legs never spiny, though the upper edge of the meropodites may have a few spinules distally, and that of the following joints is sharply granular.

Abdomen of the male consisting of 5 joints, the 3rd-5th somites being fused.

*Key to the Indian species of Chlorodius.*

- I. Carapace with the regions faintly marked, transversely wrinkled near the antero-lateral borders; four distinct teeth (exclusive of the orbital angle) on the antero-lateral border ..... *C. niger.*
- II. Carapace with a perfectly smooth unbroken surface; first lobe of antero-lateral margin almost obsolete, the third the most distinct of all ..... *C. lævissimus.*

84. *Chlorodius niger* (Forsk.) Rüppell, A. M. Edw.

*Cancer niger*, Forskal, Descr. Anim. p. 89.

*Chlorodius niger*, Ruppell, 24 Krabben roth. Meer. p. 20, pl. iv. fig. 7 and pl. vi. fig. 14: Milne Edwards, Hist. Nat. Crust. I. 401: Dana, U. S. Expl. Exp. Crust. pt. I. p. 216, pl. xii. figs. 5a-c: Stimpson, Proc. Ac. Nat. Sci. Phila., 1858, p. 33: Heller, SB. Ak. Wien, XLIII. 1861, i. p. 335, and Novara Crust. p. 18: A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71, and IX. 1873, p. 214: Kossmann, Reise roth. Meer. Crust. p. 34: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 234; and P. Z. S. 1884, pp. 10, 11; and Zool. H. M. S. Alert, pp. 183, 215, 517, 531: de Man, Notes Leyden Mus. II. 1880, p. 174, III. 1881, p. 98, and Archiv. für Naturges. LIII. 1887, i. p. 279, and Journ. Linn. Soc., Zool., XXII. 1887-88, p. 32; and Zool. Jahrb. Syst. VIII. 1894-95, p. 519: Richters in Möbius Meeresf. Maurit. p. 147: Haswell, Cat. Austral. Crust. p. 62: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 361: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 465, and in Semon's Forschungsr. (Jena. Denk. VIII.) Crust. p. 51.

*Chlorodius hirtipes*, White, P. Z. S. 1848, p. 226; Ann. Mag. Nat. Hist. (2) II. 1848, p. 286; and Adams and White, Samarang Crust. p. 40, pl. xi. fig. 4.

*Chlorodius cytherea*, Dana, Proc. Ac. Nat. Sci. Phila. 1852, p. 79, and U. S. Expl. Exp. Crust. pt. I. p. 213, pl. xii. figs. 2a-c: Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 33.

*Chlorodius nebulosus*, Dana, Proc. Ac. Nat. Sci. Phila. 1852, p. 80, and U. S. Expl. Exp. Crust. pt. I. p. 214, pl. xii. fig. 3.

*Chlorodius depressus*, Heller, Abh. zool.-bot. Ges. Wien, 1861, p. 11; and SB. Ak. Wien, XLIII. 1861, p. 338: Hilgendorf in v. d. Decken's Reisen Ost-Afr. III. i. p. 74.

Carapace hexagonal, depressed: gastric region delimited by faint grooves and subdivided into from 3 to 5 indistinct areolæ by still fainter grooves; anterior part of branchio-hepatic region, just inside the antero-lateral margin, with one or two low broad transverse wrinkles: the surface of the carapace quite smooth (non-granular).

First lobe of the antero-lateral border small, almost confluent with the rounded external orbital angle; last two lobes usually ending in procurved spine-like points.

Chelipeds, in both sexes, twice or more the length of the carapace, usually quite smooth to the naked eye; a tubercle or spine on the anterior edge, and a little crenulation (not always present) on the posterior edge of the arm; inner angle of wrist strongly pronounced; fingers stout, a good deal arched, markedly spoon-like at tip.

Legs with a good deal of hair, and long fine bristles interspersed, on the dorsal aspect of the last three joints.

Colours in spirit: yellowish brown to bluish or purplish brown, sometimes mottled; fingers black.

In the Indian Museum are 64 specimens, from the Andamans, Nicobars, Mergui, and Mekrán coast, (besides 52 from other parts of the Indo-Pacific).

#### 85. *Chlorodius lævissimus*, Dana.

*Chlorodius lævissimus*, Dana, Proc. Ac. Nat. Sci. Phila. 1852, p. 80, and U. S. Expl. Exp. Crust. pt. 1. p. 215, pl. xii. figs. 4a-g.

Carapace hexagonal, a little tumid, its surface perfectly smooth without trace of regions or areolæ.

First lobe of antero-lateral border almost obsolete, last tooth very small, the third tooth much the largest and most prominent.

Anterior edge of arm without a spine.

Last three joints of the legs with a few scattered long fine bristles—no hair.

Fingers very strongly arched, a character which—as Dana has noticed—at once distinguishes this little species from the young of *Chlorodius niger*, which it otherwise closely resembles.

Colours in spirit, white, fingers brown.

In the Indian Museum are 9 specimens, from the Andamans and Ceylon, (and 1 from Mauritius).

#### PHYMODIUS, A. Milne Edwards.

*Chlorodius*, (part) Milne Edwards, Hist. Nat. Crust. I. 399: Dana. U. S. Expl. Exp. Crust. pt. I. p. 204.

*Phymodius*, A. Milne Edwards, Ann. Sci. Nat., Zool. (4) XX. 1863, p. 283; and Nouv. Archiv. du Mus. IX. 1873, p. 217; and Miss. Sci. Mex. Crust. p. 266.

*Phymodius*, Miers, Challenger Brachyura, p. 139.

Carapace moderately flat, hexagonal, all the regions well delimited, and broken up into numerous convex areolæ which have a smooth bare surface.

Fronto-orbital border not quite two-thirds the greatest breadth of the carapace. Front distinctly bilobed, with the outer angle of each lobe forming a distinct little lobule; its breadth is about a third the greatest breadth of the carapace. Orbital margin with 2 grooves above and one at the outer angle: eyes on short thick stalks.

Antero-lateral borders cut into four lobes or teeth: postero-lateral border nearly equal in length to the antero-lateral.



Basal antennal joint large, extending outwards and upwards into the gap between the front and the orbit; the flagellum situated in the orbital hiatus.

Anterior edge of merus of external maxillipeds almost transverse.

Chelipeds unequal, twice or more the length of the carapace, about half the arm projecting beyond the edge of the carapace: fingers large, strongly arched, broadened and deeply hollowed at tip.

Legs with the meropodite carpopodite and propodite sharply spinous along their upper border.

Abdomen of the male five-jointed.

*Phymodius* is distinguished from *Chlorodius* by the extensive and distinct areolation of the carapace, by the narrower front, and by the spiny armature of the dorsal border of the legs.

*Key to the Indian species of Phymodius.*

- I. Lobules of carapace smooth but dull; chelipeds rough with nodules or tubercles; legs with scattered hairs that do not hide the spines:—
  - i. Sculpture of carapace sharp cut; chelipeds with postule-like tubercles extending as far as fingers. *P. ungulatus.*
  - ii. Sculpture of carapace worn; chelipeds with irregular nodules that do not usually reach more than halfway along the hand .. ..... *P. monticulosus.*
- II. Lobules of carapace smooth and polished, as also are the chelipeds; legs with a stiff fringe of hair along the anterior border concealing the spines there ..... *P. sculptus.*

86. *Phymodius ungulatus* (Edw.) A. M. Edw.

*Chlorodius ungulatus*, Milne Edwards, Hist. Nat. Crust. I. 400, pl. xvi. figs. 6-8: Dana, U. S. Expl. Exp. Crust. pt. I. p. 205, pl. xi. figs. 8a-b: Hess, Archiv. für Naturges. XXXI. 1865, pt. i. pp. 135, 171: Streets, Bull. U. S. Nat. Mus. VII. 1877, p. 105.

*Phymodius ungulatus*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 218: Hilgendorf, MB. Ak. Berl. 1878, p. 790: Kossmann, Reise roth. Meer. Crust. p. 34: Haswell, Cat. Austral. Crust. p. 59: Miers, Challenger Brachyura, p. 139: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 201: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 362: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 464: de Man, Zool. Jahrb. Syst. VIII. 1894-95, p. 524.

? *Xantho de Haanii*, Krauss, Sudafr. Crust. p. 29, pl. i. fig. 2: Heller, SB. Ak. Wien, XLIII. 1861, p. 337, and Novara Crust. p. 19.

*Chlorodius areolatus*, Adams and White, Samarang Crust. p. 41, pl. xi. fig. 3.

The regions and numerous sub-regions of the carapace are all convex and sharply defined by clean-cut furrows; their surface is smooth but dull, owing to close microscopic granulation.

Front bilobed, the outer angle in each lobe forming a distinct little lobule.

The four teeth of the antero-lateral border are sharply conical.

Chelipeds unequal, but not greatly so, very finely granular; arm with the anterior border rather strongly serrated, and with numerous pustule-like tubercles along the posterior border; upper and outer surface of wrist, and upper as well as a small part of inner and a larger part of outer surface of hand, covered with well-spaced pustule-like tubercles, those on the outer surface of the hand being in longitudinal series; inner angle of wrist strongly pronounced, with bifid tip.

Legs with finely granular surface, sharply granular on the dorsal aspect, where there are some long scattered hairs: upper edge of meropodites with 1 row of spinules, upper border of carpopodites with 3 rows, of propodites with 2 rows.

Colours in spirit, yellowish brown, or greenish; fingers black.

In the Indian Museum are 12 specimens, from the Andamans and Ceylon, (as well as 19, from Mauritius and Samoa).

#### 87. *Phymodius monticulosus* (Dana), A. M. Edw.

*Chlorodius monticulosus*, Dana, Proc. Ac. Nat. Sci. Phila. 1852, p. 79; and U. S. Expl. Exp. Crust. pt. I. p. 206, pl. xi. figs. 9a-f: Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 34.

*Chlorodius obscurus*, Lucas in Jacquinot's Voyage Astrolabe, Zool. Vol. III. Crust. p. 26, pl. iii. fig. 4.

*Phymodius monticulosus*, A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868. p. 71 (name only): Richters in Möbius, Meeresf. Maurit. p. 148: Miers, Challenger Brachyura, p. 139: Muller, Verh. Ges. Basel, VIII. 1886, p. 474: Cano, Boll. Soc. Nat. Napoli, III. 1889, p. 201: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 363: de Man, Zool Jahrb., Syst. VIII. 1894-95, p. 524: T. Whitelegge, Mem. Austral. Mus. III. 1897, p. 136.

*Phymodius obscurus*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 220: (?) de Man, Notes Leyden Mus. II. 1880, p. 174: Richters in Möbius, Meeresf. Maurit. p. 148.

Closely resembles *P. unguatus*, but is at once distinguished by the more convex arch of the front and antero-lateral borders, by the greater dorsal convexity of the carapace, by the "worn" look of the sculpture of the carapace, and by the much less rough hands.

Carapace thick, and distinctly convex in its anterior two-thirds; the regions and subregions are all distinct and convex, but the depressions that separate them are broad and not sharp cut, and this gives the sculpture a worn or moulded appearance.

Front bilobed, the outer angle of each lobe well defined.

The four teeth of the antero-lateral margin are blunt and rounded the first two being very much worn.

Chelipeds unequal—more so than in *P. ungulatus*: arm with two or three coarse denticles on the anterior border, the posterior border being rugose; upper and outer surface of wrist nodular; a certain part of the upper, as well as of the inner and (more so) of the outer surfaces of the hand nodular, but except in very young specimens, the nodules do not extend beyond, and often not so far as, halfway along the hand, so that the greater part of the hand is often smooth.

Legs as in *P. ungulatus*, but the spinules are coarser and blunter.

Colours in spirit—dark chestnut brown, sometimes mottled with grey; fingers blackish brown.

In the Indian Museum is a single specimen from the Nicobars (in addition to 21 from Australia, the South Seas, and Mauritius).

#### 88. *Phymodius sculptus*, (A. Milne Edwards).

*Chlorodius sculptus*, A. Milne Edwards, *Nouv. Archiv. du Mus.* IX. 1873, p. 217, pl. viii. fig. 4: de Man, *Notes Leyden Mus.* III. 1881, p. 98; *Archiv. für Naturges.* LIII. 1887, i. p. 279; and *Journ. Linn. Soc., Zool.*, XXII. 1887-88, p. 32: Ortmann, *Zool. Jahrb. Syst.* VII. 1893-94, p. 466.

Regions of the carapace well defined and subdivided, by broad and deepish grooves, into smooth, polished, convex but flat-topped lobules: those of the branchio-hepatic regions are disposed transversely: the antero-lateral sub-regions of the gastric area are not longitudinally subdivided.

Front bilobed, the outer angles of each lobe distinct but not very prominent.

The antero-lateral border is cut into four smooth lobes and is rather shorter than the postero-lateral.

The chelipeds are unequal: the arm has several sharp teeth on the anterior border and several pearly tubercles on the distal end of the posterior border, and the inner angle of the wrist is salient; but the surface of the chelipeds is smooth and polished.

The most characteristic feature of the legs is the dense stiff fringe of long greenish-yellow bristles that clothes the anterior border of the last four joints, concealing the sharp spines with which these borders are armed.

Colours in spirit, body and legs green with brownish points, chelipeds brownish, fingers black.

In the Indian Museum are 10 specimens, from the Andamans, Mergui and Ceylon.

## CHLORODOPSIS A. Milne Edwards.

*Chlorodopsis*, A. Milne Edwards, *Nouv. Archiv. du Mus.* IX. 1873, p. 227.

? *Pilodius*, (part) Dana, *U. S. Expl. Exp. Crust.* pt. I. p. 217.

Carapace flat, more or less hexagonal, the regions well delimited and well areolated, the areolæ being granular or hairy, or both.

Fronto-orbital border about two-thirds the greatest breadth of the carapace. Front bilobed, the outer angle of each lobe usually well defined and forming a distinct little lobule; its breadth is about a third the greatest breadth of the carapace.

Antero-lateral border almost always cut into four teeth. Postero-lateral border commonly a little longer than the antero-lateral.

Orbital border with the three grooves or notches very distinct.

Basal antennal joint large, extending up between the front and the orbit, the outer angle being prolonged into the orbital hiatus.

Anterior edge of merus of external maxillipeds almost transverse.

Chelipeds either unequal or subequal, their length being generally under twice the length of the carapace; the arm short and not projecting very much beyond the carapace.

Fingers strong, arched, broadened and hollowed at tip, but not so hoof-like as *Chlorodius*.

Legs dorsally almost always hairy and spinous.

Abdomen of male 5-jointed.

*Chlorodopsis* is distinguished from *Chlorodius* and *Phymodius*, (1) by the prolongation into the orbital hiatus of the outer angle of the basal joint of the antenna, and (2) by the granular and hairy or furry carapace.

*Key to the Indian species of Chlorodopsis.*

- I. The entire carapace cut into strongly-convex, isolated areolæ, the surface of which is uniformly covered with pearly granules: the deep smooth grooves between the areolæ, and the spaces between the granules, covered with a dense, dark, extremely short fur ..... *C. areolata.*
- II. Only the anterior  $\frac{2}{3}$  to  $\frac{3}{4}$  of the carapace areolated: three or four of the lobules just inside the antero-lateral border either bear spines or are themselves spine-like:—
  - i. Sculpture of carapace and legs almost concealed by bristles and long hairs:—
    1. Posterior fourth of carapace slightly concave; chelipeds rather slender, little unequal, the black colouration of the thumb hardly involves the hand at all:—
      - a. Antero-lateral margin armed with four large spines (not including the orbital angle) ..... *C. pilumnoides.*

- b. Antero-lateral margin divided into four blunt spinuliferous lobes ..... *C. nigrocrinita.*
2. Posterior fourth of carapace flat; the antero-lateral margin consists of four lobes each capped by several spinules: chelipeds markedly unequal, the black colouration of the thumb involves the greater part of the lower surface of the hand ... ..... *C. melanochira.*
- ii. Carapace with a few scattered hairs which do not in the least conceal its sculpture. The groove that cuts off the fronto-orbital margin from the rest of the carapace is very distinct:—
1. All four spines of the antero-lateral margin equal, the 2nd and 3rd commonly with an accessory spinule near the tip ..... *C. wood-masoni.*
2. First spine of the antero-lateral margin small or obsolescent; last three spines large, claw-like ..... *C. spinipes.*

89. *Chlorodopsis areolata*, (Edw.) A. M. Edw.

*Chlorodius areolatus*, Milne Edwards, Hist. Nat. Crust. I. 400: Hess, Archiv. für Naturges. XXXI. 1865, pp. 135, 171.

*Chlorodius perlatus*, Macleay, Ill. Zool. S. Afr., Annulosa, p. 59: Krauss, Sudafr. Crust. p. 31.

*Chlorodopsis areolata*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 231, pl. viii. fig. 8: Hilgendorf, MB. Ak. Berl. 1878, p. 790: Richters in Möbius. Meeresf. Maurit. p. 148: Haswell, Cat. Austral. Crust. p. 54: Miers, Zool. H. M. S. Alert, pp. 517, 532: F. Muller. Verh. Ges. Basel, VIII. 1886, p. 474: de Man, Notes Leyden Mus. XII. 1890, p. 54: Ortmann, Zool. Jahrb. VII. 1893-94, p. 470.

Carapace flat, but thick, as completely lobulated as any *Actæa*; the lobules strongly convex, isolated by broad deep smooth channels, their convexities as closely as possible covered with pearly granules, the dividing channels lined by an extremely short dense dark fur, which also extends between but does not cover the granules of the lobules.

The front is deeply and broadly cut into two granular lobes, the outer angle of each of which forms a separate lobule. The three fissures of the orbital margin are so deep as to give a lobed appearance.

The antero-lateral border is divided by broad notches into four rounded granular lobes.

Chelipeds unequal, the longer one about twice the length of the carapace; the upper part of the outer surface of the arm, the nodular or wrinkled surface of the wrist, and the upper and outer surface of the hand are all closely covered with pearly granules, which are largest on the hand: fingers strongly arched, smooth except for some grooving and granulation at base of dactylus.

The exposed surface of the legs is as closely as possible covered with a dense spongy fur from which the tops of numerous conical or subspinous granules peep out: the dorsal edge of the legs is also clothed with a thick shaggy fringe of hair, as also the ventrad edge of the last two joints.

Colours in spirit yellowish brown to blackish brown; fingers black, the colouration extending along the lower border and on to both surfaces of the hand.

In the Indian Museum are 19 specimens, from the Andamans, Nicobars and Ceylon (in addition to 12 specimens from the South Seas and Mauritius).

90. *Chlorodopsis pilumnoides*, (White).

*Chlorodius pilumnoides*, White, P. Z. S. 1847, p. 226; Ann. Mag. Nat. Hist. (2) II. 1848, p. 286; Adams and White, Samarang Crust. p. 41, pl. ix. fig. 3.

? ? *Pilodius pilumnoides*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 221, pl. xii. fig. 10a-c.

*Chlorodopsis pilumnoides*, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 34, Archiv. für Naturges. LIII. 1887, i. p. 281; Cano, Boll. Soc. Nat. Napol. III. 1889, p. 204; Ortmann, Zool. Jahrb. VII. 1893-94, p. 470.

Carapace, chelipeds and legs granular, beneath a copious covering of short black bristles among which are scattered numerous long white club-shaped hairs.

Carapace flat, its regions, in the anterior two-thirds, plainly marked and subdivided by broadish shallow furrows, but not convex; its posterior third flat, or even a little concave, between two raised transverse beaded lines.

Front cut rather deeply into two granular or denticulate lobes, the outer angle of each of which forms a little lobule. The three fissures of the granular orbital margin are distinct.

On the antero-lateral margin are four red-tipped claw-like spines not including the orbital angle, the middle two, at least, of which have a pair of spinelets at base: on the carapace just inside either antero-lateral margin is a scattered group of 5 or 6 similar, but rather smaller, spines.

Chelipeds subequal, rather slender, not longer than the legs (less than twice the length of the carapace); both edges of the upper surface of the arm spinulate; numerous spines on the wrist, the one (or two) at the inner angle the largest; rows of spines along upper surface, rows of sharp granules along lower part of outer surface, of hand; fingers strongly fluted, the ridges being sharply and elegantly serrate or spinate.

In the legs, all the edges of the meropodites are more or less spinate and the carpopodites and propodites are dorsally more or less spinulate.

Colours in spirit: yellowish, or mottled green; legs yellowish with purplish-brown cross-bands, or light green with dark green cross-bands; fingers black, the colouration not extending along the hand.

In the Indian Museum are 7 specimens from the Andamans and 1 from Mergui.

91. ? *Chlorodopsis nigrocrinita*, (Stimpson).

? *Pilodius nigrocrinitus*, Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 34.

Differs from *C. pilumnoides* in having the antero-lateral margin cut into 4 blunt lobes which when denuded and examined under a lens are spinuliferous: only the distal end of the upper edge of the arm is spinulate.

Four specimens from the Andamans are in the Indian Museum.

It is at once distinguished from *C. melanochira*, to which it also bears a strong resemblance, by the altogether different form of the chelipeds and fingers. The chelipeds, like those of *C. pilumnoides*, are slender and of equal size, and the black colouration of the fingers does not extend on to the hand.

92. *Chlorodopsis melanochira*, A. M. Edw.

