

ON CRUSTACEA BROUGHT BY DR WILLEY FROM THE SOUTH SEAS.

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With Plates LXIV.—LXXIV.

ALREADY two reports have appeared on Dr Willey's extensive collection of Crustacea from tropical waters and islands of the south-west Pacific. In 1898 a new species of Caprellidae from Lifu was described by Dr Paul Mayer, and in 1899 Mr L. A. Borradaile, after examining eighty-two species of Stomatopoda and Macrura, determined no less than twenty of them to be forms new to science. In the lower groups the proportion of new forms has proved to be even more considerable, so far at least as concerns the specimens actually investigated. There is still a residuum of small creatures, of which many but more probably few may prove to have been hitherto undescribed. For various reasons these are omitted from the present report, the leading motives for this neglect being that the report itself should not be indefinitely expanded or indefinitely delayed. The species now recorded are forty-six in number, distributed over thirty-four genera, of the Malacostraca, Entomostraca, and Thyrostraca. Of the genera eight are here for the first time established, and of the species twenty-three are registered as new. Exceptional interest will be recognized as attaching to the Thyrostracan genus which I have named *Koleolepas*. Upon this I venture to quote from a private letter in which Dr Willey modestly says, 'I have a foolish tendency to feel a trifle elated about *Koleolepas* n. g. I imagined that it was not a very frequent occurrence for a new genus of Cirripede to turn up, but this one struck me as being quite remarkable with its disc of attachment and contractile cylindrical body as well as its peculiar paguroid habitat, although that is very likely not constant.' *Anchicaligus nautili* (Willey) and *Panaietis incamerata*, both from the pallial chambers of mollusca, are not undeserving of notice. From P. J. van Beneden long ago to Mr Thomas Scott the other day, authors have called attention to the large opportunity for finding crustacean parasites which almost the whole range of the aquatic fauna provides. Of this it will be seen that Dr Willey has successfully availed himself. Neither in this nor in other respects has he been deterred by the exigencies of his own special research from advancing collateral branches of knowledge. Rather, he has utilized those exigencies for that very purpose, so that, at least in regard to 'natural history,' he has earned a right to say, *Scientiæ nihil a me alienum puto*.

In regard to the nomenclature adopted in this report, I am bound to direct the attention of critics and censors to an innovation, by which the term Cumacea, just as it was at length becoming familiar, is displaced in favour of a new title. Of minor importance is the defence here put forward for the use of the generic name *Cubaris* in preference to that of *Armadillo* among the terrestrial isopoda.

The following list shows the species dealt with in the present report, with the habitat from which each was obtained.

MALACOSTRACA.

DECAPODA MACRURA. FAM. SCYLLARIDAE.

Phyllosoma duperreyi Guérin. Milne Bay, New Guinea.

SYMPODA. FAM. NANNASTACIDAE.

Nannastacus ossiani n. sp. Barawon, Blanche Bay, New Britain.

Nannastacus georgi n. sp. Barawon, Blanche Bay, New Britain.

ISOPODA.

FAM. TANAIDAE.

Leptocheilia minuta Dana. Sandal Bay, Lifu, Loyalty Islands.

Leptocheilia lifuensis n. sp. Lifu, Loyalty Islands; and from sponge, Isle of Pines.

FAM. ANTHURIDAE.

Apanthura sandalensis n. g. et sp. Sandal Bay, Lifu, Loyalty Islands.

Paranthura lifuensis n. sp. Sandal Bay, Lifu, Loyalty Islands.

FAM. GNATHIIDAE.

Gnathia aureola n. sp. Sandal Bay, Lifu, on sting-ray.

FAM. CIROLANIDAE.

Cirolana pleonastica n. sp. Blanche Bay, New Britain.

Cirolana albicaudata n. sp. Barawon, Blanche Bay, New Britain.

Cirolana orientalis Dana. Conflict Islands, New Guinea.

Cirolana minuta Hansen. Lifu, Loyalty Islands.

Hansenolana anisopous n. g. et sp. Isle of Pines.

FAM. ALCIRONIDAE.

Alcirona insularis Hansen. Blanche Bay, New Britain.

FAM. CYMOTHOIDAE.

Anilocra dimidiata Bleeker. British New Guinea.

Renocila periophthalmi n. sp. Lifu, Loyalty Islands, on *Periophthalmus*.

Meinertia gaudichaudii (Milne-Edwards). Panaieti, Louisiade Archipelago, New Guinea.

FAM. SPHAEROMIDAE.

Cilicæa tenuicaudata Haswell. Blanche Bay, New Britain.

FAM. LIGIIDAE.

Ligia vitiensis Dana. Matadona, China Straits, British New Guinea.

FAM. ONISCIDAE.

Philoscia gracilis Budde-Lund. Lifu, Loyalty Islands.

Philoscia truncata Dollfus. New Britain.

Philoscia lifuensis n. sp. Lifu, Loyalty Islands.

Paraphiloscia stenosoma n. g. et sp. New Britain.

FAM. ARMADILLIDIIDAE.

Cubaris translucidus (Budde-Lund). Lifu, Loyalty Islands.

Cubaris lifuensis n. sp. Lifu, Loyalty Islands.

Cubaris dollfusi n. sp. Lifu, Loyalty Islands.

Cubaris officinalis (Desmarest). Isle of Pines, S. of New Caledonia.

Cubaris lundii n. sp. New Britain.

Cubaris zebricolor n. sp. Lifu, Loyalty Islands.

AMPHIPODA.

FAM. TALITRIDAE.

Parorchestia hawaiiensis (Dana). Lifu, Loyalty Islands.

FAM. RHABDOSOMIDAE.

Rhabdosoma whitei Bate. Blanche Bay, New Britain.

ENTOMOSTRACA.

BRANCHIOPODA.

PHYLLOCARIDA. FAM. NEBALIIDAE.

Nebalia bipes (O. Fabricius). Sandal Bay, Lifu, Loyalty Islands. Blanche Bay, New Britain.

OSTRACODA.

MYODOCOPA.

FAM. ASTEROPIDAE.

Asterope arthuri n. sp. Blanche Bay, New Britain.

FAM. CYPRIDINIDAE.

Cypridina baravoni n. sp. Barawon, Blanche Bay, New Britain.

COPEPODA SEMIPARASITICA.

FAM. LICHOMOLGIDAE.

Linckiomolgus caeruleus n. g. et sp. China Straits, New Guinea.

COPEPODA PARASITICA.

FAM. CALIGIDAE.

- Ancicaligus nautili* (Willey). Lifu, Loyalty Islands, New Britain.
Gloioptotes hygomianus (Steenstrup and Lütken). Rubiana, New Georgia.

FAM. DICHELESTIIDAE.

- Bassettia congru* n. g. et sp. Blanche Bay, New Britain.
Pseudocycnus appendiculatus Heller. Uvea.
Panaietis incamerata n. g. et sp. Panaieti, Louisiade Archipelago, New Guinea.

THYROSTRACA.

(Cirripedia.)

FAM. LEPADIDAE.

- Poecilasma vagans* Aurivillius. Sandal Bay, Lifu, Loyalty Islands, and New Britain.
Megalasma striatum Hoek. Blanche Bay, New Britain.
Oxygnaspis aurivillii n. sp. New Britain.
Conchoderma hunteri Darwin. Blanche Bay, New Britain.
Scalpellum sp. Blanche Bay, New Britain.
Koleolepas willeyi n. sp. Sandal Bay, Lifu, Loyalty Islands.

MALACOSTRACA.

DECAPODA MACRURA.

FAM. SCYLLARIDAE.

PHYLLOSOMA, Leach.

1818. *Phyllosoma*, Leach, Nat. Hist. App. to Tuckey's Narrative of an Expedition to explore the river Zaire, usually called the Congo, App. IV. p. 416.
 1825. *Phyllosoma*, Desmarest, Consid. gén. Crust., p. 253.
 1833. *Phyllosoma*, Guérin, Magasin de Zool., cl. 7 (unpaged).
 1837. *Phyllosoma*, Milne-Edwards, Hist. Nat. Crust., vol. 2, p. 472.
 1838. *Phyllosoma*, Guérin-Méneville, Voy. de la Coquille, Crustacés, p. 46.
 1863. *Phyllosoma*, Claus, Zeitschr. wiss. Zool., vol. 13, pt 3, p. 422.
 1873. *Phyllosoma*, Richters, Die Phyllosomen, Inaugural-Dissertation.
 1880. *Phyllosoma*, Boas, Vid. Selsk. Skr., ser. 6, Nat. Afl. 1, p. 83 (61).
 1885. *Phyllosoma*, Bate, Challenger Reports, vol. 24, Macrura, pp. 56, 89.

In the authorities above cited I think that almost everything will be found which is at present known or surmised in regard to the larval forms composing this genus. A single specimen in Dr Willey's collection must be identified with the species named

below, which belongs to the Scyllarid group, with the second antennae broad in adult and young. Mr Borradaile's report mentions *Scyllarus sieboldi*, de Haan, and *Paribacus antarcticus* (Rumph), as obtained by Dr Willey, but these were from Lifu, Loyalty Islands. Leach, who is known to be the author of appendix iv. to Tuckey's Narrative, though his name is not expressly appended to it, introduces four species of *Phyllosoma*, *brevicornis*, *laticorne*, *commune*, and *clavicorne*, with distinguishing figures on plate 12. He begins his account with the words, 'Phyllosoma, the most curious genus of crustacea that has yet been discovered.' Familiarity may lessen the curiosity of it, and the generic name is likely to disappear, when all the problems of affinity between these larval forms and their parents have been solved. But the beauty of structure remains exceptional, even now that many parallels are known to the otherwise amazing contrast between the young and adult stages of an individual life.

PHYLLOSOMA DUPERREYI, Guérin.

1833. *Phyllosoma Duperreyi*, Guérin, Magasin de zool., cl. 7 (unpaged), pl. 12.

1837. *Phyllosoma Duperreyi*, Milne-Edwards, Hist. Nat. Crust., vol. 2, p. 485.

1838. *Phyllosoma Duperreyi*, Guérin-Méneville, Voy. de la Coquille, p. 46, pl. 5, fig. 2.

1873. *Phyllosoma Duperreyi*, Richters, Die Phyllosomen, p. 17, in Zeitschr. wiss. Zool., vol. 23, pl. 33, fig. 3.

It should be noticed that both Guérin (later Guérin-Méneville) in 1833 and Milne-Edwards in 1837 give references to a work which itself contains a preface dated 1838, Guérin citing "*Voyage de Duperrey*, Zool. t. II, p. 2, p. 46; pl. 5, fig. 2," and Milne-Edwards citing "*Voyage de la Coquille*, Crust. Pl. 5, fig. 2." The explanation may be that the plates were published before the text of Duperrey's voyage, and that Guérin had in his hands the printed text of his report long before it was published. The specimen he described and figured was taken at Port Jackson, and measured more than 40 mm. in length by 30 mm. in breadth. Dr Willey's specimen, from Milne Bay, New Guinea, is 22 mm. long by 13 mm. wide. The specimen of another species, which Guérin figures as *Phyllosoma laticorne*, Leach, is represented as three inches long by nearly two inches wide, with a span between the extremities of its slender legs, when the longest are fully extended, of twelve or thirteen inches.

SYMPODA.

1846. *Cumacea*, Krøyer, Naturhistorisk Tidskrift, Ser. 2, vol. 2, p. 203.

1865. *Cumacea*, G. O. Sars, Vid.-Selsk. Forh. for 1864, Extract, pp. 1—83.

1893. *Cumacea*, Stebbing, History of Crustacea, Internat. Sci. Ser., vol. 74, pp. 8, 291.

1899. *Cumacea*, Sars, Crustacea of Norway, vol. 3, p. I.

Since the important essay by Sars in 1865 Krøyer's name for this order has been accepted without demur in a very large number of writings on the subject down to the present date. Of all these works the most important is the third volume of the

Crustacea of Norway, now on the eve of completion and entirely devoted to this group under its long-received designation. It must be admitted that a change in the title has become very inconvenient and is likely to be very unwelcome. Nevertheless, the reasons for making it may be allowed to outweigh such objections.

When the principal divisions of the Crustacea are considered, whether they are regarded as sub-classes or orders or sub-orders, it appears that a name founded upon a particular genus is limited to the Cumacea, except in the case of the recently separated and not universally accepted order or sub-order of the Tanaidacea. But the Cumacea, if allowed to derive their ordinal name from a genus, should at least derive it from the earliest generic name within the group, which is *Diastylis*, established by Say in 1818, not *Cuma*, due to Milne-Edwards in 1828. Illustrious as Henri Milne-Edwards personally was, there is no great reason for honouring him through the name of this genus, which he persisted in regarding as of larval character. Moreover, the word *Cuma* itself is under a cloud. Scudder's Nomenclator Zoologicus, an easily accessible work, gives from Agassiz, "Cuma Humph. Moll. 1795. A." Humphrey's work is rare, but Chenu, Manuel de Conchyliologie, vol. 1, p. 171, 1859, is still using his genus for two species of Gasteropods, *C. angulifera* and *C. kiosquiformis*, of Duclos, heading the description with the words, "31° Genre. **Cuma**. Humphrey. 1797. Établi aux dépens des pourpres." Lately with the friendly assistance of Mr B. B. Woodward at the British (Natural History) Museum I have been able to compare Scudder and Chenu with the original authority for the name in question. The book in which it occurs, bearing the title 'Museum Calonianum,' was published anonymously in 1797, but is known independently of its title-page to have been by G. Humphrey. It contains at p. 35, between the genera *Fusus* and *Mitra*, 'Genus LX. Cuma—L'Onde—Wave,' followed by 13 species, numbered from 645 to 657. The first of these is named '*Ictericæ*,' but this being, like most of the others, unaccompanied by any description, figure, or reference, must be regarded as a nomen nudum. On the other hand '646. *Aulica*' is referred to '*Buccinum Aulicum Soland.*,' and '647. *Morio*' is referred to '*Voluta Morio Linn. Buccinum Morio Soland.*,' while to '650. *Prismaticæ*' there is appended a short description by the author himself. There is no *angulifera* or *kiosquiformis* among the original species, so that Chenu's use of the genus for none but those two is illegitimate. None the less it is evident that a molluscan genus *Cuma* was established, in however poverty-stricken a manner, in 1797, and that the crustacean genus which received this preoccupied name in 1828 must fall back upon some other designation. The result is that the displacement of *Cuma*, Milne-Edwards, will lead to the reinstatement of *Bodotria*, Goodsir, and make the name Cumacea wholly inappropriate and unmeaning.

The new title here offered is derived from the Greek *σῖμπος*, *σῖμπος*, meaning 'with the feet closed together.' This is sufficiently characteristic of the general appearance, and the name has the advantage of agreeing in termination with the names of the neighbouring groups, the Amphipoda and the Isopoda, which owe their titles in like manner to what may be called an impressionist estimate of the limbs.

FAM. NANNASTACIDAE.

1866. *Nannastacidae*, Spence Bate, Zoological Record (for 1865), vol. 2, p. 329.
 1878—9. *Cumellidae*, G. O. Sars, Arch. Naturv., vols. 3, 4, Middelhavets Cumaceer, p. 144.
 1880. *Cumellidae*, Kossmann, Zool. Ergebn. Reise Rothen Meeres, Malacostraca, p. 90.
 1887. *Cumellidae*, Sars, Challenger Reports, vol. 19, Cumacea, p. 62.
 1893. *Nannastacidae*, Stebbing, History of Crustacea, Internat. Sci. Ser., vol. 74, p. 305.
 1895. *Nannastacidae*, Hansen, Isop. Cumac. Stomat. Plankton-Exp., p. 59.
 1900. *Nannastacidae*, G. O. Sars, Crustacea of Norway, vol. 3, p. 79.

This family agrees with the Campylaspidæ in several respects, having no distinct telson, no pleopods in the male, inner branch of the uropods one-jointed, the first and second peraeopods in the female, but the third and fourth also in the male, furnished with exopods. In the mouth-organs there are very considerable differences, the mandibular molar being blunt in the present family, but acute in the Campylaspidæ, while also in that family the second maxillæ are formed of a simple plate, but have the usual subdivisions in the Nannastacidae. In 1896, however, M. Jules Bonnier described two species of a new genus *Procampylaspis*, in which the molar of the mandible is acute, but the second maxillæ are normal. Sars in 1900 inclines to the view that *Procampylaspis* approaches nearer to the Nannastacidae than to the other family. The three pairs of maxillipeds have peculiarities which may relieve the difficulty by removing *Procampylaspis* from both the contending families.

GEN. NANNASTACUS.

1865. *Nannastacus*, Bate, Ann. Nat. Hist., Ser. 3, vol. 15, p. 86.
 1875. *Diops*, Paulson, Crustacea of the Red Sea (in Russian), p. 128.
 1878—9. *Nannastacus*, Sars, Middelhavets Cumaceer, p. 160.
 1880. *Nannastacus*, Kossmann, Zool. Ergebn. Rothen Meeres, p. 90.
 1887. *Nannastacus*, Sars, Challenger Reports, vol. 19, Cumacea, p. 62.
 1893. *Nannastacus*, Stebbing, History of Crustacea, p. 305.
 1895. *Nannastacus*, Hansen, Isop. Cumac. Stomat. Plankton-Exp., p. 59.

This genus is distinguished from all other Cumacean genera at present known by having two distinct eyes. At various dates it has had assigned to it the species *anguiculatus* Bate, *longirostris* Sars, *Sarsii* Kossmann, *Sahmii* Sars, *hirsutus* Hansen, and the *Diops spinosus* and *Diops parvulus* of Paulson. Kossmann considers it possible that his own species may be a synonym of Paulson's *parvulus*. Both sexes have been described only in the case of *anguiculatus*, *longirostris*, and *Sahmii*. In regard to the first two the sexual dimorphism so common in the present order is less striking than usual, but in the third it is strongly accentuated. Hence the question arises whether the form described by Sars as the male of his *N. Sahmii* may not really represent

a distinct species. This I am strongly disposed to believe to be the fact, since the two specimens about to be described present parallel differences, but are clearly distinct species, being both males. Should *N. Suhmii* prove to be a name covering two species, it ought to be reserved for the female specimen, since Sars according to his custom gives precedence to the description of that sex. The male specimens will then require a fresh designation, in respect of which a suggestion will be made presently.

NANNASTACUS OSSIANI n. sp.

Plate LXIV A.

Carapace tumid, median line sinuous, its concavity flanked by lateral convexities. Pseudo-rostral projection forming a rather broad, apically rounded process, obliquely ascending, the distal part concentrically ridged. Antero-lateral corners blunt, very little produced. Lower and hind margins forming almost a right angle, corner rounded. Surface reticulate with hexagonal or scale-like markings. Fourth and fifth of the free pereon segments with dorsal centre strongly raised. Segments of pleon with pellucid lateral carinae, as if formed by overlapping scales, and pair of serrate dorsal carinae distally produced into a strong tooth in each of the first five segments; fifth segment not greatly longer than the rest.

Eyes apparently having three facets, which are difficult to distinguish owing to the darkness of the accompanying pigment.

The first and second antennae scarcely differ from those of *Nannastacus unguiculatus*, described in detail by Sars (Middelhavets Cumaceer, pp. 165, 169), except that the slender flagellum of the second pair is much shorter, consisting of ten joints instead of eighteen.

The mouth-organs and pereopods, as is perhaps sufficiently shown by the figures, are in close agreement with those of *N. unguiculatus*. The branchial apparatus of the first maxillipeds was not, however, clearly observed.

The uropods are imperfect, but have peduncles shaped like those of *N. unguiculatus*, a little less produced beyond the terminal segment. The spine of the outer ramus is perhaps relatively a little shorter, but with the apex broken this remains uncertain.

Length, 2 mm.

Habitat. "Barawon. Auftrieb at night, 10/8/95." One specimen, male. Dr Willey informs me that Barawon, where this plankton capture was made, is a small village at the entrance to Blanche Bay, New Britain.

Though the shape of this species so much recalls that of *N. Suhmii*, that at the first glance I made little doubt of their identity, this is separated from that not only by characters of the trunk and pleon, which might be sexual, but also by the proportions of the joints in the fifth pereopods and outer ramus of the uropods, which in the one case Sars' figure and in the other his figure and description show to be quite different.

NANNASTACUS GEORGI n. sp.

Plate LXIV B.

Carapace less tumid than in the preceding species but with similar depression and elevations. Pseudo-rostral projection in like manner rounded, but less obliquely produced and not ridged on the surface. Antero-lateral corners acute, minutely produced. Lower and hind margins forming an obtuse angle, little rounded. Surface as in preceding species. Fifth pereopod segment and first of pleon with a marked longitudinal medio-dorsal depression. Segments of pleon with pellucid lateral carinae formed as in the preceding species, fifth segment considerably the longest.

Eyes larger than in the other species; antennae similar, but the flagellum of the second pair much longer, composed of eighteen joints or possibly more, the terminal joints so excessively slender that their boundaries are difficult to distinguish. The mouth-organs agree with those in the companion species. The branchial leaves appear to be about sixteen in number.

The pereopods are less slender. Especially it will be noticed that in the fifth pair the antepenultimate joint is little longer than the penultimate, instead of much longer as in *N. ossiani*.

The uropods differ greatly, for here the peduncle is produced beyond the terminal segment of the pleon at least as much as in *N. unguiculatus*, and the outer ramus, instead of being subequal in length to the peduncle, as in *N. ossiani*, is not half as long, in each case omitting the terminal spine, which is here of great length. The inner ramus is very long, slender, spinose.

Length, 2.5 mm.

Habitat, the same as that of *Nannastacus ossiani*.

The specific names are chosen in compliment to Professor Georg Ossian Sars. Except for some differences in the shape of the carapace, *N. georgi* seems to agree closely with the male form described by Sars from the Philippines, and if they should prove to be simply varieties of a single species the name now given will supply what is required for the form described and figured by Sars.

ISOPODA.

FAM. TANAIIDAE.

1853. *Tanaidae* (part), Dana, U. S. Expl. Exp., vol. 13, pt. 2, p. 792.
 1857. *Asellidae* (part), White, Popular Hist. Brit. Crustacea, p. 225.
 1866. *Tanaidae* (part), Bate and Westwood, Brit. Sess. Crust., vol. 2, p. 117.
 1880. *Tanaidae*, Harger, Rep. U. S. Fisheries for 1878, pt. 6, pp. 304, 413.
 1880. *Tanaidae*, Sars, Isopoda chelifera, Arch. Naturv., vol. 7, sep. copy p. 20.
 1886. *Tanaidae*, Beddard, Challenger Reports, vol. 17, Isopoda, p. 119.

1886. *Tanaidae*, Sars, Middelhavets Saxisopoder, Arch. Naturv., vol. 11, p. 309.
 1886. *Tanaidae*, Norman and Stebbing, Trans. Zool. Soc. London, vol. 12, pt. 4,
 pp. 79, 102.
 1893. *Tanaidae*, Stebbing, History of Crustacea, Internat. Sci. Ser., vol. 74, p. 322.
 1895. *Tanaidae*, Hansen, Isop. Cumac. Stomat. Plankton-Exp., p. 50.
 1896. *Tanaidae*, Sars, Crustacea of Norway, vol. 2, p. 10.
 1897. *Tanaidae*, Dollfus, Bull. Soc. Zool. France, vol. 21, p. 207.
 1898. *Tanaidae*, Dollfus, Mém. Soc. Zool. France, vol. 11, p. 35.
 1899. *Tanaidae*, H. Richardson, Proc. U. S. Mus., vol. 21, p. 819.
 1900. *Tanaidae*, H. Richardson, The American Naturalist, vol. 34, p. 210.

The genus *Tanaïs*, on which the name of this family is based, is due to Audouin and Milne-Edwards who figured a species in 1829.

LEPTOCHELIA, Dana.

