

On the crustacea collected during the 'Skeat expedition' to the Malay peninsula. Pt. II. Anomura, Cirripedia, and Isopoda / by W.F. Lanchester.

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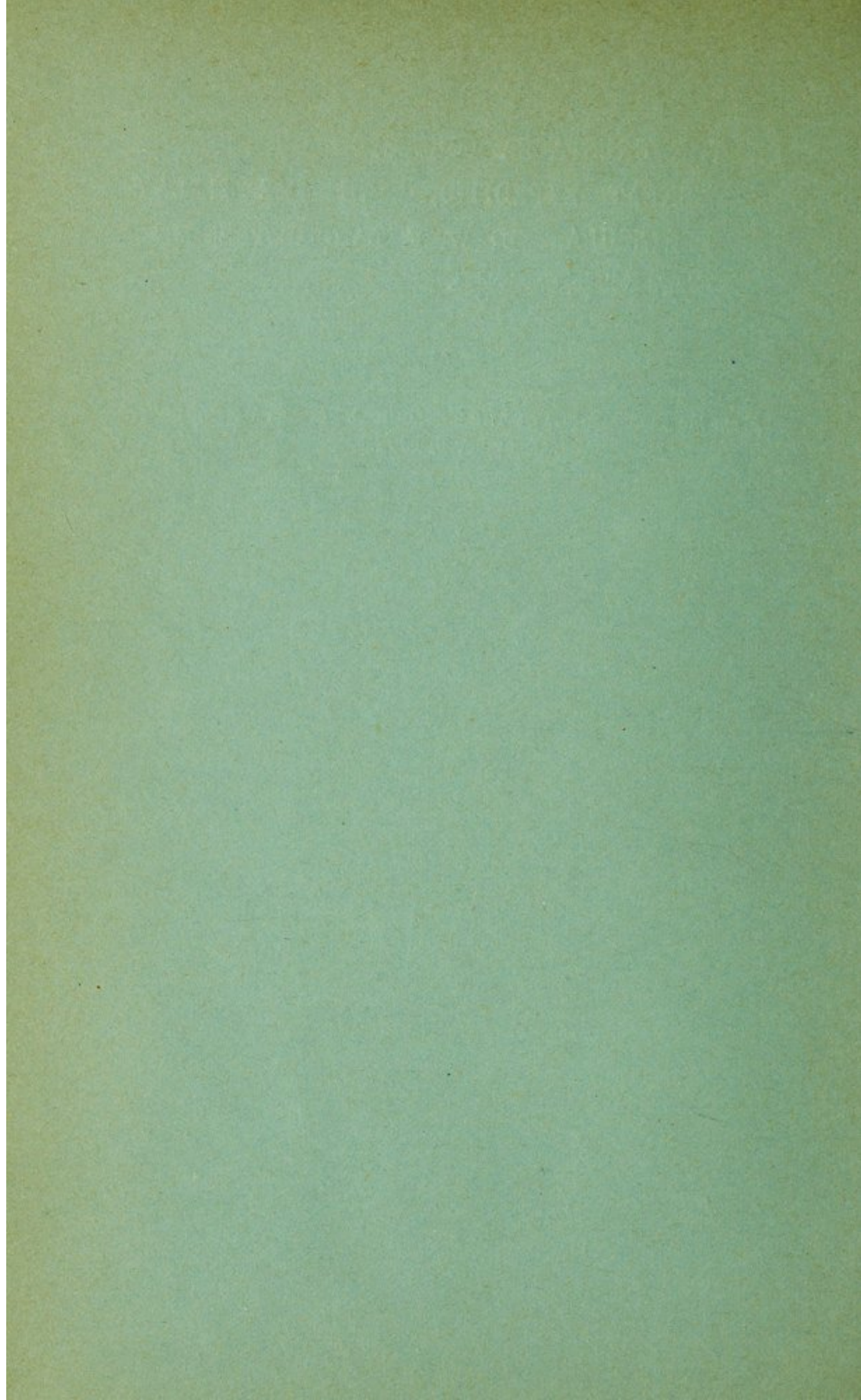
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(15.)
ON THE CRUSTACEA COLLECTED DURING THE
"SKEAT EXPEDITION" TO THE MALAY
PENINSULA. BY W. F. LANCHESTER, M.A.,
King's College, Cambridge.

[*From the* PROCEEDINGS OF THE ZOOLOGICAL SOCIETY OF LONDON,
December 2, 1902.]



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On the Crustacea collected during the "Skeat Expedition"
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(Plates XXXIV. & XXXV.²)

PART II.³—ANOMURA, CIRRIPIEDIA, AND ISOPODA.

The species represented in the above-mentioned groups, in this collection, number 35 (not including the land Isopods), comprised in 20 genera; of these 6 species are described as new, 2 among the Anomura and 4 among the Cirripecta; in addition to which I have given names, among the Anomura, to one colour-variety, and, among the Cirripecta, to one subspecies and a colour-variety of that subspecies. In the latter case it will be seen that a single form has been burdened with four names, a proceeding which will not, I fear, find favour with many systematists; I have, however, given my reasons for so doing under the description of the form in question, and will only say here that I have not acted under any preconceived ideas on the general question of a quadrinomial nomenclature, but rather from the exigencies of the special case before me.

Besides the marine Isopods herein described, there are in the collection some 10 species of land Isopods; many of these appeared to me, on examination, to be as yet undescribed. At the same time it seemed to me advisable to have the opinion of a specialist in this difficult group, and I therefore applied to M. Budde-Lund, of Copenhagen, who very kindly undertook to examine the specimens, and who tells me that "several of them are not described, but I have the descriptions and drawings laying by from other collections." These species, then, will be included by M. Budde-Lund in a more general account of the land Isopods of the Malay Peninsula, to be published later on in these 'Proceedings.'

A. ANOMURA.

I. Genus PETROLISTHES Stimpson.

1. PETROLISTHES SPECIOSUS Dana.

Porcellana speciosa Dana, U.S. Expl. Exp. p. 417, pl. xxvi. fig. 8 (1852).

Petrolisthes speciosus Ortmann, Zool. Jahrb. Syst. vi. p. 262 (1892).

Loc. Pulau Bidan, Penang. A female.

¹ Communicated by Dr. S. F. HARMER, F.Z.S.

² For explanation of the Plates, see p. 381.

³ For Part I. see P. Z. S. 1901, vol. ii. p. 534.

2. PETROLISTHES BOSCH Aud.

Porcellana boschii (Aud.), Sav. Descr. de l'Égypte, Crust. pl. vii. fig. 2 (1819).

Petrolisthes boschii de Man, Mergui Crust. p. 217 (1888).

Loc. Pulau Bidan, Penang. A male.

II. Genus PORCELLANELLA White.

3. PORCELLANELLA PICTA Stimpson.

Porcellanella picta Stm. Proc. Ac. Nat. Sci. Philad. p. 243 (1858); de Man, Mergui Crust. p. 220 (1888).

Loc. Pulau Bidan, Penang. Two specimens.

III. Genus ANICULUS Dana.

4. ANICULUS ANICULUS Fabr.

Pagurus aniculus Fabr. Ent. Syst. Suppl. p. 411 (1798).

Aniculus typicus Dana, U.S. Expl. Exp. p. 461, pl. xxix. fig. 1 (1852).

Loc. Kelantan. Two specimens.

IV. Genus SPIROPAGURUS Stimpson.

5. SPIROPAGURUS SPIRIGER de Haan.

Pagurus spiriger de Haan, Crust. Japon. p. 206 (1839).

Loc. —? A female.

V. Genus PAGURUS Fabr.

6. PAGURUS HESSII Miers.

Pagurus hessii Miers, 'Alert' Crust. p. 264 (1884); Henderson, Trans. Linn. Soc. (2) Zool. v. p. 419 (1893).