*Chlorodopsis melanochira*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 228, pl. viii. fig. 5: Haswell, Cat. Austral. Crust. p. 55: de Man, Archiv. für Naturges. LIII. 1887. i. p. 281, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 278; and Zool. Jahrb. Syst. VIII. 1894-95, p. 520: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 471.

Carapace, chelipeds and legs covered with short black bristles and long yellow hairs, the yellow hairs being sparse on the carapace but exceedingly long and numerous on the legs, and the bristles being embedded each in a curious little white ball of felt.

On the denuded carapace the regions are all well defined and well areolated by well-cut smooth grooves, the convexities of the areolæ being granular: the posterior third or fourth of the carapace forms a flat granular surface.

Front cut into two elegantly denticulated lobes, the outer angle of each of which forms an independent lobule. The three fissures of the finely denticulate orbital margin are distinct.

The antero-lateral margin is divided into four lobes, each of which is crowned with several spinules: two or three of the lobules of the carapace just inside either antero-lateral margin are capped with similar spinules.

The chelipeds are markedly unequal, the larger one being less than twice the length of the carapace. The anterior and posterior edges of the arm are granular; the wrist has the upper and outer surfaces studded with granules and conical spine-like tubercles; similar tubercles and pearly granules stud the upper and more or less of the outer surface of the hand; the finger has a few spinule-like tubercles at base.

The legs have the upper border of the meropodite, carpus, and propodite denticulate.

Colours in spirit; brownish yellow or mottled green, the mottling on the legs forming indistinct cross-bands; fingers black, the colouration involving the greater part of the lower border and both surfaces of the lower outer corner of the hand.

In the Indian Museum are 35 specimens from the Andamans.

This species is at once distinguished from *C. pilumnoides*, (1) by the smaller size, (2) by the better defined areolation of the carapace, (3) by the cap of spinelets—instead of a large claw-like spine—on each of the 4 lobes of the antero-lateral margin, (4) by the marked inequality of the chelipeds, and (5) by the black colouration of the thumb extending far back along the hand.

### 93. *Chlorodopsis spinipes* (Heller) A. M. Edw.

*Pilodius spinipes*, Heller, Abh. zool.-bot. Ges. Wien, 1861, p. 11, and SB. Ak. Wien, XLIII. 1861, i. p. 340, pl. ii. fig. 22.

*Chlorodopsis spinipes*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 230, pl. viii. fig. 6: de Man, Notes Leyden Mus. III. 1881, p. 98; Archiv. für Naturges. LIII. 1887, i. p. 282; and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 278: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 361: Ortmann, Zool. Jahrb. VII. 1893-94, p. 471.

Carapace and chelipeds with a few scattered hairs, legs with numerous long stiff brown and yellow hairs that a good deal conceal the sculpture.

The regions and subregions of the carapace in its anterior  $\frac{3}{4}$  are most remarkably well defined by broad smooth deep-cut grooves, and are coarsely and unevenly granular.

The front is cut into two lobes which have their free edge entire or slightly crenulate, and their outer angle isolated and spine-like. The orbital margin is sharp-cut and almost smooth: the 3 fissures are distinct.

The antero-lateral margin is cut into four teeth, of which the first is always small and often obsolescent, while the other three are large, procurved and claw-like. The three or four lobules of the carapace just inside and parallel with the antero-lateral border have the form of salient conical tubercles.



The chelipeds are unequal, the larger one being not quite twice the length of the carapace: the arm has 2 or 3 spines at the distal end of the anterior and posterior borders; the upper and outer surfaces of the wrist and hand are covered with sharp spine-like tubercles which become blunt and pearl-like in the lower part of the hand, and one or two of the spines at the inner angle of the wrist are enlarged; fingers with some sharp tubercles at base.

Legs with numerous long sharp spines (which are a good deal concealed by long stiff hairs) along the upper border,—a single series on the meropodites, 2 or 3 series on the carpopodites and propodites.

Colours in spirit: yellowish or greenish brown, somewhat mottled on the carapace and somewhat banded on the legs; fingers black, the colouration not extending to the hand.

In the Indian Museum are 20 specimens, from the Andamans and Mergui.

This species is suspiciously like the *Pilodius pugil* of Dana.

94. *Chlo rodopsis wood-masoni*, n. sp.

Carapace with a few rather long scattered hairs, legs with similar but more numerous hairs, not in any way concealing the sculpture, chelipeds almost free from hairs.

The carapace is thick, and has the regions and subregions well defined, in its anterior  $\frac{3}{4}$ , by broad smooth grooves, and coarsely and unevenly granular.

The front is cut into two sharply denticulate lobes, the outer angle of each of which is very distinctly isolated and spine-like. The orbital margin is denticulate and has the three fissures distinct.

The antero-lateral margin has four large procurved spines, some of which (almost constantly the second one) may have an accessory spinule near the tip. Three or four of the lobules just inside either antero-lateral margin bear each a somewhat similar spine.

The outer angle of the basal antennal joint is prolonged into the orbital hiatus.

The chelipeds are unequal, the larger one being not quite twice the length of the carapace. The arm has one or two spine-like teeth at the distal end of both the anterior and the posterior border; the wrist is studded with spine-like tubercles and has a pair of strongish spines at the inner angle; the hand has spine-like tubercles along the upper surface, and close-set pearly granules along the outer and lower surfaces; fingers with spine-like denticles at base only.

Meropodites of legs with the upper border spinulate; carpopodites

and propodites each with two or three rows of spinules and sharp granules.

Colours in spirit—yellowish or reddish brown; fingers black, the colouration stopping sharply at the base of the thumb.

Carapace 8 millim. long, 13 millim. broad.

In the Indian Museum are 19 specimens from the Andamans.

This species is very closely related to *C. melanodactylus*, A. M. Edw. (of which we have in the Museum specimens from Samoa) but differs in having (1) only a few scattered hairs on the carapace, (2) the front deeply bifid and elegantly denticulate, with the outer angle isolated and spine-like, (3) the sculpture of the carapace much sharper and bolder, (4) the pearly granules and spine-like tubercles of the chelipeds more numerous and close-set.

From *C. spinipes* it differs in having (1) the front sharply spinulate, (2) the first spine of the antero-lateral border almost as large and well spaced as the other three, the 2nd and 3rd spines moreover having almost always an accessory spinule near the tip, (3) the spines of the legs not so large and acicular and not so much concealed by hairs.

It may very possibly be the *Pilodius scabriculus* of Dana.

#### Sub-genus CYCLODIUS, Dana.

*Cyclodius*, Dana, Silliman's Amer. Journ. Sci. and Arts, (2) XII. 1851, p. 126; and U. S. Expl. Exp. Crust. pt. I. p. 222.

*Cyclodius* agrees in every particular with *Chlorodopsis*, excepting only that the carapace is longer and narrower, being, in fact, almost as much sub-circular as hexagonal.

In general form, as in the relations of the basal antennal joint, *Cyclodius* much resembles *Etisodes*, from which, however, the form and breadth of the front at once distinguishes *Cyclodius*.

#### 95. *Chlorodopsis* (*Cyclodius*) *ornata*, Dana.

*Cyclodius ornatus*, Dana, Proc. Acad. Nat. Sci. Philad. VI. 1852, p. 80; and U. S. Expl. Exp. Crust. pt. I. p. 223, pl. xii. figs. 11a-g.

Carapace flattish, about  $\frac{4}{5}$  as long as broad, almost as much sub-circular as hexagonal, its regions and subregions delimited by well cut grooves, the subregions being numerous and having a microscopically granular surface.

Front a little more than half the greatest breadth of the carapace, bilobed, the outer angle of each lobe well pronounced. Orbital margin with two grooves above and one at the outer angle.

Antero-lateral margin cut into four teeth (exclusive of the orbital angle) the last three of which are procurved and claw-like.

Basal antennal joint prolonged into the orbital hiatus—and filling it—on the same extensive scale as in *Chlorodopsis areolata*.

Chelipeds very little unequal, not much longer and stouter than the legs, about  $1\frac{3}{4}$  times the length of the carapace: arm with several spinules along the posterior border and two large ones on the anterior border; wrist and hand with numerous sharp spine-like tubercles, which fall into longitudinal series on the outer surface of the hand; fingers with some coarse spinules at base, rather strongly arched, broadened and hollowed at tip.

Legs granular, somewhat furred, the upper border of the meropodites carpopodites and propodites spinuate.

The grooving of the under surface of the carapace, found in all the species of *Chlorodius*, *Chlorodopsis*, &c., is particularly elegant.

In the Indian Museum is a male from the Andamans (and one from Mauritius).

### Alliance III. *Cymoida*.

#### CYMO, De Haan.

*Cymo*, De Haan, Faun. Japon. Crust. p. 22.

*Cymo*, Dana, Amer. Journ. Sci. and Arts. (2) XII. 1851, p. 126; and U. S. Expl. Exp. Crust. pt. I. p. 224.

Carapace about as long as broad, subcircular, or less commonly elongate-pentagonal; not, or little, convex; depressed, with regions and subregions faintly or not at all shown.

Fronto-orbital border from about  $\frac{2}{3}$  to  $\frac{3}{4}$  the greatest breadth of the carapace in extent. Front from about  $\frac{1}{2}$  to about  $\frac{1}{3}$  this measure, horizontal, bilobed, with the outer angle of each lobe prominent and separated from the supra-orbital margin by a notch and groove. The grooves of the orbital margin are either indistinguishable or distinct. Eyes on short thick stalks.

The antennules fold obliquely. The basal joint of the antennæ has its outer angle produced into the orbital hiatus, and the flagellum, which is short, is situated between this process of the basal joint and the front.

The chelipeds are remarkably unequal in both sexes, the larger cheliped, in adults, being more than half again as long and more than twice as massive as the smaller: the fingers of the larger cheliped are short, thick, blunt-pointed (beak-like) and hollowed at tip; those of the smaller hand, though also hollowed-out, are long and slender.

The legs are invested and fringed with a thick shaggy fur that entirely conceals their sculpture: they are short and massive.

The abdomen of the male consists of five joints, the 3rd-5th somites being fused.

The species of this genus are at once recognized by the subcircular carapace, which even in the male leaves the first two and part of the third abdominal terga exposed in a dorsal view; and by the remarkable inequality and dissimilarity of the chelipeds.

*Key to the species of Cymo.*

- I. Carapace subcircular, depressed, but not quite flat:—
- i. Wrists and hands studded with sharpish granules only: front bilobed, the edge of each lobe denticulate:—
    1. Fingers white..... *C. andreossyi.*
    2. Fingers black except at tip..... *C. melanodactylus*
  - ii. Wrists and hands with large granular warts as well as granules:—
    1. Front bilobed, the edge of each lobe concave and the angles in the form of granular tubercles, so that the front appears four-lobed..... *C. quadrilobatus.*
    - [2. Front not four-lobed.. ..... *C. tuberculatus.*]
- II. Carapace more elongate-pentagonal than subcircular, perfectly flat..... *C. deplanatus.*

96. *Cymo andreossyi*, (Audouin) De Haan.

*Pilumnus? andreossyi*, Audouin on Savigny's Descr. de l'Egypte, pl. v. fig. 5, p. 86.

*Cymo andreossyi*, De Haan, Faun. Japon. Crust. p. 22: Dana, U. S. Expl. Exp. Crust. pt. I. p. 225, pl. xiii. figs. 2 *a-b*: Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 34: Heller, SB. Ak. Wien, XLIII. 1861, p. 346, and Novara Crust. p. 20: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 252: Kossmann, Reise roth. Meer. Crust. p. 35: Miers, Phil. Trans. Vol. 168, 1879, p. 487, and Zool. H. M. S. Alert. pp. 517, 532: de Man, Archiv. fur Naturges. LIII. 1887, i. p. 291: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 363: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 443.

Carapace almost circular, its greatest length being inappreciably less than its greatest breadth, closely covered with a spongy fur on removal of which can be seen (1) faint depressions demarcating the gastric and cardiac regions and incompletely separating the gastric region into three sub-regions, others subdividing the branchio-hepatic regions into faintly convex areolæ, and (2) a few granules on the anterior part of the gastric region (in a transverse line) and on some of the lobules of the branchio-hepatic regions.

Front rather more than  $\frac{2}{5}$  the greatest breadth of the carapace in extent, bilobed, separated from the dentiform supra-orbital angle by a

groove, its free edge irregularly denticulate. Orbital margin entire. Lateral borders of the carapace somewhat granular.

Chelipeds markedly unequal, covered with fur, but not so much as to entirely conceal their sculpture. The arm has both borders fringed with fur and the distal corner of the upper surface granular; the upper and outer surfaces of the wrist are studded with sharpish granules, as are the upper, outer and part of the inner surfaces of the hands and the basal half of the finger — those towards the upper part of the hand having a linear arrangement. The fingers of the larger cheliped are stout, truncated, blunt-pointed and strongly hollowed at tip; those of the smaller cheliped, though also hollowed, are thin, slender and pointed.

The legs are covered with a thick shaggy coat of fur, which is specially long and adherent along the borders. When this is removed the upper edge of the meropodites is finely granular, and the upper borders of the following joints are traversed by several rows of sharpish granules.

Colours in spirit, brownish yellow or fawn-colour, fingers white.

In the Indian Museum are 11 specimens, from Mekran coast, Ceylon, Andamans and Nicobars (besides 11 from other parts of the Indo-Pacific).

#### 97. *Cymo melanodactylus*, De Haan.

*Cymo melanodactylus*, De Haan, Faun. Japon. Crust. p. 22: Dana, U. S. Expl. Exp. Crust. pt. I. p. 225, pl. xiii. fig. 1: Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 34: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 252: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 442.

*Cymo andreossyi* var. *melanodactylus*, Miers, Zool. H. M. S. Alert, p. 533 de Man, Journ. Linn. Soc. Zool. XXII. 1887-88, p. 35.

Differs from *C. andreossyi* in the following particulars:—

(1) the carapace is more lumpy; (2) the anterior half of the lateral borders shows more distinct indications of three lobules, some of which may even bear a spinelet; (3) the fingers are black, except at tip.

In the Indian Museum are 8 specimens, from the Andamans, Mergui and Ceylon, (besides 2 from other parts of the Indo-Pacific.)

#### 98. ? *Cymo deplanatus*, A. Milne Edwards.

? *Cymo deplanatus*, A. Milne Edwards, Journ. Mus. Godeffr. I. 1873, p. 257.

This species, if I am correct in my identification, differs from *Cymo andreossyi* only in the following particulars:—

The carapace is less subcircular and more elongate-pentagonal;

it is as flat as a coin and is either quite smooth or has only a transverse row of granules in the anterior part of the gastric region: the somewhat pentagonal outline is due to the antero-lateral borders being convergent from a distinct, though obtuse, angle of union with the postero-lateral.

99. *Cymo quadrilobatus*, Miers.

*Cymo quadrilobatus* Miers, Zool. H. M. S. Alert, p. 533.

General form as of *C. andreossyi*.

The carapace is covered with a fine close down which does not, however, in the least conceal its sculpture.

On either side of the carapace just behind the front are two granular transverse elevations (= Dana's areolæ 2 F and 1 M): the branchio-hepatic regions are distinctly areolated, the areolæ having the form of elevated clusters of pearly granules.

The front is really bilobed, but as each lobe has a deeply concave edge and both angles surmounted by a granular tubercle, it appears four-lobed.

The three grooves near the outer angle of the (beaded or crenulate and somewhat tumid) orbital margin are very distinct. The anterior half of the lateral margin of the carapace is divided into three granular lobes.

The chelipeds have the same general form and proportions as in *C. andreossyi*: they are more or less invested with a fine down, which does not conceal their sculpture: the upper surface of the arm is covered with pearly granules: the upper and outer surfaces of the wrist, and the upper, outer and much of the inner surfaces of the hands, are covered with pearly granules, many of which, on the wrist and in lines along the upper surface of the hand, unite to form large wart-like tubercles: the fingers of the larger cheliped are stout, truncated, blunt pointed and somewhat hollowed at tip; those of the smaller cheliped, though hollowed, are thin and pointed.

The legs are thickly covered with fur and long adherent silky hairs, beneath which the whole dorsal surface of the last four joints is granular.

Colours in spirit: light yellow, with either livid or rich chestnut brown mottled markings on the carapace: fingers of the larger hand whitish, usually with a black base, those of the smaller hand black with white tips; in both cases the distal half of the lower border of the hand is black.

Carapace of largest specimen in the Indian Museum collection 15.5 millim. long, 16 millim. broad.

In the Indian Museum are 5 specimens, from Palk Straits, 5-7 fms., and off Little Andaman 12 fms.

100. *Cymo tuberculatus*, Ortmann.

*Cymo tuberculatus*, Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 443.

This species, from the Maldive Islands, resembles *C. quadrilobatus* in the characteristic sculpture of the chelipeds, and may perhaps be identical with Miers' species.

It is not represented in the Indian Museum.

Section II. *Hyperomerista*.

The efferent branchial channels are defined by a ridge on either side of the palate, the ridges extending right up to the epistomial edge.

Sub-family IV. MENIPPINÆ.

Carapace broad, transversely oval; front a fourth, or less than a fourth the greatest breadth of the carapace. The basal antennal joint does not nearly reach the front. The abdomen of the male has all 7 segments distinct and separate.

Alliance I. MENIPPIOIDA. Carapace convex, its antero-lateral borders longer than the postero-lateral: ridges of the endostome faint.

Alliance II. PSEUDOZIOIDA. Carapace flat, its antero-lateral borders shorter than the postero-lateral: ridges of the endostome strong and sharp.

Sub-family V. OZIINÆ.

Carapace broad, transversely oval; front broad, about a third the greatest breadth of the carapace. The basal antennal joint is broadly in contact with the front. All 7 segments of male abdomen distinct and separate. The efferent branchial channels very distinct and circumscribed.

Alliance I. OZIOIDA. The orbital hiatus is open and is occupied by the antennary flagellum.

Alliance II. RUPPELLIOIDA. The orbit is a completely closed cavity.

Sub-family VI. PILUMNINÆ.

Carapace moderately broad; front about a third the greatest breadth of the carapace: the antero-lateral borders of the carapace

are not longer than, and are often shorter than, the postero-lateral. The basal antennal joint does not touch, or only just touches, the front.

Alliance I. *PILUMNOIDA*. Carapace commonly densely tomentose, its regions commonly well defined and areolated.

Alliance II. *HETEROPANOPIOIDA*. Carapace smooth, its regions either not at all, or not very well defined.

#### Sub-family VII. *ERIPHIINÆ*.

Carapace sub-quadrilateral, the antero-lateral borders not forming an arch but meeting the postero-lateral borders at a very open and inconspicuous angle. Front very broad, half or more the greatest width of the carapace, and, with the orbits, occupying the whole anterior border of the carapace. Basal antennal joint not touching the front. Abdomen of the male either with all 7 segments distinct or with the 3rd, 4th and 5th fused.

Alliance I. *ERIPHIOIDA*. The gastric region, at least, is well defined: basal antennal joint short and thick: orbits deep: arms stout and short.

Alliance II. *TRAPEZIOIDA*. Carapace perfectly smooth, without trace of regions: basal antennal joint slender: orbits shallow, affording little concealment to the eyes: arms long or very long, projecting in large part or entirely beyond the carapace, in repose.

Alliance III. *DOMECIOIDA*. No trace of regions; orbits shallow; arms short; legs, chelipeds, and frontal and antero-lateral borders of carapace strongly spinate. Merus of external maxillipeds more than twice as broad as long.

Alliance IV. *MELIOIDA*. Carapace hexagonal, the regions either absent or fairly well defined; basal antennal joint slender; orbits shallow. The chelipeds are very much shorter and slenderer than the legs.

#### Subfamily IV. *MENIPPINÆ*.

Alliance I. *Menippioida*.

*Menippe*.            *Myomenippe*.

*MENIPPE*, De Haan.

*Menippe*, De Haan, Faun. Japon. Crust. p. 21.

*Pseudocarcinus*, Milne Edwards, Hist. Nat. Crust. I. 407.

*Menippe*, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XX. 1863, p. 280; and Exp. Sci. Mex. Crust. p. 262.

Carapace broad, transversely oval, moderately convex fore and aft,



very slightly so from side to side; the regions, except the gastric, little defined.

Antero-lateral borders long, strongly arched, cut into four teeth; postero-lateral borders slightly shorter than antero-lateral, convergent; posterior border short.

Front narrow, less than a fifth the greatest breadth of the carapace, rather prominent, almost horizontal, cut into two prominent lobes, the outer angle of each of which forms a distinct tooth.

Orbit with the three grooves near the outer angle well marked: inner orbital angles—both upper and lower—well pronounced. Eyes on short thick stalks.

The side edges of the front are not turned down and the short basal antennal joint does not nearly reach the front, so that the cavities of the orbits and antennules are not properly separated: the next antennal joint just reaches the front, and the long antennary flagellum stands in the orbital hiatus. The antennules fold nearly transversely.

The anterior edge of the merus of the external maxillipeds is oblique and a little sinuous but not excised.

The ridges of the endostome, defining the expiratory channels, are complete, but low and faint.

Chelipeds massive, a little unequal in both sexes; fingers stout, pointed, not hollowed.

Abdomen of male singularly broad, all seven segments distinct.

#### 101. *Menippe rumphii*, Fabr., v. Martens.

*Cancer rumphii*, Fabr., Ent. Syst. Suppl. p. 336: Herbst, Krabben, III. i. 63, pl. xlix. fig. 2.