1849. *Leptocheilia*, Dana, Amer. J. Sci., ser. 2, vol. 8, p. 425.
 1852. *Leptocheilia*, Dana, Amer. J. Sci., ser. 2, vol. 14, p. 306.
 1853. *Leptocheilia*, Dana, U. S. Expl. Exp., vol. 13, pt. 2, pp. 792, 800.
 1864. *Tanaïs* (part), Lilljeborg, Bidrag Sverige och Norrige Isopod. underord. och Tanaid. fam., pp. 7, 11.
 1866. *Leptocheilia*, Bate and Westwood, Brit. Sess. Crust., vol. 2 (part 14), p. 132.
 1870. *Tanaïs* (part), Dohrn, Untersuch. über Bau und Entw. Arthropoden, pt. 2,
 p. 141.
 1878. *Paratanais* (part), Harger, Amer. J. Sci., vol. 15, p. 377.
 1879. *Leptocheilia* (part), Harger, Pr. U. S. Mus., vol. 2, p. 162.
 1880. *Leptocheilia* (part), Harger, Rep. U. S. Comm. Fisheries for 1878, pt. 6,
 p. 420.
 1880. *Paratanais*, G. M. Thomson, Ann. Nat. Hist., ser. 5, vol. 6, p. 2, and (1881)
 Tr. N. Zealand Inst., vol. 13, p. 207.
 1880. *Leptocheilia*, Sars, Isopoda chelifera. Arch. Naturv., vol. 7, 1881, sep. copy p. 24.
 1881. *Leptocheilia*, Delage, Arch. Zool. exp., vol. 9, pp. 145, 154.
 1886. *Leptocheilia*, Sars, Middelhavets Saxisopoder, Arch. Naturv., vol. 11, p. 315.
 1886. *Leptocheilia*, Beddard, Challenger Reports, vol. 17, Isopoda, p. 132.
 1886. *Leptocheilia*, Norman and Stebbing, Tr. Zool. Soc. London, vol. 12, pt. 4,
 p. 108.
 1893. *Leptocheilia*, Stebbing, Hist. Crust., Internat. Sci. Ser., vol. 74, pp. 323, 326.
 1895. *Leptocheilia*, Hansen, Isop. Cumac. und Stomatop. Plankton-Exp., p. 50.
 1896. *Dolichocheilia*, Stebbing, Ann. Nat. Hist., ser. 6, vol. 17, p. 49.
 1896. *Leptocheilia*, Stebbing, Ann. Nat. Hist., ser. 6, vol. 17, p. 156.
 1898. *Leptocheilia*, Dollfus, Mém. Soc. Zool. France for 1897, vol. 11, p. 40.
 1900. *Leptocheilia*, H. Richardson, The American Naturalist, vol. 34, pp. 210, 212.

As already pointed out in 1896, the type species of this genus has the outer branch of the uropods two-jointed. This character is shared by the species *minuta*

Dana (the type), *forresti* Stebbing, and *lifuensis* n. sp. For *brasiliensis* (Dana) and *filum* (Stimpson) the inner branch is not described, and the same may be said of *corsica* Dollfus and *inermis* Dollfus, species instituted in 1898, but for each of these a one-jointed inner branch is to be understood. For *inermis* it is figured beside the four-jointed inner branch. In *corsica* the inner branch is six-jointed, and as M. Dollfus was half inclined to unite his *corsica* either with *neapolitana* of Sars or with *savignyi* (Kröyer) \pm *algicola* Harger, in all of which the outer branch has but a single joint, it may be inferred that the same character belongs to *corsica*.

While retaining the opinion that *Dolichocheilia* is identical with Dana's genus, I no longer think that *Dolichocheilia forresti* should be united with *Leptocheilia minuta*, the hand and finger of the chelipeds being very distinct in the two species, which are also separated in habitat by an immense interval.

LEPTOCHEILIA MINUTA, Dana.

1853. *Leptocheilia minuta*, Dana, U. S. Expl. Exp., vol. 13, pt. 2, p. 800, pl. 53, fig. 5 a—d.

1896. *Leptocheilia minuta* (part), Stebbing, Ann. Nat. Hist., ser. 6, vol. 17, p. 158.

From *Leptocheilia forresti*, Stebbing, which in 1896 I thought must be made a synonym of Dana's species, I now think that *L. minuta* is distinct. Upon comparison of actual specimens some satisfactory marks of difference become available. The examples in Dr Willey's collection do not agree with Dana's figures either in the demarcation of the head from the first peraeon segment or in having a short joint at the base of the first antennae. That was fully to be expected. In other respects they agree well with Dana's representation, but are distinguished from *L. forresti* by the following details. The front of the head is flatly rounded rather than obtuse-angled, if one may trust mounted specimens for the observation of so minute a detail. In the first antennae the difference is striking, the second joint in the West Indian species being four-fifths the length of the first, whereas in *L. minuta* it is only half as long. The third joint, however, which Dana figures as about two-thirds the length of the second, is barely one-fourth of that length or less in the specimens which I have examined of both species. In the enormously elongate chelipeds *L. minuta* has the long fifth joint parallel-sided except at the narrow base, and the elongate thumb of the sixth joint with a low prominence near the apex, but *L. forresti* has a very marked emargination near the base of the fifth joint, and has the process near the apex of the thumb very prominent.

On the number of joints in the flagellum of the first antennae no stress can be laid, for one specimen of *L. forresti* has eight joints and another only six, while one specimen of *L. minuta* has six joints on one of these antennae and seven on the other, but a second has eleven joints in each flagellum. Yet all these specimens have the remarkably developed chelipeds distinguishing the male of this species.

The two-jointed outer branch of the uropods is a little longer as observed in

the last mentioned specimen of *L. minuta* than it is as observed in one of the specimens of *L. forresti*, but this may be set to the account of individual variation.

Length, 2.5 mm.

Habitat. Sandal Bay, Lifu, Loyalty Islands.

It is probable that *Paratanais erythraea*, Kossmann, 1880 (Zool. Ergebnisse Reise Rothen Meeres, Malacostraca. p. 103, pl. 7, fig. 1—4), is identical with this species.

LEPTOCHELIA LIFUENSIS n. sp. ♂

Plate LXV B.

♂. The first two (free) segments of the peraeon are rather shorter than those which follow. The pleon is a little wider than the peraeon, its last segment bluntly pointed as usual.

First antennae. First joint twice as long as second, which is twice as long as the third; flagellum of six joints, each nearly as long as the third joint of the peduncle, with perhaps a microscopic seventh joint.

Second antennae shorter than the peduncle of the first, very slender, all the joints of the peduncle except the last short, the flagellum consisting of one long joint between two that are quite minute; the terminal setae long.

Mouth-organs. The upper lip appears to be a narrow plate as shown in the figure. The oral parts opposed to it showed a group of lobes so small and closely compacted that I do not venture to discuss their homologies, and in the figure represent what I saw, perhaps not what I ought to have seen.

First gnathopods. These are elongate, but much more substantial than in *Leptochelia minuta*. The sixth joint or hand can fold back partially into the channelled margin of the large preceding joint; its long curved thumb has two strong processes of the inner margin, separated by a wide interval, and this leaves a large cavity when the tip of the thumb crosses the tip of the equally long finger; the distal process of the thumb is lower than the proximal and carries some long setae; the concave margin of the finger is serrate, and armed with ten spinules.

The *second gnathopods* are of the usual slender form, with the finger nearly as long as the preceding joint.

The first and second peraeopods resemble nearly the second gnathopods, except that the finger is much shorter than the preceding joint. The three following pairs differ by having the second joint stouter, with the sides slightly convex, the fourth joint not end to end with the fifth, but somewhat under-riding it, the fifth with a strong spine at the hind apex, accompanied by other smaller spines, and the sixth with a set of apical spines behind the small curved finger, these in the fifth peraeopods forming a close fringe of about half a score.

The pleopods appear to have the plumose armature usual in this genus.

The nropods have a peduncle longer than broad, the outer ramus two-jointed,

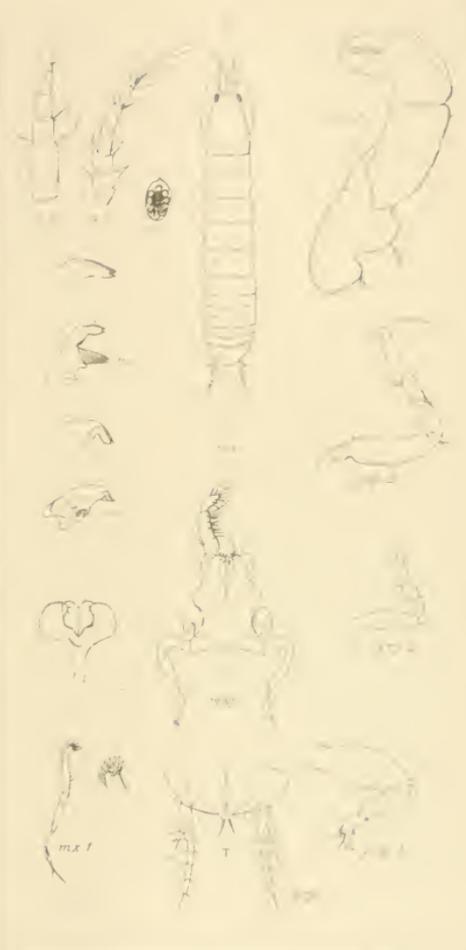
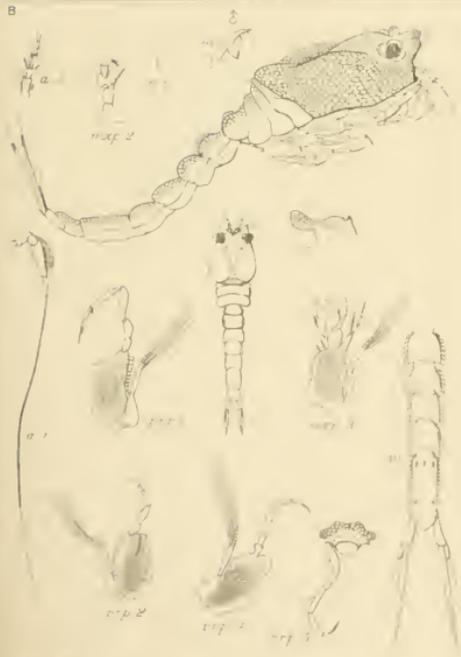


FIG. 1. *W. KAMINARUM* (GROENOV.) sp. n.
 2. *PARASITUS* (GROENOV.) sp. n.

3. *PARASITUS* (GROENOV.) sp. n.
 4. *PARASITUS* (GROENOV.) sp. n.

scarcely longer than the first joint of the inner, which is five-jointed; the rami are tipped with long setae.

Length, 2.5 mm.

Habitat. Lifu, Loyalty Islands.

The form shown in Plate LXIV D differs slightly from that above described, having the processes of the thumb in the first gnathopods separated by a narrow interval instead of a wide one, a distinction corresponding to that which Dollfus notes as separating *L. savignyi*, Kröyer, from *L. algicola*, Harger, and *L. corsica*, Dollfus, without making it very sure that all those three species may not in reality be one and the same.

Habitat. Isle of Pines; from sponge.

LEPTOCHELIA LIFUENSIS n. sp. ♀

Plate LXIV c.

♀. In keeping the description of the female separate from that of the male I am influenced by the circumstance that the specimens assignable to the former sex attain a size so much greater than is shown by any specimens of the latter, that doubt as to the identity of the species is not altogether excluded.

Apart from the size, the differences though very considerable are only such as are known to occur in the two sexes of this genus.

In the first antennae the stout first joint is three times as long as the second, the second is but little longer than the narrower third, to which succeeds a minute apical joint tipped with long setae. Exceptionally in place of the third joint there are two joints, together not much longer than the single joint.

The second antennae are much larger than in the male, the first three joints short, the second and third each tipped at each side with an outstanding pellucid spine, the fourth joint much longer, having a dark band across the middle; the short slender flagellum as in the male consisting of one principal joint between two that are microscopic, the apical perhaps itself subdivided, tipped with long setae.

The mouth-organs agree closely with the figures and descriptions given by Sars in 1886 for those of the female of *Leptochelia dubia* (Kröyer). In the first maxillae the little crowded apical spines appear to be eleven in number. The backward-directed palp has an indistinct appearance of being two-jointed, and ends in two unequal setae.

The first gnathopods are stout, the thumb short and thick, with five setules on its outer margin, the distal part of the inner crenate, the proximal part excavate, the finger having a prominence of its crenate inner margin corresponding with the emargination of the thumb, the apex of the finger not quite reaching that of the thumb.

The other limbs agree with those in the male, and the same is true of the uropods, which have a five-jointed inner, and a small but distinctly two-jointed outer

ramus. One specimen was observed with four-jointed inner ramus on one side, and a five-jointed one on the other.

Length reaching 5 mm. or a little over; many specimens much shorter, one with well-developed marsupium being only 3.5 mm. long.

Habitat. Isle of Pines: labelled as 'Tanaids from sponges.'

FAM. ANTHURIDAE.

1814. *Anthuridae*, Leach, Edinb. Encycl., vol. 7, p. 433.
 1819. *Anthuridae*, Leach, in Samouelle's Entomologist's Useful Compendium, p. 107.
 1852. *Anthurinae* (subfam. of Arcturidae), Dana, Amer. Journ. Sci. and Arts, Ser. 2, vol. 14, p. 306.
 1864. *Anthuridae*, Lilljeborg, Bidrag Sverige och Norrige Isopod. underord. och Tanaid. fam., p. 6.
 1866. *Anthuridae*, Bate and Westwood, British Sessile-eyed Crustacea, vol. 2, p. 155.
 1880. *Anthuridae*, Harger, Rep. U. S. Commission Fish and Fisheries, pt. 6 for 1878, pp. 304, 396.
 1882. *Anthuridae*, Sars, Forh. Selsk. Christian., No. 18, p. 15.
 1882. *Anthurinae* (subfam. of Arcturidae), Haswell, Catal. Australian Malacostraca, p. 304.
 1884. *Anthuridae*, Haswell, Pr. Linn. Soc. N. S. Wales, vol. 9, pt. 3, and vol. 9, pt. 4.
 1886. *Anthuridae*, Norman and Stebbing, Trans. Zool. Soc. London, vol. 12, pt. 4, p. 119.
 1886. *Anthuridae*, Beddard, Challenger Reports, vol. 17, Isopoda, p. 143.
 1893. *Anthuridae*, Stebbing, History of Crustacea, Internat. Sci. Ser., vol. 74, p. 330.
 1894. *Anthuridae*, Chilton, Trans. Linn. Soc. London, vol. 6, pt. 2, p. 209.
 1895. *Anthuridae*, H. J. Hansen, Isup. Cum. u. Stomat. der Plankton-Exp., p. 11.
 1897. *Anthuridae*, Sars, Crustacea of Norway, vol. 2, p. 43.
 1900. *Anthuridae*, H. Richardson, The American Naturalist, vol. 34, p. 215.

In his article "Crustaceology" Leach first of all placed his new genus *Anthura* among the Myriapoda (p. 404), but in the supplement to that article he transfers the family Asellides to the Malacostraca, calling it a tribe, in which the first family is the Anthuridae (p. 433). For a long time this family did not find acceptance with other writers, and Lilljeborg in 1864 supposed that he was himself establishing it for the first time. Milne-Edwards in 1840 combined in a family Idoteïdes the genera *Arcturus*, *Idotea* and *Anthura*, which are now distributed over three families, the Anthuridae being placed by Sars in the tribe Flabellifera, while the Astacillidae and Idoteidae stand together in the tribe Valvifera. Besides the authors named in the synonymy there are two who do not happen to have used the Latin name of the family, but who have made important studies for its elucidation, Anton Dohrn in his 'Untersuchungen über Bau und Entwicklung der Arthropoden,' chapter 5, p. 91, 1870, and

Schiödte in the *Naturhistorisk Tidsskrift*, Ser. 3, vol. 10, p. 211, 1875. Schiödte also calls attention to the value of Kröyer's description and figures of *Anthura carinata* (*Naturh. Tidsskr.*, Ser. 2, vol. 2, p. 402, and Gaimard's *Voy. en Scand., Crust.*, pl. 27, fig. 3 a—o). This imperfect but under the circumstances meritorious account was overlooked by Bate and Westwood. They, like Kröyer, were hampered by want of material, and were reduced to describe the mouth-organs not of *Anthura* but of an essentially different genus which they named *Paranthura*. The lettering of their figures, the figures themselves, and the accounts relating to them, involve obscurities, some of which are acknowledged by the authors, and inconsistencies which it is not so easy to explain. Schiödte has taken great pains to unravel the tangle, but apparently he was himself only acquainted with the genus *Cyathura*, to which Kröyer's species has been transferred by Norman and myself. In the eleven genera that have been named within this family, the species have so great a superficial resemblance that agreement in the character of the mouth-organs has no doubt been sometimes taken for granted, and this the more readily because they are so small and so difficult to dissect.

The paper published in the *Transactions of the Zoological Society of London* in 1886 was read to the Society in 1884 and had been in substance prepared several years earlier. Consequently it omitted from its review of the Anthuridae certain Australian and New Zealand genera which would otherwise have received notice. The six genera accepted in that paper are divided between two well-marked sections. In the first of these, to put the matter briefly, the mandibles and lower lip end obtusely, in the second acutely. The first section contains the genera *Anthura*, *Cyathura*, *Anthelura*, *Hyssura*; the second contains *Paranthura* and *Calathura*. The genus *Ptilanthura*, Harger, 1880, is regarded as a synonym of *Anthura*, but this is an opinion which I can no longer support.

In *Anthura* the female has five segments of the pleon coalesced into a single segment, the mandibles have a three-jointed palp. In *Ptilanthura* the females have a distinctly segmented pleon, the mandibles have a one-jointed palp. It is certainly curious that Harger did not include the latter feature in his generic definition, but he was a careful writer and had several specimens at command, so that his definite statement should scarcely be set aside on conjecture. In regard to the females he expressly says that they are distinguished from young specimens of *Anthura polita* by the larger eyes and 'the more elongated and distinctly segmented pleon.' *Anthura polita*, Stimpson, is in all probability the same as *Cyathura carinata* (Kröyer), which agrees with *Anthura* very nearly as to the coalescence of pleon segments in the female. Harger named the type species of his genus *tenuis* on the chance that it might prove to be identical with *Paranthura tenuis*, Sars, 1872, and Sars at one time accepted the supposed identity, but has now withdrawn his species alike from *Paranthura* and *Ptilanthura*, placing it in a new genus *Leptanthura*, which belongs to the second section of the family, while Harger's genus belongs to the first.

To the eight genera already named must be added *Haliophasma*, Haswell, 1880, and *Eisothistos*, Haswell, 1884, both from Australia, but there is no information about the mouth-organs of either to show whether the existing sections of the family are fitted to receive them. On the other hand the genus *Cruregens*, Chilton, 1882, from

New Zealand, was in 1894 made the subject of a very ample discussion by its author, and this shows that it belongs to the second section by almost all its oral characters. But there is this to be remarked in the mandibles that, though they run out to a sharp point distally, as in the other genera of the second section, this point is here not freely outdrawn, but flanked by 'a thin chitinous plate with rounded margin,' corresponding to the serrate blade which flanks the apical tooth or teeth of the mandibles in the first section. In this genus the mandibles are entirely without palp, a fact which lends additional probability to the one-jointed palp of Harger's *Ptilanthura*. The mandibular palp is indeed very variable in this family, its third joint being large in *Cyathura* and *Calathura*, but very small in *Anthura* and *Leptanthura*. But of all the oral appendages those which give the most trouble are the second maxillae. For *Cyathura* they are clearly figured by Schiödte, in close connexion with the first pair. For *Cruregens* Chilton figures them in attachment to the lower lip. In establishing the genus *Calathura* Norman and myself say nothing about them, and recently Sars has expressed the opinion that they are wanting both in *Calathura* and *Leptanthura*. Bonnier figures them for his *Calathura affinis*, but that species by the first antennae and by the maxillipeds would rather belong to *Paranthura*. In the latter genus Dohrn, describing *Paranthura nigro-punctata* (Lucas), gives a figure explained as 'coalesced second maxillae (?),' which no doubt, as Dr Chilton has already suggested, represents the pair of second maxillae with the deeply cleft lower lip between them. Now, also, the dissection of a specimen of *Calathura brachiata*, from East Finmark, given me by Canon Norman, shows that they are present in that species, just as in the species of *Paranthura*. Should they prove to be present also in *Leptanthura*, Bonnier's *affinis* might find its proper place in that genus, with which it agrees in the mandibular palp, the uropods, and most other characters. Bonnier, however, does not describe the position of the fifth joint in the hind pereopods, which is characteristic in *Leptanthura*.

From the descriptions available it appears that the maxillipeds are no less variable than other oral parts, except that the epipod-bearing first joint always seems to be indistinguishably coalesced with the wall of the head. Omitting this joint from the calculation, the maxillipeds form only one joint and a rudiment in *Cruregens*, two joints in *Anthura* and *Ptilanthura*, two and a rudiment in *Paranthura*, three in *Leptanthura* and *Cyathura*, four in *Calathura* and *Apanthura*, five in *Anthelura* and *Hyssura*.

The uropods are a subject of controversy. Chilton and Dohrn consider the lower branch to be one-jointed, not two-jointed, as various authors have stated it to be. Dr Chilton argues that it would be quite exceptional for the inner branch to be two-jointed. At the same time he points out that Gerstaecker held the upper branch to be the inner. If Gerstaecker is right in that interpretation, Dr Chilton's objection would so far disappear. The question would remain whether in the outer branch we are to consider that a first joint is consolidated with the peduncle. This seems at least not improbable.

APANTHURA, n. g.

Pleon with segments distinct. Mouth-organs as in *Anthura*, except maxillipeds, which have a three-jointed palp, of which the middle joint is much the largest. The last four pairs of pereopods, as well as the preceding pairs of pereon appendages, have the fifth joint under-riding the sixth.

Name compounded of *ἀπρό*, from, and *Anthura*, a related genus.

The only genus in the family Anthuridae agreeing with *Apantura* in the structure of the hind pereopods is *Leptanthura*, Sars, from which it is completely distinguished by the mouth-organs. *Anthelura abyssorum*, N. and S., 1886, may agree in regard to the pereopods with *Apantura*, but, if so, it differs from *Anthelura elongata*, Norman, and its generic position will require to be reconsidered.

APANTHURA SANDALENSIS, n. sp.

Plate LXV A.

Head considerably longer than broad, with a very small projection in the middle of the front. Seventh segment of pereon as usual the shortest, not quite so long as the six following segments of the pleon combined, and these rather shorter than the oval telson. The body is slightly pubescent, and the fifth pleon segment flanked with plumose setae.

Eyes small, dark in spirit, near to the front angles of the head.

Upper antennae shorter than the lower, third joint shorter than first, longer than second, about as long as the three-jointed flagellum, in which the first and third joints are extremely short.

Lower antennae with the peduncle so commonly occurring in this family, a short first joint followed by a large somewhat folded second, to which succeed three smaller joints; the fifth is here longer than the third or fourth and than the setose three-jointed flagellum.

Upper lip triangular, broader than long, unsymmetrically cleft at the apex.

Mandibles with tridentate apex, but the teeth faintly distinguished; the projecting border between the apex and the feeble molar process is very slightly serrulate; palp three-jointed, third joint scarcely so long as first, carrying four or five spines, the terminal the longest; second joint with a long spine at apex and a shorter one below.

Lower lip. The lobes less rounded than in *Cyathura* and less truncate laterally than in *Anthura*, with minute setules at the apical points and three setae on the outer margin at the point where it passes from convex to concave.

First maxillae as in *Cyathura*, the apex bent, its point projecting beyond a row of closely set spine-like teeth.

Second maxillae closely adpressed to the lower lip, but narrower and shorter, the outer margin sinuous, the apices apparently bifid, the stems seemingly coalesced.

Maxillipeds with the first joint carrying small oval epipods, but not otherwise distinguishable from the wall of the head, which, as usually in the family, is ventrally more or less carinate; second joint not twice as long as broad, seemingly with a small oval plate near inner angle of apex, which is not produced; the three-jointed palp much longer than the basal joint, which is not longer than the second of the palp; third joint of the palp small, broader than long, attached to the outer part of the truncate apex of the preceding joint.

First gnathopods. Second and third joints large, broad, third deeply channelled, fourth joint short, fifth with its triangularly produced point meeting tip of finger, sixth thick, broad at base, suboval or pyriform, but with setose palm margin almost straight; the apex, as in all the limbs, forms a little subcircular expansion beside base of finger; the finger much curved, narrowing and armed with a seta at about the middle of the inner margin.

The second gnathopods and first pereopods are much more slender, the third joint rather shorter than the second, the fourth short, distally as broad as the length, the fifth small, triangular, apically almost acute, the sixth narrowing distally, its palmar margin having a row of setae and an apical spine, with a second row of setae on the adjacent surface, the finger about two-thirds as long as the preceding joint, curved, constricted, with a seta at the constriction.

Second to the fifth pereopods. These differ little from the two preceding pairs of limbs, but the fourth joint is rather pyriform than triangular, decidedly longer than broad, the fifth joint is less narrowly triangular, and the sixth of almost uniform width. In these limbs the sixth joint and finger show a fine serration of the margins when seen at a suitable angle.