Pagurus similimanus id. 'Challenger' Anomura, p. 59 (1886).

Loc. Pulau Bidan, Penang.

One from *Strombus*, with an anemone fixed in the mouth of the shell, one from *Natica* (both these shells with *Balanus æneas*, vide infra), two from *Murex*.

Loc. —? One from *Ranella*.

The antennular peduncles are just longer than the eye-stalks, as stated by Henderson.

7. PAGURUS PUNCTULATUS Olivier.

Pagurus punctulatus Oliv. Encycl. Méth. viii. p. 641 (1811); Ortmann, Zool. Jahrb. Syst. vi. p. 286 (1892).

Loc. Pulau Bidan, Penang. One large specimen.

Loc. Kota Bharu, Kelantan. A small specimen from *Conus*.

VI. Genus EUPAGURUS Brandt.

8. EUPAGURUS LACERTOSUS var. NANA? Henderson.

Eupagurus lacertosus var. *nana* Hend. 'Challenger' Anomura, p. 64, pl. vii. fig. 1 (1886).

An ovigerous female, from *Trochus*.

The absence of the chelipedes in this specimen makes its identification a little uncertain. But the frontal, ocular, and antennal regions have exactly the structure of Henderson's variety, though the ambulatory legs are without the spines on the carpal joints.

VII. Genus CLIBANARIUS Dana.

9. CLIBANARIUS CORALLINUS Milne-Edw.

Pagurus corallinus M.-E. Ann. Sci. Nat. (3) x. p. 63 (1848); Ortmann, Zool. Jahrb. Syst. vi. p. 292 (1892).

Loc. Kota Bharu, Kelantan. Two small specimens.

10. CLIBANARIUS EQUABILIS var. MERGUIENSIS de Man.

Clibanarius equabilis var. *merguiensis* de Man, Mergui Crust. p. 247 (1888).

Loc. —? Two specimens.

11. CLIBANARIUS LONGITARSIS de Haan.

Pagurus longitarsis de Haan, Crust. Japon. p. 211, pl. 1. fig. 3 (1839); de Man, Arch. f. Naturg. liii. p. 441 (1887).

Loc. —? Two specimens, from *Telescopium*.

11 a. CLIBANARIUS LONGITARSIS, var. TRIVITTATA nov.

Loc. —? A male.

This form agrees so entirely in structural peculiarities with the above-mentioned species that it can only be considered as a colour-variety. On the posterior surfaces of the legs there are three broad white bands (broader than in *C. striolatus*), and three slightly narrower red bands; on the anterior surfaces there are two white and two red bands, the banding, however, being much less definite.

12. CLIBANARIUS STRIOLATUS Dana.

Clibanarius striolatus Dana, U.S. Expl. Exp. p. 463, pl. xxix. fig. 3 (1852); Ortmann, Zool. Jahrb. Syst. vi. p. 290 (1892).

Loc. Pulau Bidan, Penang. A female, from *Strombus*.

Loc. —? Seven specimens from *Cerithium*.

Loc. Patani. One specimen from *Murex* with *Balanus amphitrite*.

VIII. Genus DIOGENES Dana.

13. DIOGENES PLANIMANUS Henderson.

Diogenes planimanus Henderson, Trans. Linn. Soc. (2) v. p. 416, pl. xxxix. fig. 5 (1893).

Loc. —? Three specimens from *Murex*, with anemones.

Loc. Patani. Five specimens from *Natica*, with anemones.

The flagella of the antennæ are fringed along their whole length with longish hairs; this point is not noticed by Henderson in his description or figure.

14. *DIOGENES RECTIMANUS* Miers.

Diogenes rectimanus Miers, 'Alert' Crust. p. 262, pl. xxvii. fig. C (1884).

Loc. —? One small specimen from *Murex*, and several, very small, from shells of *Rissoa*, *Gibbula*, and *Neritina*.

The largest specimen has the carapace only $4\frac{1}{2}$ mm. long, and large chelipede only 9 mm. long: to their small size it is probably due that the spines on the lower border of the hand of the larger chelipede are scarcely prominent, while the arrangement of the granules on this leg is more obscure.

15. *DIOGENES SENEX* Heller.

Diogenes senex Heller, 'Novara' Reise, Crust. p. 85, pl. vii. fig. 3 (1865).

Loc. Pulau Bidan, Penang. A female, with ova, from *Murex*.

I cannot discover the ophthalmic process in this specimen, but it is probably safer to consider it as having been accidentally broken off, for otherwise the resemblance of the specimen to Heller's description and figure is complete; the hands only of the larger chelipede and the ambulatory legs would seem to be even more densely hairy than as shown in his figure.

16. *DIOGENES DESIPIENS*, sp. nov. (Plate XXXIV. figs. 1, 1 a.)

Loc. Pulau Bidan, Penang. A male, from *Cancellaria*.

This species is characterized at first sight by its extremely short, broad ophthalmic process, and the great hairiness of the legs and under surface of the body.

The anterior portion of the carapace just behind the front (which is raised into a smooth distinct ridge) is covered with large, coarse, somewhat scattered granules over a small area; behind this area is a deep, transversely-placed groove, convex towards the front and not continued towards the lateral margins, behind which groove the carapace is smooth, except for the very narrow portion enclosed within the groove, which is coarsely punctate. The sides of this part of the carapace are thickly hairy, and rough granulate (almost rugose posteriorly) beneath the hairs; the branchial regions are somewhat swollen, smooth, with a few longish hairs; the V-shaped suture of the gastric region is distinct. The rostrum is bluntly pointed, triangular, with a broad base, and reaches as forward as the lateral teeth; between these and the rostrum the front is concave.

The ophthalmic scales are longer than broad, and rounded distally where they carry some long hairs; the ophthalmic process is short and broad, reaching barely halfway along the scales, with its anterior edge microscopically denticulate. Ocular peduncles

long and slender, as long as antennular, much longer than antennal, peduncles. The antenna is very short, the peduncle (armed with long hairs) a little longer than half the eye, the flagellum only overreaching the eye by half its own length, thinly ciliated. The antennal scale is a broadish ovoid plate, fringed with long hairs, and falling short of the end of the antennal peduncle by some little distance.

The chelipedes are subequal, the right being slightly the larger; in other respects they are quite similar. The whole leg is very hairy, except on the inner surface, and a part of the outer surface, of the merus, the hair being very dense on the outer surfaces of the carpus, hand, and fingers, slightly less so on their inner joints. In the merus, the outer surface bears a few separate granules, the inner is smooth; both lower and outer margins are denticulate, the lower more distinctly so. The carpus carries a row of four large teeth on its upper margin, of which the 3rd, counting proximo-distally, bears a secondary tooth at its base internally; on its outer surface is a row of 5-6 teeth of varying size: between these two rows the carpus is somewhat hollowed proximally, and distally it bears, close to the joint, a small patch of low teeth. The hand is short and very swollen, especially on its inner surface, not longer than the fingers; its outer surface and upper and lower margins carry a few tubercular spines in three irregular rows, the row on the outer surface being the least definite: the fingers are everywhere (except their inner edges) covered with coarse, large granules, the tips corneous, faintly excavate. The ambulatory legs are densely hairy on their upper and lower margins, otherwise smooth; the dactyli a little longer than the penultimate joint.

17. *DIOGENES MIXTUS*, sp. nov. (Plate XXXIV. figs. 2-2 b.)

Loc. Pulau Bidan, Penang. Numerous examples from *Natica*, *Murex*, and other shells.

Loc. Patani. One from *Murex*.