*Menippe rumphii*, v. Martens, Archiv. für Naturges. XXXVIII. 1872, p. 88: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 36: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 363.

*Pseudocarcinus bellangeri*, Milne Edwards, Hist. Nat. Crust. I. 409, pl. xiv bis, fig. 15.

*Menippe bellangeri*, Heller, Novara Crust. p. 15: Muller, Verh. Ges. Basel, VIII. 1886, p. 474.

Gastric region distinct and fairly distinctly subdivided into three lobes; between it and the front are four pimple-like tubercles standing in a square. Two low indistinct somewhat granular elevations, nearly parallel with the curve of the antero-lateral border, traverse either branchial region; the first, which is the more distinct, can generally be traced across the gastric region also. The surface of the carapace is finely pitted antero-laterally, but elsewhere is smooth.

The front, which is not quite a fifth the greatest breadth of the carapace, consists of two prominent round-pointed lobes, outside of

each of which is a prominent rounded tooth separated from the supra orbital margin by a groove.

The antero-lateral border is fairly sharp and is divided into four broad lobes, of which the last two are distinctly, the first two indistinctly, acuminate.

Chelipeds massive, a little unequal, smooth with some fine and distant pitting: inner angle of wrist bluntly prominent; fingers stout, rather short.

Legs stout, smooth, except the upper border which is sometimes microscopically granular: upper border of carpopodites sparsely, both borders of propodites and dactyli more thickly, hairy.

Colours in spirit reddish or brownish yellow with sometimes a fine network of darker markings; fingers black.

In the Indian Museum are 100 specimens, from Penang, Tavoy, Mergui, Madras coast, Ceylon, Laccadives, Karáchi and Persian Gulf.

#### Subgenus *MYOMENIPPE*, Hilgendorf.

*Myomenippe*, Hilgendorf, MB. Ak. Berl. 1878, p. 795.

Closely resembles *Menippe* in all respects, but differs (1) in the orbit being a completely closed cavity, owing to the contact of its upper and lower inner angles; hence the long antennary flagellum is quite excluded from the orbit, and (2) in the front being rather broader (nearly a fourth the greatest breadth of the carapace) and six-lobulate.

#### 102. *Menippe* (*Myomenippe*) *granulosa*, A. M. Edw.

*Menippe granulosa*, A. Milne Edwards, Ann. Soc. Ent. Fr. (4) VII. 1867, p. 275.

*Myomenippe duplicidens*, Hilgendorf MB. Ak. Berl. 1878, p. 796, (*fide* de Man.)

*Myomenippe granulosa*, de Man, Journ. Linn. Soc. Zool., XXII. 1887-88, p. 40, pl. ii. fig. 1; and Zool. Jahrb., Syst., VIII. 1894-95, p. 525.

The gastric region is fairly well demarcated and subdivided into three areas, the two antero-lateral of which have the surface broken up into low granular convexities: the lateral regions of the carapace are also rugose, the wrinkles being granular and falling into two broken series almost parallel with the curve of the antero-lateral borders. Every margin of the carapace is granular, as is also—besides the rugosities already mentioned—but more finely, a good deal of the surface near the margins.

The antero-lateral border is thin and rather sharp and is cut into four teeth, the first three of which are broad and anteriorly acuminate, the last narrow and carinated.

The front, which is nearly a fourth the greatest breadth of the carapace, is prominent, is separated from the orbit by a deep notch, and is bilobed, each lobe being cut into three teeth. The inner lower angle of the orbit is of the same size and form and as prominent as the innermost (largest) lobule of the frontal lobes.

Chelipeds massive, a little unequal; upper and outer surfaces of wrist and upper (and sometimes in the case of the smaller cheliped the greater part of the outer) surface of hand granular; fingers stout and rather short: inner angle of wrist sharply prominent, somewhat upcurved, a finely beaded line passing from its summit, backwards, along the whole length of the wrist.

Legs stout, with a rough and furred or scurfy surface, the upper border of the last four joints and the lower border of the last two rather abundantly fringed with fine stiff hairs.

Colours in spirit light brown, or greenish brownish yellow; fingers black.

In the Indian Museum are 6 specimens, from Mergui, Arakan, Diamond I., Singapore.

#### Alliance II. *Pseudozioida.*

##### PSEUDOZIUS, Dana.

*Pseudozius*, Dana, Silliman's Journal (2) XII. 1851, p. 127; Proc. Ac. Nat. Sci. Philad. 1852, p. 81; and U. S. Expl. Exp. Crust. pt. I. p. 232.

*Pseudozius*, Miers, Challenger Brachyura, p. 141.

Carapace broad, transversely oval, little convex or quite flat, the regions not demarcated.

Antero-lateral border arched, shorter than postero-lateral border, obscurely divided into four very shallow lobes.

Front rather broad, much more than a fourth the greatest breadth of the carapace, separated from the orbit by a notch, excised in the middle line and having the outer angles pronounced,—and so, obscurely four-partite.

Orbital margin entire, the upper and lower inner angles almost in contact. The antennules fold nearly transversely.

Basal antennal joint very short, the next joint reaches the front; the flagellum, which is hardly as long as the major diameter of the orbit, lodged in a notch between the front and the orbital wall, but quite outside the latter.

The crests of the endostome, defining the expiratory channels, are strong, and the anterior border of the merus of the external maxillipeds is notched to assist in forming a permanent expiratory orifice.

Chelipeds massive, unequal in both sexes, the fingers pointed, not hollowed.

Abdomen of the male with all 7 segments distinct.

103. *Pseudozius caystrus* (Ad. and White) Miers.

*Panopeus caystrus*, Adams and White, Samarang Crust. p. 42, pl. ix. fig. 2.

*Pseudozius planus*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 81; and U. S. Expl. Exp. Crust. pt. I. p. 233, pl. xiii, figs. 6a-h: Richters in Möbius, Meeresf. Maurit. p. 148.

*Pseudozius caystrus*, Miers, Challenger Brachyura, p. 142: Ortmann, Zool. Jahrb., Syst., VII, 1893-94, p. 434; and in Semon's Forschungsr. (Jena. Denk. VIII), Crust. p. 49: de Man, Zool. Jahrb., Syst., VIII, 1895, p. 525: Whitelegge, Mem. Austral. Mus. III, 1897, p. 136.

Carapace transversely oval, depressed, smooth, almost flat behind the deflexed finely granular fronto-orbital region: no distinct regional boundaries.

The antero-lateral border is fairly sharp and is obscurely divided into four shallow lobes, the first two of which are rounded and almost confluent.

Front between a third and a fourth the greatest breadth of the carapace, bluntly four-partite.

Orbits with the margins entire, eyes small.

The buccal cavern is distinctly narrower anteriorly than posteriorly.

Chelipeds unequal, very massive, quite smooth to the naked eye; two strongish tubercles at the inner angle of the wrist; fingers arched, pointed, in the adult male they meet only at tip.

Legs smooth, dactyli furred, a few fine scattered silky bristles on the propodite.

Colours in spirit brownish yellow, fingers darker.

In the Indian Museum are 63 specimens, mostly from the Andamans, but also from the Mekrán (Baluchistán) coast, the Laccadives, and Bombay or Aden. (Also 2 from Samoa and 1 from Bantam).

Subfamily V. OZIINÆ.

Alliance I. *Ozioida*.

Ozius.

Epixanthus.

OZIUS, Edw.

*Ozius*, Milne Edwards, Hist. Nat. Crust. I. 404.

*Ozius*, Dana, Silliman's Journ. (2) XII. 1851, p. 127; and U. S. Expl. Exp. Crust. pt. I. p. 229.

*Ozius*, A. Milne Edwards, Ann. Sci. Nat. Zool. (4) XX. 1863, p. 289; and Nouv. Archiv. du Mus. IX. 1873, p. 237; and Miss. Sci. Mex., Crust. p. 276.

Carapace broad, transversely oblate-oval, moderately convex fore and aft, slightly convex or nearly flat from side to side; the regions, except the gastric, little defined; the surface smooth, or granular, often rugose anteriorly.

Antero-lateral borders of good length, strongly arched, usually broadly crenate or lobulate: postero-lateral borders convergent, usually about as long as the antero-lateral.

Front rather broad (considerably more than a fourth the greatest breadth of the carapace) obliquely deflexed, cut into four lobules or teeth of about equal size, separated from the orbit by a notch.

Orbits deep, rather small, the grooves near the outer angle inconspicuous: eyes on short thick stalks. The antennules fold nearly transversely.

Basal antennal joint prolonged between the side of the front and the orbital plate; the flagellum, which is very small (about half the major diameter of the orbit in length), stands in the orbital hiatus.

The ridges of the endostome, defining the expiratory channels, are very strong, and the opposed margin of the merus of the external maxillipeds is notched, usually very deeply, so that a permanent expiratory orifice results.

Chelipeds massive, unequal in both sexes; the fingers of good length, pointed not hollowed. In the Indian species there is a very large tooth at the base of the dactylus of the larger hand.

The abdomen of the male consists of 7 segments.

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

- |  |                         |
|--|-------------------------|
| I. Carapace more than $\frac{2}{3}$ as long as broad, scabrous, more or less studded—like the wrists and hands—with salient pearly tubercles ..... | <i>O. tuberculosus.</i> |
| II. Carapace $\frac{2}{3}$ as long as broad, smooth to feel, no tubercles; surface of wrists and hands—all or part—reticulate rugulose ...         | <i>O. rugulosus.</i>    |

#### 104. *Osius rugulosus*, Stimpson.

*Osius rugulosus*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 34: Heller, Novara Crust. p. 22, pl. iii. fig. 1: A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71, and IX. 1873, p. 240, pl. xi. fig. 3: Miers, P. Z. S. 1877, p. 135: Haswell, Cat. Austral. Crust. p. 63: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 204: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 477, and in Semon's Forschungr. (Jena. Denk. VIII.) Crust. p. 53.

Carapace two-thirds as long as broad, its surface everywhere finely pitted but not rough, a good deal rugulose and finely eroded just inside the antero-lateral borders: gastric region fairly well defined and in-

completely subdivided into three areolæ: branchial regions traversed by two ridges, which run respectively from the 3rd and 4th lobes of the antero-lateral borders, obliquely upwards and inwards to the gastric region.

Front cut into 4 equidistant teeth. Antero-lateral border rather faintly divided into 5 lobes, of which the first two are broad and rounded and the last three are bluntly acuminate. Orbital margin slightly tumid, well marked off from carapace; faint traces of two grooves near the outer angle; the inner angle of the lower margin a little prominent.

The upper and outer surfaces of both wrists and of the smaller hand, and the upper surface of the larger hand are reticulate-rugulose.

Legs stout, the last three joints and part of the under surface of the meropodites of all are tomentose.

Efferent branchial foramen large, sub-quadrangular.

Colours in spirit, dark violet brown or dark bluish brown, fingers black.

In the Indian Museum are 5 specimens, from the Andamans and Arakan.

#### 105. *Ozius tuberculatus*, Edw.

*Ozius tuberculatus*, Milne Edwards, Hist. Nat. Crust. I. 405: Heller, Novara Crust. p. 23: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 238, pl. xi. fig. 2: Muller, Verh. Ges. Basel VIII. 1886, p. 474: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 45: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 364.

Carapace more than two-thirds as long as broad, studded (except sometimes in the central and posterior parts) with small sharp pearly tubercles; gastric region well defined and imperfectly divided into elongate areolæ; branchial regions crossed transversely by two crescentic furrows, which have a common starting-point at the fourth tooth of the antero-lateral margin; post-orbital furrow well defined.

Front sunk below the level of the orbits, cut into four equidistant scabrous teeth. Antero-lateral border granular, cut into five teeth (exclusive of the orbital angle), of which the last is tuberculiform and the first four are broad and anteriorly-acuminate.

The lower edge of the orbit is separated from the tumid arch of the upper edge by a small gap, and is deeply concave between the dentiform external and internal angles.

Basal antennal joint massive, sinuous, granular. Efferent branchial foramen large, subcircular.

Chelipeds and legs with rough harsh surfaces: the upper and outer surfaces of the wrists and hands are for the most part studded with

sharp pearly tubercles like those on the carapace: the inner angle of the wrist is somewhat produced and forms a double-crowned tubercle.

The whole animal has a harsh feel, due partly to the roughness of the surface and partly to the presence of very short, stubbly, scattered bristles.

Colours in spirit, light red or madder, fingers darker, dactyli of legs blackish.

In the Indian Museum are two specimens, from Mergui and the Nicobars.

### EPIXANTHUS, Heller.

*Epixanthus*, Heller, SB. Ak. Wien, XLIII. 1861, i. p. 323.

*Epixanthus*, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XX. 1863, p. 290; and Nouv. Archiv. du Mus. IX. 1873, p. 240.

*Epixanthus*, de Man, Journ. Linn. Soc. Zool. XXII. 1887-88, p. 45.

Carapace very broad, transversely oval, either moderately convex or almost flat, the regions very obscurely marked.

Antero-lateral borders long, strongly arched, with a thin sharp edge, usually regularly fissured or dentate: postero-lateral borders strongly convergent.

Front broad (from one-fourth to nearly one-third the greatest breadth of the carapace), slightly deflexed, separated from the supra-orbital margin by a notch, cut into four teeth or lobes. Either a suture or a gap beneath outer angle of orbit.

Antennules folding transversely, inter-antennular septum broad. Basal antennal joint very broad and short, largely in contact with the front; flagellum very short (less than half the major diameter of the orbit), lodged in the orbital hiatus.

The ridges of the endostome, defining the expiratory canal, are very strong, but the anterior border of the merus of the external maxillipeds is either not at all or only very slightly notched.

Chelipeds massive, unequal in both sexes; fingers long, pointed, those of the smaller hand being remarkably long and slender.

Abdomen of the male with all 7 segments distinct.

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

- I. Carapace nearly flat, nearly smooth; antero-lateral border divided by very short narrow fissures into four broad shallow lobes..... *E. frontalis.*
- II. Carapace convex, scabrous; antero-lateral border deeply cut into five sharp thin teeth..... *E. dentatus.*

106. *Epixanthus frontalis*, (Edw.) Heller.

*Ozius frontalis*, Milne Edwards, Hist. Nat. Crust. I, 406 : Krauss, Sudafr. Crust. p. 31 : Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 34 : Hilgendorf, in v. d. Decken's Reisen Ost-Afr. III, i. p. 75.

*Epixanthus frontalis*, Heller, Novara Crust. p. 20 : A. Milne Edwards, Nouv. Archiv. du Mus. IX, 1873, p. 241 : Kossmann, Reise roth. Meer., Crust. p. 36 : Richters, in Möbius, Meeresf. Maurit. p. 148, pl. xvi. fig. 16 : Lenz and Richters, Abh. senck. Ges. XII, 1881, p. 421 : Miers, Zool. H. M. S. Alert, pp. 517, 534 : F. Muller, Verh. Ges. Basel, VIII, 1886, p. 474 : de Man, Journ. Linn. Soc. Zool., XXII, 1887-88, p. 46 ; and Archiv. fur Naturges. LIII, 1887, i. p. 292 ; and Zool. Jahrb., Syst. 1894-95, p. 525 ; Cano, Boll. Soc. Nat. Napol. III, 1889, p. 205 ; J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 364 : Ortman, Zool. Jahrb., Syst., VII, 1893-94, p. 477.

*Epixanthus kotschii*, Heller, SB. Ak. Berl. XLIII, 1861, i. p. 325, pl. i. fig. 14 (*vide* Heller).

Carapace transversely oval, depressed, almost flat, its length a little over  $\frac{5}{9}$  its breadth, granular and finely and faintly rugulose just inside the frontal and antero-lateral borders, smooth elsewhere. The gastric region and its three subregions are faintly indicated, and a low fine sinuous ridge completely traverses each branchial region from the last tooth of the antero-lateral border.

The front, which is a good deal less than a third the greatest breadth of the carapace, and has a double edge, is cut into four low teeth. Below the outer angle of the orbit there is a suture, not a gap.

Antero-lateral border thin and sharp, divided by short, narrow notches into four very broad shallow lobes, of which only the last two are at all acuminate.

Chelipeds massive, remarkably unequal—in the adult male especially. They are practically smooth. The fingers of the larger hand of the adult male are strongly arched and meet only at tip.

Legs almost smooth ; the borders of the dactylus and of the distal half of the propodite, in all, are covered with a short stubbly fur.

Colours in spirit, dirty yellowish or greenish brown, fingers blackish.

In the Indian Museum are 60 specimens, from the Andamans, Mergui, Akyab, Orissa coast, Ceylon, Makran coast (besides 22 specimens from localities outside India).

107. *Epixanthus dentatus*, (White).

*Panopeus dentatus*, White, P. Z. S. 1847, p. 226 ; Ann. Mag. Nat. Hist. (2) II. 1848, p. 286 ; Adams and White 'Samarang' Crust. p. 41, pl. xi. fig. 1.

*Heteropanope dentatus*, Stimpson, Proc. Ac. Nat. Sci. Phila. 1858, p. 35 : A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71.

*Epixanthus dentatus*, Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 233 : de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 46 : Henderson, Trans. Linn. Soc., Zool.,



(2) V. 1893, p. 364: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 478; and in Semon's *Forschungsr.* (Jena. Denk. VIII.) Crust. p. 53.

*Epixanthus dilatatus*, de Man, Notes Leyden Mus. I. 1879, p. 58 (*vide* de Man).

*Panopæus acutidens*, Haswell, P. L. S., N. S. W., VI. 1881-82, p. 542; and Cat. Austral. Crust. p. 51, pl. i. fig. 2.

Carapace transversely oval, convex fore and aft, slightly so from side to side; its length about  $\frac{9}{15}$  its breadth; its surface granular and somewhat tuberculous anteriorly, the tubercles being almost squami-form and fringed with short stubbly hair. The gastric region and its three subregions are very faintly indicated: the branchial regions are traversed by a low, sinuous, finely granular ridge.

The front, which is somewhat less than a third the greatest breadth of the carapace, has a rather indistinctly double edge and is cut into four lobes. There is a distinct gap in the orbital margin just below the outer orbital angle.

The antero-lateral border is deeply cut into five very thin sharp-edged teeth.

The exposed surfaces of the arms wrists and hands are finely reticulate-rugulose (most strongly marked on the hands) the reticulating wrinkles being covered with a very short stubbly or scurfy tomentum. Similar reticulating lines and patches of the same stubbly or scurfy growth also closely cover the surfaces of the leg joints.

Colours in spirit, dull earthy brown or yellowish, the carapace and chelipeds commonly mottled or marbled.

In the Indian Museum are 5 specimens, from Mergui and the Andamans (besides 2 from the South Sea Is.).

#### Alliance II. *Ruppellioida.*

Euruppellia.

Baptozius.

#### Subgenus EURUPPELLIA.

*Ruppellia*, Milne Edwards, Hist. Nat. Crust. I. 420 (part).

*Ruppellia*, Dana, Silliman's Journal (2) XII. 1851, p. 128, and U. S. Expl. Exp. Crust. pt. I. p. 245.

*Ruppellia*, A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XX. 1863, p. 291.

*Euruppellia*, Miers, Zool., H. M. S. Alert, p. 534.

Differs from *Ozius* only in the form of the orbits. The upper and lower inner angles of the orbit are in contact, so as to close the orbit and to completely exclude the antennary flagellum.

I do not think this character is of generic importance, and I agree with Kossmann that the type of this genus should be included with *Ozius*.

There is however one species, *Ruppellia vinosa*, Edw., that is entirely different from any of the species (with, perhaps, the exception of *Ruppellia lata*, A. M. E.) with which it has hitherto been supposed to be congeneric.

This species I have separated as the type of a new genus *Baptozius*.

If, however, the other species of H. Milne Edwards' genus *Ruppellia* are referred to *Ozius*, then the name *Euruppellia* must be retained, in a different sense, for *Ruppellia vinosa* Edw., and the name *Baptozius* must lapse.

#### 108. *Ozius (Euruppellia) tenax*, Ruppell.

*Cancer tenax*, Ruppell, 24 Krabben roth. Meer., p. 11, pl. iii. fig. 1, pl. vi. fig. 5.

*Endora tenax*, De Haan, Faun. Japon. Crust., p. 22.

*Ruppellia tenax*, Milne Edwards, Hist. Nat. Crust. I. 421: Kossmann, Reise roth. Meer., Crust., p. 40.

Carapace transversely oblate-oval, two-thirds as long as broad, rugulose and granular antero-laterally, smooth to the naked eye elsewhere. Gastric region well demarcated in its anterior two-thirds, and broken up into five incompletely separated but rather convex lobules: branchio-hepatic regions divided into two transverse somewhat convex areas, independent of the rugosities inside the antero-lateral margin.

Front sunk below the level of the orbits, cut into four equidistant rounded granular teeth. Supra-orbital margin tumid, well delimited from carapace, with two distinct grooves near the outer angle. Infra-orbital margin separated from the supra-orbital by a notch, deeply concave between the prominent dentiform internal and external angles.

Antero-lateral border granular, cut into five teeth, the first four of which are broad and anteriorly-acuminate, the fifth tuberculiform.

Chelipeds markedly unequal; upper and outer surfaces of wrist very finely granular, upper and more or less of outer surface of hand granular and studded with larger pustulous granules: inner angle of wrist bluntly bicuspid: fingers pointed, those of smaller hand long and rather slender, as in typical *Ozius*; those of larger hand stout, the movable finger with a huge tooth at base, as in Indian species of *Ozius*.