Uropods. The upper branch is strongly emarginate at the apex, of which the outer lobe is the narrower; except for two-thirds of the outer margin, this branch is fringed with setae, some of them very long; it reaches a little beyond the base of the terminal joint of the lower branch, which is strongly fringed, oval, except at junction with its base, which is equal to it in length and breadth and obliquely grooved on the surface.

The telson is oval, about twice as long as broad, slightly carinate longitudinally, with a few setae on the surface, and several long ones round the apex, which does not reach the level of the apices of the uropods.

Colour (in spirit) wanting, except for a light brown marbling on the back of head and each pereon segment.

Length, 7 mm. Judging from the antennae, the two specimens are probably females. The one figured has the segments of the pereon from the third to the seventh thickened.

Habitat. Sandal Bay, Lifu, Loyalty Islands. Specific name referring to place of capture.

GEN. PARANTHURA.

1866. *Paranthura*, Bate and Westwood, Brit. Sess. Crust., vol. 2, p. 163.

1870. *Paranthura*, Dohrn, Unters. über Bau und Entwicklung der Arthropoden, p. 91.

1886. *Paranthura*, Norman and Stebbing, Trans. Zool. Soc. London, vol. 12. pt. 4, p. 122.

1893. *Paranthura*, Stebbing, History of Crustacea, Internat. Sci. Ser., vol. 74, p. 332.

Several species have been referred to this genus by Haswell and Beddard, but, as no description is given of the mouth-organs, their generic position remains at present doubtful.

To the account of the genus given in 1886 the following observations may be added. The upper lip, as in *Calathura*, is elongate triangular, the pellucid apical part nearly parallel-sided with rounded tip. The third joint of the mandibular palp is armed with a series of spines. The spear-like first maxillae, with reverted teeth on the distal part, appear generally to protrude in advance of the mandibular apices, as though fitted to take the lead in piercing a victim. The second maxillae are very delicate organs facing the lower lip, so as to form a channel, which is greatly strengthened by the mandibles and the maxillipeds. The only parts which appear to have much freedom of movement are the first maxillae. When the maxillipeds have been removed, the first maxillae can be drawn out from between the second maxillae and the lower lip without disturbing the other organs. The maxillipeds have a small oval epipod, a long basal (or second) joint, proximally emarginate at the side for the convenience of the epipod, not, or scarcely at all, distally produced at the inner margin, being in this respect distinguished from *Calathura*, as also in the palp, which is tapering, two-jointed, with the division between the two joints almost imperceptible, whereas in *Calathura* the palp has three joints, the first very small, the third somewhat lamellar, as shown in Sars' figure of *Calathura norvegica*. My figure of *Calathura brachiata* in 1886 does not give the articulation of the terminal joint, and shows it edgewise, in its natural position relatively to the rest of the appendage, but in a misleading one for diagnosis. In *Paranthura* the maxillipeds closely resemble those of *Leptanthura*, but in the new species about to be described the basal joint is not twice as long as the palp. Also in the new species the distinctness of the pleon segments medio-dorsally is obscure, though laterally it is clear.

PARANTHURA LIFUENSIS, n. sp.

Plate LXVI B.

Head a little longer than broad, median rostral point very small, not reaching so far as the lateral angles. Segments of peraeon not elongate, seventh more than half as long as sixth, as long as the six following segments of the pleon combined. Of the latter the first and sixth are distinct, but the intermediate four are difficult to distinguish except laterally. Body a little pubescent.

Eyes small, dark in spirit, near to the front angles of the head, the component ocelli about fifteen in number.

Upper antennae little shorter than lower, third joint longer than second, shorter than the four-jointed flagellum, in which the third joint is the longest.

Lower antennae. Second joint rather large, folded; fifth longer than third or fourth or than the single-jointed flagellum, which is tapering, fringed with several tufts of setae.

Upper lip. See remarks on the genus.

Mandibles, as in *Calathura*, but the third joint of the palp is short, with only four or five spines.

Lower lip slender and delicate, a longitudinal line down the centre perhaps marking a cleft, but the length of the cleft, if any, could not be made out. There is a small tuft of setules at each side of the apex.

First maxillae, very long and slender, with eight minute retroverted teeth along the distal part. In the dorsal view of the head (fig. C) these organs will be seen protruding from between the peduncles of the lower antennae, being in fact much in advance of the mandibles.

Second maxillae. These are slender, narrowing rather abruptly at some distance from the apex, which carries two or three setules. With the lower lip they form a narrow pipe. In the figure they are drawn apart to either side of the lip.

Maxillipeds. The epipods are oval, exceedingly small. Not only is the joint to which they belong indistinguishable, but the following pair of joints is likewise at its base completely coalesced with its indistinguishable predecessor. The cleft dividing this pair of unjointed joints is equal to the length of the palp, which, as in *Paranthura nigropunctata* (Lucas), is curved and tapering, with some setae at the apex, among which a minute second joint is with difficulty discernible; a long spine-like seta tips the inner apical angle of the basal joint.

First gnathopods. Second joint not longer than third, but distally wider and channelled, fourth much broader than long, cup-like, fifth small, triangular, sixth broadly pyriform in general contour, but the palmar margin with a produced point at its base, between this and the finger having a close-set row of spinules on a slightly convex region, to which succeed some spines and setae; the narrow apex forms a subcircular expansion beside the base of the finger in this and all the limbs of the peraeon. Finger about two-thirds as long as sixth joint, its concave margin fringed with a few setules.

Second gnathopods and first peraeopods. Second joint rather longer than third, fourth cup-like, broader than long, fifth triangular, under-riding the narrowly oval sixth; finger as in first gnathopod.

Second to the fifth peraeopods. Second and third joints as in preceding pair, fourth longer than broad, fifth and sixth narrow, fifth not under-riding sixth, more than half as long; finger strongly curved, longer than the fifth joint.

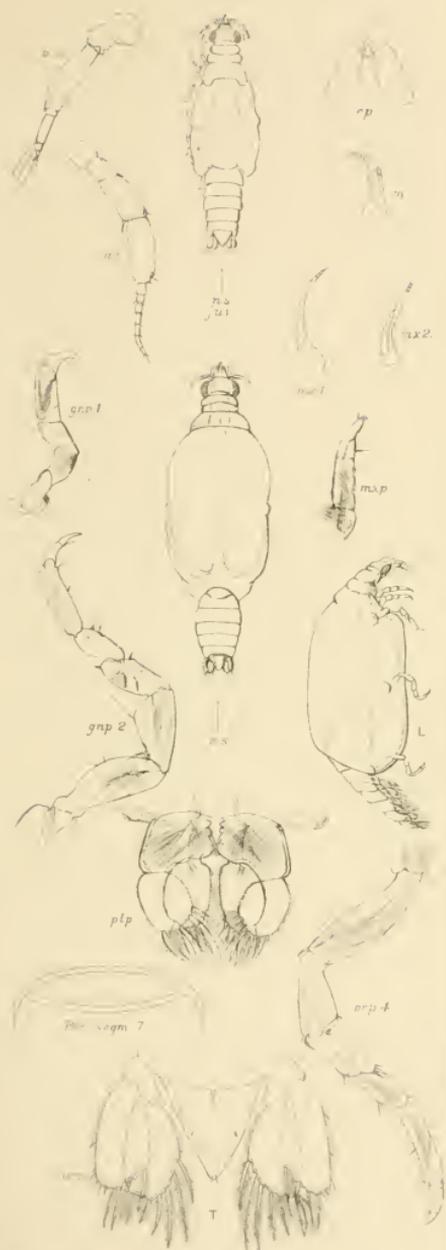
Uropods. Upper branch proximally broad, narrow apex just reaching beyond peduncular portion of the lower branch, in which the terminal joint is not longer than broad, much shorter than the peduncular part.

Telson elongate oval, wider at the base than at the setose apex, which falls somewhat short of the uropods.

Colour (in spirit) pallid, faintly speckled on the back.

Length about 8 mm.

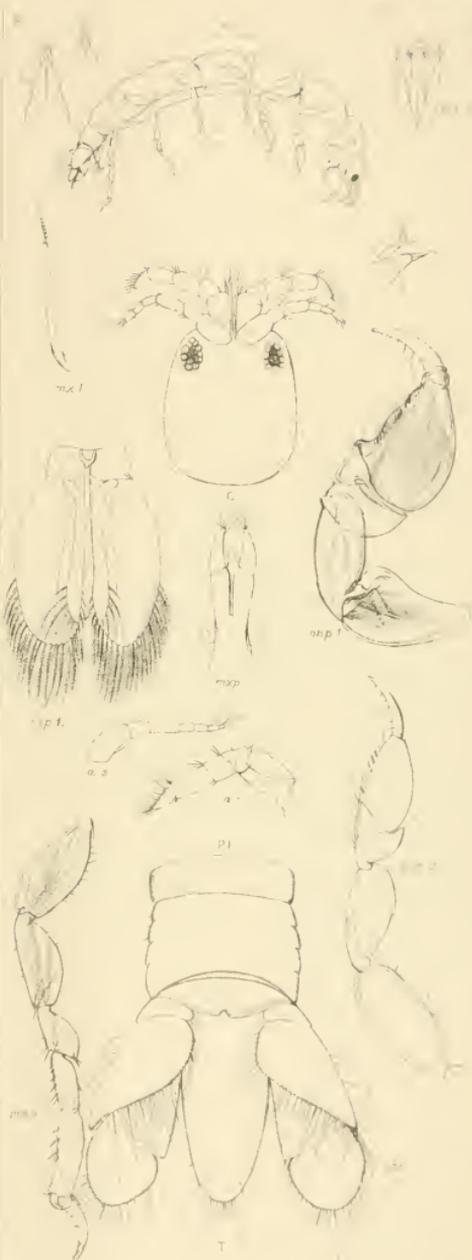
A



H. W. H. Del.

Diathea aureola, n. sp.

B



H. W. H. Del.

Phasmodon (Hemiteles) n. sp.

Habitat. Sandal Bay, Lifu, Loyalty Islands. A single specimen. Specific name referring to place of capture.

FAM. GNATHIIDAE.

- 1813—14. *Gnathonii*, Leach, Edinb. Encycl., Art. Crustaceology, vol. 7, p. 386 (*Gnathonii* on p. 402, and referred to as *Gnathonii* on p. 432).
1814. *Gnathides*, Leach, loc. cit., Appendix, p. 432.
1825. *Decempedes* (part), Latreille, Fam. Nat. du Règne Animal, p. 289.
1840. *Pranisiens*, Milne-Edwards, Hist. Nat. Crust., vol. 3, p. 191.
1847. *Pranizidae*, White, List of Crustacea Brit. Mus., p. 101.
1850. *Pranizidae*, White, Brit. Crust. in Brit. Mus., p. 73.
1850. *Anceidae*, White, loc. cit., p. 74.
1853. *Pranizidae*, Dana, U. S. Expl. Exp., vol. 13, p. 791.
1857. *Pranizidae*, White, Popular Hist. Brit. Crust., p. 239.
1857. *Anceidae*, White, loc. cit., p. 243.
1861. *Pranizadés*, P. J. van Beneden, Faune litt. de Belgique, p. 100.
1864. *Anceidae*, Lilljeborg, Bidrag Sverige och Norrige Isopod. underord. och Tanaid. fam., p. 7.
1866. *Anceidae*, Bate and Westwood, Brit. Sess. Crust., vol. 2, pt. 15, p. 168.
1880. *Gnathiidae*, Harger, U. S. Comm. Fish and Fisheries for 1878, pt. 6, pp. 304, 408.
1885. *Anceidae*, Sars, Den Norske Nordhavs Exp., Crust., vol. 14, pt. 1, p. 85.
1886. *Anceidae*, Beddard, Challenger Reports, vol. 17, Isopoda, p. 135.
1893. *Gnathiidae*, Stebbing, History of Crustacea, Internat. Sci. Ser., vol. 74, p. 335.
1897. *Gnathiidae*, Sars, Crustacea of Norway, vol. 2, pt. 3, p. 51.
1900. *Gnathiidae*, Harriet Richardson, The American Naturalist, vol. 34, p. 214.

Milne-Edwards divided his *Pranisiens* into two tribes, *Pranisiens* and *Anceiens*. White, who at first included *Praniza* and *Anceus* in a single family, subsequently allotted each genus to a separate family. The great distinction belongs to M. Eugène Hesse of having demonstrated that forms apparently so widely apart, that they could by good naturalists be placed in separate genera, tribes, or families, were really females and males of the same species. It is also memorable that Leach in 1813 had already declared his suspicion that this might be the case, while M. Hesse's not readily accepted announcement of the fact was not made to the Académie des Sciences in Paris until November, 1855.

GEN. GNATHIA, Leach.

1813. *Gnathia*, Leach, Edinb. Encycl., vol. 7, p. 402.
1816. *Anceus*, Risso, Hist. Nat. Crust. Nice, p. 51.
1818. *Praniza*, Latreille, Tableau Encyclopédique et Méthodique des trois règnes de la Nature, pt. 24, Crustacés, pl. 329, f. 24, 25.

1818. *Coelino*, Latreille, loc. cit., pl. 336, f. 28.
 1825. *Anceus*, Desmarest, Consid. gén. Crust., p. 282.
 1825. *Praniza*, Desmarest, loc. cit., p. 283.
 1829. *Anceus*, Latreille, Règne Animal, nouv. éd., vol. 4, p. 125.
 1829. *Praniza*, Latreille, loc. cit., p. 125.
 1840. *Praniza*, Milne-Edwards, Hist. Nat. Crust., vol. 3, p. 192.
 1840. *Anceus*, Milne-Edwards, loc. cit., p. 196.
 1849. *Anceus*, Lucas, Explor. sci. de l'Algérie, p. 85.
 1849. *Praniza*, Lucas, loc. cit., p. 87.
 1855. *Anceus*, Hesse, Comptes rendus, Novembre 26.
 1858. *Anceus*, Hesse, Comptes rendus, Mars.
 1858. *Anceus*, Bate, Ann. Nat. Hist., Ser. 3, vol. 2, p. 165.
 1858. *Praniza*, Bate, loc. cit.
 1861. *Anceus*, P. J. van Beneden, Faune litt. de Belgique, p. 102.
 1866. *Anceus*, Bate and Westwood, Brit. Sess. Crust., vol. 2, pt. 15, p. 170.
 1870. *Praniza* (*Anceus*), Dohrn, Untersuch. Bau und Entwicklung der Arthropoden, pt. 1, p. 65.
 1874. *Ancaeus*, Hesse, Ann. Sci. Nat., Ser. 5, vol. 19, Art. 8, p. 8.
 1880. *Gnathia*, Harger, U. S. Comm. Fish and Fisheries, pt. 6, p. 410.
 1880. *Anceus*, Kossmann, Reise in die Küstengebiete des Rothen Meeres, Malacostraca, p. 105.
 1884. *Anceus*, Hesse, Ann. Sci. Nat., Ser. 6, vol. 17, Art. 6, p. 1.
 1885. *Anceus*, Sars, Den Norske Nordhavs Exp., Crust., vol. 14, pt. 1, p. 85.
 1886. *Anceus*, Beddard, Challenger Reports, vol. 17, Isopoda, p. 135.
 1893. *Gnathia*, Stebbing, History of Crustacea, p. 337.
 1897. *Gnathia*, Sars, Crustacea of Norway, vol. 2, pt. 3, p. 51.

Various other references to the voluminous literature will be found in Bate and Westwood's work. Leach in 1813 placed the family which he instituted for this single genus between the 'Squillarii' and the 'Gammariini.'

It was this probably that induced Latreille in 1829 to neglect the guidance of Desmarest and to place the genus, not near the Amphipoda, but actually among them. Risso in 1816 had taken the still more remarkable step of placing it in his family 'Paguriens' between *Hippa* and *Pagurus*, and was rewarded for his absurdity by a prolonged upholding of his name *Anceus* over the earlier given *Gnathia*. Upon Leach has been saddled the synonym *Praniza*, which he not only never published but probably never wished to publish. It was given to the world in a haphazard manner by Latreille in the great Atlas to the Encyclopédie Méthodique, in which Slabber's figure of *Oniscus marinus* is copied and stated to belong to Dr Leach's genus *Praniza*. For the date of 1769 at which Slabber's original figure appears to have been published, it must be considered a highly creditable production, and that it belongs to what is often called the *Praniza*-form of the genus *Gnathia* is beyond question.

In this genus the absence of the fifth pereopods is not limited to the young, but extends to the adults of both sexes.

GNATHIA AUREOLA, n. sp.

Plates LXVI A and LXXIV E.

The inconvenience must be admitted of publishing a new species, of which the fully developed form is not known in either sex. But in the present instance Dr Willey took special pains to preserve an exact record of the colouring in life, and, as this is rather remarkable, it would be a pity to leave it associated with an unnamed larva. For future use it may be well to recall the peculiarity on which Hesse several times emphatically insists, that species of *Gnathia* parasitic on fish do not assume the sexual forms while on the fish, but that, when removed from their host, if kept in sea-water, they sooner or later do assume these forms. Hesse's own experience was that the larger or full-grown larvae moulted almost immediately after removal. At the same time he warns the experimenter that these little captives have a surprising agility and are sure to escape unless special precautions are taken.

In general appearance the present form differs little from the corresponding stage of *Gnathia maxillaris*, the small, delicate peraeopods forming an absurd contrast to the massive fifth and sixth segments of the peraeon which offer considerable resistance to the impact of a penknife and cut like a piece of hard cheese.

The first antennae have the third joint considerably longer than the first and second combined, those two being together about as long as the slender flagellum, in which the second joint is longer than the first plus the third and fourth, the second to the fourth carrying sensory filaments. In the second antennae the last joint of the peduncle is as long as the two preceding combined, but a little shorter than the slender 7-jointed flagellum.

Over the mandibles lies a broadly triangular piece, distally deeply emarginate, with a narrowly oval central process between the rounded corners of the emargination. This I suppose to represent the epistome and upper lip.

The mandibles have about nine microscopic teeth on the incurved narrow apex, the narrow portion being longer than the broader proximal part, while in the mandibles of *Anceus maxillaris* the reverse is the case.

The first maxillae are extremely narrow, except quite at the base, with three tiny teeth near the needle-pointed apex. The second maxillae are similar, but rather shorter and not quite so slender.

The maxillipeds have a tolerably even breadth till near the apex, the distal lobe being beset with setules and apically carrying two little teeth or spinules.

The first gnathopods though leg-like have much the character of mouth-organs. Their hooked nails project in front on either side of the organs above described. The penultimate joint is distinguished from the small triangular antepenultimate, which under-rides it, by a faintly perceptible suture. The preceding joints are rather short, subequal. The five following pairs of limbs are all very similar one to another, the last rather the longest; the armature is very slight, its most conspicuous features being a subapical spinule on the bulging margin of the third joint, spinules at apices of the three following joints, which also have the straight margin microscopically serrate,

with a spinule at about the middle of this serrulation in the penultimate joint. The finger has a setule adjoining the nail on the concave margin.

The pleopods have peduncles broader than long, their inner margins approximate, connected by two pairs of coupling spines. The outer ramus is about as long as the peduncle, little longer than broad, fringed distally with nine plumose setae. The inner ramus is rather longer, not broader, fringed with eight setae.

The uropods have the rami subequal, not quite twice as long as broad, the inner with six, the outer with four, plumose setae. The outer has also three setules at the outer corner.

The telson is triangular, the length equal to the breadth at the base, with a setule near middle of each lateral margin, and an apical pair.

Numerous specimens were obtained by Dr Willey at Lifu, Sandal Bay (near Kiki), on the 17th of February, 1897, parasitic on gills of the white ocellated 4-spined sting-ray, *Aetiobatis narinari*, attached both to the gills and to the walls of the gill-chambers. There were many of the larger and a few of the smaller specimens. Dr Willey says, "The swollen portion of body (mesosoma) of former was light gold and black—gold prevailing in living condition—characterised also by two large lateral golden orioles on each side and one anteriorly on each side of front and of mesosoma. The mesosoma darkened very much in alcohol, and the gold rings and spots faded to a pale greenish tint. Abdomen yellowish white." He adds that the eyes were dotted with gold spots, that a black longitudinal line lay immediately below the points of insertion of the limbs on the mesosoma, that the whole of the dorsum was covered with gold spots, usually aggregated into area-like groups, but leaving free parts of a medio-dorsal black band. The large hinder gold rings included gold spots with a central black one.

The total length is 5.5 mm., length of thickened part of mesosoma or peraeon 3.5 mm., and its height 2 mm. The few small specimens, though about three-quarters as long as the large ones, were very much below them in total bulk.

The specific name refers to the golden circlets of the living colour. Slight traces of these remain only in the small specimens.

The seventh peraeon segment is not in this species clear of the sixth as in *Anceus Rhinobatis*, Kossmann, from the Red Sea. Kossmann speaks of the second antennae as the front, and of the first as the hinder.

FAM. CIROLANIDAE.

1880. *Cirolanidae*, Harger, Rep. U. S. Comm. Fisheries for 1878, pt. 6, pp. 304, 376.

1890. *Cirolanidae*, H. J. Hansen, Vid. Selsk. Skr., Ser. 6, v. 3, pp. 275, 310, 317, 318.

1893. *Cirolanidae*, Stebbing, History of Crustacea, Internat. Sci. Ser., vol. 74, pp. 341, 342.

1895. *Cirolaninae*, Hansen, Isop. Cumac. Stomat. Plankton-Exp., p. 12.

1897. *Cirolanidae*, Sars, Crustacea of Norway, vol. 2, p. 68.

1899. *Cirolanidae*, Harriet Richardson, Proc. U. S. Mus., vol. 21, p. 822.
 1900. *Cirolanidae*, Harriet Richardson, The American Naturalist, vol. 34, p. 215.

Hansen in 1890 included in this family Leach's three genera *Cirolana*, *Conilera* and *Eurydice*, together with *Bathynomus* A. Milne-Edwards, and *Anuropus* Beddard, for the latter of which in 1893 I suggested a separate family Anuropidae. To the *Cirolanidae* has since been added the genus *Cirolanides*, Benedict, from fresh water, and I am now proposing a new genus *Hansenolana*.

GEN. CIROLANA, Leach.

1818. *Cirolana*, Leach, Dict. Sci. Nat., vol. 12, p. 347.
 1840. *Cirolana*, Milne-Edwards, Hist. Nat. Crust., vol. 3, p. 235.
 1867. *Cirolana*, Bate and Westwood, Brit. Sess. Crust., vol. 2, p. 294.
 1890. *Cirolana*, Hansen, Vid. Selsk. Skr., Ser. 6, v. 3, pp. 318, etc.
 1893. *Cirolana*, Stebbing, History of Crustacea, Internat. Sci. Ser., vol. 74, p. 342.
 1897. *Cirolana*, Sars, Crustacea of Norway, vol. 2, p. 69.
 1899. *Cirolana*, H. Richardson, Proc. U. S. Mus., vol. 21, p. 822.
 1900. *Cirolana*, H. Richardson, The American Naturalist, vol. 34, p. 215.

Many additional references will be found in the works above cited.

CIROLANA PLEONASTICA, n. sp.

Plate LXVII A.

This species is most nearly allied to Hansen's *Cirolana sulcata* from the Cape of Good Hope, but well distinguished from that species by the different sculpturing of the pleon, and by the setose surface of the outer ramus of the uropods.

First segment of the peraeon considerably the longest; all the peraeon segments marbled with brown spots, which above the hind margin form a transverse row, but with a clear central space running lengthwise; last four pairs of side-plates strongly sulcate, last two a little produced, subacute. First segment of pleon concealed; sides of fourth with obtuse corners completely overlapping but not concealing those of the fifth. Terminal caudal plate triangular, from the middle fringed with plumose setae, eight spines encircling the rounded or almost truncate apex; down the centre, producing a sulcate appearance, are four to five pairs of processes successively smaller; a dark centre gives the process the look of a tooth, but on nearer inspection it is found to be ovate, projected backward. Similar processes are found, twelve in number but minute, above the hind margin of the last peraeon segment, and in a similar position but not quite so small, to the number of nine on the fourth, and of seven on the fifth peraeon segment. In profile the hinder portion of the animal has a somewhat serrate outline.

Eyes rounded, with thirty to forty ocelli. In one set of specimens dark brown, in another set black.

First antennae scarcely as long as peduncle of second, third joint a little longer than first or second, the latter two faintly separated; flagellum equal in length to the peduncle, ten-jointed, with hyaline filaments. In the specimen dissected the first joint of the flagellum was extremely short on one antenna, on the other it was the longest of all; each flagellum was ten-jointed.

Second antennae nearly reaching the end of the fourth pereopod segment, fourth and fifth joints of the peduncle subequal, flagellum nearly twice as long as the peduncle, twenty-seven-jointed, sparingly ciliated.

Upper lip short but broad, rather strongly emarginate.