This species is closely allied to *D. miles* Fabr., *D. merguiensis* de Man, and *D. intermedius* de Man; and it has seemed to me best to arrange the main points in which these species agree or differ in tabular form:—

<i>D. miles.</i>	<i>D. merguiensis.</i>	<i>D. intermedius.</i>	<i>D. mixtus.</i>
<i>a. Merus of 3rd legs.</i>			
Numerous large spines on upper border.	Spines less numerous and smaller.	Spines absent.	As in <i>D. miles</i> .
<i>b. Outer surface of joints of 3rd legs.</i>			
Numerous small piliferous granules.	Less numerous, larger, and more piliferous granules.	Scarcely granular. Merus nearly smooth.	As in <i>D. intermedius</i> , but a row of piliferous granules a little below the upper margin of penultimate joint.

<i>D. miles.</i>	<i>D. merguensis.</i>	<i>D. intermedius.</i>	<i>D. mixtus.</i>
c. Hand and Carpus.			
Much as in <i>D. merguensis</i> , but tubercles less prominent and more thickly placed. Two rows as in <i>D. merguensis</i> .	Two rows of 11-12 granules, and numerous pili-ferous acute tubercles on carpus. Palm similar, but the two rows number 8 externally, 5 internally.	Two rows of 11-12 granules, and less numerous granules, with 1-2 hairs at bases only, on carpus. On palm the two rows number 25-27 externally, 10-11 internally.	As in <i>D. intermedius</i> , but, on the carpus, the two rows number 14-15 each, and on the palm 10-11 each.
d. Fingers.			
80 granules in the external row. (?)	16-17 granules. The row of granules on the under margin of the immobile finger extends as far as the carpal joint.	25-27 granules. Row of granules extends partly on to the hand.	24 granules. As in <i>D. merguensis</i> .
e. Antennal scales.			
The inner process extends as far as the middle of the penultimate joint.	Inner process extends a little beyond the penultimate joint.	Inner process extends to the anterior $\frac{1}{4}$ of the penultimate joint.	As in <i>D. intermedius</i> .

From this table it may be seen that *D. mixtus* combines some of the characters of the other three species with characters of its own in such a way that it is difficult to regard it as a variety of any one of the other species, and necessary to regard it as a distinct, though closely allied form.

IX. GENUS CÆNOBITA Latr.

18. CÆNOBITA COMPRESSUS M.-Edw.

Cænobita compressus M.-E. Hist. Nat. Crust. ii. p. 241 (1837); Ortmann, Zool. Jahrb. Syst. vi. p. 318 (1892).

Loc. Pulau Bidan, Penang. One specimen from *Dolium*, two from *Murex*, one from *Purpura*, and numerous other individuals.

Ortmann's diagnosis is deceptive in so far as the outer surface of the 3rd left leg is not quite smooth in large individuals, but, like the cephalothorax, finely granulated or tuberculated; the short stiff hairs springing from these tubercles in front at the base; the tubercles themselves being sometimes corneous at the tips. The same remark holds good also for some large specimens, in the Cambridge Museum, of *C. rugosus* from Torres Straits. On the last joint, however, in both species, the granulation is confined to the proximal $\frac{1}{4}$ or $\frac{1}{5}$ of the joint. Further, the ridge on the outer surface of the penultimate joint becomes rounder, the larger the individual. No doubt these characters are correlated with age.

19. CÆNOBITA RUGOSUS M.-Edw.

Cænobita rugosus M.-E. Hist. Nat. Crust. ii. p. 241 (1837); Ortmann, Zool. Jahrb. Syst. vi. p. 317 (1892).

Loc. Pulau Bidan, Penang. Two females, one with ova. Also another female, from *Neris*, with a small Ascidian attached to the left sides of the 2nd and 3rd abdominal segments.

20. *CÆNOBITA PERLATUS* M.-Edw.

Cænobita perlatus M.-Edw. Hist. Nat. Crust. ii. p. 242 (1837); Miers, 'Alert' Crust. p. 555 (1884).

Loc. — ? Three females, from *Murex*.

Miers has noted (*l. c. supra*) the fact that in this species "there is an oblique row of somewhat more elongated tubercles on the upper surface of the palm, occupying the place of the series of oblique ridges in *C. rugosa*"; such an arrangement I find in these three specimens. But the specimens in question being somewhat small, the tubercles on the legs are noticeably less prominent and less pearly than in typical examples; the carapace also is less rugose.

B. CIRRIPIEDIA.

X. Genus *BALANUS* da Costa.

21. *BALANUS AMPHITRITE* Darwin.

Balanus amphitrite Darwin, 'Balanidæ,' p. 240, pl. v. (1854).

Loc. Patani. On pieces of wood, var. *communis*; on *Murex*, var. *obscurus*; on Lamellibranch shells, var. *niveus*.

Loc. Singora. On Lamellibranch shells, var. *obscurus*, and var. *niveus*.

22. *BALANUS AMARYLLIS DISSIMILIS*, subsp. nov. (Plate XXXIV. figs. 3-3 c.)

? *Balanus amaryllis* var.? Weltner, Arch. f. Naturg. lxiii. 1, p. 270 (1897).

Cf. *Balanus amaryllis* Darwin, 'Balanidæ,' p. 279, pl. vii. fig. 6 (1854); Hoek, 'Challenger' Cirripedia, p. 153 (1883).

Loc. Kota Bharu, Kelantan.

This subspecies is represented here by two distinct forms: one, the subspecies itself, of which there are seven large examples; the other a colour-variety, of which there are several smaller examples, attached to pieces of a Gorgonian. These two forms well illustrate the difficulty, which must sometimes arise, of finding a satisfactory place in the binomial system of nomenclature for certain divergent forms. Thus, in the present instance, No. I., though *closely* allied to the species *B. amaryllis*, yet shows sufficiently divergent structural characteristics to be ranked as a distinct variety, if considered alone. But the presence of No. II. necessitates some sort of modification of this conception; for, while exhibiting the same structural divergence, it also differs in colour arrangement: thus it becomes incumbent to form either a subvariety for No. II., or a subspecies for No. I. And in view of the fairly numerous instances in which Darwin has considered colour differences as of varietal worth (vide, e. g.,

B. amaryllis, *amphitrite*, *improvisus*), I have been content to follow him in this respect, and to consider No. II. as a *colour-variety* of No. I., the latter being then necessarily regarded as a *subspecies* of *B. amaryllis*. For my justification in separating this form from *B. amaryllis*, I must refer to the differences about to be described.

No. I. = the subspecies.

This form agrees with *B. amaryllis* in all characteristics, whether in structure of shell or structure of body, except those of the opercular valves. These latter, although agreeing in general shape with those of *B. amaryllis*, present the following differences:—

(a) The *scutum*.—Articular ridge prominent, with a very slight tendency to be reflexed to the tergal margin (this is better seen in the large specimens of the subspecies than in the smaller specimens of the variety); adductor crest prominent. These differences have been already noted by Dr. Weltner in his useful Catalogue of recent Cirripede species (*l. c. supra*).

(b) The *tergum*.—Depressor crests well developed; spur, only half its own width from the basiscutal angle.

I think there is no doubt that, apart from No. II., these differences would entitle No. I. to be considered as a variety of the species, and as such I should have classed it, did I not, as I have said, follow Darwin in considering colour difference of varietal worth, so that these differences must be considered as subspecific.

No. II. = var. *clarovittata*.

Presents the same structural distinctions as the subspecies, and differs in the shell being white with rather closely placed longitudinal hyaline lines.

In one specimen of this variety the basal margin of the tergum is very concave between the spur and the basiscutal angle, while the basiscutal angle is sharp, almost tooth-like; and the basal margin of the scutum presents a broad, shallow notch not far from its basi-occludent angle.