Legs stout, finely granular under a lens, but smooth to naked eye; the dactyli covered with velvet up to the claw.

Colours in spirit reddish yellow, the reddish tinge darkest on carapace.

In the Indian Museum is a fine specimen from the Mekrán (Baluchistán) coast.

109. *Ozius (Euruppellia) annulipes*, Edw.

*Ruppellia annulipes*, Milne Edwards, Hist. Nat. Crust. I. 422 : Dana, U. S. Expl. Exp. Crust. pt. I. p. 246, pl. xiv. figs. 4a-c : Stimpson, Proc. Acad. Nat. Sci. Phila. 1858, p. 37 : A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71 : Haswell, Cat. Austral. Crust. p. 73 : Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 479 : Whitelegge, Mem. Austral. Mus. III. 1897, p. 137.

*Euruppellia annulipes*, Miers, Zool. H. M. S. Alert, pp. 517, 523 : de Man, Archiv. fur Naturges. LIII. 1887, i. p. 293, pl. xi. fig. 4 (hand only).

Closely resembles *Ozius (Euruppellia) tenax*, but differs as follows:—(1) the front is cut into four broader, shallower and much less prominent teeth : (2) the five teeth of the antero-lateral border are much sharper, and the margin of the first three is sharp and crest-like : (3) the supra-orbital margin is, practically, entire, the grooves near the outer angle being hardly visible even with a lens : (4) the infra-orbital margin is separated from the supra-orbital only by a shallow groove, is not concave, and has its outer angle hardly prominent.

In the Indian Museum is a specimen from Muscat (besides one from Samoa).

## BAPTOZIUS, n. gen.

*Ruppellia* (part) Milne Edwards, Hist. Nat. Crust. I. 420.

Type RUPPELLIA VINOSA, Edw. (*Op. cit.* I. 422).

Carapace broad, transversely oval, moderately convex fore and aft, slightly so from side to side, with no indication of regions.

Front very broad, about two-fifths the greatest breadth of the carapace, obliquely deflexed, with a thin almost straight edge.

Antero-lateral border short, not two-thirds the length of the postero-lateral, thin, cut into four sharp-edged teeth.

Orbits large, with a sharp, prominent, entire edge : the upper and lower inner angles are in contact, so as to completely exclude the antennary flagellum.

Antennules folding nearly transversely, the inter-antennular septum very broad.

Basal antennal joint massive ; the flagellum of good length (about three-quarters the major diameter of the large orbit), lodged beneath the front and quite outside the orbital wall.

The crests of the endostome that define the expiratory canals are very strong, and a permanent orifice is formed not, as in *Ozius*, by a notch in the anterior border of the merus of the external maxillipeds—for the anterior border of the merus of the external maxillipeds is

entire—but by a deep emargination of the prolonged foliaceous opercular process of the first maxillipeds.

Chelipeds fairly massive, unequal in both sexes; fingers of good length, pointed.

Abdomen of male with all seven segments distinct.

110. *Baptozius vinosus*, (Edw.)

*Ruppellia vinosa*, Milne Edwards, Hist. Nat. Crust. I. 422.

*Euruppellia vinosa*, de Man, in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 278, pl. i. fig. 1.

Carapace broad, transversely oval, with a shiny frosted surface due to extremely close fine granulation, the granules becoming vesiculous and plainly visible to the naked eye near the frontal, orbital, and lateral borders.

The orbits are marked off by a fine groove, a short shallow  $\Lambda$ -shaped groove bisects the front and ends on the anterior part of the gastric region, and a fine sinuous crease passes from the interval between the third and fourth tooth of the antero-lateral margin inwards towards the gastric region; otherwise the surface of the carapace is unbroken.

Front nearly two-fifths the greatest breadth of the carapace, almost straight, with a fine double edge, the upper rim of which runs on to the orbit while the lower turns obliquely downwards to rest on the basal antennal joint,—both rims finely beaded.

The antero-lateral borders are cut into four thin sharp-edged teeth, the first three of which are somewhat angular, while the last is elegantly procurved: the edges of all are finely beaded.

The orbits are large and almost subtubular: the finely-beaded edge is entire, and the inner angle of the lower border is bluntly prominent: quite inside the orbit, where the cornea comes into contact, is an elegant fringe of eye-lashes.

The upper and outer surfaces of the wrists and hands are finely frosted: the inner angle of the wrist has the form of a sharp spine.

The last three joints of the legs are more or less covered with a harsh tomentum, thickest along the upper surface.

Colours in spirit: carapace dark purple above, dark greenish below, legs greenish, chelipeds greenish daubed with red and purple, fingers red. In very old spirit specimens the carapace and chelipeds are of a rosy madder.

In the Indian Museum are 4 specimens from the Andamans and one from an unrecorded (Indian) locality.

## Sub-family VI. PILUMNINÆ.

Alliance I. *Pilumnoida.*

Pilumnus.

Actumnus.

## PILUMNUS, Leach.

*Pilumnus*, Leach, Trans. Linn. Soc. XI. 1815, p. 321; and Malac. Podophth. Brit.: Latreille, Encycl. Meth. X. p. 124: Desmarest, Consid. Gen. Crust. p. 111: De Haan, Faun. Japon. Crust. p. 19: Milne Edwards, Hist. Nat. Crust. I. 415: Dana, Silliman's Amer. Journ. Sci. and Arts, (2) XII. 1851, p. 127, and U. S. Expl. Exp. Crust. p. 229: Milne Edwards, Ann. Sci. Nat. Zool. (4) XX. 1863, p. 285: Kossmann, Reise roth. Meer. p. 37: Milne Edwards, Miss. Sci. Mex. Crust. p. 280: Miers, Challenger Brachyura, p. 145.

In the numerous species of this genus the carapace and legs are generally thickly covered with hair.

Carapace transversely oval or subquadrilateral, declivous anteriorly, flat posteriorly, not greatly broader than long; the regions, as a rule, but moderately plainly demarcated and areolated.

Antero-lateral borders not longer, but commonly shorter, than the postero-lateral, and cut into teeth which, very commonly, are spiniform.

The front is usually about a third the greatest breadth of the carapace, but is sometimes broader: it is cut into two lobes, the outer angle of each of which commonly forms an independent dentiform or spiniform lobule separated from the supra-orbital angle by a groove or notch.

The orbits generally have a gap or fissure just below the outer angle, and one or two gaps or notches in the upper border: the inner lower orbital angle is commonly sharp and prominent. The eyestalks are moderately long and slender.

The antennules fold transversely. The basal antennal joint is short, either not quite touching the front, or just touching it by its inner angle; the flagellum, which is planted in the orbital hiatus, is long, usually very much more than the major diameter of the orbit.

The ridges of the endostome, defining the expiratory channels, are usually plain but not very high: the anterior border of the merus of the external maxillipeds is almost transverse and is not notched.

The chelipeds are stout, the fingers coarse, short and pointed. Legs usually stout and of moderate length.

The abdomen of the male consists of seven separate segments.

*Key to the Indian species of Pilumnus.*

## 1. Abnormal species:—

Carapace and chelipeds quite smooth and devoid of hair *P. lævis.*

Carapace covered with symmetrically disposed, raised, curved or sinuated ridges ..... *P. labyrinthicus.*

2. Normal species in which the carapace (like the legs and the greater part of the chelipeds) is covered with a more or less thick coat of hair, and is without raised ridges:—

I. Front about a third the greatest breadth of the carapace:—

i. Carapace declivous anteriorly, flat posteriorly; the outer orbital angle is not a spine, though it may be sharp:—

1. Upper margin of orbit with two, very distinct, triangular gaps or notches:—

a. A subhepatic spine just below outer orbital angle..... *P. vespertilio.*

b. No subhepatic spine:—

α. Free edge of front, and upper margin of orbit, finely denticulate: front very prominent ..... *P. longicornis.*

γ. Free edge of front, and upper orbital margin, smooth or nearly so: front not prominent ..... *P. andersoni.*

2. Upper margin of orbit with one or both of the two notches indistinct or absent:—

a. Regions and areolæ of carapace convex, uniformly granular, and separated by smooth, deepish, clean-cut grooves ..... *P. cærulescens.*

b. Regions etc. of carapace faintly demarcated and not uniformly granular:—

α. Notches in the denticulated upper orbital margin faint but distinguishable ..... *P. sluiteri.*

γ. Only one notch in the smooth upper orbital margin, and that faint: legs long and slender ..... *P. cursor.*

ii. Carapace uniformly convex, or globose; the outer orbital angle is a spine like those of the antero-lateral border:—

1. Regions of carapace fairly distinct: whole outer surface of larger hand covered with sharp prominent spine-like tubercles..... *P. dorsipes.*

2. Regions of carapace faint; lower part of outer surface of hand smooth ..... *P. hirsutus.*

II. Front nearer half than a third the greatest breadth of the carapace, nearly straight, finely denticulated, emarginate in the middle line..... *P. dehaanii.*

111. *Pilumnus vespertilio*, Fabr.

*Cancer vespertilio*, Fabricius, Ent. Syst. II. 463, and Suppl. p. 338.

*Pilumnus vespertilio*, Desmarest, Consid. Gen. Crust. p. 112: Latreille, Encyc. Meth. X. p. 125: Milne Edwards, Hist. Nat. Crust. I. 418, and in Cuvier's Règne An., Crust. pl. xiv. fig. 3: Dana, U. S. Expl. Exp. Crust. pt. I. p. 236: Heller, SB. Ak. Wien, XLIII. 1861, p. 343: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 242: Miers, Crust. New Zealand, p. 19; and Ann. Mag. Nat. Hist. (5) V. 1880, p. 234; and Zool. H. M. S. Alert, pp. 183, 219: Tozzetti, Magenta Crust. p. 55, pl. iv. figs. 25, 27, 32: Hilgendorf, MB. Ak. Berl. 1878, p. 793: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 53 (*gastric teeth*): Richters in Möbius Meeresf. Maurit. p. 148: Haswell, Cat. Austral. Crust. p. 65: Filhol, Crust. New Zealand, p. 374, pl. xlv. fig. 5: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 58; and Archiv. für Nat. LIII. 1887, i. p. 295; and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 283; and Zool. Jahrb., Syst., VIII. 1894-95, p. 537: Cano, Boll. Soc. Nat. Napol. II. 1889, p. 206: A. O. Walker, Journ. Linn. Soc., Zool., XX. 1886-90, p. 110: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 365: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, pp. 436, 438, and in Semon's Forschungsr. (Jena. Denk. VIII) Crust. p. 49: Zehntner, Rev. Suisse Zool. II. 1894. p. 154.

*Pilumnus ursulus*, Adams and White, Samarang Crust. p. 45, pl. ix. fig. 6: Hess, Archiv. für Nat. XXXI. 1865, i. pp. 137, 171, pl. vi. fig. 2: Kossmann, Reise roth. Meer., Crust. p. 39: F. Muller, Verh. Ges. Basel, VIII. 1886, p. 475.

Carapace, legs and chelipeds (with the exception of the fingers and the lower corner and lower border of the hand, which are bare) entirely concealed by a thick, dark, shaggy coat of coarse, tufted and somewhat matted hair. The hairs are of two kinds, longer and shorter, the longer being most numerous on the legs and on the borders of the carapace. The following description (and the descriptions of all the species mentioned in this paper) applies to the denuded animal.

Carapace transversely oval, nearly  $\frac{3}{4}$  as long as broad, flat posteriorly, a good deal deflexed anteriorly, the regions fairly distinctly delimited and areolated, the surface studded with small well-separated clusters of granules, from which the hairs spring.

Front obliquely deflexed, about a third the greatest breadth of the carapace, cut into two lobes, each of which consists of a large prominent convex inner division and a small receding semi-independent, but not dentiform, outer angle, lying nearly in front of the inner upper angle of the orbit.

The orbital margins, like the edge of the front, are smooth or obscurely crenulate; in the upper margin are two broad triangular gaps: the outer angle of the orbit is sharp but not spiniform, and immediately below it is a fissure or gap in the infra-orbital margin.

The antero-lateral border is a little shorter than the postero-lateral, and is cut into three spiniform teeth, besides which there is a sub-hepatic denticle behind and below the outer orbital angle.

The chelipeds are unequal: the inner angle of the wrist may be sharp, but is never spiniform: the upper and outer surfaces of the wrists, of the smaller hand, and of all but the lower border and lower outer corner of the larger hand (which is quite bare and usually quite smooth) are covered with clusters of granules, some of which, on the smaller hand—and sometimes also on the larger hand—are arranged in longitudinal series.

The carpopodites and propodites of all the legs, and the meropodites also of the last pair, have the anterior and dorsal aspects granular. The longest legs are not much more than half again as long as the carapace.

In the Indian Museum are 64 specimens, chiefly from the Andamans, but also from Mergui and Palk Straits; (besides 10 specimens from other parts of the Indo-Pacific).

*Pilumnus vespertilio*, var.

Differs from the above only in having (1) the fur stiff, fine, bristly, and golden-yellow in colour, and (2) the whole of the outer surface—but not the lower border—of the larger hand granular.

In the Indian Museum are 9 specimens from Karáchi and 1 from Tavoy.

112. *Pilumnus longicornis*, Hilgendorf.

*Pilumnus longicornis*, Hilgendorf, MB. Ak. Berl., 1878, p. 794, pl. i. figs. 8, 9.

Carapace covered with a fine and very short fur, amid which—especially anteriorly—are numerous long silky bristles. Legs and chelipeds—except the larger hand, the greater part of which is quite bare—covered with similar fur and fringed with similar bristles.

Carapace somewhat quadrilateral or hexagonal, about  $\frac{7}{9}$  as long as broad, anteriorly deflexed, posteriorly flat; the regions fairly distinctly defined and areolated, the surface granular near the frontal and antero-lateral margins, elsewhere smooth to the naked eye.

Front obliquely deflexed, about a third the greatest breadth of the carapace, deeply cut into two lobes, each of which consists of a prominent angularly-convex inner portion and an independent spiniform outer angle; the free edge finely and evenly denticulate.

Two triangular gaps in the finely denticulated upper orbital margin and a fissure in the denticulated lower margin, just below the outer angle, which is not dentiform or very conspicuous.

Antero-lateral margin a good deal shorter than the postero-lateral, cut into three longish procurved spiniform teeth the bases of which are granular. No denticle—at most only a slightly-enlarged granule—below the outer angle of the orbit.



Antennary flagellum considerably more than half the greatest length of the carapace, fringed with some long silky hairs.

Chelipeds very unequal; anterior border of ischium and arm spinulate or spinate, both the other borders of the arm spinulate or granular; upper and outer surfaces of wrist sharply granular, the inner angle of the wrist prolonged into a stout spine; the whole upper outer and lower surfaces of the smaller hand sharply granular, with several rows of enlarged spiniform granules, fingers of smaller hand fluted; the larger hand and fingers are smooth, except for a granular patch quite at the near end of the outer surface and extending a variable distance along the upper border of the hand, and for a small patch of granules at the base of the dactylus.

The upper border of the meropodites of the legs is usually sharply spinate.

Colours in spirit yellow, fingers dark brown.

In the Indian Museum are 21 specimens, from Mekrán, Karáchi, Bombay, Nicobars, and Malacca Strait.

#### 113. *Pilumnus andersoni*, de Man.

*Pilumnus andersoni*, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 59, pl. iii. figs. 5, 6, and Zool. Jahrb. Syst., VIII. 1895, p. 552.

Closely resembles *P. longicornis* from which it differs in the following particulars:—

(1) the carapace appears broader owing to the front being less prominent:

(2) the free edge of the front and the upper margin of the orbit are nearly or quite smooth; the lobes of the front are much less prominent, the notch between them is not so wide and deep, and the outer angles are dentiform, not spiniform:

(3) the outer angle of the orbit is sharper:

(4) the granular patch at the base and along the upper border of larger hand is larger.

In the Indian Museum are 5 specimens, from Mergui, Ceylon, Karáchi (and 5 from Gaspar Strait).

#### 114. *Pilumnus sluiteri*, de Man.

*Pilumnus sluiteri*, de Man, in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 283, pl. i. fig. 2: Ortmann, Zool. Jahrb., Syst., VII. 1893-94; pp. 436, 438.

*Pilumnus forskalii*, de Man (*nec* Edw.), Archiv. für Naturges. LIII. 1887. i. p. 295, pl. xii. fig. 1.

Carapace, legs and chelipeds (except the fingers) covered with a

harsh coat of short bristles with longer bristles interspersed, the latter being most numerous on the legs.

Carapace about  $\frac{5}{6}$  as long as broad, deflexed anteriorly, nearly flat in the posterior two-thirds, the regions fairly distinctly delimited, the surface rather profusely studded with little pits, from which the tufts of bristles arise; some granules near the antero-lateral borders and on the front part of the gastric region.

Front cut into two lobes, each of which is again subdivided by a deep triangular gap into a large square-cut internal lobe and an acute triangular external lobule.

Orbital margin granular: there are two gaps in the upper margin, but the inner one is narrow and indistinct; there is also a small gap just below the outer angle of the orbit, which is not very prominent.

Antero-lateral margin not much shorter than the postero-lateral, cut into three somewhat granular spiniform teeth. No tooth below the outer angle of the orbit.

Antennary flagellum not quite a third the length of the carapace, not fringed with hairs, though there may be one or two at its base.

Chelipeds very unequal: upper and outer surfaces of both wrists and hands and bases of dactyli covered with granules or small pearly tubercles, which are larger and more numerous and more prominent on the hands than on the wrists; sometimes a small patch of granules on inner surface of hands: inner angle of wrists strongly pronounced and dentiform.

Legs stout, the longest pair are about two-thirds again as long as the carapace.

Colours in spirit: carapace yellow copiously overspread with brick-red, chelipeds and legs yellow blotched and sometimes banded with terra-cotta-red.

In the Indian Museum are 7 fine specimens from the Andamans (besides one from Samoa).

#### 115. ? *Pilumnus cursor*, A. Milne Edwards.

? *Pilumnus cursor*, A. Milne Edwards, *Nouv. Archiv. du Mus.* IX. 1873, p. 244, pl. ix. fig. 4: Haswell, *Cat. Austral. Crust.* p. 67: Miers, *Zool. H. M. S. Alert*, pp. 183, 223: de Man, *Archiv. für Naturges.* LIII. 1887, i. p. 299.

Carapace etc. covered with a short fur with long hairs interspersed, the latter most numerous on the legs.

Carapace subquadrilateral, flat in the posterior half or more, declivous anteriorly, the regions faintly marked, finely and sparsely granular.

Front nearly two-fifths the greatest breadth of the carapace, not

very prominent, divided into two lobes, each of which consists of a convex inner part and an independent though not very prominent external angle.

The upper orbital margin is little prominent and has only one notch and that indistinct: outer orbital angle not prominent.

Antero-lateral border very much shorter than the postero-lateral, cut into three sharp teeth: no subhepatic tooth.

Chelipeds unequal: inner angle of wrists sharply pronounced, upper and outer surfaces of hands granular.

Legs slender, the longest pair are more than twice the length of the carapace.

Colours in spirit, carapace reddish-yellow, legs yellow.

In the Indian Museum is a single specimen, from the Andamans.

I identify this species with *P. cursor* on account of the long slender legs, the subquadrilateral carapace, the very short antero-lateral borders, and the broad front.

#### 116. ? *Pilumnus cærulescens*, A. M. Edw.

? *Pilumnus cærulescens*, A. Milne Edwards, *Nouv. Archiv. du Mus.* IX. 1873, p. 242, pl. ix. fig. 3: L. Zehntner, *Rev. Suisse Zool.* II. 1894, p. 153.

Carapace etc. covered with short fur, with long hairs interspersed, about  $\frac{5}{7}$  as long as broad, subquadrilateral, convex in anterior half, flat posteriorly: *the regions very distinctly defined by well cut grooves, the areolæ convex and studded with granules of good size.*

Front a third the greatest breadth of the carapace, deflexed, cut into two lobes the outer angles of each of which form independent dentiform lobes.

The upper orbital margin shows very faint traces of two shallow notches: a small triangular gap below the sharp, but non-spiniform, outer orbital angle.

Antero-lateral borders a good deal shorter than the postero-lateral, cut into three sharp teeth, in addition to which there is a small denticle behind and below the outer orbital angle.

Chelipeds unequal; upper and outer surfaces of wrists and of both hands closely and sharply granular, fingers very short, inner angle of wrists dentiform.

Legs stout, the longest pair not much more than two-thirds again the length of the carapace.

Colours in spirit, dull blue with a brownish tinge in places, fingers blackish brown.

In the Indian Museum is a single specimen from the Andamans.

I judge this species to be *P. cærulescens* by the Xanthodes-like form and sculpture of the carapace mentioned by Milne Edwards.

117. ? *Pilumnus hirsutus*, Stimpson.

? *Pilumnus hirsutus*, Stimpson, Proc. Ac. Nat. Sci. Philad., 1858, p. 37: Miers, P. Z. S. 1879, pp. 20, 31: Haswell, Cat. Austral. Crust. p. 69: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, pp. 435, 437.

Carapace etc. covered with stiff hairs of two kinds—long and short, the former most numerous on the legs.

Carapace nearly  $\frac{3}{4}$  as long as broad, convex in both directions, smooth when denuded, the regions hardly marked.