Mandibles. The left mandible shows on the cutting edge four distinct teeth, though the two in the centre have their broad edges almost in a continuous line; in both mandibles the plate between the cutting edge and the molar has two or three of the spines rather conspicuous; the third joint of the palp is shorter than the first, broad, except at the truncate apex.

First maxillae. The inner plate has the usual three thick plumose setae, of which the lowest is the longest; the outer plate has twelve spines, all slender, three or four very slight, one or perhaps more a little dentate, and on the plate's inner margin are four minute teeth or spinules. As usual, the muscles of these appendages are very powerful.

Second maxillae. The inner plate has the broad oblique distal margin fringed with slender setiform spines and three plumose setae below, of which the lowest is the longest; the other two plates, which in Hansen's later view belong in common to the third joint of the maxilla, are narrow, rather long, carrying several apical setae, the inner having setae also on its inner margin.

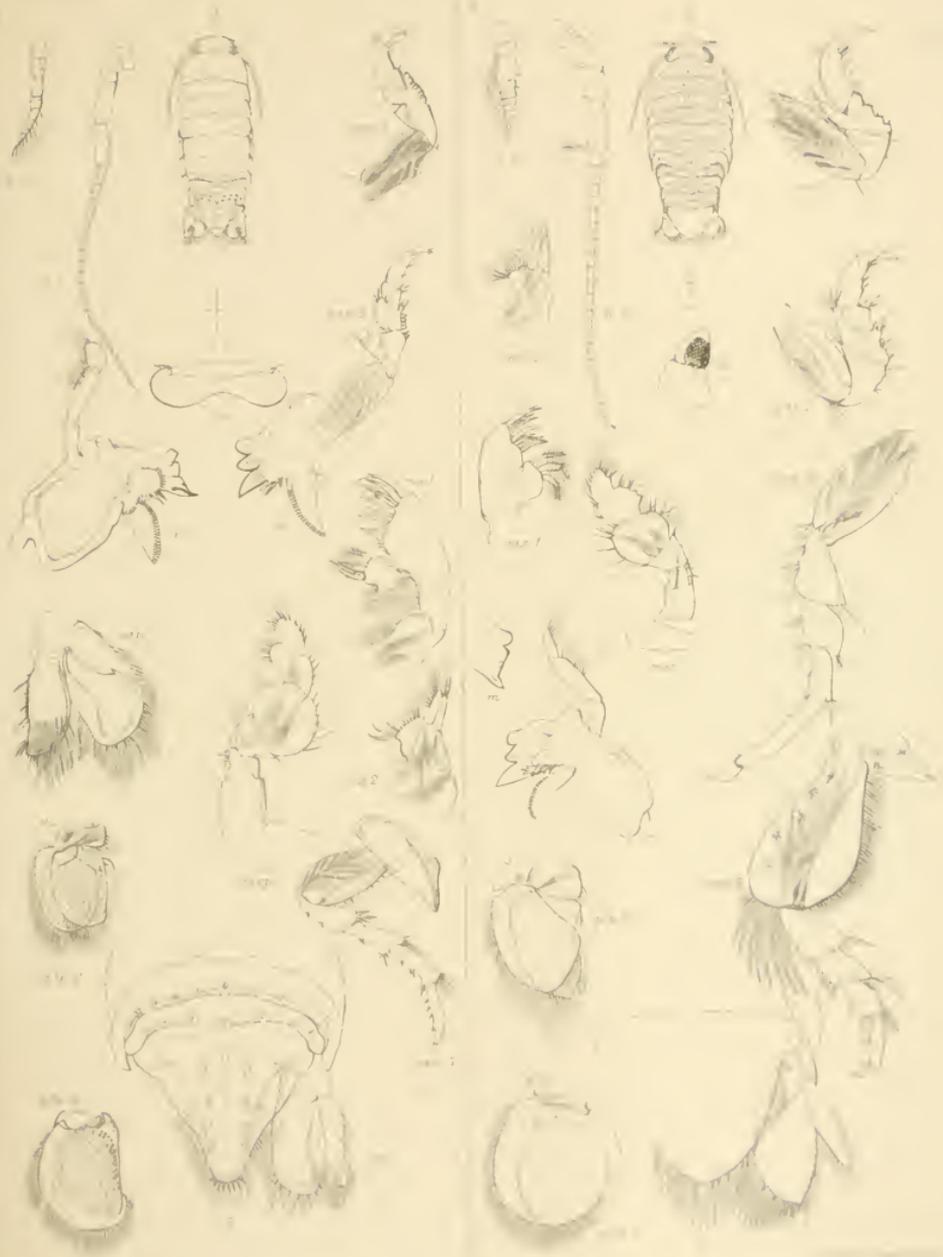
Maxillipeds. These have the fifth joint much wider than the fourth, with seven setae on its outer margin, and its inner apex a little emarginate; the sixth and seventh joints each have five setae on the outer margin.

First gnathopods. The fourth joint on its inner margin has six short blunt-headed spines attached to the inner surface, four ordinary spines attached to the outer surface; the fifth joint is triangular, small, almost embedded in the inner surface of the fourth, and somewhat under-riding the sixth, which has on its inner margin three spines, the apical the largest.

Second gnathopods. These are rather longer and more slender than the first; the third joint has at the inner apex two spines, the upper of which is button-like, scarcely at all projecting; the fourth joint has four blunt spines, and a little apart from them a stout apical spine; the fifth joint is short, not overlapped by the fourth, and not under-riding the sixth.

First pereopods. These closely resemble the second gnathopods.

Second to fifth pereopods. These are nearly alike except in length, the fourth being the longest; all having numerous apical spines on the third, fourth, and fifth joints; the second joint is smooth except in the fifth pair, which has a scanty supply of setae on its outer margin.



Pleopods. The peduncle is broader than long, with four uncinatè spines on the inner margin of the first and second pairs, 6 in the third, 3 in the fourth, none in the fifth; below the hooks in the second pair there are five spine-like setae. In the first four pairs both rami are partially fringed with plumose setae; in the last three pairs the outer ramus has a transverse suture. The male appendage of the second pair is straight except at the point of attachment, and has a subacute apex, which reaches little beyond the inner ramus. In the fifth pair the peduncle has a pointed outer apex, and the inner ramus sends up a process in front of the peduncle's inner margin.

Uropods. The peduncle strongly produced, its apical part fringed on the inner margin with plumose setae; the inner ramus reaching beyond the telson, its broadly rounded, strongly fringed distal part having eight or nine spines among the plumose setae; the outer ramus much narrower and slightly shorter: its outer margin coarsely serrate, nearly straight, with a few spines and setae, the apex a little notched; the inner margin and the distal surfaces crowded with plumose setae.

Length, 8.5 mm.; breadth rather more than a third of the length.

Habitat. New Britain, Blanche Bay, at 100 fathoms depth, and at 60 fathoms. Those from the greater depth, as preserved, have brown eyes and dark dorsal markings, those from the smaller depth have black eyes, but are otherwise quite pale in colour.

The specific name refers to the richness of detail in the pleon, beautiful to observe, but rather too much of a good thing for the efforts of an ordinary pencil.

CIROLANA ALBICAUDATA, n. sp.

Plate LXVII B.

Head broader than long, little immersed, rostral point minute. Segments of peraeon broad, not very unequal in length, first the longest. Anterior side-plates oblong, those of seventh segment produced acutely backward, but not beyond the first segment of the pleon, which is well displayed. Second to fourth segments of pleon slightly, and fifth considerably, narrower than first. Terminal segment below insertion of the uropods narrowing with gently convex sides to a subacute apex, its lower part fringed with long plumose setae and eight spines.

Eyes large, dark, distant, subquadrangular, broader behind than in front, ocelli more than fifty in number.

First antennae short, moderately stout, second joint narrower than first or third, flagellum shorter than peduncle, tapering, seven-jointed.

Second antennae about half as long as the body, peduncle (as in *Cirrolana gracilis*, Hansen) having the third joint widest distally and the fourth widest proximally, the two subequal, each shorter than the fifth; flagellum twice as long as peduncle, with about twenty joints, many of them slender.

The left mandible has the two middle teeth of its cutting plate very flat and feebly separated. All the joints of the mandibular palp are narrow. The first maxillae have the usual three stout plumose setae on the inner plate; the outer is apically fringed with ten spines of unequal length, all slender, some pectinate. The maxillipeds

have the fifth joint rather broader than long, with four or five setae on its outer margin.

First gnathopods. The third joint is tipped with long setae on the outer apex, the fourth has its outer apex narrowly produced along the base of the sixth and tipped with slender spines or spine and spiniform setae, its inner margin carrying three stout spines and others of slighter dimensions; the fifth joint is quite small, under-riding the sixth, which has a row of four spines along the inner margin; the finger is long, tipped with a short nail.

The second gnathopods differ from the first in that the fifth joint is rather larger, not under-riding the sixth, and the outer process of the fourth only reaches the end of the fifth; the sixth joint has three spines along the inner margin. The finger is as long as the fifth joint.

First pereopods in close agreement with the second gnathopods.

The second to the fifth pereopods agree in general structure, but with considerable differences in size and other details. The second are much the smallest, and agree with the third in having the second joint narrowly oval, with very fine marginal and apical setae, while in the fourth and fifth pairs this joint is broad, especially at the lower part in the fifth pair, and is fringed with plumose setae all along the hind margin and with very long ones on the front apical margin. In all the pairs the third, fourth, and fifth joints are strongly spined; these joints are successively longer to the fourth pair, but in the fifth scarcely so long as in the third; the sixth joint is longest in the third pair and shortest in the fifth.

The second pleopods in the male have the stiliform process obtuse at the apex, and not quite so long as the inner ramus. The rami of the fifth pair are very broad: in the outer the transverse suture is only faintly perceptible.

Uropods. The peduncle, with a few setae on its inner margin, is produced on the inner side well to the middle of the inner ramus, which is more than twice as broad as the outer, and without being much longer reaches much beyond it, as well as somewhat beyond the telson. On the distal half or two-thirds it is fringed with long plumose setae, intermingled with spines, five on the convex serrate inner margin, and three on the much straighter outer margin, these margins meeting in a subacute apex. The slender outer ramus is similarly armed.

The whole of the back is thickly sprinkled with dark stellate markings to the end of the fifth pleon segment, the compound terminal segment except just at the base and the uropods being quite clear of markings and colour, a peculiarity to which the specific name alludes.

Length, 4.5 mm., breadth nearly half the length.

Habitat. Barawon, Blanche Bay, New Britain.

The species that most nearly approach the present one are *Cirolana neglecta*, Hansen, from the Mediterranean, *Cirolana gracilis*, Hansen, probably from the West Indies, and *Cirolana latistylis*, Dana, from Straits of Balabac, north of Borneo. *C. neglecta* is thrice as long; *C. gracilis*, which is 8 mm. long, has the second joint of the fifth pereopods no wider than that of the third; so that these cannot well be confused with the species above described. Dana's species, however, being only 'three lines long' or a

quarter of an inch, is not put out of court by any great superiority of size. Unluckily Dana has only given a rather meagre description of it and no complete figure. But he states that the first pleon segment is nearly concealed under the peraeon, that the uropods do not reach beyond the telson, and that their setae are not half as long as the rami. In these respects, therefore, it differs from our species. His account of the legs is obscured by what must be a misprint. He says of them that 'the fourth joint of the third pair is a little shorter than either the third or fifth pairs, and longer than the tarsus.' If the word 'pairs' has slipped in by mistake where 'joint' was intended, the passage would mean, according to our enumeration of limbs and joints, that in the first peraeopods the fifth joint is shorter than the fourth or the sixth, which would be a character common to several species, but it would further mean that the fifth joint is longer than the seventh. This interpretation will agree with Dana's figure of the limb, but that figure shows the fourth joint only a little way produced over the outer margin of the fifth, instead of to its extremity as in our species.

CIROLANA ORIENTALIS, Dana.

1853. *Cirolana orientalis*, Dana, U. S. Expl. Exp., vol. 13, pt. 2, p. 773, pl. 51, fig. 7 a—d.

1890. *Cirolana orientalis*, Hansen, Cirolanidae, p. 117, pl. 4, fig. 4—4h, in K. D. Vid. Selsk. Skr., Ser. 6, vol. 3, p. 353.

As pointed out by Hansen, there are two striking features in this species. "The head is produced in front into a large, advanced process, apically dilated, coalesced with the frontal plate, and truncate in front," and the uropods are peculiar, the inner ramus being emarginate on its outer edge, and the outer ramus, which is the longer, having its outer edge bare. Dana's figures show the cephalic process but ignore the emargination of the uropod, which was perhaps regarded as an accidental malformation of the ramus. The terminal segment has a pair of well-marked pits or depressions near the base.

Hansen describing a subadult female, gives fifteen joints for the flagellum of the first, and twenty-one for that of the second antennae. His specimen was 10.8 mm. long. In a specimen 12 mm. long, I find the flagellum of the first antennae having on one side seventeen, on the other only twelve joints, in each case the joint next the peduncle being extremely short. Corresponding to these two respectively, the flagella of the second antennae had twenty-four and twenty-five joints.

The cutting edge of the right mandible is formed of three large approximate teeth, the uppermost rounded, the other two triangular. In the left mandible between the rounded upper and the triangular lower tooth there is a broad low tooth giving a very different appearance to the cutting edge of this organ.

In the maxillipeds the second joint is much the longest, apart from its produced plate, which is also long, armed with several plumose setae and near its rounded apex with a single strong hook; the fifth joint is much larger than the sixth.

The specimens were labelled as surf isopods, Conflict Group, New Guinea. A single specimen was from 'Isle of Pines.'

CIROLANA MINUTA, H. J. Hansen.

1890. *Cirolana minuta*, Hansen, Cirolanidae, p. 111 (K. D. Vid. Selsk. Skr. p. 347), pl. 3, fig. 5—5 *d*, pl. 4, fig. 1—1 *f*.

The frontal plate has an acuminate horn at its base, a distinctive character but not especially easy to observe. Hansen describes and figures the peduncle of the first antennae as two-jointed. In the specimen here referred to his species there are two short joints followed by a long one, the first joint the thickest; the flagellum has nine joints, the last two very small. In the second antennae one of the flagella has seventeen joints, the other twenty-one; Hansen gives seventeen or eighteen joints.

The right mandible has the upper tooth of the cutting edge blunt, the next triangular, short, the lowest triangular, long; in the left mandible the blunt upper and sharp lower tooth are both small, with a rather long low obscurely bipartite ridge between them. The other mouth-organs are in close agreement with Hansen's figures. The vibrating plate of the second joint of the maxillipeds has only about eight setae on the outer margin, and they are rather coarsely plumose. The large size of the fifth joint is characteristic.

In this species the second joint of the sixth and seventh paraeopods is not adorned with long plumose setae.

In the uropods the inner ramus is longer and much broader than the outer; both have the apex bifid. Under slight pressure the inner ramus reaches very distinctly beyond the last caudal segment, whereas Hansen speaks of that segment as reaching a very little beyond the uropods, no doubt indicating the appearance without pressure.

Length of specimen, 3.75 mm.

Habitat. Sandal Bay, Lifu, Loyalty Islands.

The possibility is open that this species may be identical with the incompletely described *Cirolana latistylis*, Dana.

HANSENOLANA, n. g.

Mouth-organs as in *Cirolana*. Head wider in front than behind. Segments of pleon widening to the fourth, which conceals the angles of the fifth. First gnathopods complexly subchelate, much larger than any of the following limbs of the peraeon. All the pleopods with the peduncle broader than long and with both rami membranaceous, the peduncle of the first pair with eight uncinat spines on the inner margin.

As well from *Cirolana* as from its neighbouring genera *Conilera* and *Eurydice* the new genus is distinguished in a marked manner by the character of the first limbs of the peraeon. Among the species of *Cirolana* the aberrant *C. sphaeromiformis*, Hansen, makes the nearest approach to the new genus by the general shape and some peculiarities of the head and pleon.

The name of the genus is framed in compliment to H. J. Hansen, whose work has shed so much light on the structure of the Cirolanidae and the nearly related families.

HANSENOLANA ANISOPOUS, n. sp.

Plate LXVIII A.

Head twice as broad as long, more than half as broad as the peraeon, deeply immersed, front broader than the straight hind margin, truncate, but with small rostral point and the lateral angles rounded, surface wrinkled. Peraeon only slightly convex, first segment the largest, wrinkled, its front angles much produced, rounded, second segment the shortest, the rest subequal, with hind margins faintly nodulose, the side-plates successively more acute and reaching further beyond their respective segments, those of the seventh segment overlapping the fourth pleon segment completely. Pleon broad, widening to the fourth segment. first segment and angles of second and fifth concealed, angles of the fourth reaching the apices of the side-plates of the seventh peraeon segment, fifth segment at the middle rather longer than the fourth. Terminal segment with a breadth at its base more than twice its length, which exceeds that of the four preceding segments combined, sides curved, apex slightly curved, less than half the basal breadth. Earlier segments of pleon have a median lobe which narrows to the base of the terminal segment, thence to the apex forming a low carina. By help of the second antennae above and the uropods below the whole body is strikingly parallel-sided; many parts of it carrying small hairs.

Eyes placed at the antero-lateral corners of the head, small, but with several (about eighteen) ocelli.

First antennae shorter than the peduncle of the second, very slender, first joint the longest, width not uniform, second shorter and much narrower, followed by what appears to be an extremely short third peduncular joint, flagellum seven-jointed, a little shorter than the first, a little longer than the second, joint of the peduncle. But this account must be modified if, as is quite probable, the first joint of the peduncle is composite, representing the first and second joints in coalescence.

Second antennae. Peduncle much stouter than in first pair, third and fourth joints equal, fifth a little longer than either, flagellum slender, as long as the peduncle, twenty-one-jointed.

Frontal lamina widening to the rounded apex, its base perhaps concealed by a rounded median projection of the wide, very short epistome. Upper lip broad and short.

Mandibles. The trunk from a broad base narrows to the cutting edge, which on the right mandible is divided into three strong unequal teeth, on the left has a couple of denticles at the top and a tooth below. *In situ*, as described by Hansen for the Cirolanidae in general, the cutting edge of the right mandible is covered by that of the left. The blade-like molar has the usual row of teeth within the thin convex front edge; between this and the cutting edge is the part called 'lacinia mobilis' by Hansen, here surrounded by eighteen spines and preceded by a thin, slightly spinulose lobe, apparently attached to the cutting edge. Second joint of palp longer

than first or third, not strongly armed, third joint with an even row of short spines and one or two long ones at the apex. Anterior articular condyle not very prominent.

First maxillae. Inner plate with three apical setae or spines and a slender sub-apical one; outer plate with nine strong spines distinguished.

Second maxillae. Inner plate (lacinia of second joint) apically fringed with about eight spinules and two long feathered setae; outer plates (lacinia of third joint divided into two branches, according to Hansen) are very short, each surmounted with a couple of setae; of these plates, so far as I can discern, only the inner is here articulated.

Maxillipeds. First joint forming a small setose projection in front of the second, its epipod forming a broad projection behind it, this also carrying four small setae; second joint a little longer than broad, its plate carrying one or two hooked spines on the inner margin, a simple spine on the surface and plumose setae at the apex; third joint broader than long, as also are the three following joints, of which the first is cup-shaped, the second the largest, and all have marginal setae; the seventh joint is narrowly oval, with setae on the hind margin and apex.

First gnathopods. These, when *in situ*, largely conceal the mouth-organs, the third joints meeting just over the peduncular part of the maxillipeds. They are much more massive than any of the following limbs, which on the ventral surface of the animal are wide apart. Second joint substantial, more than twice as long as broad, third about half as long, fourth short but wide, receiving in a sort of cup the somewhat cup-shaped short and wide fifth joint, which on the inner margin forms a blunt tooth or lip, over which the long and strong finger projects, the broad oval sixth joint having its inner margin broken into two tooth-like processes, each like the lip of the fifth joint carrying a minute spine. The arrangement of these last three joints produces a 'complexly subchelate' grasping apparatus, in which the blunt inner apex of the fourth joint may perhaps take a share, for the point of the finger appears to approach it near enough to assist in holding an intervening object. Generally in the Cirolanidae the first three pairs of limbs are in near agreement.

Second gnathopods, with all the joints attached end to end, none of them notably setose or expanded or under-riding or over-riding a succeeding joint. Second joint more than twice as long as third, which is subequal to fourth plus fifth, fourth longer than fifth, with three short stout spines near the base and three near the apex of its inner margin, fifth joint with one such spine at the inner apex, sixth joint longer than fifth or than the little curved bidentate finger. In *Cirolana borealis* (Lilljeborg) the fourth joint over-rides the fifth, in *C. sphaeromiformis* the fifth under-rides the sixth.

Fifth pereopods. These differ little from the second gnathopods, except that the second joint is rather shorter and stouter, the fifth joint longer, the sixth narrower and not longer than the fifth. The fourth and fifth joints have one or two spinules at the apex on each margin, but the fourth joint is without the stout spines observable on the inner margin of the second gnathopod.

Pleopods. The peduncle of the first pair carries eight uncinatè spines, of the second six or seven with two slender spines or setae, of the third five, of the fourth three uncinatè spines with two plumose setae, the spines being longer than those of the

A

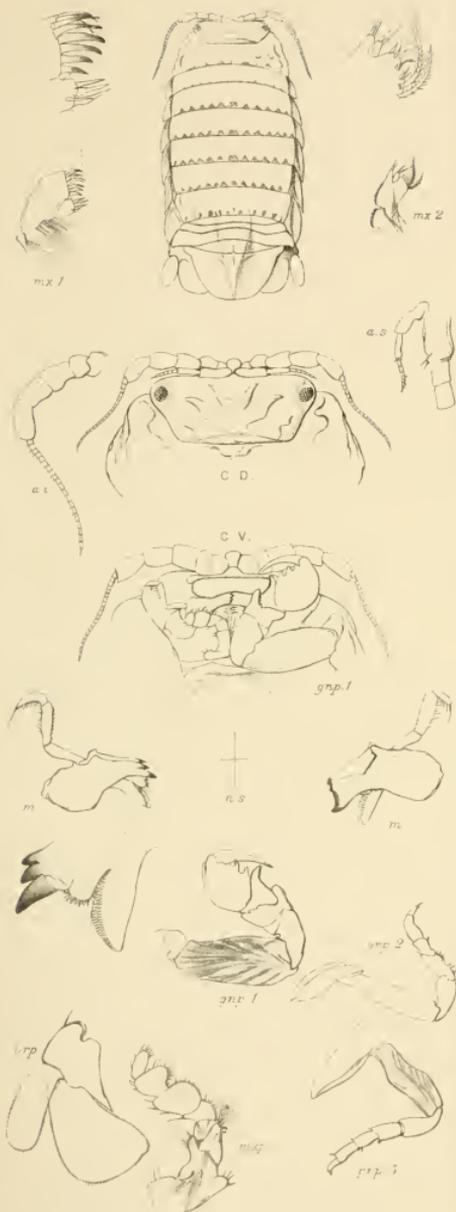
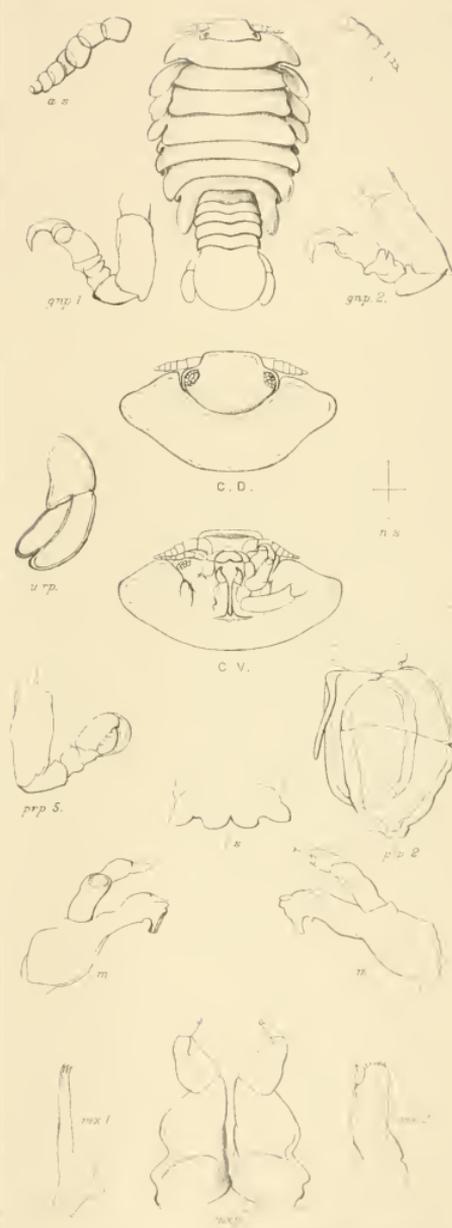


FIGURE 10A

Hensenotera arthropus n.g et sp.