The large specimens are about $1\frac{1}{4}$ in. in greatest diameter of base, and about $1\frac{1}{2}$ in. high; the small barely $\frac{1}{2}$ in. across the base, and $\frac{5}{8}$ in. high.

23. *BALANUS AENEAS*, sp. nov. (Plate XXXIV. figs. 4-4 b.)

Loc. — ?

Shell white, smooth, not very tall, internally longitudinally ribbed; orifice toothed, but not deeply, large and rhomboidal. R radii reduced and very narrow; basis porous, parietes solid. Scutum with the lines of growth distant, not prominent; articular ridge prominent, extending about halfway down the tergal margin; adductor ridge not prominent. Tergum broad, without any beak; spur short, a quarter of the width of the whole basal margin, placed about two-thirds of its own width from the basiscutal angle, its apex rounded.

Mouth: labrum with 2 teeth on each side of the central notch; mandible with 4 large teeth, of which the first is sharper than, and distant from, the others, and 3 small teeth, of which two are situated at the bases of the 3rd and 4th larger teeth respectively, while the third is close to the lower angle; maxillæ with a straight edge and 7 teeth, of which the two upper and the two lower are a little longer than the others.

XI. Genus CHELONOBIA Leach.

24. CHELONOBIA TESTUDINARIA.

Lepas testudinaria Linn. Syst. Nat. (1767).

Chelonobia testudinaria Darwin, 'Balanidæ,' p. 392, pl. xiv. fig. 1 (1854).

Loc. Kota Bharu, Kelantan. Nine specimens.

XII. Genus PLATYLEPAS Gray.

25. PLATYLEPAS OPHIOPHILUS, sp. nov. (Plate XXXV. figs. 5-5 b.)

? *Platylepas* — ? Darwin, 'Balanidæ,' p. 430 (1854).

Loc. — ?

Hab. Embedded, not very deeply, in the skin of the sea-snake, *Enhydria curtus*.

Shell depressed, orifice large and ovoid.

Parietes, probably aporous, externally marked with longitudinal ribs which are crossed by transverse grooves, at least in the upper half, giving rise to a beaded appearance; in the lower half the ribs are less obviously broken into beads and project beyond the lower line of the compartment, to the number of three or four on each side of the midrib; they are, however, more pointed than, and not nearly so prominent as, the latter. The midribs of the rostrum and carina are a little shorter than those of the lateral compartments. Internally, the longitudinal ribs are visible in the lower half of the compartment, but in the upper half the shell has thickened considerably, growing inwards nearly to the level of the inner edge of the midrib. Basis only moderately convex. Scuta with the rostral ends narrower than the tergal, rounded, and the outer margins lightly concave; the rostral ends not curved inwards. Terga with the outer margins strongly convex towards the carinal end, these ends being truncate and bent inwards, so as to lie with their margins nearly parallel; scutal ends a little broader than the carinal.

The mouth-parts conform to the characters of the genus and present no specific differences. The rami of the 1st cirri are unequal, but not very much so, the inner exceeding the outer only by its last joint. The penis is long, in one instance twice as long as the whole body from the anterior end of the prosoma to the origin of the penis itself; it gradually tapers to its bluntly truncate apex, the terminal half only with a few scattered,

longish, stiff hairs, the apex with the usual bundle of short bristles.

This species, which Mr. F. F. Laidlaw kindly brought to my notice on an *Enhydria* which he was examining, is possibly identical with one of which Darwin had only a single young and imperfect specimen, taken off Borneo, from the skin of a sea-snake. It agrees in the presence of the "two or three very distinct ridges on each side of the midrib" internally; but I have been unable to satisfy myself, in these small specimens, of the existence of any pores in the parietes, so that an identification with Darwin's form must remain a matter of doubt.

It is clearly marked off from the other two species described by Darwin—(a) from *P. bissexlobata* by the subequality of the rami of the 1st cirrus, and (b) from *P. decorata* by the very moderate convexity of the basis. Moreover, to judge from Darwin's figures, the shell and opercular valves would seem to be considerably thinner in our species.

XIII. Genus *IBLA* Leach.

26. *IBLA* QUADRIALVIS Cuvier.

Anatifa quadrivalvis Cuv. Mém. pour servir . . . Mollusq. figs. 15-16 (1817).

Ibla quadrivalvis Darwin, 'Lepadidæ,' p. 203, pl. iv. fig. 9 (1851).

Loc. Pulau Bidan, Penang. Numerous specimens.

XIV. Genus *LEPAS* Linn.

27. *LEPAS* ANSERIFERA Linn.

Lepas anserifera Linn. Syst. Nat. (1767); Darwin, 'Lepadidæ,' p. 81, pl. i. fig. 4 (1851).

Loc. Patani. Two specimens.

XV. Genus *DICHELASPIS* Gray.

The following key to the species of this genus is partly based on that given by Hoek in the Report on the Cirripedia collected by the 'Challenger,' and amplified by Stebbing in the 'Annals and Magazine of Natural History,' (6) xv. p. 21 (1895); but I have modified it somewhat in Group B, owing to the relatively larger number, namely eight, of new species which now have to be included in that group.

A. Carina terminating in a disk.

Basal segment of scutum narrower than occludent.

Tergum axe-shaped.

Edge crenate *D. grayii* Darwin.

Edge smooth *D. pellucida* Darwin.

Basal segment twice as broad as occludent..... *D. warwickii* Darwin.

Basal segment thrice as broad as occludent.

Tergum narrowing anteriorly *D. antiquæ* Stebbing.

Tergum widening anteriorly *D. hoeki* Stebbing.

B. Carina terminating in a fork.

Terga absent.

Basal segment broader than occludent and of the same length

D. cor Auriv.

Basal segment narrower than occludent and shorter.

Basal at right angles to occludent

D. aperta Auriv.

Basal at obtuse angle to occludent, then parallel to fork of carina.....

D. cuneata Auriv.

Basal segment absent

D. angulata Auriv.

Terga present.

Basal segment broader than occludent.

Tergum with three teeth

D. alata Auriv.

Tergum shaped like a horse's head and neck

D. equina, sp. n.

Basal segment narrower than occludent.

Basal half as long as occludent, or less.

Tergum triangular

D. aymonini Lessona.

Tergum with carinal edge rounded, scutal edge with 2 lateral teeth.....

D. neptuni Macdonald.

Basal more than half as long as occludent.

Tergum with 2 teeth.

Teeth nearly equal

D. sinuata Auriv.

Teeth very disproportionate

D. trigona Auriv.

Tergum hook-shaped, handle broad.

Hook large and blunt

D. lowei Darwin.

Hook small and sharp

D. darwinii Filippi.

C. Carina terminating in a cup.

Scutum in two distinct segments.

Basal narrower than occludent, tergum with 5 unequal teeth

D. orthogonia Darwin.

Basal broader than occludent, tergum with 3 teeth

D. occlusa, sp. n.

Scutum with a notch only and indistinctly divided.

D. sessilis Hoek.

D. Carina absent

D. bullata Auriv.

28. DICHELASPIS OCCLUSA, sp. nov. (Plate XXXV. figs. 6-6 c.)

Loc. Kelantan; Trengganu.*Hab.* Mouth-parts of *Thenus orientalis*.

The valves in this species are all very closely apposed, much more than in any other species of the genus. The carina extends between the terga by quite $\frac{1}{3}$ of its own length, is rather strongly curved, and has its anterior end expanded, cup-shaped, and embedded in the peduncle. The scutum consists of two segments, of which the occludent is longer than the basal by barely $\frac{1}{6}$ of its own length, has its tergal margin bluntly rounded, and is united at its rostral end to the basal segment by a narrow bridge of non-calcified tissue; while the basal is $2\frac{1}{2}$ times the breadth of the occludent and separated from it only by a very narrow membranous interspace, and is faintly hollowed on its curved carinal margin close to its tergal angle for the reception of the tip of a strong tooth on the tergum. Between this latter tooth and its occludent angle, the tergum is deeply hollowed where it fits round the end of the occludent segment of the scutum; the scutal margin thus appears tridentate.