Front about a third the greatest breadth of the carapace, deflexed, cut into two lobes much like those of *P. vespertilio* in shape.

Upper orbital margin smooth, with two very faint and shallow notches; lower margin denticulate, with a gap just below the outer angle. No subhepatic tooth.

Antero-lateral border much shorter than the postero-lateral, with 4 spiniform teeth, one of which is the orbital angle.

Antennary flagellum of moderate length, without hairs, except at base.

Chelipeds unequal; borders of arm finely granular or denticulate, wrists with the upper and outer surfaces rough and the inner angle sharply pronounced; lower part of outer surface of larger hand smooth, the rest of this surface—like that of the smaller hand—sharply granular, the granules becoming spiniform towards the upper border.

Legs rather slender, the longest pair about two-thirds again as long as the carapace.

Colours in spirit, yellow, fingers light brown.

In the Indian Museum are 11 specimens, from the Andamans, Mergui, and the Malacca Str.

118. ? *Pilumnus dorsipes*, Stimpson.

? *Pilumnus dorsipes*, Stimpson, Proc. Ac. Nat. Sci. Philad., 1858, p. 37.

Carapace *globose, extremely deep*, not very much broader than long, covered—like the chelipeds and legs—with soft, though stiff, hair, fairly well areolated, finely granular under a lens.

Front about a third the greatest breadth of the carapace, cut into two convex, rounded, finely denticulate lobes, of which the outer angles form dentiform lobules.

Upper orbital margin not prominent, the two notches are very faint and shallow (especially the inner one), but are recognizable: lower orbital margin with a deep narrow cleft just below the outer angle.

Antero-lateral margin cut into four denticulate spiniform teeth, one of which is the outer orbital angle. No subhepatic tooth.

Antennulary flagellum about a third the length of the carapace, not hairy, except at base.

Chelipeds unequal, both hands covered, on the outer surface and upper and lower borders, with prominent spiniform granules, which also extend some way along both fingers.

Legs rather short, the longest pair being about half again as long as the carapace.

Colours in spirit yellow.

The body is of such depth that the last pair of legs, even in the male, lie, in the normal inclination of the body vertically over the first pair.

In the Indian Museum is a single male from the Andamans.

#### 119. *Pilumnus de Haanii*, Miers.

*Pilumnus de Haanii*, Miers, P. Z. S. 1879, pp. 20, 32; and Challenger Brachyura p. 155, pl. xiv. fig. 1: A. O. Walker, Journ. Linn. Soc., Zool., XX. 1886-1890, p. 110.

Carapace covered with a very fine and short, but dense, fur: legs and chelipeds with a similar fur mixed with long fine hairs on outer surface of hands and on borders of legs.

Carapace transversely oval, not three-quarters as long as broad, the regions (when carapace is denuded) fairly well marked and areolated, granular towards the antero-lateral margins and near the front.

The front is nearer half than two-fifths the greatest breadth of the carapace, is nearly straight, not at all prominent, is finely denticulate, and emarginate in the middle line.

Orbital margin very finely denticulate, the upper border with two very inconspicuous notches, a fissure below the acute outer orbital angle.

Antero-lateral border a good deal shorter than the postero-lateral, cut into three shallow anteriorly-acuminate teeth.

Chelipeds unequal: the outer surface of the wrists with a few granules anteriorly and along the inner border: upper and outer surfaces of hands closely covered with acute spiniform tubercles which also extend far along the fingers.

Legs stout, unarmed.

Colours in spirit, golden yellow.

In the Indian Museum are 7 specimens from Palk Str. 28 specimens from off Ceylon, 26½ to 34 fms., only differ from the typical form in having the front more deeply emarginate in the middle line.

This species, but for the broader straighter front, and for the broader carapace, more nearly resembles an *Actumnus* than a *Pilumnus*.

120. *Pilumnus labyrinthicus*, Miers.

*Pilumnus labyrinthicus*, Miers, Zool. H. M. S. "Alert," pp. 183 and 224, pl. xxii., fig. C: and "Challenger" Brachynura, p. 161: A. O. Walker, Journ. Linn. Soc. Zool. XX, 1896-1890, p. 110; Henderson, Trans. Linn. Soc. Zool. (2), V, 1893, p. 365.

"In this curious form the surface of the carapace is everywhere covered with raised curved or sinuated ridges, which are separated by wide depressions; the body and legs are covered with a dense close brown pubescence; from most of the ridges and from the teeth of the antero-lateral margins of the carapace spring longer setæ, and the margins of the ambulatory legs are also fringed with longer hairs. The frontal lobes, which are scarcely separated as usual by a median notch, are rather broad, straight, and but little prominent; the antero-lateral margins are somewhat shorter than the postero-lateral, and are armed with three distinct teeth, that of the exterior orbital angle being obsolete. The orbital margin is somewhat thickened; the epistoma rather longer in proportion to its breadth than is usual. The basal antennal joint is short, scarcely attaining to the sub-frontal process, and not nearly reaching to the apex of the very prominent lobe at the inner suborbital angle. The chelipeds are rather small and (like the carapace) are densely pubescent, besides being clothed with longer hairs; the outer surface of the wrist or carpus is tuberculated beneath the hairy coat; the palm is clothed externally with long dense hairs; the upper margin of the palm bears three distinct tubercles; the fingers are slaty coloured, dentated on their inner margins and acute at their apices. The ambulatory legs are densely hairy and of moderate length."

Not in the Indian Museum collection.

121. *Pilumnus* (?) *lævis*, Dana.

*Pilumnus lævis*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 82, and U. S. Expl. Expd. Crust. pt. i, p. 238; de Man, Journ. Linn. Soc. Zool. XXII, 1887-1888, p. 66, pl. iv. figs. 1 and 2: and Zool. Jahrb. Syst. VIII. 1895, p. 553.

"Near *P. levimanus*, but broader. Carapace smooth and shining, not areolate, rather convex: front emarginate, antero-lateral margin three-toothed, the teeth minute and like spines, the posterior much the smallest, outer angle of orbit not raised into a tooth. Anterior feet very unequal, carpus smooth, not even faint tuberculate; larger hand wholly smooth, smaller sparsely hirsute, not at all tuberculate. Posterior eight feet slender, somewhat hirsute."

A single specimen from Mergui. It appears to me doubtful that this species belongs to the genus *Pilumnus*.

122. *Pilumnus seminudus*, Miers.

*Pilumnus seminudus*, Miers, Zool. H. M. S. "Alert" pp. 183 and 222, pl. xxi. fig. C: "Challenger" Brachyura, p. 161: de Man, Journ. Linn. Soc. Zool. XXII, 1887-1888, p. 65.

"This species resembles *P. semilanatus* in having the gastric, cardiac, and branchial regions of the carapace smooth and naked; but it may be at once distinguished by the following characters:—The carapace is broader in proportion to its length, and its anterior parts clothed with a close velvety pubescence, which also extends over the upper and outer surface of the wrist and palm of the chelipeds; the two posterior teeth of the antero-lateral margins are more distinctly spiniform, the basal antennal joint does not nearly reach to the sub-frontal process; the granulations of the wrist and palm are much more inconspicuous, those of the outer surface of the palm appear, through the pubescence, to be arranged in four distinct longitudinal series; the ambulatory legs are slenderer."

A single small specimen in the Indian Museum, from Mergui, has been referred by Dr. de Man to this species.

## ACTUMNUS, Dana.

*Actumnus*: Dana, Silliman's Amer. Journ. Sci. and Arts, (2) XII. 1851, p. 128; and Proc. Acad. Nat. Sci. Philad. VI. 1852, p. 82; and U. S. Expl. Exp. Crust. pt. i. p. 243: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 284.

Carapace very little broader than long, convex, fairly well or very well areolated: the antero-lateral borders short, cut into teeth; the postero-lateral longer than the antero-lateral, concave.

Front from about a third to about two-fifths the greatest breadth of the carapace; cleft or notched in the middle line, or bilobed with the outer angles independent, usually separated from the supra-orbital angle by a notch or groove.

Orbits rather large, with one or two notches or fissures or suture-lines (which often, however, are indistinct) in the upper margin, and one (often, also, very indistinct) in the lower margin near the outer angle. The inner lower angle of the orbit is prominent, and often comes so near to the supra-orbital angle as to almost exclude the antennary flagellum from the actual orbital hiatus.

The basal antennal joint touches or nearly touches the front; the flagellum which is of moderate length (longer than the major diameter of the orbit) sometimes springs from the orbital hiatus, but is sometimes almost excluded from the hiatus.

The crests of the endostome, defining the expiratory channels, are

not very strong, and the anterior border of the merus of the external maxillipeds is not notched.

The chelipeds are stout, and are unequal in both sexes: the fingers, which are short and stout, are commonly defined as spoon-shaped at tip: they are not really so, but have the tips curved and blunt pointed.

The legs are stout and not very long.

The abdomen of the male consists of seven separate segments, and the first tergum is unusually long and narrow in all the typical species.

Most of the species of this genus, but not all, are densely tomentose: all, however, have hairy or tomentose legs.

*Key to the Indian species of Actumnus.*

I. Carapace tomentose:—

i. Carapace areolated: front separated from the supra-orbital angle by a notch; antero-lateral border cut into 3 teeth (exclusive of outer angle of orbit):—

1. Front normally bilobed: supra-orbital margin granular, with two distinct notches:—

a. Carapace moderately convex, rather faintly areolate; outer angles of front hardly independent .....

*A. tomentosus.*

b. Carapace strongly convex, strongly areolate; the outer angles of the front are small distinct little lobules:—

x. Lateral gastric areolæ semi-circular .....

*A. setifer.*

y. Lateral gastric areolæ  $\cup$  shaped

*A. verrucosus.*

2. Front broadly triangular, with a deep button-hole cleft (the hole at posterior end) in the middle line: supra-orbital margin thin sharp, with a single deep very narrow fissure.....

*A. fissifrons.*

ii. Carapace not areolated; front not separated from the supra-orbital angle; antero-lateral border with 7 spinuliform granules (3 pairs) and an odd one anteriorly .....

*A. elegans.*

II. Carapace perfectly bare:—

i. Carapace not areolate, front broadly bilobed; legs almost bare .....

*A. nudus.*

ii. Carapace very distinctly areolate, front with two median lobes and two (external) lobules: legs tomentose:—

1. Surface of carapace (and of parts of chelipeds) formed of a mosaic of smooth flat polygonal granules in the closest contact .....

*A. tessellatus.*

2. Surface of carapace, etc. covered with sharp crystalline granules in the closest contact ...

*A. arbutum.*



123. *Actumnus tomentosus*, Dana.

*Actumnus tomentosus*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 82; and U. S. Expl. Exp. Crust. pt. i. p. 243, pl. xiv. figs. 2a-c: A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 285, and IX. 1873, p. 194: ? Tozzetti, Magenta Crust. 3. 56, pl. iv. figs. 22, 24, 26, 29: Haswell, Cat. Austral. Crust. p. 73: Etheridge, Mem. Austral. Mus. 1889, pp. 34, 36.

Carapace subcircular, rather more than  $\frac{3}{4}$  as long as broad, moderately convex, covered with a very dense short smooth tomentum. Much the same tomentum covers the exposed surfaces of the legs and chelipeds (except the lower and distal part of the outer surfaces of the hands), and the legs are also fringed with long fine hairs.

The regions are fairly well delimited and areolated, the areolæ being moderately convex: on the undenuded carapace the areolæ are faint.

Front about two-fifths the greatest breadth of the carapace, cut into two finely denticulated lobes, the outer angles of each of which, though sharply separated from the supra-orbital margin, do not form distinct lobules.

Orbital margin finely denticulate, the lower more markedly so than the upper; in the upper margin are two broad notches, the outer the more distinct; in the lower margin, just below the outer angle, is a narrow fissure; outer orbital angle dentiform.

Antero-lateral borders about two-thirds the length of the concave postero-lateral, very regularly cut into 3 uniform teeth similar to the outer orbital angle.

Chelipeds unequal: arm smooth; inner angle of wrists sharp, their inner border finely beaded, a few scattered granules on their upper and outer surfaces; upper and outer surfaces of hands covered with pearly granules which become obsolescent or obsolete near the lower border of the larger hand; dactyli longitudinally grooved, beaded at base.

Denuded legs nearly smooth.

In the Indian Museum are 53 specimens, from the Andamans, the Orissa Coast up to 30 fms., Palk str. and Cheduba.

Our specimens completely agree with Dana's figure, and are easily distinguished from *A. setifer* by the less convex and less distinctly areolated carapace.

124. *Actumnus setifer*, (De Haan), A. M. Edw.

*Pilumnus setifer*, De Haan, Faun. Japon. Crust. p. 50, pl. iii. fig. 3 (*Xantho*).

*Actumnus setifer*, A. Milne Edwards, Nouv. Archiv. du Mus. I. 1865, p. 287, pl. xv. figs. 5-5b: Richters in Möbius' Meeresf. Maurit. p. 148: Miers, Zool.

H. M. S. Alert, pp. 183, 225, 517, 533: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 47, and Archiv. für Naturges. LIII. 1887, i. p. 262: Walker, Journ. Linn. Soc., Zool. XX. 1886-90, p. 110: Pocock, Ann. Mag. Nat. Hist. (6) V. 1890, p. 74: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 364: Ortmann, Zool., Jahrb. Syst. VII. 1893-94. p. 474.

Closely resembles *A. tomentosus*, from which it is distinguished by the following characters:—

The carapace is subglobular: the regions are very distinctly delimited and areolated, the areolæ being strongly convex and often uniformly granular.

The outer angles of the front form distinct little lobules: the fissure in the lower orbital margin, just below the outer angle, is indistinct.

The granules on the wrist are more numerous.

The more convex carapace and the more numerous and more convex areolæ, at once distinguish this species.

In the Indian Museum are 32 specimens from the Andamans, Ceylon up to 34 fms., Persian Gulf, Pedro shoal, and Mergui (besides 13 from Hongkong and 1 from Samoa).

The Indian specimens, especially those from deep water, have the lobules of the carapace more convex than those from Hongkong.

### 125. *Actumnus verrucosus*, Hndrsn.

*Actumnus verrucosus*, Henderson, Trans. Linn. Soc. Zool. (2), V, 1893, p. 364.

“The carapace is very convex, covered with a short brown pubescence, and provided with a series of remarkable granulated lobes. The frontal margin is granulated and four-lobed, the rounded prominent submedian lobes separated by a narrow median fissure, the outer lobes of small size. The antero-lateral margin has four prominent, subequal, granulated or subspinose lobes, while the postero-lateral margin is smooth and deeply excavated; the upper orbital margin is granulated and has two well-marked fissures. The granulated lobes on the carapace are arranged as follows:—On the anterior gastric region, behind the front, two pairs, of which the posterior is much larger; on the posterior gastric region three lobules, one median and anterior, two posterior; on each protogastric or lateral gastric region a peculiar  $\Psi$ -shaped lobule; on the cardiac region two lobules which are slightly excavated in the centre; on the branchial region three lobules, anterior, postero-external (which is the largest of the three), and a postero-internal one placed external to and between the posterior gastric and cardiac lobules.”

“The right cheliped is slightly larger than the left in both sexes;

both are clothed with a short pubescence on the outer surface of the carpus and hand, except towards the base of the immobile finger. The carpus is sparingly tuberculate externally, with a sulcus running parallel to the articulation with the hand, and separated from the latter by a tuberculated strip: the outer surface of the hand is strongly tuberculate, the tubercles with more or less acute apices, rather closely crowded and without any definite arrangement. The fingers are short, with white and obtuse tips, and the immobile one is placed in a straight line with the lower border of the hand; the dactylus is tuberculated superiorly on its proximal half, and a prominent tooth is present on either finger. The ambulatory legs are simply pubescent. The abdomen is smooth and seven-jointed in both sexes. The external maxillipeds are smooth, with a faint impressed line in the middle of the proximal two-thirds of the ischium. The basal joint of the antennal peduncle is joined to the sub-frontal process, and the terminal joints lie in the orbital hiatus."

"The largest specimen (a male) has the carapace 18.5 mm. long and 25.3 mm. broad."

#### 126. *Actumnus fissifrons*, n. sp.

Carapace and legs covered with a not very dense coat of hairs of two kinds—long and short—the long hairs most numerous on the legs; chelipeds with very little hair.

Carapace strongly convex in all directions,  $\frac{3}{4}$  as long as broad, the regions distinctly delimited and areolated by smooth shallow grooves, the areolæ being slightly convex and more and less granular.

Front not quite a third the greatest breadth of the carapace, deflexed, broadly triangular, the apex with a deep button-hole fissure (the hole at the posterior end), the outer angles separated from the supra-orbital angles by a deepish notch.

Supra-orbital margin thin, sharp, very prominent, deeply fissured near the middle: infra-orbital margin thin, concave, fissured just below the outer angle.

Antero-lateral margin a little shorter than the postero-lateral, cut into three sharp-edged anteriorly-acuminate teeth (exclusive of the outer orbital angle): postero-lateral margin deeply concave.

Chelipeds markedly unequal: upper and outer surfaces of wrists with a few granules, most numerous anteriorly; upper and outer surfaces of both hands—including a great part of the fingers—studded with granules, of which many are enlarged conical or pearl-like, and those along the upper border are spiniform.

Colours in spirit bright orange yellow.

Off Ceylon, 26½–34 fathoms. Four specimens.

The carapace of the largest specimen is 21 millim. long and 28 millim. broad.

127. *Actumnus tessellatus*, n. sp.

Legs tomentose and hairy, chelipeds inconspicuously tomentose in parts, carapace bare.

The entire dorsal surface of carapace, the upper and outer surfaces of the wrists and the upper surface of the hands, have the form of an elegant mosaic of smooth polygonal tile-like granules in the closest possible contact everywhere.

Carapace strongly convex,  $\frac{3}{4}$  as long as broad, regions well defined and subdivided by broad depressions, the areolæ strongly and somewhat angularly convex.

Front much less than a third the greatest breadth of the carapace; deeply cut into two prominent subfoliaceous median lobes, each of which is flanked externally by a small dentiform lobule.

Orbital margins smooth, not fissured, though there are narrow inconspicuous depressions where the notches exist in other species. The antennary flagellum springs from the orbital hiatus.

Antero-lateral margins thin, sharp, cut into 3 teeth (not including the orbital angle) the last 2 of which are subfoliaceous: postero-lateral margins a little longer than the antero-lateral, markedly concave.

Chelipeds little unequal: in addition to the mosaic ornamentation there are a few scattered pustulous granules on the wrist and upper surface of hand, and all the lower half of the outer surface of the hand is studded with pearl-like or bead-like granules, which are also found on the bases of the fingers.

The legs when denuded are smooth to the naked eye.

Colours in spirit: lavender grey, a good deal suffused with orange-pink, fingers cinnamon.

Carapace 15 millim. long, 20 millim. broad.

A male and a female from the Persian Gulf.

128. *Actumnus arbutum*, n. sp.

Legs with a somewhat scanty growth of hair not concealing their sculpture, chelipeds slightly hirsute in places, carapace bare.

The whole dorsal surface of carapace covered with sharp angular crystalline granules in the closest possible contact: much the same ornamentation is found on the upper and outer surfaces of the wrists and on the upper surface of the hands, the lower half of the outer surface of the hands being studded with pearly and bead-like granules.

Carapace  $\frac{3}{4}$  as long as broad, strongly convex, profusely deeply and symmetrically puckered-areolate.

Front much less than a third the greatest breadth of the carapace, shaped as in *A. tessellatus*, but the edges of the lobes and lobules are crenulate.

Orbits and relations of antennæ as in *A. tessellatus*, but the edges of the orbits are sharply crenulate.

Antero-lateral margin cut into three sharply crenulate granular teeth—not including the orbital angle: postero-lateral margin shorter than the antero-lateral, concave.

Chelipeds a little unequal: fingers granular in the basal half or more.

Carpopodites and propodites of legs, and meropodite of last pair, sharply granular as to the dorsal surface.

Colours in spirit pink, fingers brownish.

Carapace 13.5 millim. long, 18 millim. broad.

A single male from off the coast of Sind, 51 fms.

#### 129. *Actumnus elegans*, de Man.

*Actumnus elegans*, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 47.

Carapace and exposed surfaces of legs and chelipeds covered with a thickish bright-yellow tomentum, with longer hairs on chelipeds and legs and near frontal margin.

Carapace not much more than  $\frac{2}{3}$  as long as broad, with some scattered comparatively large granules, but *with almost no indication of regions*; convex fore and aft, slightly so from side to side.

Front about a third the greatest breadth of the carapace, broadly triangular, notched at the apex, not separated from but *confluent with the supra-orbital angles*. There is a suture line in the lower orbital margin just below the outer angle.

Antero-lateral borders not shorter than the very concave postero-lateral, *armed with 7 acute spinuliform granules, in 3 pairs, with an odd one* between the first pair and the orbital angle.

Chelipeds unequal: the upper and outer surfaces of wrists and both hands, including a large part of the fingers closely studded with conical white granules.

In the Indian Museum are 2 specimens, one from Mergui the other from Kyuk Phyu Harbour.

This species seems to me to be better placed with *Pilumnus* than *Actumnus*: it and *Pilumnus scabriusculus* White, seem to be very closely related.

130. *Actumnus nudus*, A. M. Edw.