B



Hensenotera pseudochelone n.sp.

preceding pleopods. The peduncles of the fifth pair are less prominent than those of the fourth and are perhaps unarmed. The plates of the first and second pleopods are narrower than those of the following pairs, and both inner and outer plates have some plumose setae. In all the inner plate is smaller than the outer: in the last three pairs it is without setae, and in these pairs the outer plate has a transverse suture.

Uropods. The peduncle has its inner margin acutely produced to about the middle of the very broad inner ramus, which does not reach the end of the pleon. The outer ramus is rather more than twice as long as broad, oblong, with rounded apex, shorter than the inner ramus, which widens distally till it is twice as wide as the outer. Both curve a little inward.

Length, 10 mm., breadth, 5 mm.

Habitat. Isle of Pines, south of New Caledonia.

The specific name, from the Greek *ἀνίσοππος*, unequal-footed, refers to the characteristic size of the first legs, which in this family is rather remarkable. The spelling *anisopos* is preferred to *anisopus*, to preclude if possible the atrocity of *anisopa*, as a supposed correction to agree with the generic termination.

FAM. ALCIRONIDAE.

1890. *Alcironidae*, H. J. Hansen, Vid. Selsk. Skr., Ser. 6, vol. 3, pp. 285, 312, 390.

1893. *Alcironidae*, Stebbing, History of Crustacea, Internat. Sci. Ser., vol. 74, pp. 341, 346.

To this family Hansen assigns his own two genera *Alcirona* and *Lanocira*, *Tachaea* of Schiödte and Meinert, and possibly Kossmann's *Corilana*. The limbs of the peraeon are without long natatory setae.

GEN. ALCIRONA, Hansen.

1890. *Alcirona*, Hansen, *loc. cit.*, pp. 313, 391.

1893. *Alcirona*, Stebbing, *loc. cit.*, p. 346.

The clypeus is broadly crescent-shaped. The genus contains apparently four species, *krebsii* and *insularis* of Hansen, together with that named *Ega multidigita* by Dana, and that named *Cirolana multidigitata* by Miers.

ALCIRONA INSULARIS, Hansen.

1890. *Alcirona insularis*, Hansen, Cirolanidae, pp. 51, 155, 157, pl. 8, fig. 2—2n, in K. D. Vid. Selsk. Skr., Ser. 6, vol. 3, pp. 287, 291, 393.

In his very much larger species, *Alcirona krebsii*, out of seven examples Hansen describes and figures a male, probably adult, 9.2 mm. long, and a great non-ovigerous female 18 mm. long. These are contrasted in shape by the circumstance that the

peraeon segments of the female are much narrower and, except the first, much longer than those of the male. Of *Alcirona insularis* he had at command three specimens, but those comprised no female, were not fully grown males, and were not all exactly alike. They ranged in size from 3·7 to 5·1 mm., the longer ones having more joints in the antennal flagella, the telson distally more narrowed, and a greater hirsuteness on the hinder half of the body. The shape is likened to that of *Cirolana parva*, so that these young males, as also the figure shows, are in agreement with the male of *Alcirona krebsii* in general appearance.

Two specimens were obtained by Dr Willey which do not seem easily separable from Hansen's *insularis*. They are a male and a female, both adult, the former about 5 mm., the latter about 4 mm., in length. But the singular thing is that here it is the male which has the segments of the peraeon much narrower and longer than those of the female, just the reverse of what is found in *Alcirona krebsii*, and this singularity remains whether the identification of the specimens with Hansen's species be valid or not. There are certain differences to be noted, but these may well be attributed to the maturity of the specimen.

The male differs from the female not only in the proportions of the peraeon, but also in the pleon, the penultimate segment of which has a small projecting tubercle in the middle of the hind margin while the triangular terminal segment is distally very narrow, its serrate sides and spinulose truncate point being girt with plumose setae. Down the centre there is a low ridge. On the seventh joint of the first gnathopod the four teeth are less erect than in Hansen's figure, lying in the direction of the nail and being successively larger. Those of the second gnathopod are a little smaller but have otherwise the same character. Also in both gnathopods there are six or seven little nodular teeth fringing the inner margin of the sixth joint. The spines of the fourth joint in the gnathopods and also in the first peraeopods are very stout. The second pair of pleopods are just like those figured by Hansen for the male of *Alcirona krebsii*.

The female specimen had the marsupium filled with twelve large oval hardened eggs, two of them brown, the rest pale. The general habit was like that of the young male, but with the telson distally more narrowed than in Hansen's figures. The first antennae have the first joint thickened at the base, much shorter than the second, the third joint in one antenna equal to the first joint of the five-jointed flagellum, in the other antenna shorter than that joint. The second antennae in both sexes have 20—21 joints in the flagellum. In the maxillipeds of the female the broad vibratory lamina of the second joint reaches slightly beyond the rather narrow palp. In the gnathopods the seventh joint has two minute teeth followed by a longer one adjoining the nail, much like the formation in the first peraeopods of the male. In the female all the peraeopods have the finger with its margin simple except for a prominence at the base of the nail.

Habitat. Blanche Bay, New Britain, 15—20 fathoms.

Ega multidigita, Dana, 6·3 mm. long, from Balabac Passage, north of Borneo, is certainly an *Alcirona*, and may possibly be identical with the present species. In the terminal segment it agrees fairly with the account of the male pleon above given, but the size and shape of the body differ; the proportions of the first antennae, and the

teeth on the fingers of the gnathopods cannot be reconciled with my descriptions, and there is no tubercle on the penultimate segment of the pleon.

FAM. CYMOTHOIDAE.

1890. *Cymothoidae*, Hansen, 'Cirrolanidae,' Vidensk. Selsk. Skr., Ser. 6, Naturv. Afl., vol. 3, pp. 316, 406.
 1895. *Cymothoinae*, Hansen, Isop. Cumac. Stomat. Plankton-Exp., pp. 12, 14.
 1897. *Cymothoinae*, Hansen, Bull. Mus. Comp. Zool. Harvard, vol. 31, no. 5, p. 101.
 1899. *Cymothoidae*, Harriet Richardson, Proc. U. S. Mus., vol. 21, p. 828.
 1900. *Cymothoidae*, Harriet Richardson, The American Naturalist, vol. 34, p. 219.
 1900. *Cymothoidae*, Stebbing, Marine Investigations of South Africa, Crustacea, p. 55.

Having so recently discussed the fuller synonymy of this group, I may here limit myself to repeating that the family in Hansen's acceptance includes the Anilocridae, Saophridae, and Cymothoidae of the Monographia Cymothoarum by Schiödte and Meinert.

GEN. ANILOCRA, Leach.

1818. *Anilocra*, Leach, Dict. Sci. Nat., vol. 12, pp. 348, 350.
 1818. *Canolira*, Leach, Dict. Sci. Nat., vol. 12, pp. 348, 350.
 1881. *Anilocra*, Schiödte and Meinert, Mon. Cymothoarum, Nat. Tidsskr., Ser. 3, vol. 13, p. 100.
 1899. *Anilocra*, H. Richardson, Proc. U. S. Mus., vol. 21, p. 830.
 1900. *Anilocra*, H. Richardson, The American Naturalist, vol. 34, p. 220.
 1900. *Anilocra*, Stebbing, Marine Investigations of South Africa, Crustacea, p. 56.

Other references are supplied in the last cited memoir. *Canolira* has what is called page precedence over *Anilocra*, from which Leach distinguished it by the single feature that the rami of the uropods are almost equal, of moderate length, with the inner ramus slightly the longer, while in *Anilocra* the rami are unequal, elongate, the outer the longer. This difference being untenable as a generic character, the two genera coalesce, and *Canolira* as standing first would naturally have become the generic name, but the only species which Leach assigns to it, *Canolira rissoniana*, of unknown habitat, seemingly has not been identified, so that the name *Anilocra*, with which Leach connected some well-ascertained species, has properly been adopted.

ANILOCRA DIMIDIATA, Bleeker.

1857. *Anilocra dimidiata*, Bleeker, Crust. Ind. arch., p. 31, pl. 2, fig. 10—10 a.
 1880. *Anilocra dimidiata*, Miers, Ann. Nat. Hist., Ser. 5, vol. 5, p. 462.
 1881. *Anilocra dimidiata*, Schiödte and Meinert, Mon. Cymothoarum, Nat. Tidsskr., Ser. 3, vol. 13, p. 111, pl. 8 (15), figs. 5, 6.

Schiödte and Meinert, from whom I have borrowed the reference to Bleeker, place side by side *leptosoma* and *dimidiata* as two species of *Aniloera*: having in common geniculate first antennae, side-plates not carinate and the fingers of the first four pairs of legs inflated in the middle. The ovigerous female of *A. leptosoma* is described as attaining a length of 33·5 mm., with a body long elliptic, three or four times longer than broad (almost as 10 : 3). The ovigerous female of *A. dimidiata* has assigned to it a length of 26·5 mm., with a body elliptic, scarcely three times as long as broad (20 : 7). But Miers gives the length of this species as an inch and a third, therefore practically as long as *A. leptosoma*. A specimen in Dr Willey's collection is 35 mm. long by 10 mm. broad. Consequently the shape is not a distinguishing character between the two species. The points on which I rely for identifying Dr Willey's specimen with *A. dimidiata*, as described by Schiödte and Meinert, are the following. It has the 'front margin of the first peraeon segment manifestly trisinate, with the lateral sinuses much deeper than the middle sinus,' the sides of the fifth pleon segment 'deeply, angularly incised,' and the terminal, obscurely carinate, segment not produced into an apical point. To these features may perhaps be added the character that the uropods extend very slightly beyond the telson. According to Schiödte and Meinert they do not quite reach the end of the telson in *A. dimidiata*, while in *A. leptosoma* the inner ramus reaches far beyond it. Koelbel in his *Aniloera alloceraea* speaks of the two rami as nearly equal and both reaching somewhat beyond the telson. His species is confidently identified with *A. leptosoma* by Schiödte and Meinert, and doubtfully by Miers. The latter author (*loc. cit.* p. 463) says, 'Bleeker, it may be observed, notes that the uropoda in *A. leptosoma* do not reach beyond the extremity of the terminal post-abdominal segment; in his figure, however, they are represented as distinctly longer than this segment, in this particular agreeing both with Köbel's description of *A. alloceraea* and with the specimen before me.' It may be remarked that the extension of the uropods in relation to the telson is not always easy to determine, as the appearance varies, according as the rami are directed inward or outward, and according to the amount of flattening to which the specimen is exposed.

In the specimen 35 mm. long the young could be perceived through the partially pellucid plates of the marsupium. These showed the head between the dark eyes thickly covered with dark stellate markings. A second specimen measures 22 mm. by 6·25 mm., and a third 15 mm. by about 4·5 mm.

Habitat. One label in the bottle with these specimens read, 'Cymothoa off fish called Losilili. Karuana, Nov. 1895,' the other, 'D'Entrecasteaux group. British New Guinea.'

GEN. RENOCILA, Miers.

1880. *Renocila*, Miers, Ann. Nat. Hist., Ser. 5, vol. 5, p. 464.

1884. *Renocila*, Schiödte and Meinert, Mon. Cymothoarum, Nat. Tidsskr., Ser. 3, vol. 14, p. 414.

According to Miers, 'this genus, in all its characters, is most nearly allied to *Aniloera*, from which it is distinguished by its broad non-inflexed front, the greatly produced postero-lateral angles of the three posterior thoracic segments, and the greatly

dilated superior antennae.' According to Schiödte and Meinert, it is not to *Anilocra*, but to *Nerocila* that it stands nearest, though easily distinguished from that genus by the character of the antennae, and many other points. While Miers includes in the generic character 'the front not produced inferiorly, so as to conceal the bases of the antennae,' the other authors give 'frons prosiliens, declivis, fornicata, scaposa antennarum magnam partem obtegens.' This concealment, in fact, as often, only applies to the dorsal view. Miers, in describing the type species, *Renocila ovata*, assigns to the head a 'straight anterior margin, which is inflexed, but not produced so as to conceal the bases of the antennae,' and this is evidently more accurate than the expression 'non-inflexed' in the generic account.

The mouth-organs not discussed by the above-named authors. In respect to the upper lip, the two maxillae, and to some degree the maxillipeds, these agree with the figures of those parts in Savigny's Egyptian Crustacea, pl. 11, fig. 10, assigned by Audouin to *Anilocra cuvieri*, Leach, but copied by Guérin, Iconographie, Crust., pl. 29, fig. 4, for his *Canolira aegyptiaca*. Seeing that Guérin expressly says that his species has the outer ramus of the uropods a little longer than the inner, and *Canolira* is distinguished by Leach from *Anilocra* by the single character that the inner ramus is the longer, Guérin's species cannot be a *Canolira*, and that genus appears to be untenable for want of any real definition.

RENOCILA PERIOPHTHALMI, n. sp.

Plate LXVIII B.

Head broader than long, front slightly inflexed, truncate with rounded angles; breadth abruptly increasing at the eyes. Body smooth; pereon broad, only slightly convex, length of segments in medio-dorsal line least in the seventh, greatest in the first, which is nearly approached by that of the fourth; obtuse-ended side-plates of second and third segments reaching beyond the lateral angles; those of the fourth about, or not quite, level with those angles, those of the three following segments successively much smaller and not nearly reaching the angles, which are successively more produced backward, those of the last segment very obtuse and overlapping the first three segments and nearly all the fourth of the abruptly narrowed, and in dorsal view, parallel-sided pleon. The first segment of the pleon is rather longer than any of the four following; all are obtusely angled medio-dorsally; their side-plates bend abruptly downward and then a little outward, being successively smaller, and in the fifth segment not reaching the dorso-lateral angles. The terminal segment is flat, broader than long, strongly rounded except at the base, so as to have an almost circular appearance; its length equals that of the other pleon segments together.

Eyes rather obscure, small, distant, with about ten ocelli.

First antennae stout, not geniculate, the two basal joints clearly distinct, the third abruptly wider than the second, the seventh much narrower than the sixth but still broader than long, the eighth minute.

Second antennae quite concealed in dorsal view, much shorter and narrower than the first, consisting of seven joints, none very large.

Upper lip with distal margin forming four well separated blunt teeth or lobes.

Mandibles. Cutting edge broad, produced downward in a long blunt tooth or process, not strongly chitinized, and showing above a tooth which seems to stand free, but from the curvature of the plate has its bearings obscured; palp is planted rather far back, first joint very large, second smaller but still rather large, and attached angularly below the apex of the first, third small, tipped with one or more setules. On the left mandible this joint in our specimen carries four setules and is narrower and less conical than on the right, but the differences may be accidental.

First maxillae. The slender plate is tipped with four small curved spines.

Second maxillae. The apex is unequally divided between the little inner plate and the broad outer, the former carrying one, and the latter two or three extremely small hooked spines and others still smaller that are not hooked.

Maxillipeds. Second joint the largest, with very convex outer margin, the third broadly tapering, the fourth small, bent inward and tipped with a little outward pointing hooked spine.

The limbs of the trunk differ little in length. They have the second joint parallel-sided, the fourth and fifth very short, the sixth with an almost circular apex overlapping the base of the finger, the finger geniculate in the first four pairs, in the last three simply but strongly unciniate, not longer than the sixth joint.

The second pleopods have the stiliform process shorter than the outer ramus, and the much larger inner ramus has a faint transverse suture above the middle.

The uropods have the peduncle slightly produced at the inner apex, the rami slightly curved, blunt-ended, the outer the longer, reaching nearly the end of the terminal segment of the pleon.

Length, 12 mm., breadth, 6.25 mm.

Habitat, Lifu, parasitic on *Periophthalmus*, whence the specific name.

Renocila ovate, Miers, attains a length of 24 mm. Schiödte and Meinert say that it has the terminal segment much longer than broad, once and a half as long as the other pleon segments united. Yet they also say that it is transversely suboval, and Miers says that it is almost semicircular in outline, giving a figure in which it is decidedly broader than long. The postero-lateral angles of the seventh peraeon-segment reach its base, which is not the case in the other two species of the genus. *Renocila indica*, Schiödte and Meinert, attains a length of 18 mm., and has the fingers of the trunk-limbs elongate, those of the first pair being much longer than the sixth joint.

GEN. MEINERTIA, Stebbing.

1893. *Meinertia*, Stebbing, History of Crustacea, Internat. Sci. Ser., vol. 74, p. 354.

1899. *Meinertia*, H. Richardson, Proc. U. S. Mus., vol. 21, p. 829.

1900. *Meinertia*, H. Richardson, The American Naturalist, vol. 34, p. 220.

1900. *Meinertia*, Stebbing, Marine Investigations of South Africa, Crustacea, p. 57.

The name of this genus takes the place of *Ceratothoa*, Schiödte and Meinert, which is distinct from the earlier *Ceratothoa* of Dana.

MEINERTIA GAUDICHAUDII (Milne-Edwards).

1840. *Cymothoa Gaudichaudii*, Milne-Edwards, Hist. Nat. Crust., vol. 3, p. 271.
 1868. *Ceratothoa rapax*, Heller, Reise Novaræ, Crust., p. 146, pl. 12, fig. 17.
 1883. *Ceratothoa Gaudichaudii*, Schiödte and Meinert, Naturhist. Tidsskr., Ser. 3, vol. 13, p. 335, pl. 13 (20), figs. 11—15, pl. 14 (21), figs. 1—5.
 1893. *Meinertia Gaudichaudii*, Stebbing, History of Crustacea, Internat. Sci. Ser., vol. 74, p. 354.
 1899. *Meinertia gaudichaudii*, H. Richardson, Proc. U. S. Mus., vol. 21, p. 829.

Two specimens labelled 'Parasites from floor of mouth of *Tetrodon Panaieti*,' agree very closely with the description and figures of the adult male of this species given by Schiödte and Meinert. Yet there are some small differences. In the first antennæ there are eight joints instead of seven. The front margin of the first peraeon segment is in the middle more broadly and deeply concave. In the last peraeopod the hind margin of the second joint is much less convex than in the figure. The fifth segment of the pleon has its hind margin bisinuate rather than deeply quadrisinuate. The terminal segment is not slightly carinate, nor is it manifestly longer than the rest of the pleon segments combined. The inner branch of the uropods is a little shorter instead of longer than the outer, and both branches are apically blunt. The authors quoted give the length of the adult male as 13—32 mm., and, as the specimens here described have a length of only 13 mm., it is probable that some of the differences mentioned would have disappeared with increase of size. It must, however, be observed that the terminal segment in Schiödte's and Meinert's own figure is shorter than the other pleon segments combined. Several species in the genus have eight-jointed first antennæ, but none of these combine the obtusely fronted head with the subtrapezoidal terminal segment of the present species. *Cinusa tetrodontis*, Schiödte and Meinert, of which it is said that the female with the male has pretty often been taken in the mouth or jaws of *Tetrodon Honckenii* Bl., has the first antennæ seven-jointed, the second ten-jointed, and the head, sides-plates, and terminal segments differently shaped from those of *Meinertia gaudichaudii*.

FAM. SPHAEROMIDAE.

1847. *Sphaeromidae*, White, List of Crustacea in the British Museum, p. 102.
 1900. *Sphaeromidae*, Stebbing, Proc. Zool. Soc. London, p. 552.

I have so recently given numerous references to authorities on this family, that it seems unnecessary here to repeat them.

GEN. CILICAEA, Leach.

1818. *Cilicæa*, Leach, Dict. Sci. Nat., vol. 12, pp. 341, 342.
 1825. *Cilicæa*, Desmarest, Consid. gén. Crust., p. 295.
 1838? *Cilicæa*, Guérin-Méneville, Iconographie Règne Anim., Crust., pl. 30 (*Cilicæa* in text, p. 30, with correction of erroneous numbering on plate).

1840. *Nesea* (part), Milne-Edwards, Hist. Nat. Crust., vol. 3, p. 218.
 1881. *Cilicæa*, Haswell, Proc. Linn. Soc. N. S. Wales, vol. 5, p. 475, vol. 6, p. 2.
 1882. *Cilicæa*, Haswell, Catal. Australian Crust., p. 295.
 1886. *Cymodocea*, Beddard, Challenger Reports, vol. 17, Isopoda, p. 145.
 1893. *Cilicæa*, Stebbing, History of Crustacea, p. 364.
 1900. *Cilicæa*, Harriet Richardson, The American Naturalist, vol. 34, pp. 222, 224.

In a synoptic table of the Sphaeromidae Miss Richardson distinguishes *Cilicæa* as having 'outer branch of the uropoda not rudimentary,' 'only the external branch of the uropoda projecting and exposed; outer branch incapable of folding under inner'; 'all the thoracic segments of equal length. Penultimate abdominal segment in male generally produced in spine. Terminal segment excavated with or without median lobe.'

If, however, the figures given by Desmarest and Guérin of the type species can be trusted, that has the first peraeon segment decidedly longer than the others, nor will equality of the peraeon segments apply to any one of the six species described by Professor Haswell. Mr Beddard considers that both *Cilicæa* and *Nesea* are synonyms of *Cymodoce*, but while so little is known as at present about the mouth-organs of the numerous species, speculation as to their generic position seems useless.

CILICÆA TENUICAUDATA, Haswell.

1881. *Cilicæa tenuicaudata*, Haswell, Proc. Linn. Soc. N. S. Wales, vol. 5, p. 475, pl. 17, fig. 2.
 1882. *Cilicæa tenuicaudata*, Haswell, Catal. Australian Crust., p. 295.

Having had no opportunity of examining any other specimen of this genus it is only provisionally that I assign the solitary one in Dr Willey's collection to Professor Haswell's species. It agrees in almost all respects remarkably well with his description and figures, but under the microscope the tuberculation, especially of the pleon, is scarcely to be called obscure; the first antennæ have 10—11, and the second 14—15, joints in the flagella (whereas Haswell says, flagella of antennæ each with about ten articuli); and the long ramus of the uropods has the apex oblique, more as in figure of *C. crassicaudata*, Haswell, not bifurcate as in both figure and description of *C. tenuicaudata*. The eyes are large and deeply let into the front of the large first segment of the peraeon. The long, apically bifurcate process of the pleon is ventrally clothed with hair or stiff but fine setæ. The length, 7.5 mm., agrees nearly with the five-sixteenths of an inch given by Haswell.

At the tip of one uropod is a little foraminifer. The apices of both uropods and of the pleon process were grouped about this object, as if engaged either in securing it or attempting to dislodge it. In this position the uropods seemed as if they were bifurcate, but not so when separated.

Habitat. Blanche Bay, New Britain, 40—50 fathoms. Taken by trawl.

ONISCOIDEA.

ISOPODA TERRESTRIA.

1825. *Oniscoides*, Latreille, Fam. Nat. du Règne Animal, p. 297.
 1853. *Oniscoidea* (part), Dana, U. S. Expl. Exp., Crust., p. 713.
 1876. *Oniscoidea*, Miers, Crust. N. Zealand, p. 94.
 1882. *Oniscoidea*, Sars, Christiania Vidensk. Forh., No. 18, p. 58.
 1885. *Isopoda terrestria*, Budde-Lund, Monograph.
 1893. *Oniscoidea*, Stebbing, History of Crustacea, p. 420.
 1898. *Oniscoidea*, Sars, Crustacea of Norway, vol. 2, pt. 9, p. 153.
 1900. *Oniscoidea*, H. Richardson, The American Naturalist, vol. 34, p. 301.
 1900. *Oniscoidea*, Stebbing, Proc. Zool. Soc. London, p. 563.

This group answers to the Cloportides of Latreille and Milne-Edwards, and under various headings has been in recent years largely illustrated by the well-known writings of M. Adrien Dollfus. Budde-Lund in 1885 uses the term *Oniscoidea* in a much restricted sense, as the second section of his family Onisci.

FAM. LIGIDAE.

1855. *Ligiæ* (part), Budde-Lund, Isopoda terrestria, p. 242.
 1893. *Ligiidae* (part), Stebbing, History of Crustacea, p. 420.
 1898. *Ligiidae*, Sars, Crustacea of Norway, vol. 2, pt. 9, p. 155.
 1900. *Ligiidae*, H. Richardson, The American Naturalist, vol. 34, p. 306.

In 1898 Sars restricted this family by separating from it several genera which he allotted to a new family Trichoniscidae. With rapidly increasing knowledge of the terrestrial isopoda some changes in classification cannot fail to ensue, although the discoveries which necessitate the separation of groups are always liable to be counterbalanced by others which tend to reunite them.