The capitulum is rather flattened from side to side; the peduncle differs in appearance in the adult and young forms, being in the former swollen, a little shorter than the capitulum, and brown in colour; and in the latter not swollen, a little longer

than the capitulum, white and semi-transparent; in both, however, it is thickly studded with minute chitinous papillæ (as in *D. warwickii*).

The 1st cirrus is only $\frac{2}{3}$ of the length of the 6th, is distant by the thickness of its own pedicel from the 2nd, and has its rami equal; the rami also of the other cirri are equal. The caudal appendage is exactly as long as the pedicel of the 6th cirrus, but appears longer to the naked eye owing to the presence, at its tip, of numerous hairs as long as the joint itself.

As regards the mouth-parts, the outer maxillæ are ovoid, with their inner sides folded over outwardly and their outer surfaces covered with longish hairs; the inner maxillæ each present an incision on their border by which are formed two low step-like projections, the inner being the smaller, and each bears 13 spines, of which the one at the inner angle is much stouter than the rest. The mandibles have 5 teeth, the strongest of which forms the inner angle. The palpi are bluntly conical, with hairs along their outer edges.

The penis is rather thick, and only begins to taper just before its distal end; along its length are several exceedingly short hairs.

This species seems to me to bridge over the narrow gap between the genera *Dichelaspis* and *Pæcilasma*, in relation on the one side with the *Dichelaspids* generally, and on the other side with *Pæcilasma tridens* Auriv. in particular. My grounds for placing it in the former of the two genera are (a) the connection between the two portions of the scutum, and (b) the extension of the carina between the terga; these two points clearly bring it within Darwin's definition of his genus. At the same time, the bridge of tissue connecting the two parts of the scutum is extremely narrow, so that I was, for some time, for considering the two portions as separate valves and for referring the species to the genus *Pæcilasma*; while, on the other hand, the carina in *Pæcilasma tridens* also extends between the terga, though only by $\frac{1}{6}$ of its length. This species, moreover, has a point in common with those of *Pæcilasma*, and differing from those of *Dichelaspis*, namely, the close apposition of the valves.

But its relationship with both these genera is clearly shown, on the one hand, by the yet present connection between the two parts of the scutum and the extension of the carina between the terga; and, on the other hand, by the almost complete severance of the scutal segments and the close apposition of the valves. And though its possibly closer relationship to one of these genera relieves me of the responsibility of uniting two genera which Darwin separated after the study of a greater number of species, still I feel that there can be little doubt but that the tie between these genera is exceedingly close.

There are also some specimens taken from the extreme base of the chelipedes and from the long epipodite of the 3rd maxillipeds of *Neptunus gladiator*. On the same crab were the specimens of the species next described.

29. DICHELASPIS EQUINA, sp. nov. (Plate XXXV. figs. 7-7 d.)

Loc. Trengganu.

Hab. Bases of antennules, antennæ and legs, and posterior border of carapace of *Neptunus* (*Amphitrite*) *gladiator*.

The carina in this species is formed of two pieces—a quite short basal portion, and a much longer tergal portion, each of which abuts closely on the other by a small median tooth; these two pieces can be separated readily by caustic potash. In the basal portion the base, embedded in the peduncle, is somewhat widened and forked, but the prongs of the fork are not very prominent; the tergal portion, quite narrow where it abuts on the basal, gradually widens towards its distal end which is squarely rounded.

The scutum consists, as usual, of two parts, connected by a bridge of tissue semicalcified on its occludent side, completely calcified on its basal side (fig. 7 d). The occludent segment is nearly twice as long as the basal (= 5.25 mm.: 3 mm.) and has its apex rounded; the basal segment is twice as broad as the occludent at the middle of its length, three times as broad along its basal margin, and is produced at its rostral angle into a blunt, almost tooth-like process, forming the half-bridge of calcified tissue mentioned above. General shape subtriangular, with rounded angles; its basal and tergo-lateral margins are somewhat convex, the occludent somewhat concave.

The tergum has rather the shape of the head and neck of a horse with forwardly-directed ears (whence the specific name)—the base of the neck lying between the apices of the occludent segment of the scutum of the carina; the top of the head forming the upper, the back of the neck the lower carinal margin; and the snout forming a strong tooth projecting in the direction of the scutum, and the forehead forming the occludent margin.

The 1st cirrus lies close to the 2nd, but yet a little more distant than the rest are from each other; the rami of each of all the cirri are equal; the 1st cirrus is only a little more than half the length of the 6th. The caudal appendage is as long as the 1st joint of the pedicel of the 6th cirrus; it carries hairs at its apex, of which the longest are about half the length of the joint, and also distant bundles of 2-3 longish hairs along the outer margin. The penis is just shorter than the 6th cirrus, thick, but tapering suddenly at the tip, with an excavation at the base, at the distal angle of which excavation is a blunt tooth-like prominence, nearly as high as the excavation is deep; this prominence is set within a shallow hollow within the excavation. The penis also, besides the hairs at its tip, bears along its length scattered hairs, some short and stiff, others long and more flexible; rings very distinct.

The palpi are bluntly conical, with longish hairs at the tip. The mandible has five teeth, the one at the inner angle being the strongest, and the one at the outer angle very small and blunt, lying close to the 4th tooth at its outer base.

The outer maxilla has a deep incision in its edge, at the bottom of which is a spine, externally to it three spines, and internally seven spines; the inner maxilla is ovoid, with long hairs on its outer surface.

The peduncle is equal to, or sometimes a little shorter than, the capitulum in length.

VARIATIONS.

This species is very variable in external appearance, one or two of the specimens appearing at first sight to be specifically distinct; but I have no doubt, from a comparison of all the specimens here present, that they are all of one species. These variations are connected with differences in the structure of the membrane, and the form and shape of the valves.

(i) *The Membrane.*

The membrane varies, both in the peduncle and capitulum, from the one extreme, in which it is thin, whitish, and translucent, to the other, in which it is thick, brown (in formol), and opaque, with the valves almost invisible; transitional stages connect these two extremes.

(ii) *The Valves.*

The tergum is generally shaped like the head and neck of a horse, as described, and formed of a single piece, but varies to the extreme shown in fig. 7 *b*. In two young forms also, with transparent membrane, the head proper is reduced and the neck thickened, giving an appearance as in fig. 7 *c*. In one specimen the base of the neck is formed of a very small separate double piece.

The scutum is generally as described; but the basal segment, generally as high as wide, is sometimes less developed, and is then much wider than it is high. The basal segment is also very variable in the number of pieces of which it is formed, thus:—

Individual specimens: basal segment of scutum:

(a) Very small, calcified separate portions are present—one at the baso-lateral, and two others at the tergal, angles.

(b) Formed of two pieces—a small umbonal, and a large distal (tergal).

(c) Formed of three distinct pieces—(1) a relatively small piece round the umbo of the valve; (2) a large piece, including the basal, and a little more than half of the tergo-lateral, margins; (3) a piece, intermediate in size, including the rest of the tergo-lateral, and the whole of the occludent, margins. The line of the tergo-lateral margin is markedly irregular.

(d) On the right side (in relation to the animal) of three pieces as in *c*; on the left side of two pieces, a large umbonal and somewhat smaller distal (tergal), the suture between them running irregularly from the middle of the tergo-lateral, to the middle of the occludent, margins. The carina is constantly formed of two

pieces, of which the distal (tergal) broadens to the blunt distal end.