*Actumnus nudus*, A. Milne Edwards, Ann. Soc. Entomol. France, (4) VII. 1867 p. 265 : de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 49, pl. ii. figs. 3, 4.

Carapace almost completely bare, legs with only a few scattered hairs.

Carapace subcircular, convex, regions hardly indicated, studded with pearl-shaped granules in its anterior and antero-lateral parts, twelve of these granules are arranged in an arched line—convex forwards—on either side of the posterior end of the gastric region.

Front much advanced, divided into two rounded oblique lobes, the outer angles of which are hardly separated from the supra-orbital angles.

Antero-lateral border divided into four teeth (not including the outer orbital angle).

Chelipeds unequal; upper and outer surfaces of hand covered with pearly granules, which also exist on the upper surface of the wrist.

Found at Pondicherry and Mergui.

Not represented in the Indian Museum collection.

This species seems to me to be improperly referred to *Actumnus*.

Alliance II. *Heteropanopioida.*

Heteropanope.

Eurycarcinus.

Nectopanope.

## HETEROPANOPE, Stimpson, de Man.

*Heteropanope*, (part) Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 35.

*Heteropanope*, (part) A. Milne Edwards, Ann. Sci. Nat., Zool., (4) XX. 1863, pp. 288, 289.

*Pilumnopus*, (part) A. Milne Edwards, *loc. cit.*; and Ann. Soc. Entomol. France, (4) VII. 1867, p. 277.

*Heteropanope*, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 52.

Carapace moderately broad, moderately or little convex, with the regions little or hardly demarcated.

Antero-lateral borders shorter than the postero-lateral, cut into four lobes or teeth, of which the first is confluent with the outer angle of the orbit: postero-lateral borders moderately convergent, posterior border rather long.

Front moderately broad, between a fourth and a third the greatest breadth of the carapace, cut into two lobes, the outer angle of each of which is dentiform and separated from the supra-orbital margin by a notch.

A small triangular gap in the orbital margin just beneath the outer angle. The antennules fold nearly transversely.

Basal antennal joint short, not reaching the front; the flagellum, which is about equal in length to the major diameter of the orbit, lodged in the rather broad orbital hiatus.

The ridges of the endostome, defining the expiratory canals, are well marked, but the anterior border of the merus of the external maxillipeds is not notched. The buccal cavern is broader anteriorly than posteriorly.

Chelipeds unequal in both sexes; fingers rather short, pointed, not hollowed.

The abdomen of the male consists of seven separate segments.

*Heteropanope* closely resembles *Panopeus* (e.g. *P. herbstii*), but differs in having the crests of the endostome much more distinct, and all seven segments of the male abdomen separate.

*Key to the Indian species of Heteropanope.*

- I. Carapace decidedly convex, both chelipeds perfectly smooth to the naked eye ..... *H. lævis.*
- II. Carapace almost flat, wrist and hand of smaller cheliped studded with vesiculous or pearly granules..... *H. indica.*

131. *Heteropanope indica*, de Man.

*Heteropanope indica*, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 53, pl. iii. figs. 1, 2.

Carapace more than two-thirds as long as broad, very little convex, surface somewhat granular and scantily tomentose near the margins. Gastric region and its three sub-regions faintly indicated. Two series, starting respectively from the 3rd and 4th teeth of the antero-lateral margins, of discontinuous wavy finely granular ridges cross the carapace transversely, fairly parallel with the common curve of the frontal and antero-lateral borders.

The finely granular orbital margin has the two grooves near the external angle, and the gap just below the external angle, distinct.

Antero-lateral border cut into four teeth, of which the first two are broad thin and compressed and the last two pointed and subpyramidal; the edges of all are finely granular.

Chelipeds and legs more or less tomentose. Chelipeds very unequal; a curved spine-like tooth at distal end of upper border of arm, and a spine at inner angle of wrist: upper and outer surface of smaller hand and wrist studded with vesiculous granules; larger hand quite smooth, very large, little shorter than the greatest breadth of the carapace.

Colours in spirit, dull earthy brown with a greenish tinge.  
In the Indian Museum is a single specimen, from Mergui.

132. *Heteropanope lævis* (Dana).

*Panopæus lævis*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 76, and U. S. Expl. Exp. Crust. pt. I. p. 180, pl. viii. figs. 13a-c: J. E. Benedict and M. J. Rathbun, P. U. S. Nat. Mus. XIV. 1891, p. 380.

Carapace two-thirds as long as broad, decidedly convex fore and aft, its surface perfectly smooth to the naked eye, and bald. The gastric region and its three sub-regions are as faintly as possible indicated, and the two broken series of transverse elevations present in *H. indica* are also present, but are much blunter smoother and fainter. The orbits are as in *H. indica*, but the margin is but microscopically granular.

The antero-lateral border is cut into four teeth, all of which are thin and compressed, and all but the first are sharply acuminate forwards.

The chelipeds are extremely unequal, and are perfectly smooth and bare: there is a denticle at the distal end of the upper border of the arm, and a stout sharp tubercle (often double-crowned) at the inner angle of the wrist. The greatest length of the larger hand, in the male, is about equal to the greatest breadth of the carapace, and its greatest height more than three-quarters the greatest length of the carapace: in the female this hand is not quite so large.

The edges of the last four joints of all the legs are scantily hairy in the male, but more profusely so in the female.

Colours in spirit; brownish yellow or dull green.

In the Indian Museum are 17 specimens from Karáchi and one from Bombay.

133. *Heteropanope eucratoides*, Stimpson.

*Heteropanope eucratoides*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 35: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 56, pl. iii. figs. 3, 4.

This species is included by de Man in the Mergui fauna. There are no specimens in the Indian Museum. According to de Man it chiefly differs from *H. indica* in having the antero-lateral margins much shorter, and the 3rd tooth of the antero-lateral margin smaller than any of the others.

The chelipeds have a smooth surface.

EURYCARCINUS, A. Milne Edwards.

*Eurycarcinus*, A. Milne Edwards, Ann. Soc. Entomol. France (4) VII. 1867, p. 276.

*Eurycarcinus*, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 43.

Carapace broad, convex, perfectly smooth, without trace of regions.



Antero-lateral borders very much shorter than the postero-lateral, cut into four lobes or teeth, of which the first is confluent with the outer angle of the orbit: postero-lateral border moderately convergent, posterior border rather long.

Front broadish, nearly a third the greatest breadth of the carapace, obliquely deflexed, projecting a little beyond the orbits, straight and square cut, commonly emarginate in the middle line.

Orbits shallow, affording little concealment to the eyes, the upper margin entire, a gap in the lower margin, below the outer angle. The antennules fold quite transversely.

Basal antennal joint short, not reaching the front, the flagellum, which is long (much longer than the major diameter of the orbit), lodged in the orbital hiatus.

The ridges of the endostome, defining the expiratory canals, are well pronounced, but the anterior border of the merus of the external maxillipeds is not notched. Buccal cavern wider anteriorly than posteriorly.

Chelipeds unequal in both sexes, fingers pointed, not hollowed.

The abdomen of the male is seven-jointed.

*Eurycarcinus* is very closely related to *Heteropanope*, but is easily distinguished by the broad smooth convex carapace, the shallow and rather elongate orbits, and the very short antero-lateral margins.

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

- I. Thumb of the larger cheliped with a much-enlarged tooth at basal end:—
  1. Antero-lateral border less than  $\frac{2}{3}$  the length of the postero-lateral ..... *E. orientalis.*
  2. Antero-lateral border at least  $\frac{2}{3}$  the length of the postero-lateral ..... *E. maculatus.*
- II. Thumb of the larger cheliped without a much-enlarged tooth at base .... *E. grandidieri.*

#### 134. *Eurycarcinus orientalis*, A. Milne Edwards.

*Eurycarcinus orientalis*, A. Milne Edwards, Ann. Soc. Entom. France (4) VII. 1867, p. 277: de Man, Notes Leyden Mus. XIV. 1892, p. 226.

Carapace rather over two-thirds as long as broad, perfectly smooth (except for an extremely fine and faint granular ridge that runs transversely inwards towards the gastric region from the last tooth of the antero-lateral margin), decidedly convex fore and aft and slightly so from side to side.

Front cut quite straight and square, slightly emarginate in the middle line.

Antero-lateral border cut into four thin shallow teeth, of which the first two are rounded and the last two are anteriorly acuminate, the first being the least prominent of all and the last being the smallest of all. The antero-lateral border is extremely short, a good deal less than two-thirds the length of the postero-lateral.

Supra-orbital margin entire, the infra-orbital finely denticulate.

Chelipeds markedly unequal, perfectly smooth, inner angle of wrist rather strongly pronounced; the hand and fingers are rather short and stout and the thumb of the larger cheliped is a good deal shorter than the hand and has a very strong tooth at its base.

The legs and under surface of the body are covered with a dense, extremely short scurfy tomentum.

Colours in spirit yellowish brown.

In the Indian Museum are four specimens, from Karachi, Bombay and the Andamans.

This species agrees in all respects with the descriptions and figures of *Eurycarcinus maculatus*, except in respect of the antero-lateral borders. These are so short that a line joining their posterior extremities would divide the carapace into two halves, of which the anterior would be much the smaller: the teeth of the antero-lateral border are also much shallower and less salient.

135. *Eurycarcinus grandidieri*, A. Milne Edwards.

*Eurycarcinus grandidieri*, A. Milne Edwards, Ann. Soc. Entom. France, (4) VII. 1867, p. 277; and Nouv. Archiv. du Mus. IV. 1868, p. 80, pl. xix. figs. 13-16.

Carapace about two-thirds as long as broad, strongly convex fore and aft, slightly so from side to side, perfectly smooth to the naked eye.

Front cut square, emarginate in the middle line, the fore edge straight but sloping a little obliquely from the outer angles to the middle line. Supra-orbital margin entire, the infra-orbital obscurely denticulate.

Antero-lateral border as in *E. orientalis* but rather longer, its length being at least two-thirds that of the postero-lateral; the edges of all the teeth are a little thickened and granular.

Chelipeds unequal, perfectly smooth, inner angle of wrist pronounced: the hand is more elongate and narrower and the fingers are slenderer than in *E. orientalis*, and the thumb of the larger cheliped has no enlarged tooth at the base. The legs, the smaller cheliped, and the under surface of the body are covered with a dense, extremely short and fine tomentum.

Colours in spirit, yellowish brown.

In the Indian Museum is a single specimen from the Nicobars.

The chief difference between this species and *E. orientalis* and *maculatus* appears to be in form of the hand and fingers of the larger cheliped.

136. *Eurycarcinus maculatus*, (A. M. Edw.) de Man.

*Pilumnopeus maculatus*, A. Milne Edwards, Ann. Soc. Entom. France, (4) VII. 1867, p. 277; and Nouv. Archiv. du Mus. IV. 1868, p. 82, pl. xix. figs. 17-19.

*Eurycarcinus maculatus*, de Man, Journ. Linn. Soc. XXII. 1887-88. p. 44, pl. ii. figs. 2 and 3 (not 3 and 4).

The Mergui specimen described by de Man does not appear to be in the Indian Museum.

This species agrees with *E. orientalis* in the form of the chelipeds (hand and thumb), and appears to differ from that species only in having a longer and more deeply cut-up antero-lateral border.

NECTOPANOPE, Wood-Mason.

*Nectopanope* Wood-Mason, Ann. Mag. Nat. Hist. March, 1891, p. 261.

Carapace broad, approaching the quadrilateral, convex fore and aft, the branchial regions so inflated and convex dorsally as to make the transverse plane of the carapace strongly concave in the middle line, the other regions obscurely defined, the surface smooth.

The antero-lateral borders are very much shorter than the postero-lateral, are very thin and sharp, and are cut into teeth of which the first is confluent with the outer orbital angle.

Front broad, a third the greatest breadth of the carapace, straight, square cut, slightly projecting beyond the supra-orbital angle, from which it is sharply cut off by an angular notch, on either side.

Orbits large, with a thin, sharp, prominent margin; a notch internal to the middle of the upper margin, the notch breaking this margin into two curves, one corresponding to the eye-stalk the other to the cornea: eyes large, reniform, on moderately stout stalks.

Antennules folding transversely. The basal antennal joint is very short, but almost touches the turned down side-edge of the front: the flagellum, which is considerably longer than the major diameter of the large orbit, springs from the rather broad orbital hiatus.

The buccal cavern is broader anteriorly than posteriorly, and the mouth parts do not nearly reach its front edge, so that a wide and permanent gap is left: the crests of the endostome are not very strong, but the free edge of the endostome corresponding to the efferent branchial channel, on either side, is deeply excavated. The outer wall of the efferent branchial canal forms a strong angular bulge in the pterygostomian region.

The chelipeds in the female are equal; the fingers are compressed and pointed, not hollowed.

The legs are long and slender, the propodite and dactylus of the last pair strongly compressed and a little broadened.

This form is most nearly related to *Eurycarcinus*.

137. *Nectopanope rhodobaphes*, Wood-Mason.

*Nectopanope rhodobaphes*, Wood-Mason, Ann. Mag. Nat. Hist. March, 1891, p. 261.

Carapace about  $\frac{3}{4}$  as long as broad. Front extremely obscurely grooved in the middle line. Antero-lateral border cut into three thin sharp-edged teeth, of which the first is broad and rounded and confluent with the orbit, the second is broad and anteriorly acuminate, and the third almost spiniform.

Chelipeds smooth, in the female they are equal and are a little over  $1\frac{3}{4}$  times the length of the carapace: arm with an acute spine near the far end of the upper border; inner angle of wrist acute, spiniform; fingers thin, compressed, pointed and hooked at tip, armed with thin lacinate teeth, the thumb very broad.

Legs thin, the first three pairs not much shorter than the chelipeds, with long compressed-styliform dactylus: the last pair a good deal shorter, with thin blade-like propodite and dactylus closely fringed with hair.

Colours in spirit uniform yellowish white: in life pink, with a dotted, V-shaped, white mark between the gastric and branchial regions.

In the Indian Museum is a single female specimen from off the Godávári coast 98–102 fms.

*Nectopanope longipes*, which was referred provisionally to this genus by Wood-Mason, who had insufficient material for examination, turns out, now that numerous good specimens have been dredged by the "Investigator," to be a *Catometope*.

Subfamily VII. ERIPHIINÆ.

Alliance I. *Eriphioida*.

ERIPHIA, Latr.

*Eriphia*, Latreille, Cuvier Règne An. (1) III. 18.

*Eriphia*, Desmarest, Consid. Gen. Crust. p. 125.

*Eriphia*, De Haan, Faun. Japon. Crust. p. 22.

*Eriphia*, Milne Edwards, Hist. Nat. Crust. I. 425.

*Eriphia*, Dana, Silliman's Journ. (2) XII. 1851, p. 128; and U. S. Expl. Exp. Crust. pt. I. p. 246.

*Eriphia*, Heller, Crust. Sudl. Europ. p. 74.

*Eriphia*, A. Milne Edwards, and Miss. Sci. Mex. Crust. p. 337.

*Eriphia*, Miers, Challenger Brachyura p. 162.

Carapace thick and deep, approaching a quadrilateral shape, very little convex or nearly flat, not remarkably broader than long, the regions except the gastric not demarcated.

Antero-lateral borders slightly curved, much shorter than the postero-lateral and meeting the latter, not at a strong angle as in most Cancrids, but at a very open and imperceptible angle; though spinate they are not cut into lobes.

The fronto-orbital border is extremely broad, much more than three-quarters the greatest breadth of the carapace; the front, which is therefore broad also, is strongly deflexed, is almost straight, and is cut into two broad lobes the outer part of each of which is broadly in contact—far beyond the limits of the antennal base—with a singularly broad prolongation of the infra-orbital plate. The orbits, which are deep and oval, are therefore completely closed and widely separated from the antennæ.

The basal antennal joint is very small short and broad; the flagellum is long, more than the major diameter of the large orbit. The antennules fold transversely.

The crests of the endostome, defining the expiratory canals, are strong, and the canal is completed below by the foliaceous process of the first maxillipeds, the anterior edge of that process being concave. The oblique anterior border of the merus of the external maxillipeds is not notched.

Chelipeds massive, unequal in both sexes; fingers stout, pointed, not hollowed.

The abdomen of the male has all 7 segments separate.

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

- I. Carapace nearly  $\frac{4}{5}$  as long as broad, devoid of hair dorsally; front cut into blunt teeth:—
  1. Chelipeds smooth to the naked eye ..... *E. lævimana.*
  2. Hand and wrist of the smaller cheliped studded with tubercles ..... *E. smithii.*
- II. Carapace only  $\frac{3}{4}$  as long as broad, with numerous scattered hairs; front not cut into teeth ..... *E. scabricula.*

#### 138. *Eriphia lævimana*, Latr. Edw.

*Eriphia lævimana*, Guérin, Icon. R. A., Crust. pl. iii. fig. 1: Milne Edwards, Hist. Nat. Crust. I. 427: Dana, U. S. Expl. Exp. Crust. pt. I. p. 249, pl. xiv. figs. 7a-c: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 37: A. Milne Edwards, in Maillard's Pile Réunion, Annexe F. p. 5, and Nouv. Archiv. du Mus. IV. 1868, p. 71, and IX. 1873, p. 255: Heller, Novara Crust. p. 24: Hilgendorf in v. d. Decken's

Reisen Ost-Afr. III. i. p. 75, and MB. Ak. Berl. 1878, p. 797: Miers, P. Z. S. 1877, p. 135, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 237, and Zool. H. M. S. Alert, pp. 517, 534, and Challenger Brachyura, p. 162: Tozzetti, Magenta Crust. p. 60, pl. v. figs. 1a-c: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 58 (*gastric teeth*): Richters in Möbius Meeresf. Maurit. p. 151: Haswell, Cat. Austral. Crust. p. 75: Muller, Verh. Ges. Basel VIII. 1886, p. 475: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 68, and Archiv. f. Naturges. LIII. 1887, i. 327, and Zool. Jahrb. Syst. &c. VIII. 1894-95, p. 555: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 367: Ortman, Zool. Jahrb., Syst., VII. 1893-94, p. 480, and in Semon's Forschungsr. (Jena. Denk. VIII) Crust. p. 54: Zehntner, Rev. Suisse Zool. II. 1894, p. 161: Whitelegge, Mem. Austral. Mus. III. 1897, p. 137.

*Eriphia trapeziformis*, Hess, Archiv. für Naturges. XXXI. 1865, i. pp. 135, 171, pl. vi. fig. 4 (see de Man, Zool. Jahrb., Syst., II. 1887, p. 695).

Carapace nearly  $\frac{4}{5}$  as long as broad: gastric region large, well demarcated and subdivided into three large subregions, its anterior part, like the anterior part of the branchio-hepatic regions, covered with small pearly and subsquamiform tubercles; the rest of the carapace smooth, but closely covered with very small vesiculous granules not plainly visible to the naked eye: the post-orbital groove is distinct, and behind it, parallel with the gastric region, on each side a small narrow areola is marked off.

The free edge of the frontal lobes is bluntly spinate: there is a blunt spine also at the lower inner angle of the orbit, and two or three at the outer angle of the orbit: and there are 5 or 6 blunt spines or spinules of decreasing size along the antero-lateral border.

Chelipeds almost smooth to the naked eye, though closely covered with small depressed vesiculous granules under the lens: upper border of arm denticulate at its distal end, where also the granules on the neighbouring part of the outer surface are plainly visible without a lens; the anterior border of the arm denticulate at its proximal end. The upper part of the inner surface of the wrist forms a distinct facet, the proximal angle of which is pronounced and the distal end of which is bounded by two or three blunt spines.

Legs stout, smooth; upper edge of merus denticulate and somewhat hairy, the lower edge with tufts of stiff hair: similar tufts of hair along upper edge of carpus and on all the edges and surfaces of the propodite; the greater part of the dactylus covered with short stiff hairs and longer bristles.

Colours in spirit dull maroon, with a bluish-green tinge on the postero-lateral parts of the carapace and on the walking-legs.

In the Indian Museum are 53 specimens, from the Andamans, Arakan coast, Mergui, Ceylon and Laccadives (besides 2 from Samoa).

139. *Eriphia lævimana* var. *Smithii*, Macleay, Hilgdf.

*Eriphia smithii*, Macleay, Ill. Ann. S. Afr. p. 60: Krauss, Sudafr. Crust. p. 36, pl. ii. fig. 3: Dana, U. S. Expl. Exp. Crust. pt. I. p. 251: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 37: A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71: Hoffmann in Pollen and Van Dam, Faun. Madagasc., Crust. p. 6, pl. i. figs. 1a-c: Lenz and Richters, Abh. Senck. Ges. XII. 1881, p. 422: Ortman in Semon's Forschungsr. (Jena. Denk. VIII) Crust. p. 54.

*Eriphia lævimana* var. *smithii*, Hilgendorf MB. Ak. Berl. 1878, p. 797: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 237, and Zool. H. M. S. Alert, pp. 517, 535: de Man, Archiv. f. Naturges. LIII. 1887, i. p. 327: ?? Cano, Boll. Soc. Nat. Napoli, III. 1889, p. 210: A. O. Walker, Journ. Linn. Soc., Zool., XX. 1886-90, p. 110: Ortman, Zool. Jahrb., Syst., VII. 1893-94, p. 481.

The variety *Smithii* differs from the typical *Eriphia lævimana* only in the sculpture of the chelipeds.