GEN. LIGIA, J. C. Fabricius.

1798. *Ligia*, Fabricius, Supplementum Ent. Syst., p. 301.
 1833. *Ligia*, Brandt, Bull. Soc. Nat. Moscou, vol. 6, p. 171.
 1853. *Lygia*, Dana, U. S. Expl. Exp., Crust., p. 716.
 1879. *Ligia*, G. M. Thomson, Trans. N. Zealand Inst., vol. 11, p. 232.
 1885. *Ligia*, Budde-Lund, Isopoda terrestria, p. 258.
 1893. *Ligia*, Dollfus, Feuille des Jeunes Naturalistes, Ser. 3, Année 24, No. 273.
 1899. *Ligia*, Chilton, Ann. Nat. Hist., Ser. 7, vol. 3, p. 197.

Budde-Lund cites the spelling *Lygia* also from Roux, 1828. Dollfus distinguishes this genus as neither terrestrial nor marine, but maritime, as living not in the sea but on its lips. Chilton's paper is on the sexual characters of *Ligia oceanica*. Budde-Lund referring, confessedly at second hand, to Thomson's *Ligia quadrata*, gives the habitat as Australia. It should be Dunedin, New Zealand.

LIGIA VITIENSIS, Dana.

1853. *Lygia vitiensis*, Dana, U. S. Expl. Exp., Crust., p. 741, pl. 49, fig. 5 a, b.

1885. *Ligia vitiensis*, Budde-Lund, Isopoda terrestria, p. 271.

Dana's single specimen from 'the Feejees' was 'mutilated in its last abdominal segment, besides wanting the stylets and antennae.' In all Dr Willey's specimens the stylets are unfortunately missing. The eyes are large, widening outward, the space between them more than half the horizontal length of the eye, not less than half as in Dana's *Ligia hawaiiensis*. The second antennae in natural position reach back to the beginning of the pleon; the last joint of the peduncle is considerably longer than the penultimate; the flagellum is rather longer than the peduncle, with 28 to 30 joints. In the last two pairs of trunk legs, that is, the fourth and fifth peraeopods, there is a tuft of hairs on the hind margin at the base of the double unguis. The terminal segment of the pleon has the postero-lateral angles rather long, acute, but otherwise its apical border is very unlike that described and figured by Dollfus for *Ligia exotica*, Roux, the extremity being as Dana says 'very low, triangular' and the intermediate angles being, as his figure shows, quite blunted down. This margin and the sides of the segment carry minute spinules, of which two flank the little apical emargination or notch. Dana speaks of the surface of the body as quite smooth, but there are scattered hairs in our specimens. Colour, the usual diversified iron grey.

Length, from front of head to end of telson, 13—17.5 mm., only a single specimen attaining the latter dimensions. For *Ligia exotica* Budde-Lund gives 20—30 (—35) mm. for the length.

Habitat. Matadona, China Straits, British New Guinea. 'From face of cliff, with fresh water species, far above tide-mark.'

FAM. ONISCIDAE.

1885. *Onisci* (Section II.), Budde-Lund, Isopoda terrestria, p. 75.

1893. *Oniscidae*, Stebbing, History of Crustacea, p. 426.

1898. *Oniscidae*, Sars, Crustacea of Norway, vol. 2, p. 169.

1900. *Oniscidae*, H. Richardson, The American Naturalist, vol. 34, p. 302.

Budde-Lund's family Onisci comprises two sections, the Armadilloidea and Oniscoidea, corresponding to the two families Armadillidiidae and Oniscidae. In the latter group he includes a genus *Oniscus*, which he divides into five subgenera, *Oniscus*, *Philoscia*, *Alloniscus*, *Lyprobius*, *Scyphax*. It is by most writers, I believe, thought more convenient to regard all these as independent genera. Budde-Lund himself assigns twenty-three species to *Philoscia*, and several have been added since his book was published.

GEN. PHILOSCIA, Latreille.

1804. *Philoscie* (probably misprint for *Philoscia*), Latreille, Hist. Nat. Crust. et Insectes, vol. 7, p. 43.

1810. *Philoscia*, Latreille, Consid. gén. Crust., Arachnides, Insectes, p. 110.
 1813. *Philoscia*, Leach, Edinb. Encycl. (Art. Crustaceology), vol. 7, p. 406.
 1825. *Philoscia*, Desmarest, Consid. gén. Crustacés, p. 318.
 1833. *Philoscia*, J. F. Brandt, Bull. Soc. Nat. Moscou, vol. 6, p. 182.
 1840. *Philoscia*, Milne-Edwards, Hist. Nat. Crust., vol. 3, p. 163.
 1868. *Philoscia*, Bate and Westwood, Brit. Sess. Crust., vol. 2, p. 448.
 1880. *Philoscia*, Harger, Rep. U. S. Comm. Fisheries, pt. 6 for 1878, p. 305.
 1885. *Philoscia*, Budde-Lund, Isopoda terrestria, pp. 201, 207.
 1893. *Philoscia*, Stebbing, History of Crustacea, Internat. Sci. Ser., vol. 74, p. 430.
 1897. *Philoscia*, Dollfus, Feuille des Jeunes Naturalistes, Ser. 3, 27^e Année, No. 317
 (Tableau icon. des *Philoscia* d'Europe).
 1898. *Philoscia*, Sars, Crustacea of Norway, vol. 2, p. 172.
 1900. *Philoscia*, Harriet Richardson, The American Naturalist, vol. 34, p. 303.

In this genus the antennae are comparatively smooth, the first maxillae have several spines on the apex of the outer plate, and the inner ramus of the uropods is slender, these being characters in which it differs from the genus next to be discussed.

PHILOSCIA GRACILIS, Budde-Lund.

1879. *Philoscia gracilis*, Budde-Lund, Prospectus Crust. Isop. terrestrium, p. 2.
 1885. *Philoscia gracilis*, Budde-Lund, Isopoda terrestria, p. 220.

A single specimen, without antennae or uropods, appears to belong to this species, which I only know from the second work above cited. 'The fifth segment of the pereon almost entirely black-brown' among the others that are much marbled with white is rather a striking characteristic. The length of the specimen, however, is only about 6 mm., whereas Budde-Lund's from the Island of Upolu was 10 mm.

Habitat. Lifu, Loyalty Islands.

PHILOSCIA TRUNCATA, Dollfus.

1898. *Philoscia truncata*, Dollfus, Zool. Ergebn. Niederländisch Ost-Indien, vol. 4, p. 376, pl. 15, fig. 23, and in text fig. 23 a, 23 b.

The shape and colouring of the specimens agree very exactly with the figure on Dollfus' plate, the seventh segment of the pereon having the postero-lateral angles notably truncate, with the whole of each corner pale in contrast with the dark hue otherwise prevailing. A specimen 8 mm. in length, which is the length given by Dollfus for specimens from Celebes and Flores, has the caudal segment apically sub-obtuse; in a smaller specimen, only 5 mm. long, this segment would rather be described as obtuse at the apex.

Habitat. New Britain.

PHILOSCIA LIFUENSIS, n. sp.

Plate LXIX B.

The surface scabrous with minute, sparsely planted hairs, some of them occurring between the lenses of the eyes. Bent part of the occiput forming a dark border to the head in a ventral view. First three segments of the peraeon with the hind margin very slightly sinuous, last segment the longest, none with acute angles, all pale in front, and darkly marbled behind. Pleon abruptly narrowed, short, the caudal segment much broader than long, very obtuse at the apex.

Eyes with several ocelli, probably about sixteen. Second antennae missing.

First maxillae with the outer plate rather narrow, apically bent, the apex carrying eight spines, the outermost the largest, several bifid, the setulose fringe of the concave distal part of the outer margin having its little setules much longer at the extremities than in the middle portion. The maxillipeds have a minutely spinulose surface.

Uropods. Peduncle reaching beyond the telson, channelled on the outer edge, intermediate in length between the two lanceolate rami, which are attached on a level, the slender inner one three-fifths of the length of the more robust outer one, both spinose. Rami and peduncle alike are microscopically fringed at the inner margin.

Colour of dark portions blackish or purplish grey.

Length, 4.2 mm., breadth, 1.4 mm. *Philoscia weberi*, Dollfus, 1898, from Sumatra, is 5.5 by 2.4 mm., has no dark band on the middle segment of the peraeon, the dark bands on the first three segments in the front instead of at the back, and, judging by the figure, has a long pleon, not a short one. In other respects it shows agreement with the form here described.

Habitat. Lifu, Loyalty Islands. Specific name from place of capture.

PARAPHILOSCIA, n. gen.

In general agreement with *Philoscia*, but distinguished by the spinose second antennae, first maxillae with only three apical spines on the outer plate, and the uropods with laminar inner ramus, and each ramus terminating in a pencil of setae.

The spinose somewhat geniculate antennae and the long setae at the tips of the uropods recall the features of *Trichoniscus*, but connexion with that genus is excluded by the mouth-organs, the eyes with numerous ocelli and the telson not truncate.

PARAPHILOSCIA STENOSOMA, n. sp.

Plate LXIX C.

Head with deflexed front. Peraeon narrow, nearly parallel-sided, the earlier segments a little shorter and broader than the hinder ones. Pleon abruptly narrower, slightly tapering; anterior margin of the first segment seen through the overlapping hind margin of the seventh peraeon segment gives the appearance of a segment too many. Caudal segment twice as broad as long, subacutely triangular.

Eyes with about twenty-one ocelli. First antennae minute, first joint subequal to the

second and third united. Second antennae with the three joints of the flagellum subequal, and together equal to the last joint of the peduncle, which is slightly longer than the penultimate, and considerably longer than the antepenultimate. Upper lip with convex distal margin. First maxillae with two short thick plumose setae on the inner plate, three spines on the apex of the outer, one of them considerably stouter than the other two; the outer margin of the apical part is very feebly fringed, the inner margin carries some setules. The second maxillae have the apex divided between a very small process and a rather broad plate. In the maxillipeds the epipod is more than two-thirds as long as the large second joint, which is capped by a small apically rounded almost unarmed plate; the palp is a little shorter than the plate, though reaching beyond it with its curved apical seta.

The legs are rather spinose, with the second joint not very large, but the third to the fifth stout, the sixth being abruptly narrower; the finger is slender, with two setules on the inner margin.

Uropods. The peduncle reaches little beyond the caudal segment, and is equal in length to the finely fringed inner ramus, which is not quite twice as long as broad, though seen edgewise it gives a very different impression. It is inserted a little in front of, and is about three-fifths as long as, the lanceolate outer ramus.

Colour, uniform light brown.

Length, 3.60 mm., breadth, about 1.15 mm.

Habitat. New Britain.

"*Oniscus? angustus*," Dana, from Tierra del Fuego, shows some resemblance to this species, for which I had at first chosen the same specific name. Dana's specimen, which was more than twice as long, had lost the antennae and uropods,

FAM. ARMADILLIDIIDAE.

1885. *Onisci* (Section I), Budde-Lund, *Isopoda terrestria*, p. 14.

1893. *Armadillidiidae*, Stebbing, *History of Crustacea*, p. 432.

1898. *Armadillidiidae*, Sars, *Crustacea of Norway*, vol. 2, pt. 11, p. 187.

1900. *Armadillidiidae*, H. Richardson, *The American Naturalist*, vol. 34, p. 305.

Brandt in 1833 divides his group *Armadillina* into two sections, the first *Armadillidia*, containing only his genus *Armadillidium*; the second *Cubaridea*, containing his two genera, *Cubaris* and *Diploexochus*. Both sections are united in the present family.

GEN. CUBARIS, Brandt.

1833. *Cubaris*, J. F. Brandt, *Bull. Soc. Nat. Moscou*, vol. 6, p. 189 (*Conspectus Monographiae Crustaceorum Oniscodorum Latreillii*).

1833. *Armadillo*, Brandt, *ibid.*, p. 191.

1833. *Diploexochus*, Brandt, *ibid.*, p. 192.

1840. *Armadillo*, Milne-Edwards, *Hist. Nat. Crust.*, vol. 3, 177.

1840. *Diploexochus*, Milne-Edwards, *ibid.*, p. 180.

1840? *Pentheus*, C. L. Koch, *Deutschlands Crustaceen, Myriapoden und Arachniden*, Heft 34, No. 1 (*Herrich-Schäffler*, Heft 180, No. 1).

1843. *Armadillo*, Krauss, Die Südafrikanischen Crustaceen, p. 63.
 1847. *Armadillo*, White, Crust. Brit. Mus., p. 100.
 1853. *Armadillo*, Dana, U. S. Expl. Exp., vol. 13, p. 715.
 1853. *Spherillo*, Dana, *ibid.*, pp. 715, 719.
 1853. *Diploeochochus*, Dana, *ibid.*, p. 715.
 1859. *Pyrgoniscus*, Kinahan, Proc. Dublin Univ., vol. 1, p. 199.
 1868. *Spherillo*, Heller, Reise der Novara, Crust., p. 134.
 1876. *Armadillo*, Miers, Catal. Crust. New Zealand, p. 94.
 1876. *Cubaris*, Miers, *ibid.*, p. 95.
 1876. *Spherillo*, Miers, *ibid.*, p. 96.
 1877. *Cubaris*, Miers, Proc. Zool. Soc. London, p. 664.
 1877. *Orthonus*, Miers, *ibid.*
 1879. *Armadillo*, Budde-Lund, Prospectus Isopodam terrestrium.
 1885. *Armadillo*, Budde-Lund, Isopoda terrestria, pp. 15, 50, 282.
 1887. *Armadillo*, Dollfus, Bull. Soc. d'études sci. de Paris (Crust. isop. terrestres).
 1893. *Cubaris*, Stebbing, History of Crustacea, Internat. Sci. Ser., vol. 74, p. 432.
 1898. *Armadillo*, Dollfus, Zool. Ergebnisse Niederländisch Ost-Indien, vol. 4, p. 358.
 1898. *Cubaris*, Sars, Crustacea of Norway, vol. 2, p. 188.
 1900. *Cubaris*, Harriet Richardson, The American Naturalist, vol. 34, p. 305.

This genus now contains so large a number of species that its subdivision would be a matter of convenience. In the synonymy there are several names inviting employment for such a purpose. Unfortunately they were introduced before the necessities of the case were well understood, so that in general they are rather a stumbling-block than an assistance. The use of the name *Cubaris* itself requires vindication, especially as it has been discarded both by Gustav Budde-Lund and by Adrien Dollfus, two writers to whom science is so deeply indebted for extended and more intimate acquaintance with the land Isopoda of the world. The name *Armadillo* to which those authors give the preference was introduced by Latreille in 1804, Hist. Nat. des Crustacés, vol. 7, p. 47, with the three species, *vulgaris*, *variegatus*, *maculatus*. But by Budde-Lund the first two of these are included in the genus *Armadillidium*, and the third is considered not to be an isopod at all. All three are referred to *Armadillidium* by Dollfus. For these authorities, therefore, *Armadillo* ought to disappear. They, like Brandt, base it upon a species called *Armadille des boutiques* by Duméril in 1806 (*officinalis*, Desmarest, Consid. gén. Crust., p. 323, *officinatum*, Brandt, loc. cit., p. 191), which, as Miers remarks, had not been described when Latreille founded the genus, so that, as Duméril's *Armadillo* is generically distinct from Latreille's, it falls to the ground as a preoccupied name. Latreille's *Armadillo*, it is true, has precedence of Brandt's *Armadillidium*. But there is fair reason for maintaining that Latreille's *Armadillo* is also preoccupied. The name was used for a quadruped by Brisson in 1756, and the second enlarged edition of Brisson's Regnum Animale in 1762 retains the name (see p. 23) in preference to the *Dasyppus* of Linnaeus. No doubt Brisson was not uniformly consistent in the use of the recently-introduced binomial nomenclature, but he does not transgress it in any of his seven species of *Armadillo*, except that he leaves the first without any

specific name, as *the Armadillo*, which does not seem a bad notion for indicating the type of a genus. In any case it should be remembered that in the Stricklandian Rules of 1842 Brisson is expressly mentioned as one whose defined genera had a title to recognition, though the same indulgence was not to be extended to his species, even when their designations 'are accidentally binomial in form.' Latreille himself admits preoccupation of the name in its French form, for in 1804, loc. cit., p. 63, when establishing the myriapod genus *Glomeris*, he says that its formation is due to Cuvier, 'qui l'avoit nommé *armadille*' (Journ. d'hist. natur. tome II. p. 27).

In the Règne Animal, vol. 4, p. 144, 1829, Latreille assigns to his *Armadillo* species belonging to both Brandt's genera *Armadillidium* and *Armadillo*, and it is perhaps for this reason that Budde-Lund suggests that Latreille's original *Armadillo vulgaris* may have been a collective species, from which Brandt had a right to extract the later *Armadillo officinalis* as a type of the genus. But Latreille defining *Armadillo* in 1829 expressly says that the last segment is triangular, a shape of the telson which excludes Duméril's species, and entails the alternative of either substituting *Armadillo* for *Armadillidium* or relinquishing *Armadillo* altogether.

It may be worth explaining, in regard to terminology, that Dollfus distinguishes in the epistome three portions, first, the proepistome, which is the upper boundary, in this genus not unfrequently advanced in front of the cephalic 'front,' secondly, the mesepistome, a middle region, in or on which lie the basal joints of the second antennae, and thirdly, the metepistome, a lower transverse piece, flanked by lobes at its upper corner, and bearing below it the labrum or upper lip.

CUBARIS CINCTUS (Kinahan).

Plate LXIX A.

1859. *Pyrgoniscus cinctus*, Kinahan, Proc. Dublin Univ., vol. 1, p. 200, pl. 19, fig. A—f.

1885. *Armadillo translucidus*, Budde-Lund, Isopoda terrestria, p. 290.

It is not without some hesitation that I identify the form here described with Budde-Lund's species from Noumea, New Caledonia. The Danish author states that the last joint of the peduncle in the second antennae is almost three times as long as the flagellum. that the eyes are large, with rather large, subglobose ocelli, twenty or more in number; and that the colour is yellow, sprinkled with numerous black or blackish spots and dots, being in particular black with confluent spots in the middle of the fifth, sixth and seventh segments of the peraeon and at the sides of the third, fourth and fifth segments of the pleon. In these respects his specimen is not in agreement with Dr Willey's. But the agreement otherwise is so very close that separation seems unadvisable. Budde-Lund in his Monograph, p. 46, speaks of knowing Kinahan's *Pyrgoniscus* by the description, but curiously leaves his readers without any clue to the terms of it, which he had probably himself forgotten when describing *Armadillo translucidus* in the appendix to his own work.

Kinahan's specimen from 'the Eastern seas' was without the second antennae,

and we are not told that its mouth-organs were examined. Yet the placing of the species in a new genus, if not quite tenable, was not without plausibility, for it does not conform to one of the prominent characters assigned to the Armadillidiidae, that of being contractile into a globular shape. The flattening of the head and tail and sides prevents this, and the creature doubles up instead of rolling up, the side-plates of the peraeon, especially those of the third and fourth segments, becoming conspicuously imbricated. In any future subdivision of the genus *Cubaris*, Kinahan's *Pyrgoniscus* should be taken into account.

In the following description the sentences in inverted commas are translated from Budde-Lund.

Body "oblong oval, rather convex, subopaque, very minutely squamose and punctate."

Eyes not very large, oval, with rather small ocelli, 15—17 in number.

First antennae, as usual minute, third joint a little longer than the second, with some apical and subapical setules.

Second antennae. Last joint of peduncle about twice as long as each of the three preceding joints and as the flagellum, "first joint of flagellum not half as long as the second."

"Clypeus with large, oblong, roundly subrectangular lobes." This is the part called by Dollfus the metepistome, which supports the labrum. Between the transverse plate and the upper antennae, as shown in the ventral figure of the head, there are two outward-directed horns or lobes.

"Epistome [prosepistome of Dollfus] with its upper margin reaching much in advance of the front, the middle faintly cleft and sub-bipartite by a longitudinal suture. Front behind the plate of the epistome excavate in the middle." This laminar expansion in front of the 'front' by its great size and central cleft is the most striking feature of the species.

The labrum or upper lip is transversely and narrowly oval. The lower lip has two broad contiguous lobes, with a central conical inner plate.

The cutting edge of the mandibles is tridentate, powerful, darkly coloured like the secondary plate, which is also strong; near to these is what Sars describes as a membrauous hairy lappet and a group of setae, and a little more remote a re-curved much subdivided seta.

The first maxillae have two short thick plumose setae on the inner plate, and on the outer ten spines very unequal in length and thickness.

The second maxillae have the apex divided into two lobes of very unequal breadth.

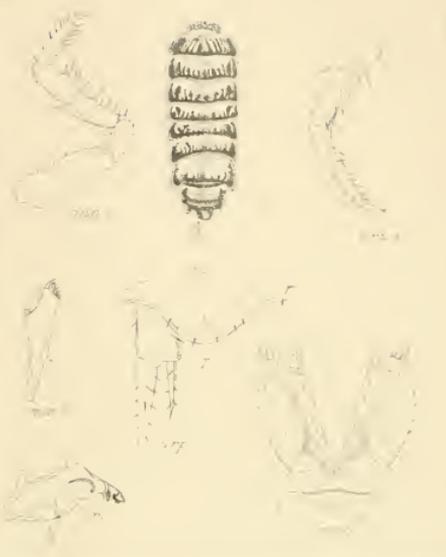
Maxillipeds. The epipod is produced along the side of the large second joint, and is slightly folded, and perhaps expanded at the apex. The small plate on the inner apical margin of the second joint has a straight inner and convex outer margin, with three spinules on its crenulate distal margin. It is fully as long as the small two-jointed palp, which has two spinules on the transverse first joint and four on the rounded triangular second.

"Segments of the peraeon with thin translucent side-plates. Side-plates of the



Calliphora vicina
Linn. arch.

1868



Protonotaria thomasi
Pleschinsk. & Fiedler & G. 1890

1890

first three segments with a small, inferior, tooth. Hind margin of the anterior segments, especially the first, sinuated on each side, the hinder angles of the first segment acute. The first segment longer and larger than the rest, in the middle sub-bulbose, produced. Legs slender." By the 'small, inferior, tooth' I understand that to be intended which I have shown in the ventral figure of *per. s. 1*; it is produced backward at the sinuate point of the hind margin on either side. The spinnulation of the slender legs is sufficiently shown in the figures *gmp. 1* and *ppp. 5*.

"Side-plates of the third, fourth, and fifth segments of the pleon broad, rectangular, widening outward. Anal segment a little wider than long, narrowed in the middle, having at the base a longitudinal fluting, the apex convexly truncate; the peduncle of the uropods oblong, much longer than broad, at the apex a little narrowed; outer ramus small, inserted far from the apex in the incisure of the inner margin of the peduncle; inner rami much shorter than the anal segment." The longitudinal stria or fluting may easily be overlooked in consequence of the colour variegation.

Colour in our specimens forming throughout a dark ground of brown and blackish brown confluent spots, marbled with light markings, which in many parts, especially on the sides, take the form of bright round or rounded dots; under side and legs pale, as is also the dorsal connecting skin between the segments shown in flexure.

Length, 10—12 mm., breadth, 5—6.25 mm. Budde-Lund gives length, 11.5 mm., breadth, 5.5 mm., height, 2.7 mm.

Habitat. Lifu, Loyalty Islands.

Miers (Proc. Zool. Soc. London, for 1877, p. 667), in his account of *Cubaris gigas*, from Nicaragua, remarks that 'in the prominent anterior margin of the head, beneath which the antennae are partly concealed, it resembles the genus *Pyrgomiscus*, Kinahan,' and this genus, he adds, 'is nearly allied to *Cubaris*.' In *C. gigas* the prominent margin of the head is represented without any median fissure.

CUBARIS LIFUENSIS, n. sp.

Plate LXX A.

Body minutely squamose, with microscopic scattered hairs, otherwise smooth. Head short and broad. Anterior margin of prosepistome rather convex, just forming a rim to the front of the head. First peraeon segment with front and hind margins strongly sinuous, anterior angles more acute than the posterior, lateral margins thin, in front slightly curving upward, a slight fold passing, at a little distance from the outer edge, from the front angle to a rounded ending some way short of the hinder angle. This fold is scarcely to be seen without dissection. The hinder angles of all the segments after the second are subquadrate, the second and third segments have a duplicature ending roundly half-way down, not adjacent to the lateral margin.

The eyes have ocelli in varying number, 16—22.

In the second antennae the penultimate joint is longer than either of the two preceding joints and slightly longer than the flagellum, which is two-thirds as long as the ultimate, and has a first joint only a little shorter than the second.