Affinities.—This species is certainly closely allied to *Dichelaspis warwickii* Gray. The general external appearance is much the same, making allowance for its variability in this species, and the mouth-parts appear to agree essentially with the description of *D. warwickii* given by Darwin (Lep. pp. 121–122). But it differs in the fact that the valves are not thin and translucent, but thick and opaque; in the distal broadening, and division into two parts, of the carina; in the shape of the tergum (despite its variability); and in the fact that the 1st cirrus is not "far removed from the 2nd," and that the rami of the 2nd are not unequal.

Although the shape and fission of the carina is the most constant external feature, I have found it difficult to fix that fact satisfactorily in the specific name; words such as *bicarinata*, *fissicarinata*, or others suggesting rather a reduplication of the carina than a single carina formed of two pieces.

I have, therefore, fixed on the horse-like shape of the tergum, which, though not constant, still evidently represents the typical form of that valve in the species, by which to designate the species; hence the specific name *equina*.

C. ISOPODA.

XVI. Genus CYMOTHOA Fabr.

30. CYMOTHOA STROMATEI Bleeker.

Cymothoa stromatei Blkr. Act. Soc. Sci. Indo-Néerland. ii. p. 35, pl. ii. fig. 13 (1857).

Loc. —? *Hab.* "Mouth-parts of fish, chiefly of Ikan dalam." Six females and a small male.

31. CYMOTHOA PULCHRUM, sp. nov. (Plate XXXV. figs. 8–8 a.)

Loc. Pulau Bidan. One female.

Eyes invisible, lateral prolongations of the 1st thoracic segment reaching very nearly to the level of the front, which is rounded acuminate. Cephalic segment $\frac{3}{4}$ as long as broad (4.5 : 6 mm.), superiorly depressed so as to form a shallow pit; 1st thoracic segment the longest, 2nd, 3rd, and 4th a little shorter and subequal, 5th, 6th, and 7th gradually becoming shorter, the 5th not abruptly shorter than the 4th; segments 1–6 rugose, the rugosities becoming gradually less marked on the hinder segments, the 7th smooth; the lateral prolongations of the 1st segment smooth, curved forwards and inwards, bluntly pointed in front. Abdomen abruptly narrower than thorax, the segments gradually increasing in width to the 5th, which is as wide as the last thoracic, and the 6th, which is as wide as the penultimate thoracic, segments. 6th abdominal segment about twice as wide as long (15 : 7 mm.), somewhat excavate in the anterior median line, and slightly

swollen and coarsely reticulate laterally; uropods just shorter than the 6th segment; rami equal, inwardly curved, and narrow, the outer being a little broader than the inner. Distal end of the crest on the last four thoracic legs increasing gradually in height from before backwards; unguis of all the legs curved, moderately long, and increasing in size backwards but only very gradually, so that those of the last pair are only a little longer than those of the first pair.

Length 35 mm.; breadth 17 mm.

XVII. Genus MEINERTIA Stebbing.

32. MEINERTIA CARINATA Schiödte & Meinert.

Ceratothoa carinata Sch. & Mein. Naturhist. Tidsskr. iii. 13, p. 327 (1883).

Loc. Great Redangs. Several specimens.

XVIII. Genus NEROCILA.

33. NEROCILA SUNDAICA Bleeker.

Nerocila sundaica Blkr. Crust. Ind. Arch. i. p. 26, fig. 4; Sch. & Mein. Naturhist. Tidsskr. iii. 13, p. 9 (1881).

Loc. — ? A single female.

Although the anal segment and uropods are much damaged, there is no doubt in my mind that this specimen belongs to the above species, presenting as it does three very characteristic features: namely, the swollen basal joints of the first antennæ, the pectination of the 3rd and 6th-7th legs, and the constriction of the unguis of the other legs. In two points, however, it differs; for the median concavity in the anterior margin of the first segment is slightly deeper (not shallower) than the lateral, and the first four abdominal segments are all subequal, the fifth being only very slightly longer.

XIX. Genus ROCINELA Leach.

34. ROCINELA MUNDANA, sp. nov. (Plate XXXV. figs. 9-9 a.)

Tale Sab. "From the gills of a freshwater skate."

Flagellum of 1st antennæ 4-articulate, of 2nd antennæ 12-articulate; eyes distant, reniform, with the anterior end truncate; ocelli fairly large, numerous.

Front bluntly triangular, projecting in front of the eyes, and only just concealing the base of the 1st antenna; 1st thoracic segment longer than the rest, which are subequal, its anterior border trisinate; epimera small, increasing in size backwards, the last just overlapping, with its blunt point, the posterior angle of the last segment; 1st abdominal segment partly concealed, distinctly shorter than the rest; its posterior border sinuate, those of the rest becoming straighter towards the telson.

Telson with a transverse swelling at the base on each side of

the middle line; these swellings just meet at the middle line, and from their junction proceeds a very short longitudinal median swelling; the rest of the upper surface smooth and slightly convex. Tip of telson extremely blunt. Uropods with ciliate margin; outer rami as long as telson, inner just longer, and twice as broad as the outer.

Anterior legs without teeth, but with a few short cilia; posterior legs with a few short spines along the lower border of the 3rd to the 6th joints; ungues short.

XX. Genus SPHÆROMA Latr.

35. SPHÆROMA FELIX, sp. nov. (Plate XXXV. fig. 10.)

Loc. —? Thirteen specimens.

Body gradually widening from the head to the abdomen, the telsonic portion of which narrows suddenly at the level of the base of the uropods, and thence rather more gradually to the posterior end. Eyes conspicuous, but small. The posterior portion of each of the thoracic segments is marked off from the anterior portion as a raised, broadish, transversely-grooved ridge; the anterior portion, which is smooth, slides, in extension, under the raised portion, which is finely, but rather widely, granulate, as is also the cephalic segment. On the abdomen, and the upper surface of the inner rami of the uropods, the granules are larger, placed more thickly, and concealed under a rather dense, but very short, pubescence. The telson, from the base of the uropods, is bluntly triangular, with its margin non-granulate and reflexed upwards; the inner ramus of the uropods is a little longer than the telson, the outer a little longer than the inner, with its upper surface smooth, and its outer edge fringed with short hairs and bearing 8 small teeth.

A List of the Terrestrial Isopods.

By M. GUSTAV BUDDE-LUND.

1. *Ligia exotica* Roux.—Several specimens; Kamlon, Singapore.

2. *Trichoniscus antennatus*, n. sp.—A few specimens of this little species (circa 5 mm. long), without information as to the locality. Distinguished by the very long and slender antennæ, which have a long flagellum, 15-articulate; the antennæ also, especially the first joint, are proportionally long. The uropods have the basal joint, and the exopodite, long and thick, the endopodite very thin.

3. *Philoscia truncatella*, n. sp.—Two specimens, both with damaged antennæ and uropods, from Gunong Inas, Perak, 5000 ft. Seems to be allied to *P. truncata* Dollf., from Celebes and Flores, but the last segment of the truncus is obliquely truncate only on the inside of the epimere; also the transverse line on the epistome is a little sinuate, forwardly, in the middle. Another small,

damaged, specimen, from rotten wood at Ajenz (? Aring, W. F. L.), Kelantan, perhaps also belongs here.

4. *Philoscia incurva*, n. sp.—Only one specimen, without the uropods and with damaged antennæ, from Patalung. Differs from the other Asiatic species in the proportionally well-developed epimera of the caudal segments, which are acute and produced outwardly and backwardly; the last segment of the truncus has the hind margin very deeply incurvated.

5. *Alloniscus brevis* B.-L.—Many specimens from Patalung; a single specimen from Pulau Bidan, Penang.