The upper and outer surfaces of the wrists and hands of the smaller cheliped are closely covered with miliary granules and are profusely studded with salient and subsquamous tubercles, which, on the lower half of the hand are arranged in longitudinal series.

The wrist and hand of the larger cheliped may be nearly smooth or may have a few scattered pustulous tubercles (as they are in most Indian specimens), or they may more nearly resemble the smaller cheliped in sculpture.

In the Indian Museum are 15 specimens from Karáchi, and one from the Mekran coast.

140. *Eriphia scabricula*, Dana.

*Eriphia scabricula*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 82, and U. S. Expl. Exp. Crust. pt. I. p. 247, pl. xiv. figs. 5a-b: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 37: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 256: Hilgendorf, MB. Ak. Berl. 1878, p. 798: Richters in Möbius Meeresf. Maurit. p. 151: Lenz and Richters, Abh. Senck. Ges. XII. 1881, p. 422: Miers, Zool. H. M. S. "Alert," pp. 518, 535: de Man, Notes Leyden Mus. XII. 1890, p. 66, and Zool. Jahrb., Syst., VIII. 1895, p. 555: Ortman, Zool. Jahrb., Syst., VII. 1893-94, p. 480: Whitelegge, Mem. Austral. Mus. III. 1897, p. 137.

*Eriphia gonagra*, Krauss (*nec* Edw.) Sudafr. Crust. p. 36.

Carapace  $\frac{3}{4}$  as long as broad, grooved on the surface as in *E. lævimana*, closely covered anteriorly and laterally with sharpish subsquamiform granules among which are numerous soft but stiffish hairs.

Free edge of frontal lobes entire, microscopically beaded. A sharp tooth at the outer angle of the orbit only. Antero-lateral border with 4 or 5 sharp teeth of gradually decreasing size.

Upper and outer surfaces of wrists and hands closely covered with vesiculous granules and sharpish pearly tubercles with numerous hairs

between them, the tubercles on the smaller hand being in longitudinal series and the hairs thick there.

Legs smooth; the borders of the last four joints, specially the upper border, fringed with longish hairs.

Colours in spirit, warm light brown, the legs in good specimens cross-banded alternate dark and light brown.

In the Indian Museum are three specimens, from the Laccadives, the Andamans and Ceylon, (also one from Samoa)

#### Alliance II. Trapezioida.

Trapezia.      Tetralia.      Quadrella.      Sphenomerus.

#### TRAPEZIA, Latreille.

*Trapezia*, Latreille, Fam. Nat. p. 269, and Encyclop. Meth. x. 695.

*Trapezia*, Milne Edwards, Hist. Nat. Crust. I. 427.

*Trapezia*, Dana, Silliman's Journ. (2) XII. 1851, p. 128, and U. S. Expl. Exp. Crust. I. p. 252.

*Trapezia*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 257 and Miss. Sci. Mex., Crust. p. 341.

*Trapezia*, Miers, Challenger Brachyura, p. 163.

*Trapezia*, Ortmann, Zool. Jahrb., Syst., X. 1897, p. 202.

*Grapsillus*, Macleay in Smith's Ill. Zool. S. Afr. p. 67.

Carapace approaching the quadrilateral, little convex, not much broader than long, smooth and without any trace of regions.

Antero-lateral borders much shorter than the postero-lateral, running backwards almost straight and parallel with one another, not therefore meeting the convex curved and convergent postero-lateral borders at any angle.

Fronto-orbital border extremely broad, about as extensive as the greatest breadth of the carapace. Front broad, horizontal, lamellar separated from the supra-orbital angle by a notch; cut into two lobes, of which both the inner and outer angles are pronounced: so that with the supra-orbital angle the front usually appears 6-toothed.

The orbits, which afford no concealment to the eyes and are large, are cut out of the antero-lateral angles of the carapace: their dentiform upper and lower inner angles are broadly in contact, so that the antennæ are widely excluded from the orbit: their margins are without fissures or sutures.

The antennules fold nearly transversely, but in most spirit specimens are extended beyond their fossæ. The basal antennal joint is slender and very short and does not nearly reach the front: the flagellum is very long, much longer than the major diameter of the orbit.



The crests of the endostome, defining the expiratory canals, are well developed and the canals are closed in below by the foliaceous process of the 1st maxillipeds: the anterior edge of the merus of the rather slender external maxillipeds is not notched.

The chelipeds are long and very massive and are sub-equal or not very unequal in both sexes: the arm usually projects a long way beyond the carapace, and has its anterior edge sharp and crest-like and serrate: the fingers have usually a thin and sharp cutting-edge, best marked on the immobile finger. Legs stout, of moderate length.

The abdomen of the male consists of 5 segments, the 3rd-5th being fused.

The species of *Trapezia* are found in the crevices of coral-stocks.

*Key to the Indian species of Trapezia.*

- I. A distinct spine or tooth at the junction of the antero-lateral and postero-lateral borders of the carapace:—
  - i. Lower border of hand sharp, entire:—
    1. Outer surface of hand, in its upper part at least, covered with a mass of fine tangled downy hairs ..... *T. cymodoce.*
    2. Outer surface of hand smooth and bald:—
      - a. Carapace and appendages plain yellowish or reddish brown ..... *T. ferruginea.*
      - b. Carapace (and sometimes also the upper surface of the hands) covered with an elegant meshwork of fine dark brown lines (a scurfy pubescence on outer surface of hand, occasionally) ..... *T. areolata.*
      - c. Carapace and appendages everywhere covered with roundish red spots ..... *T. maculata.*
      - d. Carapace covered with faintish brown spots, upper surface of hands with a network of brown lines ... *T. intermedia.*
  - ii. Lower border of hand granular or bluntly serrulate: carapace, etc. covered with roundish red spots ..... *T. rufopunctata.*
- II. Nothing more than an indistinct notch at the junction of the antero-lateral and postero-lateral borders: colours, in spirit, blackish brown ..... *T. digitalis.*

With the species of *Trapezia* the citations of the various writers are so extremely uncertain that I have given up the attempt to make them complete.

Ortmann, in *Zoologische Jahrbücher, Abth. für Systematik, etc.* X. ii.

1897, pp. 201–216, has published a little monograph of the group, in which full lists of citations will be found.

141. *Trapezia cymodoce*, (Herbst) Miers, de Man, Ortmann.

*Cancer cymodoce*, Herbst, Krabben III. ii. 22, pl. li. fig. 5.

*Trapezia cymodoce*, Savigny and Audouin, Descr. de l'Égypte, Crust. p. 85, pl. v. fig. 2: Miers, Ann. Mag. Nat. Hist. (5) II. 1878, pp. 408, 409: de Man, Notes Leyden Mus. II. 1880, pp. 177, 178, and Journ. Linn. Soc., Zool., XXII. 1887-88, p. 69: Ortmann, Zool. Jahrb., Syst. X. 1897, pp. 203, 204.

*Trapezia hirtipes*, Lucas in Jacquinet's Voy. Astrolabe, Zool. III. Crust. p. 44 pl. iv. fig. 14.

*Trapezia cærulea*, Heller, SB. Ak. Wien, XLIII. 1861, p. 348.

*Trapezia dentata*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 261.

Carapace four-fifths as long as broad, slightly convex in both directions in the adult female, almost flat in the male, smooth and polished.

Front prominent beyond the supra-orbital angle, rather deeply cut into two lobes, each of which has the inner angle dentiform and still further prominent, and the outer angle (though rounded) sharply marked and separated by a deep notch from the dentiform supra-orbital angle.

Inner angle of lower edge of orbit acutely spiniform: outer angle of orbit acute.

Antero-lateral borders nearly parallel with one another or very slightly curved outwards, an acute procurved spine marks their junction with the postero-lateral borders.

Chelipeds sub-equal in both sexes: more than  $2\frac{3}{4}$  times the length of the carapace in the adult male but not quite so long in the female: the arm, which projects far beyond the edge of the carapace, has the anterior border foliaceous and cut into numerous sharp teeth: inner angle of wrist sharp and prominent, but not usually spiniform: hands long and compressed, the upper and lower edges (especially the lower) both sharp, the upper part of the outer surface of the hand (and wrist also, in many cases) covered with silky wool; fingers compressed, the cutting-edges thin sharp and not much toothed.

Legs smooth, the dactylus with rather numerous silky bristles, which are also found scattered along both edges of propus and upper edge of carpus.

Colours in spirit yellowish or reddish brown, often very dark or livid on the carapace; distal two-thirds of fingers commonly dark brown.

In the Indian Museum are 37 specimens, from the Andamans, Nicobars, Mergui, Palk Straits and the Mekrán coast (besides 16 from other parts of the Indo-Pacific).

In some specimens the free edge of the frontal lobes is more or less crenulate: the outer angle of the orbit and the lateral epibranchial spine are sometimes blunt: the whole of the outer surface of the hand is sometimes pubescent, and the arm also.

The species can, however, always be recognized by the uniform colouration, the hairy outer surface of the hands, and the very prominent front.

142. *Trapezia ferruginea*, Latr., Miers, de Man, Ortmann.

*Trapezia ferruginea*, Latreille, *Encycl. Meth.* X. p. 695: Milne Edwards, *Hist. Nat. Crust.* I. 429: Heller, *SB. Ak. Wien*, XLIII. 1861 p. 349, pl. iv. fig. 40: Miers, *Ann. Mag. Nat. Hist.* (5) II. 1878, pp. 407, 408: de Man, *Notes Leyden Mus.* II. 1880, pp. 178, 179: Ortmann, *Zool. Jahrb. Syst.*, X. 1897, pp. 202, 205.

*Grapsillus subinteger*, Macleay in Smith's *Ill. Zool. S. Afr.*, *Annulosa*, p. 67.

*Trapezia cymodoce*, Dana, *U. S. Expl. Exp. Crust.* pt. I. 257, pl. xv. fig. 5, A. Milne Edwards, *Nouv. Archiv. du Mus.* IX. 1873, p. 260, and *Miss. Sci. Mex. Crust.* p. 342.

*Trapezia miniata*, Lucas in Jacquinot's *Voy. Astrolabe*, *Zool.* III. *Crust.* p. 43, pl. iv. fig. 10.

*Trapezia subdentata*, Gerstaecker, *Archiv. für Naturges.* XXII. 1856, i. p. 127.

Differs from *T. cymodoce*, which it closely resembles in form and colour, in the following particulars:—

(1) the front as a whole is not so prominent, and its constituent teeth, as well as the supra-orbital angle, are not so prominent, and deep-cut: the tooth at the lower inner angle of the orbit is not so sharp:

(2) the outer angle of the orbit and the lateral epibranchial spine are not nearly so spiniform in the adult:

(3) the upper border of the hand is not so sharp, and the outer surface of the hand is smooth, polished and quite hairless.

In the Indian Museum are 25 specimens, from the Andamans, Nicobars and Ceylon.

*Trapezia ferruginea* var. *intermedia*, Miers.

*Trapezia rufopunctata* var. *intermedia*, Miers, *Challenger Brachyura*, p. 168, pl. xii. fig. 2, 1886.

*Trapezia*, sp. Richters in Möbius, *Meeresf. Maurit.* p. 152, pl. xvi. fig. 13, 1880.

Differs from *T. ferruginea* only in colouration.

The carapace, legs, arms and wrists are covered with light brown rather blotchy spots, while the upper surface of the hands is marked by a network of fine brown lines.

*Trapezia ferruginea* var. *guttata*, Rüpp.

Carapace light brown, edge of front brick-red: chelipeds with a network of fine pinkish-brown lines: legs with small pink spots.

Twelve specimens have just been dredged by Dr. A. R. S. Anderson of the "Investigator," off Great Coco I. (Andamans).

A faded specimen could not be distinguished from *T. ferruginea*.

In the Indian Museum are 3 specimens, from Diamond Island (off C. Negrais, Burma).

The Museum also possesses one of the "Challenger" duplicates from Honolulu.

143. *Trapezia ferruginea* var. *areolata*, Dana.

*Trapezia areolata*, Dana, Proc. Acad. Nat. Sci. Philad. 1852, p. 83, and U. S. Expl. Exp. Crust. pt. I. p. 259, pl. xv. figs. 8a-b and 9: Heller, Novara Crust. p. 25: de Man, Archiv. für Naturges. LIII. 1887, i. p. 317, and Zool. Jahrb. Syst. VIII. 1894-95, p. 556: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 366: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 485.

*Trapezia reticulata*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 37.

*Trapezia areolata* var. *inermis*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 259, pl. x. fig. 6: Miers, Challenger Brachyura, p. 167: Zehntner, Rev. Suisse Zool. V. 1894, p. 157.

*Trapezia ferruginea areolata*, Ortmann, Zool. Jahrb., Syst., X. 1897, pp. 203, 206.

This species also differs from *T. ferruginea* only in colouration.

The carapace, and sometimes also the upper surface of the chelipeds, is covered by a very elegant honeycomb network of fine brown (in spirit) lines. Even in old spirit specimens this network can be made out, with a lens, on the carapace, though not on the chelipeds.

In many specimens of *T. areolata*, the upper part of the outer surface of the hand is covered with a very fine scurf-like pubescence.

In the Indian Museum are 52 specimens, from the Audamans, Nicobars, Ceylon and Mergui (besides 3 from other parts of the Indo-Pacific).

144. *Trapezia maculata* (Macleay) Dana.

*Grapsillus maculatus*, Macleay in Smith's Ill. Zool. S. Afr., Ann. p. 67.

*Trapezia tigrina*, Eydoux and Sonleyet, Voy. Bonite, Vol. I. p. 232, pl. ii. fig. 4.

*Trapezia maculata*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 256, pl. xv. figs. 4a-d: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 37, and Ann. Lyc. Nat. Hist., N. York, VII. 1862, p. 219: Streets, Bull. U. S. Nat. Mus. VII. 1877, p. 106: de Man, Archiv. für Naturges. LIII. 1887, i. p. 318, pl. xiii. fig. 2: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 366.

*Trapezia rufopunctata* var. *maculata*, Miers, Phil. Trans. Roy. Soc., Vol. 168, 1879, p. 487: Ortmann, Zool. Jahrb., Syst. VII. 1893-94 p. 484.

*Trapezia ferruginea maculata*, Ortmann, Zool. Jahrb., Syst., X. 1897, pp. 203, 206.

Differs from *T. cymodoce* in the following particulars:—

(1) the front as a whole is not so prominent, nor are its constituent teeth and the supra-orbital angle quite so deep-cut:

(2) the chelipeds are not much more than twice the length of the carapace in the male, the arm being shorter than in *T. cymodoce* and *ferruginea*; there is a strong spine at the inner angle of the wrist; the outer surface of the hand is smooth, polished and hairless:

(3) the carapace, chelipeds, legs, etc., are everywhere covered with well defined roundish red spots.

*N.B.* The lower border of the hand is sharp and entire (non-granular, non-serrulate).

In the Indian Museum are four specimens from Table Island (north of the Andamans).

145. *Trapezia rufopunctata* (Herbst) Latr., Ortmann.

*Cancer rufopunctatus*, Herbst, Krabben III. i. 54, pl. xlvii. fig. 6.

*Trapezia rufopunctata*, Latreille, Encyclop. X. p. 695: Dana, U. S. Expl. Exp., Crust. pt. I. p. 255, pl. xv. figs. 3a-b: Lucas in Jacquinot's Voy. Astrolabe, Zool. III. Crust. p. 41, pl. iv. fig. 8: Gerstaecker, Archiv. für Naturges. XXII. 1856, i. p. 123: Heller, SB. Ak. Wien, XLIII. 1861, p. 350: A. Milne Edwards, Nouv. Archiv. du. Mus. IV. 1868, p. 71, and IX. 1873, p. 258, and Miss. Sci. Mex. Crust. p. 342: Hilgendorf in v. d. Decken's Reisen Ost-Afr. III. i. p. 75, pl. ii. fig. 3: Kossman, Reise roth. Meer., Crust. p. 42: Miers, Challenger Brachyura, p. 167: de Man, Archiv. für Naturges. LIII. 1887, i. p. 318, pl. xiii. figs. 1, 2: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 366: Ortmann, Zool. Jahrb., Syst. VII. 1893-94, p. 484, and X. 1897, pp. 205, 207, and in Semon's Forschungsr. (Jena. Denk. VIII.) Crust. p. 52: Zehntner, Rev. Suisse Zool. II. 1894, p. 157.

*Trapezia acutifrons*, A. Milne Edwards, Ann. Soc. Entom. France, (4) VII. 1867, p. 281.

Differs from *T. cymodoce* as follows:—

(1) though the front is of the same general form, the edge of each frontal lobe is somewhat angularly excised and the outer angle is angularly acute (not rounded) and is produced to or even beyond the level of the dentiform inner angle of each lobe:

(2) the inner angle of the wrist is more acute and spiniform, the upper border of the hand is rounded and the outer surface smooth polished and hairless, and the lower border of the hand is granular or bluntly serrulate:

(3) the carapace, chelipeds and legs are covered with rather large red spots.

In the Indian Museum are 5 specimens from Ceylon.

146. *Trapezia digitalis*, Latr.

*Trapezia digitalis*, Latreille, Encycl. Meth. X. 696: Milne Edwards, Hist. Nat. Crust. I. 429: Heller, SB. Ak. Wien, XLIII. 1861, p. 352: Kossmann, Reise roth. Meer., Crust. p. 42: de Man, Notes Leyden Mus. II. 1880, p. 177: Ortmann, Zool. Jahrb. Syst. X. 1897, pp. 203, 208.

*Trapezia leucodactyla*, Rüppell, 24 Krabben roth. Meer. p. 28.

? *Trapezia fusca*, Lucas in Jacquinot's Voy. Astrolabe, Zool. III. Crust. p. 45, pl. iv. fig. 17.

Carapace about five-sixths as long as broad, but having a broader look, owing to the less marked projection of the front and the greater

curvature and convergence of the postero-lateral borders; its surface smooth and burnished.

The front is slightly notched in the middle line, and is separated from the hardly-dentiform supra-orbital angles by a shallow notch: it is thus rather obscurely divided into two lobes, each of which has the free edge finely denticulate. Outer angle of orbit acute, as is also the inner angle of the lower margin.

There may be a slight notch at the junction of the antero-lateral and postero-lateral borders, but there is never a spine.

Chelipeds subequal in both sexes, about twice the length of the carapace, smooth and burnished. The arm is much shorter than it is in *T. cymodoce* and *ferruginea*, being broader than long, its foliaceous anterior border dentate or crenate; inner angle of wrist acute; upper border of hand rounded, lower border sharp.

Legs smooth, dactylus with a few bristles, which are almost absent from the other joints.

Colours in spirit, blackish-brown, fingers, lower edge of hand and distal ends of leg joints lighter.

In the Indian Museum are six specimens from Ceylon and Palk Straits.

#### TETRALIA, Dana.

*Tetralia*, Dana, Silliman's Journ. Sci. and Arts (2) XII. 1851, p. 128, and Proc. Ac. Nat. Sci. Phila., 1852, p. 83, and U. S. Expl. Exp. Crust. pt. I. p. 261.

*Tetralia*, Heller, SB. Ak. Wien, XLIII. 1861, p. 353.

*Tetralia*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 261.

Closely resembles *Trapezia* in form, and only differs in the following characters:—

The front is hardly separated from the hardly-dentiform supra-orbital angle by a small and very inconspicuous notch, and has its free edge very slightly convex, very faintly sinuous or straight (instead of being divided into lobes or teeth), and finely denticulate.

The antero-lateral borders are usually continued into the postero-lateral without any trace of a spine or notch to mark their junction.

The eyes are smaller.

The chelipeds are usually remarkably unequal; the arms are shorter and their expanded anterior edge is not denticulate throughout.

The meropodites of the legs are short and broad, almost foliaceous.

The abdomen of the male consists of seven separate segments.

#### 147. *Tetralia glaberrima* (Herbst.)

*Cancer glaberrimus*, Herbst, Krabben I. ii. 262 pl. xx. fig. 115.

*Trapezia integra*, Latreille, Encycl. Meth. x. p. 696.

*Trapezia glaberrima*, Krauss, Sudafr. Crust. p. 35.

*Tetralia glaberrima*, Dana, U. S. Expl. Exp. Crust. pt. i. p. 263, pl. xvi. fig. 3: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 38: A Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 262: Kossmann, Reise roth. Meer. Crust. p. 46: Lenz and Richters, Abh. senck. Ges. XII. 1881, p. 422; de Man, Archiv. für Naturges. LIII. 1887, i. p. 321: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 366: Ortmann. Zool. Jahrb., Syst., VII. 1893-94, p. 485, and X. 1897, p. 209, and in Semon's Forschungsr. (Jena. Denk. VIII.) Crust. p. 53: Zehntner, Rev. Suisse Zool. II. 1894, p. 157.

*Tetralia nigrifrons*, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 83, and U. S. Expl. Exp. Crust. pt. i. p. 262, pl. xvi. figs. 2a-d: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 262: Hilgendorf, MB. Ak. Berl. 1878, p. 798.

*Trapezia serratifrons*, Lucas in Jacquinot's Voy. Astrolabe, Zool., III. Crust. p. 47, pl. iv. fig. 20.

*Tetralia lævissima*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 38.