The terminal segment of the pleon has its base shorter but much broader than

its quadrate apical part, in which the sides are parallel, the distal margin a little convex. The uropods (seen from below) are as broad as long, the much narrowed distal part not closely filling the space between the terminal segment and its predecessor; the inner rami reach the end of the terminal segment, their apical setules being visible beyond it; the conical outer rami reach the end of their own peduncle.

Colour mottled with brown and yellowish markings of an ordinary type. Length, 11—12 mm.

Habitat. Lifu, Loyalty Islands. Budde-Lund's *Armadillo nigrinus*, of unknown habitat, probably from the Cape of Good Hope, seems to approach this species nearly, but it is described as very minutely granular, with the ordinary tuberculosities manifest on both sides of the body; with 20 or more ocelli to the rather large eyes, the terminal segment of the pleon scarcely broader than long, its rectangular apex longer than broad, slightly carinate longitudinally; the peduncle of the uropods much longer than broad, the colour grey, or grey-black, with paler sides. The side-plates of the (first) segment of the peraeon are said to be entire, thin.

CUBARIS DOLLFUSI, n. sp.

Plate LXX B.

This species makes the nearest approach to *C. simplex* (Dollfus), 1895, from North Madagascar, but is distinguished from it by the longer rami of the uropods, and as well by the anterior margin of the prosepistome as the apical of the caudal segment, both of which are straight in the species compared.

The present species has the body only moderately convex, minutely squamose. The prosepistome is well in advance of the front, broadly convex in the middle, with subacute lateral lobes. Eyes prominent, with about 18 ocelli. Second antennae have the penultimate joint of the peduncle much longer than either of the two preceding joints; rest missing.

First segment of peraeon, with front angles more rounded than the hinder, a little raised; the duplicature represented by a long ridge remote from margin ending in a small tooth; the two following segments each have a short ridge, ending in a tooth; the sides of the sixth and seventh segments are very much broader than those of the four preceding segments; in the pleon the third, fourth and fifth segments laterally widen outward.

The caudal segment is nearly as long as breadth at base, the basal part about one-third of the length, the subquadrate apical part with sides very slightly converging to a somewhat arched or obtuse-angled apex, thus supplying a form very unusual in this genus. The segment is not quite flat, but slopes a little from the middle to the sides.

The uropods with the narrow apical part do not completely fill the space between the terminal and preceding segments. The inner rami reach the apical margin of the caudal segment; the outer are slightly curved, more than half as long as the peduncle, being attached high up well within its margin, and reaching slightly beyond its apex, though falling considerably short of the inner rami.

The colour is brightly and on the whole symmetrically marbled with brown and yellowish tints. The head is rather dark, with a transverse pale line in two portions near the front and pale markings at the back. The legs are longitudinally striped above with brown. Length, 11 mm., breadth, a little over 5 mm.

Habitat. Lifu, Loyalty Islands.

This interesting species is named in compliment to M. Adrien Dollfus.

CUBARIS OFFICINALIS (Desmarest).

1825. *Armadillo officinalis*, Desmarest, Consid. gén. Crust., p. 323.

1833. *Armadillo officinarum*, Brandt, Bull. Soc. Nat. Moscou, vol. 6, p. 191, pl. 4, fig. 16, 17, 19.

1885. *Armadillo officinalis*, Budde-Lund, Isopoda terrestria, p. 16.

1890. *Armadillo officinalis*, Dollfus, Soc. d'études sci. de Paris, Juillet, 1890, p. 5.

Although this species belongs to the countries surrounding the Mediterranean, I feel obliged to assign to it specimens from the South Pacific, which are indeed smaller in size and different in colour, but otherwise show no appreciable differences that I can detect.

The body is very convex. The prosepistome is convex, scarcely passing beyond the front. The eyes are small, with about 12 ocelli. The second antennae have the earlier joints proportioned as in *C. dollfusi*, but the last joint of the peduncle and the flagellum rather longer than in that species, the first joint of the flagellum half as long as the second. The first segment of the peraeon has the lateral margins sulcate and cleft at the distal end; the duplicature is strongly expressed in the second segment. The broad short telson has the wide basal part slightly longer than the distal, of which the apical margin is very feebly convex. The uropods have a broad apical margin closely fitting between that of the caudal and fifth segments; the inner rami not reaching the apex of the telson, the outer minute, only visible above in a lateral pocket of the peduncle.

Colour mottled with dark brown and yellow, sometimes the brown prevailing, diversified with pale spots.

Length of largest specimen rolled up, 8 mm., unrolled it might be about 13 mm.

Habitat. Isle of Pines, South of New Caledonia.

Dollfus in 1892 describes 'a variety *ex colore*' from the Mount of Olives and other Syrian localities as *Armadillo officinalis*, var. *Syriaca*.

CUBARIS LUNDI, n. sp.

Plate LXX c.

Body very convex, squamose; each segment of the peraeon having on either side of the back a little pit with a small elevation in the middle of it.

Both front and hind margins of the head concave in the centre. The prosepistome follows the frontal curve, from which it is separated by a narrow groove.

The eyes are not very prominent, composed of numerous (about 27) small ocelli.

The second antennae are not elongate; the short flagellum is about three-quarters the length of the last joint of the peduncle; of the three preceding joints the middle one is the shortest, each of the others being about as long as the flagellum; first joint of the flagellum half as long as the second.

The first segment of the peraeon has the hinder angles broadly rounded, little produced; the duplicature extends from the front angle almost to the other extremity, and the lateral margin has the peculiarity of being broadest at the top, but, though the groove is so extensive, the actual cleavage at the distal end is not very long. The second segment has the duplicature well developed, but not externally conspicuous.

The caudal segment at the base is more than twice as broad as the total length, which is exceeded also by the slightly convex apical margin; the basal part of the segment is nearly as long as the distal, the short sides of which are only faintly divergent.

The uropods fill the space between the caudal segment and the fifth, their outer and distal margins forming a gentle, almost continuous, curve; the inner rami do not quite reach the apex of the telson; the outer are minute, invisible from below, being placed in a little dorsal pocket of the peduncle, at some distance from its apex.

Colour dull, mottled; the legs and parts of the pleopods rather thickly covered with brown markings, brighter than those on the back.

Length, 10 mm., breadth, 5 mm. The second specimen, a male, was rather smaller.

Habitat. New Britain.

The specific name is given in acknowledgment of the great assistance derived from Budde-Lund's work on the terrestrial Isopoda.

CUBARIS ZEBRICOLOR, n. sp.

Plate LXX D.

Body moderately convex, bordered with fine hairs, appendages extremely brittle. The prosepistome in frontal view convex, scarcely passing the front. The eyes not very prominent, with about 20 ocelli. Second antennae with flagellum three-fourths as long as ultimate joint of peduncle, this joint considerably longer than any of the three preceding, of which the middle one is the shortest; first joint of flagellum half as long as second.

First segment of peraeon with the lateral edge thickened, feebly sulcate above, with strongly marked duplicature below, the inner plate reaching as far back as the outer, with broadly rounded apex. In the second segment the duplicature is represented by a short tooth high up.

The caudal segment is not nearly twice as broad as long, the distal part a little longer than the broader basal part, sides strongly incurved, and then forming strongly rounded corners to the slightly convex apical margin.

The uropods are about equal in length and breadth, the inner rami falling a good deal short of the apex of the telson, the outer minute, on the dorsal surface of the peduncle adjacent to the telson just below its lateral emargination; the apex

of the peduncle of the uropods is narrow, its curve not sharply distinguished from the line of the outer side.

Colour, forming transverse bands of dark brown, clubbed at the ends, near the hind margin of the several segments. The mesepistome is also dark, and the front margin of the head and the first peraeon segment.

Length of a male specimen, 7.5 mm. by a breadth of 2.75. The specimen from which the figures were taken was rather larger.

Habitat. Lifu, Loyalty Islands.

The specific name refers to the strikingly contrasted light and dark bands of the dorsal colouring.

From the head to the caudal segment the dissected specimen was practically filled with the labyrinthine parasite represented on the plate, its orange coils firmly embracing the intestine.

AMPHIPODA,

FAM. TALITRIDAE.

1900. *Talitridae*, Stebbing, in 'Fauna Hawaiiensis,' p. 527.

Talitrus being the earliest of the genera accepted in this family, it seems right that the family name should be based upon it, in accordance with the example set by Achille Costa, who in 1857 introduced the name Talitriini.

GEN. PARORCHESTIA, Stebbing.

1899. *Parorchestia*, Stebbing, Trans. Linn. Soc. London, vol. 7, pt. 8, p. 402.

1900. *Parorchestia*, Stebbing, in 'Fauna Hawaiiensis,' p. 529.

PARORCHESTIA HAWAIENSIS (Dana).

1853. *Orchestia hawaiiensis*, Dana, U.S. Expl. Exp., Crustacea, p. 880, pl. 59, fig. 8, a—g.

1899. *Parorchestia hawaiiensis*, Stebbing, Trans. Linn. Soc. London, vol. 7, pt. 8, p. 402.

1900. *Parorchestia hawaiiensis*, Stebbing, in 'Fauna Hawaiiensis,' p. 529, pl. 21 c.

Dr Willey's specimens, which are of the female sex, were obtained at Lifu, Loyalty Islands.

FAM. RHABDOSOMIDAE.

1895. *Rhabdosomidae*, Stebbing, Trans. Zool. Soc. London, vol. 13, pt. 10, p. 366.

GEN. RHABDOSOMA, Adams and White.

1847. *Rhabdosoma*, Adams and White, in White's List of Crustacea in the British Museum, p. 138.

1848. *Rhabdosoma*, Adams and White, Zool. Voy. H.M.S. Samarang, p. 63.

1858. *Macrocephalus*, Bate, Ann. Nat. Hist., Ser. 3, vol. 1, p. 361.
 1862. *Rhabdosoma*, Bate, Catal. Brit. Mus. Amphipoda, p. 344.
 1887. *Rhabdonectes*, Bovallius, Bihang Vet.-Ak. Handlingar, vol. 11, No. 16, p. 39.
 1888. *Rhabdosoma*, Stebbing, Challenger Reports, vol. 29, Amphipoda, p. 1606.
 1890. *Xiphocephalus*, Bovallius, The Oxycephalids, R. Soc. Sci. Upsala, pp. 3, 116, etc.
 1895. *Rhabdosoma*, Stebbing, Trans. Zool. Soc. London, vol. 13, pt. 10, p. 367.
 1900. *Rhabdosoma*, Chevreux, Amphipodes de l'Irondelle, Rés. Sci. Prince de Monaco,

fasc. 16, p. 163.

Several other references, with full discussion of the genus and its name, will be found in the writings above cited under the dates 1888, 1890, and 1895.

RHABDOSOMA WHITEI, Bate.

1862. *Rhabdosoma Whitei*, Bate, Catal. Brit. Mus. Amphipoda, p. 345, pl. 54, fig. 7.
 1878. *Rhabdosoma Whitei*, Streets, Pr. Ac. Sci. Philad., p. 287, fig. 6.
 1887. *Rhabdosoma armatum* (part), Claus, Die Platysceliden, p. 74, pl. 25, fig. 1—6, pl. 26, fig. 5.
 1887. *Rhabdosoma Whitei*, Bovallius, Bihang. Vet.-Ak. Handlingar, vol. 11, No. 16, p. 39.
 1887. *Rhabdosoma investigatoris*, Giles, Journ. Asiat. Soc. Bengal, vol. 56, pt. 2, p. 219, pl. 4.
 1888. *Rhabdosoma armatum*, Stebbing, Challenger Reports, vol. 29, Amphipoda, p. 1607, fig. in text of *Rhabdosoma Whitei*, v. Willemoes Suhm.
 1890. *Xiphocephalus Whitei*, Bovallius, The Oxycephalids, R. Soc. Sci. Upsala, p. 125, pl. 7, fig. 1—20, and numerous figures in the text.
 1895. *Rhabdosoma Whitei*, Stebbing, Trans. Zool. Soc. London, vol. 13, pt. 10, p. 368.

Of this remarkable form two specimens, a male and a female, are included in Dr Willey's collection. They agree well with the elaborate details supplied by Dr Bovallius, except that the lower angle of the seventh segment of the peraeon is less acute than in the specimens he describes. The long fourth joint of the first, second, and third peraeopods is inflated and somewhat fusiform in the female, but that joint in the fourth peraeopods shows no inflation. Bovallius (p. 42, 1890) observes that in the females of the three species of this genus which he has examined the fourth and fifth joints of the first four pairs of peraeopods 'are sometimes inflated, and almost egg-shaped, owing to a strongly developed glandular mass surrounding the axis of the joint for the whole of its length.' But he supposes the inflation to be periodical, and to have some connexion with the fixation of the eggs on the underside of the body, as he has seen full-grown females without the inflation, but those with eggs or young ones always had it. So in the present specimen eggs can be seen in process of development within the body. In the male specimen, the nerve-apparatus of the eyes being broken, the prolonged ends of the pair of liver-tubes with their large conspicuous cells wear a striking appearance within the 'neck' of the head, as shown, though not very forcibly, in pl. 25, fig. 1, of Claus's Platysceliden.

Length of female, 55 mm., of male (with rostrum imperfect), 35 mm.

Habitat. Blanche Bay, New Britain.

ENTOMOSTRACA.

BRANCHIOPODA.

PHYLLOCARIDA.

1879. *Phyllocarida*, Packard, American Naturalist, vol. 13, p. 128.
 1883. *Phyllocarida*, Packard, U. S. Geol. Survey, vol. 12, p. 447.
 1887. *Phyllocarida*, Sars, Challenger Reports, vol. 19, Phyllocarida.

FAM. NEBALIIDAE.

1850. *Nebaliadae*, Baird, British Entomotraca, Ray Soc., p. 31.
 1853. *Nebaliadae*, Dana, U. S. Expl. Exp., Crust., p. 1305.
 1887. *Nebaliidae*, Sars, Challenger Reports, vol. 19, Phyllocarida, p. 6.
 1896. *Nebaliidae*, Sars, Fauna Norvegiae, vol. 1, p. 6.

Dana formed the opinion that *Nebalia* and *Chirocephalus* should be regarded as representative genera of two families in a common tribe. Claus considered that *Nebalia* could best be placed in a special group Leptostraca, between the Malacostraca and the Entomotraca.

GEN. NEBALIA, Leach.

1814. *Nebalia*, Leach, Zool. Miscell., vol. 1, p. 99.
 1896. *Nebalia*, Sars, Fauna Norvegiae, vol. 1, p. 7.

NEBALIA BIPES (O. Fabricius).

1780. *Cancer bipes*, O. Fabricius, Fauna Groenlandica, No. 223.
 1896. *Nebalia bipes*, Sars, Fauna Norvegiae, vol. 1, p. 9, pl. 1, fig. 1—3, pl. 2, pl. 3, pl. 4, fig. 1—8, pl. 5.

Synonymy and references to the important works on the species, genus and family by Krøyer, Claus, Metschnikoff, Packard, and others will be found in the Fauna Norvegiae or the Challenger Phyllocarida.

The specimens obtained by Dr Willey appear certainly to belong to this wide-ranging species. One set were labelled "Crustacea, etc. that feed on dead fish, etc. in the fish-traps. Lifu, Sandal Bay." Of these the largest scarcely exceeded a length of 6 mm., and many were much smaller. Another set came from Blanche Bay, New Britain, and were taken from 60 fathoms. Of these the largest reached a length of 7.5 mm. Baird gives a length of three-eighths of an inch for British specimens. Sars speaks of the species reaching a length of 12 mm.

OSTRACODA.

MYODOCOPA.

1894. *Myodocopa*, G. W. Müller, Fauna und Flora des Golfes von Neapel, Mon. 21, p. 202.

In 1865 G. O. Sars divided the Ostracoda into four sections, Podocopa, Mydocopa, Cladocopa, Platycopa. In 1896 this classification is retained by Brady and Norman. In the meantime G. W. Müller had reduced the four sections to two tribes, the Mydocopa and the Podocopa, the former including the Polycopidae, the single family of the Cladocopa, and the latter including the Cytherellidae, the single family which had constituted the Platycopa.

FAM. ASTEROPIDAE.

1896. *Asteropidae*, Brady and Norman, Trans. Royal Dublin Soc., Ser. 2, vol. 5, p. 628.

The genus for which this family was instituted is included by G. W. Müller in the Cypridinidae. But, as Brady and Norman say, "the family is widely separated from other *Mydocopa* by the peculiar structure of the three pairs of maxillae, and the presence of dorsal branchiae." They begin their account of the family with the character, "shell more or less oblong or elliptical," which well suits some of the species, but is not very applicable to the nearly circular shell of *Cylindroleberis Lobianci*, Müller. Whether the family name should be Asteropidae or Cylindroleberidae depends on the validity or the reverse of the generic name *Asterope*.

GEN. ASTEROPE, Philippi.

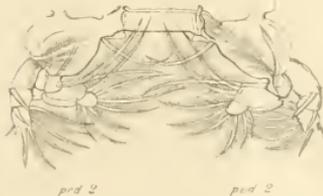
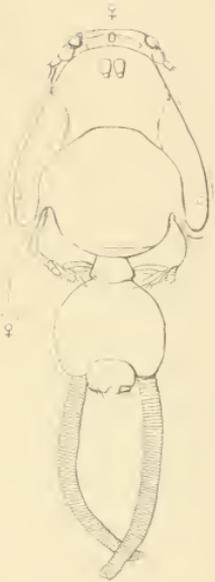
1840. *Asterope*, Philippi, Arch. Naturg., Jahrg. 6, p. 186.
 1868. *Cylindroleberis*, Brady, Intellectual Observer, vol. 12, p. 127.
 1868. *Cylindroleberis*, Brady, Trans. Linn. Soc., vol. 26, p. 464.
 1870. *Asterope*, Claus, Untersuch. Grundlage der Crustaceen-systems, p. 94.
 1879. *Copechaete*, Hesse, Ann. Sci. Nat., Ser. 6, vol. 7, p. 1.
 1887. *Asterope*, Sars, Arch. Naturv., vol. 12, p. 183 (Ostracoda Mediterranea, p. 11).
 1890. *Asterope*, G. W. Müller, Zool. Jahrbücher, vol. 5, p. 238.
 1894. *Cylindroleberis*, G. W. Müller, F. u. Fl. Golfes von Neapel, Mon. 21, p. 216.
 1896. *Asterope*, Brady and Norman, Trans. Royal Dublin Soc., Ser. 2, vol. 5, p. 629.

In 1840 the name *Asterope* was given to a genus of Echinodermata, which in the same year received independently a different name. But whether the ostracode was named *Asterope* by Philippi before the starfish was so named by Müller and Troschel remains obscure. Since the late Mr Sladen in his Challenger report relinquished the claim to the title *Asterope* for the starfish, and Dr Brady has relinquished his own claim to the title *Cylindroleberis* for the ostracode, it can scarcely be wrong for the present to follow Brady and Norman in adopting Philippi's generic name.

ASTEROPE, ARTHURI n. sp.

Plate LXXII A.

♀. Shell porcellanous, broadly oval; antennal notch shallow, below the middle; rostral process broad at apex. At the opposite extremity the left valve is slightly angled.



The eyes are oval.

The first antennae have the third and fourth joints obliquely connected, the two together rather longer than the fifth joint, the third carrying eight marginal setae. Of *Asterope teres* Norman and Brady say that the third joint is 'much shorter than the fourth, divided diagonally so as to form two triangular joints'; but in their figure these joints are as long as the succeeding joint, and in G. W. Müller's figure they are longer. In the present species the line of articulation is oblique, but does not as in *A. teres* extend from base to apex of the two joints. The annulated sensory seta of the fifth joint a little dilated at the point from which its numerous branches spring. Sixth and seventh joints very short, the unguis long and slender, with margin crenate or serrate.

Second antennae with eleven setae on the swimming branch, the first and last rather short, the rest very long, four belonging to the terminal joint, the seven preceding short joints having one a-piece; the three-jointed secondary appendage has a single seta near the base of its third joint.

The frontal tentacle is very slender.

Mandible having the first joint of the palp produced backward at the proximal corner in a rounded lobe armed with a plumose spine and several setae, above which its margin is fringed with about a score of trident-headed spines; on the opposite margin are various setae, two of them annulate and one of these very long; also at the apex of this margin there is an unarmed laminar appendage as long as the following joint. The tapering third joint is fringed with setae along its upper margin and near the apex of the lower. The fourth joint has two strong annulate setae.

The first maxillae agree with G. W. Müller's account of these appendages in the present genus. The stem on the lower side forms a rounded projection fringed with stout setae, and on the upper side has an unarmed tapering process adjacent to, and more than half as long as, the great first joint of the palp, which on the upper side is fringed above and below with setae, an intermediate space being left bare; on its lower side it has the wonderful comb of long, parallel, terminally thickened setae, the extremities of which form a convex line. At right angles to the apex of the first joint is the thin second joint, followed by a minute, setiferous, apical joint.

The second maxillae consist of a slender curved plate, the concave inner margin of which is fringed closely with short setae, and having attached to it, but not quite in the same plane, the large vibratory lamina, densely fringed on the outer convex margin with long plumose setae.

The third maxillae (Norman and Brady) or maxillipeds or first legs (G. W. Müller) are in this species shaped like the blade of a battle-axe, the front margin convex, fringed with plumose setae, and produced at each end to a somewhat acute process, instead of having, as is more usual, one extremity rounded. In *Asterope fusca*, G. W. Müller, 1890, a small Japanese species, supposed to be devoid of eyes, the maxillipeds are figured with both ends pointed, Müller at that date giving this shape as generally characteristic.

The vermiform limb has the apex beset with rows of minute teeth, and along its distal rings there are some forty spines, some at least carrying four distal pairs of teeth.

The branchial laminae are very large.

The caudal laminae (or furca) have six pairs of serrate ungues or principal spines, the first pair of the graduated series one-fourth as long as the last. They have above them three spinules and a row of setules.

Length, 8 mm., breadth, 6.4 mm. Other specimens 7.5 × 5 mm., and 5 × 3.5 mm.

Habitat. Blanche Bay, at 60 fathoms and at 70 fathoms; the larger specimens from the smaller depth.

The species is strongly distinguished by the character of the maxillipeds combined with its great size. The name is chosen in compliment to Dr Arthur Willey.

FAM. CYPRIDINIDAE.

1850. *Cypridinadae*, Baird, British Entomostraca, Ray Soc., p. 176.

1880. *Cypridinidae* (part), Brady, Challenger Reports, vol. 1, Ostracoda, p. 151.

1887. *Cypridinidae* (part), Sars, Arch. Naturv., vol. 12, p. 181.

1894. *Cypridinidae* (part), G. W. Müller, F. u. Fl. des Golfes von Neapel, Mon. 21, p. 203.

1896. *Cypridinidae*, Brady and Norman, Trans. Royal Dublin Soc., Ser. 2, vol. 5, p. 638.

Distinguished from the Asteropidae by the structure of the maxillae and the absence of branchiae, or their comparatively inconsiderable development. *Eumonopia*, Claus, is distinguished as a subgenus of *Cypridina*, among other characters, by having a T-shaped branchial vesicle, and *Cypridina Hilgendorfi*, G. W. Müller, has seven branchial folds in the male (G. W. Müller, *loc. cit.*, p. 205).

GEN. CYPRIDINA, Milne-Edwards.

1838. *Cypridina*, Milne-Edwards, Annotated Edition of Lamarck's Anim. sans Vertèbres, vol. 5, p. 178.

1840. *Cypridina*, Milne-Edwards, Hist. Nat. Crust., vol. 3, p. 409.

1850. *Cypridina*, Baird, Brit. Entom., Ray Soc., p. 176.

1853. *Cypridina*, Dana, U.S. Expl. Exp., vol. 13, pt. 2, p. 1290.

1876. *Cypridina*, Claus, Unters. genealogischen Grundlage der Crustaceen-systems, p. 92.

1880. *Cypridina*, Brady, Challenger Reports, vol. 1, Ostracoda, p. 155.

1887. *Cypridina*, Sars, Arch. Naturv., vol. 12, p. 206.

1890. *Cypridina* (and subgen. *Pyrocypris*), G. W. Müller, Zool. Jahrbücher, vol. 5, p. 211.

1894. *Cypridina*, G. W. Müller, F. u. Fl. des Golfes von Neapel, Mon. 21, p. 204.

1896. *Cypridina*, Brady and Norman, Trans. Royal Dublin Soc., Ser. 2, vol. 5, p. 645.

Many more references may be obtained by consulting those given above. In citing *Cypridina* from the edition of Lamarck's History of Invertebrates, annotated by Henri Milne-Edwards, Brady and Norman add in parenthesis "(including subgenus *Pyrocypris*,

W. Müller)." Milne-Edwards in 1840 declares that he only knows a single species of the genus, *C. Reynaudi*, from the Indian Ocean. If, therefore, that species agrees in its characters with *Pyrocypriis*, that name can only be a synonym of *Cypridina*, and some other name must be chosen for any species that need to be taken out of the latter genus.