6. *Alloniscus* sp.—Only one specimen of a little Oniscoid Isopod taken at Bukit Besar. It is without the uropods, and seems to be akin to the *Alloniscus albus* Dollf. from Sumatra.

7. *Metoponorthus pruinus* Brandt.—Eight specimens among specimens of *Armadillo murinus* Br. from Patani.

8. *Lyprobius* sp.—Only one specimen from Patani. This species is perhaps not different from *L. cristatus*, a species which is found in most tropical parts. I think also that *Porcellio sundanicus* Dollf., from Sumatra, Java, and Celebes, belongs here; and that *P. pallidipennis* Dollf. from Flores, and *P. modestus* Dollf. from Saleyer, should certainly also be included in this subgenus.

9. *Toradjia conglobator*, n. sp.—Three specimens from rotten wood at Ajenz (? Aring, W. F. L.), Kelantan. I know several species of this genus, in which M. Dollfus has included three species—*T. celebensis* Df., *T. gorgona* Df., and *T. cephalica* Df. The *Perysciphus weberi* Df. may be placed here, and *T. conglobator* is most nearly allied to this latter species, the first segment of the truncus not being split in the posterior edges, and the epistome being plain. The antennæ are shorter than in *T. weberi*, with the flagellum short, white, and basal joint very short.

10. *Armadillo murinus* Brandt.—Several specimens from Patani.

11. *Armadillo infuscatus*, n. sp.—Several specimens from Goah Janat. This species and the next belong to the group of which *A. murinus* is the type, having the epimera of the truncus without folds in the hind margin of the first segment. This species is rather larger than *A. murinus*, and has the endopodite of the uropods much longer than in that species. The colour is a dirty pale yellow.

12. *Armadillo pallidus*, n. sp.—Six specimens from Bukit Besar. Very like *A. infuscatus*, but well separated by the form of the telson, which is not so strongly narrowed in the middle, and has the apex much longer than the basis; the basal joint also of the uropods is narrower.

13. *Spherillo grisescens*, n. sp.—Several specimens from Aring, Kelantan. This little species (5 mm. long) is remote from all

hitherto described species, but allied to several new species I have seen. It has some affinity with *S. ambiguus* B.-L., but has a little fold in the hind edge of the first segment of the truncus: the apex of the telson is quadrangular, not narrowed in the middle, and the exopodite of the uropods scarcely visible.

[I have slightly modified, or occasionally condensed, the language of these descriptions kindly supplied me by M. Budde-Lund.—W. F. L.]

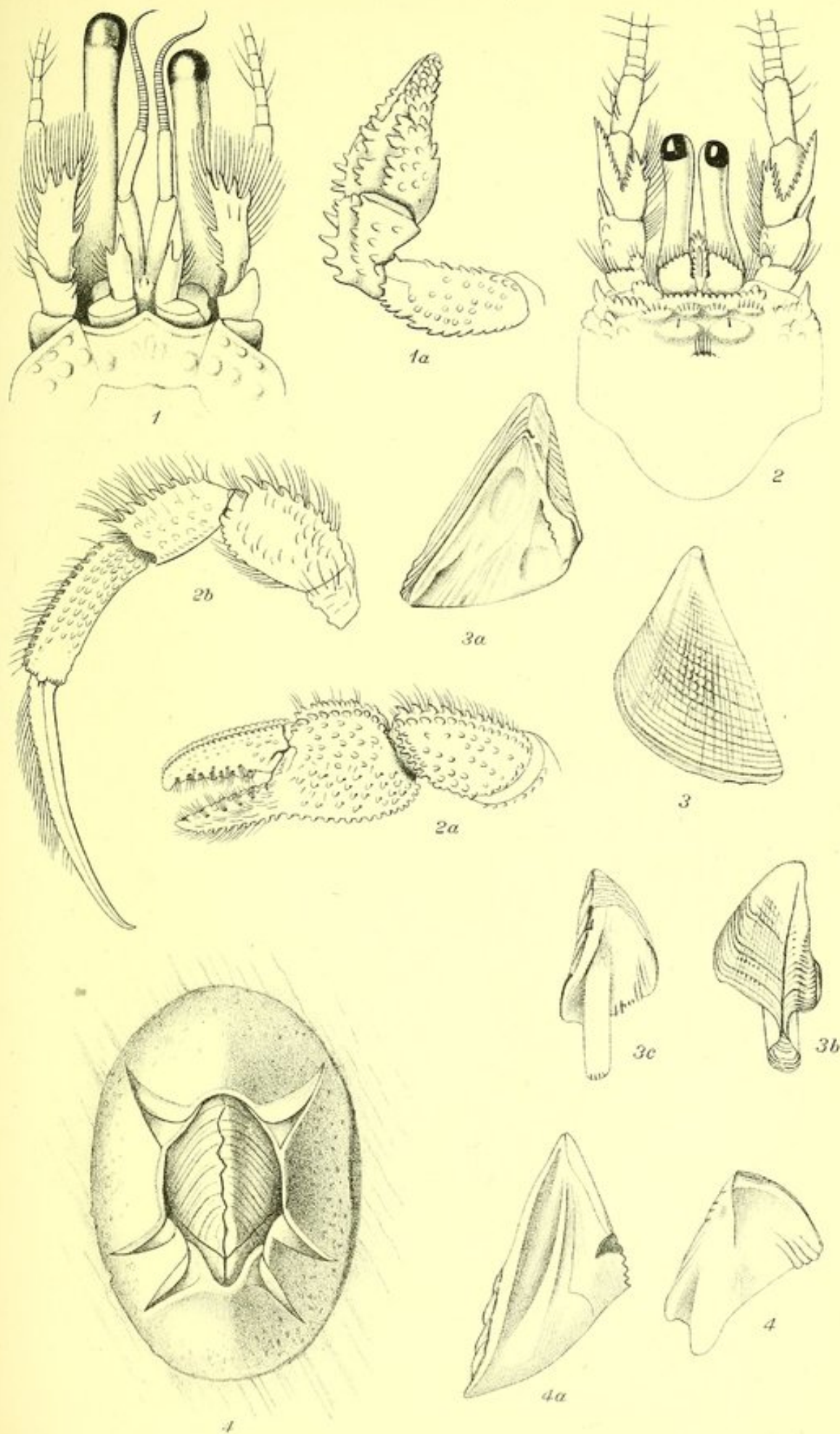
EXPLANATION OF THE PLATES.

PLATE XXXIV.