*Tetralia cavimana*, Heller, Abh. zool.-bot. Ges. Wien. XI. 1861, p. 14, and SB. Ak. Wien. XLIII. 1861, p. 353, pl. iii. figs. 24, 25, and Novara Crust. p. 26: Miers, Phil. Trans. 168, 1879, p. 488, and Zool. H. M. S. Alert, pp. 518, 537: de Man. Notes Leyden Mus., II. 1880, p. 180: R. I. Pocock, Ann. Mag. Nat. Hist. (6) V. 1890, p. 73: Whitelegge, Mem. Austral. Mus. III. 1897, p. 138.

*Tetralia heterodactyla*, Heller, Abh. zool.-bot. Ges. Wien. XI. 1861, p. 14, and SB. Ak. Wien. XLIII. 1861, p. 354.

Carapace about five-sixths as long as broad, flat smooth and shiny, with occasionally a faint short and distant pubescence near the frontal and lateral margins.

The front is finely and evenly denticulate, is almost straight, and is generally but not always separated from the similarly denticulate supra-orbital angle by a slight and inconspicuous break. The lateral borders are very slightly curved in their anterior half and are moderately convergent in their posterior half: they show no trace of a spine or notch, at least in the adult.

The chelipeds are very unequal both in length and bulk in both sexes, but even more so in the male than in the female.

In the male the larger cheliped is a good deal more and the smaller a good deal less than twice the length of the carapace: in the female the larger is about  $1\frac{3}{4}$  times and the smaller about  $1\frac{1}{3}$  times the length of the carapace.

The arm has the distal end of its anterior border expanded and finely denticulate: a little down and a few hairs are present on the outer surface of the wrist hand and finger, especially in the larger cheliped.

At the base of the larger hand, on the upper part of the outer surface, is a roundish pit of variable size and depth and usually full of hair.

The legs are rather short and stout and end in a curious little

coarse blunt claw: the meropodites are singularly broad and flat: the dactyli and propodites have both edges, and the carpopodites the upper edge, somewhat hairy.

Colours in spirit rather variable: sometimes uniform yellow or brown, usually the edge of the front and of the anterior part of the lateral margin is darker—almost black; occasionally the ends of some of the leg-joints have a black spot, and sometimes the legs are broadly banded yellow and blackish-brown.

In the Indian Museum are 78 specimens, from the Andamans, Mergui, Ceylon, the Maldives and the Mekrán coast.

In some but not in all young specimens there is a small lateral spine placed far forward on either lateral border of the carapace.

#### QUADRELLA, Dana.

*Quadrella*, Dana, Silliman's Amer. Journ. Sci. and Arts (2) XII. 1851, p. 128, and Proc. Ac. Nat. Sci. Philad. 1852, p. 84, and U. S. Expl. Exp. Crust. pt. i. p. 265.

*Quadrella*, A. Milne Edwards, Miss. Sci. Mex. Crust. p. 344.

Carapace squarely hexagonal, nearly as long as broad, moderately convex, perfectly smooth without trace of regions.

The antero-lateral borders, which are about equal in length to the postero-lateral, are straight, slope very slightly outwards, and join the postero-lateral at a very wide, but distinct, angle, marked usually by a spine.

The fronto-orbital border is about equal in extent to the greatest breadth of the carapace, and the broad almost horizontal front is cut into four acute spines, external to which, on either side, is seen the acute spiniform internal angle of the lower edge of the orbit projecting beyond the acute supra-orbital angles; so that the front is commonly spoken of as six-spinate.

The orbits, which are small and are cut out of the antero-lateral angles of the carapace, afford no concealment to the eyes: their upper and lower inner angles are in contact so as to exclude the antennæ.

The antennules fold almost transversely. The basal antennal joint is slender and does not nearly reach the front; the flagellum is slender and long—nearly half the length of the carapace.

The crests of the endostome are distinct and the expiratory canals are closed in as in *Trapezia*, etc.

The chelipeds are massive but are of great length, the whole of the long arm projecting beyond the edge of the carapace: they are subequal, or not markedly unequal, in both sexes.

Legs long and slender, the dactyli strongly and evenly serrated along the inner edge.



The abdomen of the male consists of 5 segments, the 3rd–5th being fused together.

The species of this genus inhabit stocks of corals and Alcyonarians.

148. *Quadrella coronata*, Dana.

*Quadrella coronata*, Dana, Proc. Acad. Nat. Sci. Philad., 1852, p. 84, and U. S. Expl. Exp. Crust. pt. i. p. 266, pl. xvi. figs. 5a–d: Ortmann, Zool. Jahrb. Syst. X. 1897, p. 210.

*Trapezia* sp. Miers, Zool. H. M. S. Alert, p. 536, footnote, (see Challenger Brachyura, p. 163 footnote).

Carapace squarely hexagonal, moderately convex, perfectly smooth, polished, about as long as broad. An acute procurved spine at the open angle of junction of the antero-lateral and postero-lateral borders.

Front with 6 horizontal spines, the four larger of which belong to the front proper, the other two being at the lower inner angles of the orbits which are much more prominent than the also spiniform upper inner angles.

Outer angle of orbit acute: eyes small, the diameter of the cornea about a tenth the length of the carapace.

Chelipeds smooth and polished, about  $2\frac{3}{4}$  times the length of the carapace, the arm and the palm each being nearly as long as the carapace. The whole arm, as well as the end of the ischium, visible, from above, beyond the carapace; an acicular spine at the inner angle of the ischium and from six to ten such spines along inner (anterior) border of arm; one, or two, little spines sometimes, but not always, present at inner angle of wrist: lower border of hand quite smooth.

Legs long slender, about  $1\frac{3}{4}$  times the length of the carapace: a few silky hairs on dactylus and propodite, and sometimes a very few on the carpus also: the inner edge of the dactylus strongly toothed.

Colours in spirit, milkwhite.

In the Indian Museum are 9 specimens from various parts of the Indian coasts and islands and from depths of 28 to 88 fathoms (one specimen from ? 7 fathoms).

*Quadrella coronata* var. *maculosa*, nov.

Differs from the typical form in the following particulars:—

(1) the greatest breadth of the carapace is distinctly more than the greatest length (including frontal spines):

(2) the chelipeds, under a lens, are frosted over with tiny granules: the anterior border of the arm is finely denticulate, with 2 or 3 spines at the distal end only; the inner border of the hand and thumb is finely denticulate:

(3) the carapace is closely covered with tiny purple (in spirit) dots, except for a very distinctly defined **W**-shaped white area stretching across its posterior half: the legs, sternum and abdominal terga are less closely covered with similar purple specks: chelipeds white.

Length of carapace 7 millim., breadth 8 millim.

In the Indian Museum are a male from off Table I. (Andamans) 15-35 fms., and a female from off the Andamans, 20 fms.

*Quadrella coronata*, var. *reticulata*, nov.

Differs from the typical form in the following particulars:—

(1) the carapace is distinctly broader than long:

(2) the chelipeds in the male are only about  $2\frac{1}{2}$  times the greatest length of the carapace, and under the lens are more or less frosted over with granules: the anterior border of the arm is serrate, the inner border of the hand and thumb is finely denticulate:

(3) the carapace is symmetrically traversed by several fine purple-brown lines which intersect to form a regular and wide meshwork, and there is an irregular meshwork of similar coloured lines on the hands.

Length of carapace 7 millim., breadth 8 millim.

In the Indian Museum are a male from the Andamans, taken on a *Spongodes*, and two from off Ceylon 34 fms.

149. *Quadrella boopsis*, n. sp.

Differs from *Q. coronata* in the following particulars:—

(1) the chelipeds in the male are only about twice the greatest breadth of the carapace:

(2) the arm is stout, is only about three-fifths the greatest length of the carapace, and has its anterior border serrated, not spiniferous:

(3) the eyes are large, their diameter being about one-fifth the greatest length of the carapace:

Colours in spirit uniform yellowish.

Length of carapace equal with the breadth, which is 5 millim.

In the Indian Museum are a male and a female from the Arakan coast 20-30 fms.

This species is not the young of *Q. coronata*, which has the long slender arm and small eyes of the adult.

SPHENOMERUS, Wood-Mason.

*Sphenomerus*, Wood-Mason, Ann. Mag. Nat. Hist. March 1891, p. 263.

Carapace transversely oval or subcircular, the front and antero-lateral margins forming together a semicircle; markedly convex in both directions, perfectly smooth, without trace of regions.

Antero-lateral borders shorter than the postero-lateral—a spinule at their point of junction.

Front somewhat deflexed, broad and broadly bilobed. Orbits affording little or no concealment to the eyes, without fissures or sutures: there is a gap between the front and the inner angle of the orbit in which the antennary flagellum is lodged. The fronto-orbital border, in the adult, is not quite  $\frac{4}{5}$  the greatest breadth of the carapace.

The antennules fold nearly transversely: the basal antennal joint does not reach the front, the flagellum is a good deal longer than the major diameter of the orbit.

The buccal cavern is a little narrowed anteriorly. The crests of the endostome are very faint, but to make up for this the anterior edge of the buccal cavern is puffed out and is very deeply excised on either side of the middle line; the anterior margin of the foliaceous process of the 1st maxillipeds is also excised to correspond, and so a permanent expiratory orifice is formed, which is very large and prominent beyond the almost transverse anterior edge of the merus of the external maxillipeds.

The chelipeds are stout, very long and not very unequal; the whole of the arm projects beyond the edge of the carapace: the fingers are somewhat compressed and are pointed.

The legs are rather slender.

The abdomen of the male consists of five pieces, the 3–5th somites being rigidly united but without obliteration of sutures.

#### 150. *Sphenomerus trapezioides*, Wood-Mason.

*Sphenomerus trapezioides*, Wood-Mason, Ann. Mag. Nat. Hist. March 1891, p. 263: Ill. Zool. Investigator, Crust. pl. v. fig. 2 (where the carapace is drawn a little too broad).

Carapace about  $\frac{4}{5}$  as long as broad, convex in all directions, smooth, polished.

The front is about  $\frac{3}{5}$  the greatest breadth of the carapace, is obliquely deflexed, and is divided into two rather shallow broadly-rounded lobes the free edge of which is entire.

The supra-orbital angle is not defined, but the dentiform or spiniform angle of the lower edge of the orbit can be seen from above.

The antero-lateral margins form with the front a semicircular curve, each carries three sharp spinules, namely, one at the outer angle of the orbit, one at the junction with the postero-lateral border and one exactly intermediate between the other two.

The chelipeds are a little, but not very remarkably, unequal: the larger one is about  $2\frac{1}{2}$  times the length of the carapace. Their surface is smooth and polished. The arm, the whole of which is visible beyond

the carapace, has much the same shape as in *Trapezia*, but its anterior border, though serrated, is not expanded; the lower border of the hand is sharp and somewhat dilated posteriorly, as in *Trapezia*: the inner angle of the wrist is rounded, but sometimes carries a small spinule.

The legs are slender smooth and polished, and have a few hairs distally.

Colours in spirit yellowish white, fingers sometimes blackish in their basal half.

Length of carapace of largest specimen 9 millim., breadth 11 millim.

In the Indian Museum are 11 specimens from the Andaman Sea at depths between 130 and 290 fms.

### Alliance III. *Domecioida.*

#### DOMECIA, Eydoux and Souleyet.

*Domecia*, Eydoux and Souleyet, Voy. Bonite, Crust. Zool. vol. i. p. 234: Lucas in Jacquinot's Voy. Astrolabe, Zool. vol. iii. Crust. p. 48.

*Domaecius*, Dana, Silliman's Amer. Journ. Sci. and Arts, (2) XII. 1851, p. 128, and U. S. Expl. Exp. Crust. pt. i. pp. 230, 251.

*Domecia*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 263, and Miss. Sci. Mex. Crust. p. 345.

? *Neleus*, Desbonne and Schramm, Crust. Gaudaloupe, p. 35.

Carapace somewhat oval transversely but much contracted posteriorly, flat, somewhat hairy, with no trace of regions.

The fronto-orbital border is not much less than the greatest breadth of the carapace. The front is profusely spinate, the spines being sharp, a little curved, and falling into about six tufts or groups separated by more or less well-marked intervals.

The antero-lateral borders pass backwards with but little outward slope: they are a little shorter than the concave and convergent posterolateral borders, and are armed with numerous sharp curved spines.

The orbits are at the antero-lateral angles of the carapace and do not conceal the eyes, their edge shows no fissures or sutures: their upper and lower inner angles are broadly in contact, or almost in contact, so as to exclude the antennæ.

The antennules fold nearly transversely. The basal antennal joint hardly reaches the front, though its outer angle is produced towards the front: the flagellum is short—hardly as long as the orbit.

The buccal cavern is broad: the crests of the endostome are not very strong; nor is the foliaceous process of the 1st maxillipeds produced far forwards: the external maxillipeds are very large, and the merus is remarkably broad and short.

The chelipeds are somewhat unequal, and are short and not very massive: the arm is almost entirely hidden by the carapace: fingers compressed, pointed.

The legs are stout, especially the meropodites.

The abdomen of the male has all 7 segments distinct and separate.

151. *Domecia hispida*, Eydoux and Souleyet.

*Domecia hispida*, Eydoux and Souleyet, Voy. Bonite, Zool. vol. i. p. 235, pl. ii. figs. 5-10: Dana, U. S. Expl. Exp. Crust. pt. I. p. 251: Lucas in Jacquinot's Voy. Astrolabe, Zool. vol. iii. Crust. p. 50, pl. iv. fig. 3-7: Stimpson, Bull. Mus. Comp. Zool. II. 1870-71, p. 145: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 263, and Miss. Sci. Mex. Crust. p. 345, pl. lviii. fig. 2 (not good): de Man, Archiv. für Naturges. LIII. 1887, i. p. 326: Ortmann, Zool. Jahrb., Syst. VII. 1893-94, p. 478.

? *Neleus acanthophorus*, Desbonne and Schramm, Crust. Guadeloupe, p. 35.

? *Eupilumnus websteri*, Kingsley, Proc. Ac. Nat. Sci. Philad. 1879, p. 397, pl. xiv. fig. 3.

Carapace covered with light-coloured hairs: antero-lateral border with five or six (including the orbital angle) acute dark-tipped spines, and several similar spines on the carapace just inside the antero-lateral border, and also just inside the spiny fronto-orbital border. The orbital margin and the prominent edge of the epistome are finely denticulate.

Merus of the external maxillipeds extremely broad and short, with an elevated patch of denticles on its outer surface.

Chelipeds a little unequal, the larger one is not very much longer than the carapace: the arm, wrist, hand and dactylus are all studded with acute spines.

Legs stout, not very much shorter than the chelipeds: the anterior surface of the last four joints fringed with hairs, and the anterior edge of the merus spinate, as also, but much less distinctly, is the anterior edge of the carpus and propus.

Colours in spirit, yellow with brown blotches on the carapace and chelipeds and indistinct dusky cross-bands on the legs.

In the Indian Museum are a male and female from off Little Andaman I., 10 fms., and two females from Great Coco I.

Alliance IV. *Melioida.*

MELIA, Latreille, Edw.

*Melia*, Latreille, Encycl. Meth. X. 705.

*Melia*, Milne Edwards, Hist. Nat. Crust. I. 431.

*Melia*, Dana, Silliman's Journal (2) XII. 1851, p. 128, and U. S. Expl. Exp. Crust. pt. I. p. 242.

Carapace rather depressed and narrow, hexagonal, not concealing the first  $2\frac{1}{2}$  or 3 abdominal terga even in the male, the regions not, or fairly distinctly, delimited.

Fronto-orbital border more than  $\frac{3}{4}$  the greatest breadth of the carapace. Orbits very shallow, affording little concealment to the eyes. Antennules folding obliquely.

Basal antennal joint slender, of good length but yet hardly touching the front; the flagellum very long (half the length of the carapace, or more), lodged in the orbital hiatus.

*Chelipeds slenderer and much shorter than the walking-legs, the hand often hidden in a matted tuft of hair.*

Walking-legs long and stout, *the third pair the longest of all.*

External maxillipeds somewhat slender and almost subpediform.

Both the Indian species of this genus differ from *Melia tessellata* (of which there are several specimens in the Indian Museum collection) in having the carapace rugulose, the antero-lateral border crenulate, the front more prominent, and the regions fairly well delimited and areolated.

152. *Melia cæstifer*, n. sp.

Carapace hexagonal, about as long as broad, rugulose or tuberculous, somewhat pubescent posteriorly and laterally, the regions fairly well defined and areolated.

Front broad, sublaminar, square-cut, horizontal but on a lower plane than the gastric region.

Antero-lateral border cut into three blunt lobes, the first of which is confluent with the outer orbital angle.

Antennary flagellum very long.

Chelipeds extremely slender; hand hidden in a tuft of adherent hair, which has to be removed before the slender hooked fingers can be seen.

First pair of legs somewhat more slender than the others, and shorter than the last pair; the second and third pair stouter and longer than the others, the third pair being the longest and the stoutest (especially as to the merus) of all. All the legs are more or less pubescent.

The abdomen of the male consists of 5 segments, the 3rd–5th being fused.

Colours in spirit, white, the bases of all the rugosities or tubercles defined by more or less circular very fine dark lines.

Length of carapace barely 4 millim., breadth hardly over 4 millim.

In the Indian Museum are a male and a female from off Ceylon, 34 fms.

153. *Melia pugil*, n. sp.

Differs from *M. cæstifer* (females compared) in the following characters:—

(1) the carapace is distinctly broader than long:

(2) the regions though as well defined are not nearly so much broken up into tubercles :

(3) just behind the 3rd tooth of the antero-lateral margin is a distinct indentation, making the anterior end of the postero-lateral border dentiform :

(4) the chelipeds are distinctly stouter and the hand is concealed in a fleshy glove :

(5) the first pair of legs is as stout as the fourth.

Length of carapace 5 millim., breadth 7 millim.

Colours in spirit, white, with a wider and more angular network of fine dark lines.

In the Indian Museum is a single female from off Ceylon, 26½ fms.

#### Appendix to *Hyperolissa* ?

##### PLATYPILUMNUS, Wood-Mason.

*Platipilumnus*, Wood-Mason MS., Alcock, Ann. Mag. Nat. Hist. May 1894, p 401.

Carapace hexagonal—the prominent bilaminar horizontally-projecting front forming the shortest side of the hexagon—thin, depressed, perfectly flat, with the regions and subregions very faintly impressed: the antero-lateral borders are spinate, the postero-lateral are slightly convergent, and the posterior border is long.

Front about a third the greatest breadth of the carapace. Upper margin of orbit spinate, the inner angle of the lower margin acutely spiniform.

The antennules fold transversely. The basal antennal joint, though of fair length, does not reach the front; the next joint lies loosely in the wide orbital hiatus; the antennary flagellum is long, about twice the major diameter of the orbit.

Buccal cavern quadrangular, very well defined anteriorly; the external maxillipeds do not nearly cover it, but leave the efferent branchial channels permanently widely open; the endostomial ridges that define these last are well defined posteriorly, but do not reach the anterior border of the buccal cavern.

Chelipeds in the female, markedly unequal, fingers long, pointed.

Legs long, slender, compressed, spiny.

As there is only a single female in the Indian Museum, I cannot be sure of the place of this genus in the system. It probably belongs to the *Cancroidea*, and should be placed near *Galene*.

*Platypilumnus gracilipes*, Wood-Mason.

*Platypilumnus gracilipes*, Wood-Mason MS., Alcock, Ann. Mag. Nat. Hist. May, 1894, p. 401: Ill. Zool. Investigator, Crust. pl. xiv. fig. 6.

Carapace much depressed, perfectly flat above, with the surface nearly smooth centrally and very finely and closely granular laterally, and with the regions indistinctly defined. The front has the form of a horizontally projecting bilobed lamella, with the free edge sharply and very evenly spinate and the sides turned abruptly downwards. The margins of the orbit are spinulate, the upper margin the more distinctly so, and the lower margin terminates internally in a strong oblique spine, the point of which inclines towards the sharply vertical tooth formed by the already mentioned downfolding of the lateral edge of the frontal lamella.

The antero-lateral borders of the carapace which are arcuate and are shorter than the postero-lateral, are armed with three large spines, in front of, between, and behind which are several spinules.

The pterygostomian regions are large and inflated, and the branchial apertures, especially the efferent aperture, are large and patulous.

The eye-stalks are large and are of moderate length; the corneal region is rather small.

The antennules are long and are transversely folded, their basal joint is large and inflated.

The antennæ are long, their basal joint is slender and free; the second joint lies loosely in the internal orbital hiatus.

The inner edge of the meropodite of the external maxillipeds is convex, with a pair of little spines at the summit of the convexity; the succeeding joint arises at the antero-internal angle.

The thoracic legs are furnished with many spines and long hairs. The chelipeds, which are robust, are unequal; their prismatic arm has all its borders spiny; the short inflated wrist is sharply granular and spinulate in the distal half of its dorsal surface and along the outer edge, while the inner edge bears a pair of rather large spines; the hand is spinulate everywhere in the smaller cheliped, but only in the proximal third of its outer surface in the larger; the fingers also of the smaller cheliped are spinulate on the outer surface, while those of the larger cheliped are smooth; the cutting-edges of the fingers are finely and unevenly toothed.

The other thoracic legs are long, compressed, and slender, and have the meropodite spiny along both edges, the carpopodite and propodite spiny along the front edge, and the dactylopodite styliform.

Colour in the fresh state yellowish red.

Andaman Sea, 188-220 fms. A single female.