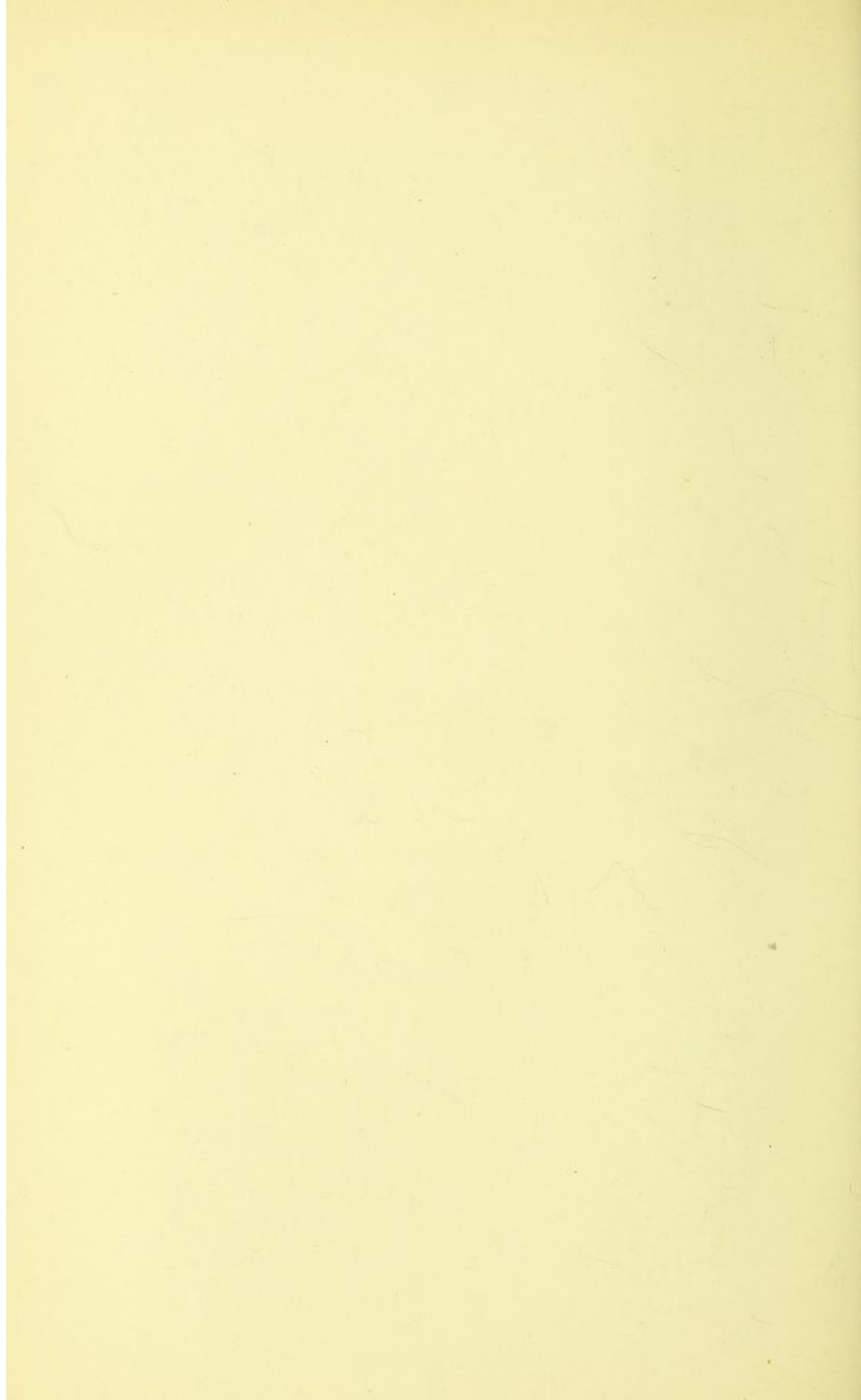
- Fig. 1. *Diogenes desipiens* (p. 366). Antennal region. 1 *a*. Left chela.
2. *Diogenes mixtus* (p. 367). Antennal region. 2 *a*. Chela. 2 *b*. 3rd left leg.
3. *Balanus amaryllis dissimilis* (p. 369). 3-3 *a*. Scutum. 3 *b-c*. Tergum.
4. *Balanus æneas* (p. 370). From above. 4 *a*. Scutum. 4 *b*. Tergum.

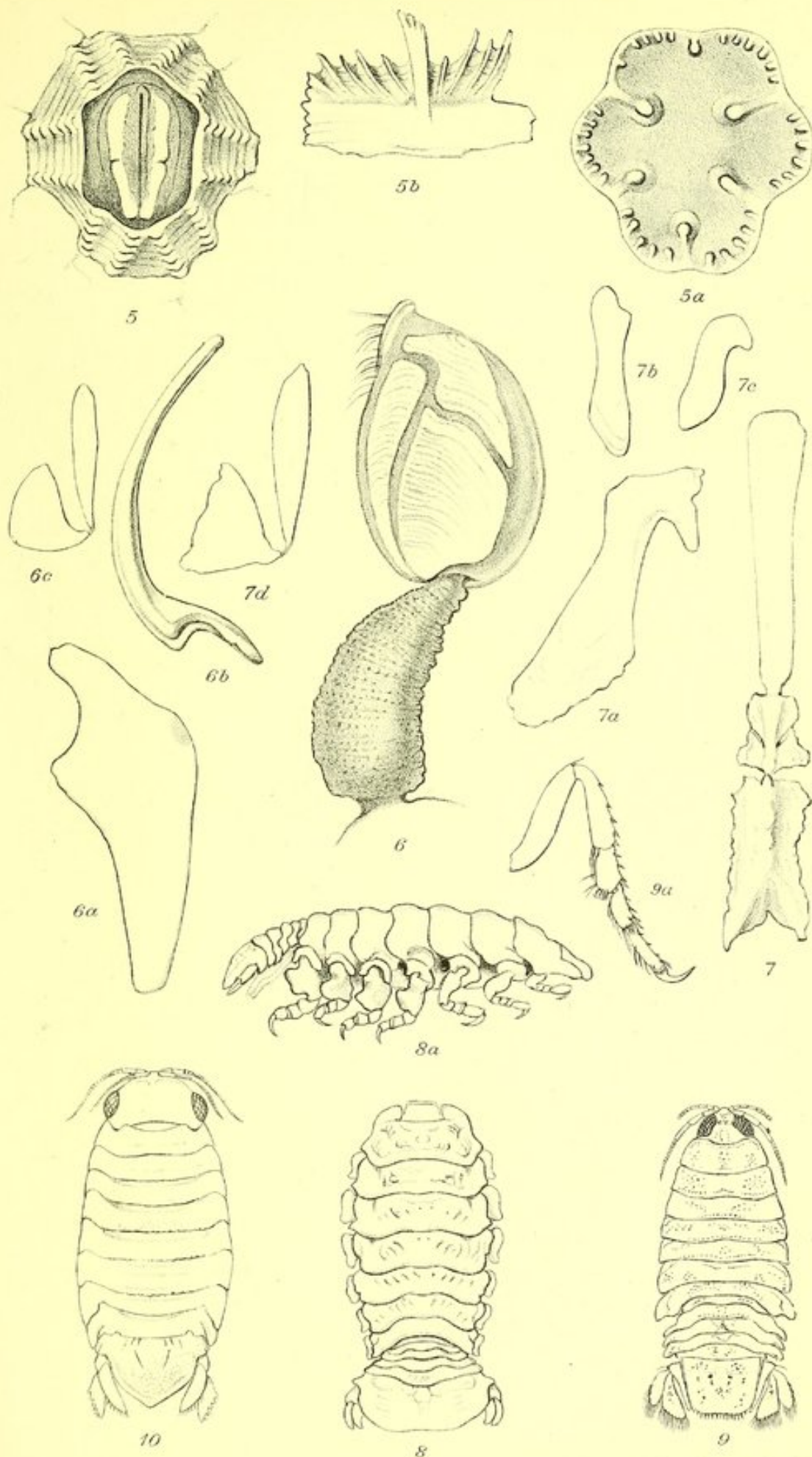
PLATE XXXV.

- Fig. 5. *Platylepas ophiophilus* (p. 371). From above. 5 *a*. From below. 5 *b*. A lateral compartment, seen from the inside.
6. *Dichelaspis oclusa* (p. 373). From the side. 6 *a*. Tergum. 6 *b*. Carina. 6 *c*. Scutum.
7. *Dichelaspis equina* (p. 375). Carina. 7 *a*. Tergum, typical form. 7 *b-c*. Two different forms of the tergum. 7 *d*. Scutum.
8. *Cymothoa pulchrum* (p. 377). From above. 8 *a*. From the side.
9. *Rocinela mundana* (p. 378). From above. 9 *a*. Posterior leg.
10. *Sphæroma felix* (p. 379). From above.



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