It may be remarked that a species taken by the 'Challenger' in the Eastern Archipelago, and described by Dr Brady under the name '(?) *Cypridina punctata*, Dana.' in Trans. Zool. Soc. London, vol. 14, pt. 3, p. 89, pl. 16, figs. 5—9, 1897, shows a close resemblance to a singular species from the Bay of Bengal, *Eupathistoma natans*, Brady, described in the same transactions, vol. 14, pt. 8, p. 437, pl. 44, figs. 21—26, 1898. Probably the species ought to bear the name *Eupathistoma punctatum* (Dana).

CYPRIDINA BARAVONI, n. sp.

Plate LXXII b.

♀. Shell smooth, oblong, length twice the height, antennal sinus below the centre, rostral process well arched, not acute; dorsal margin rather more convex than the ventral, which is apically produced beyond the dorsal, so as to have the 'lower half of posterior part large gibbosa' just as described and figured by Dana for his *Cypridina gibbosa* (U. S. Expl. Exp., Crust., p. 1295, pl. 91, f. 4), but not so well agreeing with Brady's *Philomedes gibbosa* (Dana) in Challenger Ostracoda, p. 160, pl. 39, f. 12. At the rostral extremity the present form agrees neither with Dana's nor Brady's.

Eyes small, dark, rounded oval.

First antennae. First joint larger than second, third very small, fourth with a long seta, fifth with long apical setae, perhaps belonging severally to this and two very minute terminal joints.

Second antennae. Secondary branch apparently represented only by two or three setae, as in the form described by Brady.

Mandibles. There are three spines or ungues at the apex; the minute apical joint scarcely distinguishable from the tapering penultimate joint.

The two pairs of maxillae and the maxillipeds, as shown in the figures, appear to be consistent with the character of the genus.

The vermiform limb had but few spines on the distal rings.

The rather long narrow furca carries nine pairs of spines, the first microscopic, and only the last three of considerable size.

Length, about 1.6 mm. Dana's *gibbosa*, which G. W. Müller refers to his genus or subgenus *Pyrocypriis*, was one-twentieth of an inch long and nearly twice as long as high; Brady's was of the same length, with 'height equal to more than half the length.'

Habitat. Baravon, Blanche Bay, New Britain. Capture at night. Dana's specimen, a female, was taken in the Pacific, lat. 15° 20' S., long. 148° W., Brady's, a male, in Zebu Harbour, Philippine Islands; both seem to be too oval in shape to be identified with the form here described.

COPEPODA.

COPEPODA SEMIPARASITICA.

FAM. LICHOMOLGIDAE.

1877. *Lichomolgidae*, Kossmann, Zool. Ergebn. einer Reise...Rothen Meeres, Erste Hälfte, Entomostraca, pt. 1.
 1880. *Sapphirinidae*, Brady, British Copepoda, Roy. Soc., vol. 3, p. 39.
 1883. *Corycaeidae* (part), Brady, Challenger Reports, vol. 8, Copepoda, p. 109.
 1885. *Sapphirinidae* (Section *b*, *Lichomolgina*), Carus, Prodr. Fauna Mediterrannae, vol. 1, p. 350.
 1889. *Lichomolgiden*, Claus, Arbeiten Zool. Inst. Wien, vol. 8, pt. 3, pp. 1, 19.
 1891. *Lichomolgidae*, Cauu, Bull. Sci. France-Belgique, vol. 23, p. 477.

Concerning genera belonging or closely allied to this family there is frequent mention or discussion in the writings of Thorell, Professor Della Valle, Mr Thomas Scott, F.L.S., Dr Giesbrecht, and others. Canu (*loc. cit.* p. 482) observes that the members of it are doubtless near relatives of the Sapphirinidae on one side, and of the Ergasilidae on the other. The most precise definition of it at present available appears to be that given by Claus in 1889, and with that the new genus here assigned to the family in many respects agrees, but whereas Claus states that the first antennae are generally seven-jointed, they are here eight-jointed, and while he describes the maxillipeds as three-jointed, provided in the male with powerful grappling hooks, these parts in the new genus would rather appear to be one-jointed in the female, and to have vanished from the male.

LINCKIOMOLGUS, n. g.

Body piriform, of ten segments; the shield, composed of head and first thoracic segment, long and broad, the next two segments broad but short, the two following abruptly narrower; the genital segment rather broader than long in female, but not in male; the four following segments very small and the caudal appendages not longer than broad, one of their apical setae very long, especially in the female; eyes not perceived; first antennae eight-jointed, without 'aesthetask,' setose; second antennae four-jointed, apically uncinatè; first four pairs of feet biramous, all the rami triarticulate, except inner one of fourth pair, which is slender, biarticulate; fifth feet slight, one-jointed. Female much larger than the male, with two large egg-sacs, containing numerous eggs.

Generic name compounded of *Linckia*, name of the host, and *μολγός*, skin, the form of the name being intended to link this genus with *Lichomoligus* historically, even if the changes and chances of classification should sever it from the Lichomolgidae.

LINCKIOMOLGUS CAERULEUS, n. sp., Plate LXXIV B.

Female. The shield is moderately convex, as long as the rest of the body minus the short caudal appendages, and is considerably broader than long, with front and sides smoothly rounded, postero-lateral angles a little produced, acute, as also are those of the two following segments, which successively diminish in breadth, the second of

them having the lateral apices obliquely truncate between two acute points, the inner of these overlapping the two following segments. The fifth thoracic segment is longer than the fourth, and widens distally, bearing at its lateral apices the almost rudimentary fifth feet. Near each lower corner of the genital segment there stands out a seta, not regularly tapering, but divided as it were between lash and handle.

First antennae. First two and last three joints short, the third much the longest, all furnished with tapering setae, several of which are long.

Second antennae. First two joints produced each subacutely over its successor, third carrying three small setae, apical joint forming a strong hook.

Mouth-parts. These appear to be degraded. All that I have been able to make out clearly are first, a hook, having a broad base ornamented with very many close-set lines running to the convex border, and a strongly curved very slender apex; secondly, in apparent attachment to this hook, a denticulate border lying across its base. I am uncertain whether these parts together make up the mandible, or whether the sickle-shaped portion is the mandible and the denticulate border the first maxilla. The second maxillae and maxillipeds seem to be reduced to small plates with a few minute spinules upon them. But in regard to these parts my dissections have not been sufficiently skilful.

Feet. In the first four pairs the outer ramus has the second joint shortest, a single spine on the outer apex of this and of the first joint, two or three on the outer margin of the third, which round the other margin carries several setae, the second joint also having one very long seta on its hind margin; the inner ramus in the first three pairs, though not very long, is longer than the outer, and armed in a similar fashion, but it has a seta on the hind margin of the first joint and no spine on its front apex, two setae instead of only one on the second joint, and on the other hand not so large a number of setae on the third joint as in the outer ramus; the inner ramus of the fourth pair consists of two slender joints, the first carrying one seta, the second with one on its inner margin, but with two setae on its oblique apex; the slender fifth foot is, I think, certainly one-jointed, though the pellucid overlapping corner of the thoracic segment may give the appearance of an additional joint at the base; it has an oblique apex, with a rather long seta at the outer, and a short one at the inner point. Of the caudal setae, the longest is about equal to the body minus the shield; on its outer side is one which seems to vary between half and two-thirds of its length, and external to this are two short setae; innermost of all are one or two more of great tenuity. Length, without caudal setae, 1.25 mm., breadth, about .85 mm. The egg-sacs contain sometimes as many as 100 eggs a-piece.

Male. Front of shield rather flattened, postero-lateral angles of this and the following segment scarcely acute, and those of the second free segment rounded; the next segment very small, and the last scarcely defined from the genital segment, except by its projecting distal angles; the genital segment with the sides parallel instead of convex. First and second antennae and fifth feet and perhaps the other thoracic feet as in the female. The mouth-organs in the male seem to have become aborted. The male and female in attachment, with the shield of the male seeming

to fit neatly into the strong emargination of the third thoracic segment of the female, might easily be mistaken for a single animal, were not a warning given by the caudal setae of the female, which project from below the male, apart from his caudal appendages. One of these couples has a rather remarkable appearance. Besides her two packets of eggs, the female has, on one side of the genital segment, two curved, narrow, cylindrical bodies, rather longer than that segment, possibly spermatophores. But along with these there is another cylinder, transversely striped, as broad as the end of the female pleon and nearly equal to the whole length of her body.

The specimens were labelled "Copepod ectoparasites from Blue Linckia. Light blue-coloured alive."

Habitat. Feather Island, China Straits, New Guinea.

The specific name refers to the colour. The species bears in some respects a striking resemblance to some members of the *Asterocheridae*, but it is without some of the distinguishing features of that group (see Giesbrecht, *Fauna und Flora des Golfes von Neapel*, Mon. 25), having no aesthetascs on the first antennae, and, instead of having the eggs large and few (at most 20), having them small and numerous, reaching as above stated a hundred in number.

PANALETIS, n. gen.

Head large, widening backwards, rest of the body tapering, the five leg-bearing segments distinct, the four following separated from one another by constrictions rather than definite boundaries; the whole animal flat. First antennae seven-jointed. Second antennae two-jointed, with apical hooks. Mouth-organs (seemingly) laminar. The first four pairs of legs biramous, each ramus three-jointed; the fifth pair single-jointed, cylindrical. The caudal appendages slender, about a seventh of the total length.

This genus seems to make a near approach to *Anthessius*, Della Valle, and *Paranthessius*, Claus, but it is distinguished by having the first thoracic segment completely divided from the head-shield.

PANALETIS INCAMERATA, n. sp.

Plate LXX E.

Head with slightly convex front and sides, hind margin nearly straight, breadth greater than the length. First leg-bearing segment broader but shorter than any of the following segments; the fifth with lateral dilatations at the middle, and the next with such dilatations at its base; the latter is the longest of all, the nearest to it in length being the terminal segment, which is rather longer than the head, and has a small apical cleft.

The first antennae are moderately stout, smooth, the second joint not thicker than the first, but considerably longer, the third joint short, the fourth thicker than the fifth, but scarcely so long, about equal to the last two joints combined. In the second antennae the lower apical hook or nail is stout, the three above it are slender, sinuous. The appearance of the mouth is represented in the figure. It seems fitted only for absorption of very soft or liquid food, but, being observed only in a single specimen,

nothing can be said as to the variations it may undergo according to sex and stage of life.

The first four pairs of legs are similar, increasing in size successively. The basal joint is large, with a fold above, the inner branch has two short stout joints followed by a longer oval one, with three spines on the outer margin, and two or three setules on the apex; the outer branch is similar, but with the first and third joints larger, the first and second each with a stout distal spine, the third with four spines on the outer and three or four setules on the apex. The fifth legs are simple cylinders or slender bag-like appendages attached to the prominences of their segment. The caudal appendages are rather longer than the longest segment, apparently (like the first antennae) tipped with one or two minute hairs.

Length, 8 mm.

Habitat. Deboyne Lagoon, Panaieti, an island in the Louisiade Archipelago, New Guinea, "from pallial chamber of gastropod." The generic name refers to the island, the specific to the parasitic position, in which the specimen was found.

COPEPODA PARASITICA.

FAM. CALIGIDAE.

1819. *Caligidae*, Leach, Dict. Sci. Nat., vol. 14, Art. Entomostracés, p. 525.

1849. *Caligidae*, Dana, Proc. Amer. Acad., Cambridge, Conspectus Crust., pt. 1, p. 53.

1850. *Caligidae*, Baird, British Entomostraca, Ray Soc., p. 256.

1853. *Caligidae*, Dana, U. S. Expl. Exp., vol. 13, pt. 2, p. 1316.

1857. *Caligidae*, White, Popular Hist. British Crustacea, p. 310.

1861. *Caligidae*, Steenstrup and Lütken, K. Danske Vid. Selsk. Skr., Ser. 5, vol. 5 (Extract, p. 9).

1864. *Caligina*, Krøyer, Naturhist. Tidsskrift, Ser. 3, vol. 2, p. 104.

1868. *Caligina*, Heller, Reise der Novara, Crust., p. 160.

1889. *Caligidae*, Thomson, Trans. New Zealand Inst., vol. 22, p. 354.

1899. *Caligidae*, Bassett-Smith, Proc. Zool. Soc. London, p. 444.

1900. *Caligidae*, T. Scott, 18th Annual Rep. Fishery Scotland, part 3, p. 147.

If, in addition to the above references, the Consid. gén. sur la classe des Crustacés of Desmarest and Hist. Nat. des Crustacés of H. Milne-Edwards be consulted, a tolerably complete synonymy of the family, with the history of its extensions and limitations, can be obtained.

ANCHICALIGUS, n. g.

Carapace large, scutiform. Frontal border provided with lunulae. Ventral surface without furcula. Eyes with conspicilla. First and fourth thoracic limbs uniramous; second and third biramous; terminal joints of first to third pairs fringed with strongly plumose setae. Fourth thoracic segment free, small, without dorsal plates. Genital segment without dorsal plates or processes. Abdomen small, single-jointed, the caudal plates not fully reaching its apex.

This genus, though very near to *Caligus*, seems to be sufficiently distinguished from it by the entire disappearance of the furcula, the peculiar character of the abdomen, and perhaps it may be added, by the habitat of the type species.

Name from *ἀγγι*, near, and *Caligus*.

ANCHICALIGUS NAUTILI (Willey).

Plate LXXI.

1896. *Caligus nautili*, Willey, Quart. Journ. Micro. Sci., vol. 39, p. 145.

In general shape and proportions this species bears a close resemblance to *Caligus abbreviatus*, Kröyer, and consequently also to *Caligus centrodonti*, Baird, though it is separated from both by generic characters. The carapace is only a little longer than broad, but greatly longer than the rest of the body, in the male even more than double as long. The genital segment is broader than long, little more than half the width of the carapace in the female, less than half in the male. The small abdominal segment is more than half as wide as the genital segment in the male, and less than half in the female.

The frontal plate has a slight central notch over a small oval clear space (described in Kröyer's species as 'orange-shaped point of attachment') and its corners are occupied by large almost circular lunules, abutting upon which are the first antennae, two-jointed, the second joint much narrower than the somewhat ovoid first. The second antennae have a hooked terminal joint, the basal seemingly longer in the male than in the female.

Between the second antennae, a little below them, and just over the base of the rostrum, are the two eyes, 'spectacle-eyes' according to Dana's expression (U. S. Expl. Exp., Crust., p. 1315). Of these he says (p. 1325), 'Besides the ordinary simple eyes in the Caligidae, there is sometimes a pair of simple eyes with large prolate lenses and oblate conspicilla or broad convex corneas as in our genus *Specilligus*.' In describing that genus, he says (p. 1374), 'The essential point of difference between this genus and *Nogagus*, is the existence of two large transparent lenticular corneae (conspicilla), exactly like those of the Sapphirinae. These conspicilla are attached to the exterior shell, but with some difficulty may be separated. On pressure they proved to be brittle, though rather hard. The lenses of the eyes are situated below, near the conspicilla, though a little nearer the median line. Between the two there is a minute coloured spot.' The species, *Specilligus curticaudis*, was taken from the body of a shark, off New Zealand. 'The pigment of the two eyes was deep blue; the colour of the minute spot between, bright red.' Steenstrup and Lütken (*op. cit.*, p. 50) threw out the suggestion that Dana's *Nogagus validus* and his *Pandarus brevicaudis*, taken at the same time with his *Specilligus*, may be the same species. It may be remarked that all three are clearly distinguished from *Anchicaligus* by the absence of lunulae. In the species now under description the prominent eyes differ from those described by Dana by having the conspicilla adjacent above, and the lenses a little remote. No median spot could be perceived, but that and the eye pigment may easily have disappeared in spirit.

The rostrum appears to be composed as usual of slender mandibles between an elongate upper and under lip.

The first maxillipeds have the terminal joint longer but much narrower than the basal, with a minute spinule below the middle, and two apical setae.

The second maxillipeds have the basal joint powerful, irregularly oval, longer than the finger and nail; the inner margin of the finger is rather more bulging in the male than in the female.

The furcula is entirely wanting, and of ventral subsidiary hooks on the carapace the only representative seems to be a spinule near the base of the second antennae. It may be noticed that in *Caligus abbreviatus* Kröyer speaks of the furcula as practically rudimentary. Possibly this organ is less needed in abbreviated forms.

First feet. These are slender, three-jointed, the second joint the longest, the third short, with three plumose setae on the inner margin, the apex fringed with three little spines and a seta.

Second feet. The stout basal joint begins with a narrow neck, perhaps representing a true first joint, the point of junction with the true second being marked by a plumose seta. The base carries two three-jointed rami, the first joint of the outer and the second of the inner being the largest. The inner ramus carries one plumose seta on the first, two on the second, six on the third joint. The outer ramus has an apical spine to each joint, successively smaller, its second joint has two plumose setae and the third five. The whole armature is, as so often in this pair, of conspicuous size and beauty.

Third feet. The large and laminar, transversely oval, basal joint has the translucent wing of its outer margin divided into three portions, the middle one very small between the two little rami. The outer ramus has a minute first joint, the second joint with one plumose seta, the third with three such setae and some setules. The inner ramus has a minute first joint with one plumose seta, and a second joint with six such setae, but two of them very small.

Fourth feet. The slender second joint is considerably longer than the rather stouter basal joint, it is tipped with two unequal setae, and has near the middle of the outer margin a seta, marking the point at which in some Caligidae an additional articulation occurs. The similarity of this limb to the first maxilliped is worthy of remark.

The linear egg-strings of the female are not so long as the body; the eggs are numerous, eighty or more in each string.

The caudal plates are separated by the rounded apices of the caudal segment, which are produced a little beyond them. The minute basal joint is marked by a setule at its junction with the obliquely oval second joint, the margin of which is furnished with three plumose setae, successively longer inwards.

The length of the female is 4 mm., of the male, 2.5 mm.

The specimens were taken at New Britain on *Nautilus pompilius*. Others were labelled 'from *N. macromphalus*. Lifu. 1896-7 etc.'

Dr Willey informs me that the specimens occur "in *N. pompilius* in the mantle-cavity, and in *N. macromphalus* on the slimy convexity of the involuted portion of the

shell where the nuchal region of the animal plays upon the shell." In his 'Letters from New Guinea,' Quart. Journ. Micro. Sci., vol. 39, p. 145, 1896, he wrote as follows:—"Ectoparasites. In my previous note [Natural Science, vol. 6, June, 1895] I accidentally omitted to mention the occurrence of numerous Copepod parasites in the mantle-chamber of the Nautilus. They are present in nearly every individual that I have examined, and are found attached to the branchiae, the internal surface of the funnel, and in other regions of the pallial chamber. The parasites are a species of the genus *Caligus* and possess the characteristic semi-lunar suckers on the first pair of antennae. When Nautili are placed in jars the Caligids emerge in large numbers from the mantle-chamber, and swim about actively in the water, usually in close proximity to the sides of the vessels, from which they can be removed only with some difficulty, owing to the great adhering power of the above-mentioned suckers." A foot-note gave the name *C. nautili*, pending a more detailed description. It well deserves to be retained.

GEN. GLOIOPOTES, Steenstrup and Lütken.

1861. *Gloiopotes*, Steenstrup and Lütken, K. Danske Vid. Selsk. Skr., Ser. 5, vol. 5, p. 363 (23).

1868. *Gloiopotes*, Heller, Crustaceen der Novara, p. 161.

1889. *Lepeophtheirus*, G. M. Thomson, Trans. N. Zealand Inst., vol. 22, p. 354.

1889. *Gloiopotes*, Bassett-Smith, Proc. Zool. Soc. London, p. 458.

Bassett-Smith gives the definition in the following form:—"Carapace large, oval, scutiform. No lunulae on the frontal border. Fourth thoracic segment with two dorsal plates partly covering the genital segment, the latter being produced backwards by two elongated curved processes having a styliform appendage projecting from the outer border, serrated at the edge. Abdomen long. Caudal plates lanciform. First and fourth thoracic limbs single-branched, second and third double."

Of the two species known, the type *G. hygomianus* has the two dorsal plates of the fourth thoracic segment irregularly oblong and the stiliform appendages of the genital segment not reaching the apices of the processes from which they project, whereas in *G. huttoni* (Thomson) the dorsal plates are semi-lunate, and the stiliform appendages project beyond the apices of the prolongations of the genital segment.

The terminal caudal appendages might rather be called filiform than lanceolate; there is nothing leaf-like or laminar about them. The definition, as explained further on, requires some modification now that the male of the type species is known.

GLOIOPOTES HYGOMIANUS, Steenstrup and Lütken. Plate LXXIV A.

1861. *Gloiopotes Hygomianus*, Steenstrup and Lütken, K. Danske Vid. Selsk. Skr., Ser. 5, vol. 5, p. 363 (23), pl. 5, fig. 9.

1899. *Gloiopotes hygomianus*, Bassett-Smith, Proc. Zool. Soc. London, p. 458.

Only the female of this species was described by Steenstrup and Lütken. The specimen was taken in the Atlantic from some unnamed fish. Dr Willey's specimens



Alcedipus villosus n. sp. pl. 19.

were labelled "Rubiana, New Georgia, from tail of Albicore." The females with egg-strings attached agree with the figures and description given by the authors above-mentioned. The male differs from the female seemingly much more than is the case with Mr Thomson's New Zealand species, and in a manner that will not suit the generic definition drawn up from the female alone. The genital segment is rounded oblong, not produced into lappets, but having lappets attached at its sides. These lappets are not articulated but marked off by a slight constriction and extend along about two-thirds of the abdomen or pleon; their outer margin is folded under and ends in two spines, the much more convex inner margin ending separately in a single spine. I am inclined to suppose that they correspond not to the lappets in the female, but to the appendages which project laterally from those lappets and which have the inner margin fringed with twelve or more spinules or denticles. The dorsal plates of the fourth segment of the trunk have their inner margins more divergent and oblique in the male than in the female. In both sexes the pleon is two-jointed as described by Thomson, not unjointed as described and figured by Steenstrup and Lütken. The filiform caudal appendages, which in the female are considerably shorter than the pleon, in the male nearly equal it in length; at a point between a quarter and a third of their length they become narrower and have a spinule at the outer margin; at the apex are three unequal spines.

Length of female, 12 mm.; of egg-strings, 12 mm.; of specimen including egg-strings, 22 mm.; of male, 10 mm.

The agreement in habitat and general details leaves no doubt that the males and females belong to the same species. A single specimen, like the males in size, but with dorsal plates as in the female, had very short lappets carrying lateral appendages as large as the normal ones in the female but with only two or three denticles as in those of the male. This may be either a monstrosity or a developing female.

FAM. DICHELESTIIDAE.

1898. *Dichelesthiina*, Bassett-Smith, Ann. Nat. Hist., Ser. 7, vol. 2, p. 91.

1899. *Dichelestiidae*, Bassett-Smith, Proc. Zool. Soc. London, p. 468.

1900. *Dichelestiidae*, T. Scott, 18th Annual Rep. Fishery Scotland, pt. 3, p. 159.

Mr Bassett-Smith in 1898 quotes from Gerstaecker a synoptic table of sixteen genera in this family, and then modifies the table to include two new genera of his own. In 1899 he withdraws the genus *Baculus*, Mrázek having shown that *Baculus* Lubbock, and *Hessella* Brady, are only represented by young forms of the Lernaeid *Pennella* Oken. At the same time he transfers *Philichthys* Steenstrup, to a new family Philichthyidae.

BASSETTIA, n. gen.

Head globose. Body narrowed behind the head, with little or no demarcation of the pedigerous segments, the genital segment oblong oval, wider and longer than all the rest of the animal, having closely connected with it a much narrower short terminal segment, carrying two short and narrow appendages, tipped with minute spinules. First

antennae nine-jointed. Second antennae having a hooked unguis attached to a strong basal joint. Mouth-parts extremely small, apparently suctorial. First three pairs of legs unjointed, rounded, tubercular; fourth pair at the base like the rest, but also carrying two small narrow rami or prolongations.

This genus makes an approach to *Cyenus*, Milne-Edwards (Hist. Nat. Crust., vol. 3, p. 495, 1840). That name being preoccupied must give way to *Congericola*, van Beneden (Bull. Ac. Roy. Belgique, vol. 21, pt. 2, p. 583, 1854), which is distinguished from the present genus by having all four pairs of legs two-branched.

BASSETTIA CONGRI, n. sp.

Plate LXX F.

The first antennae have the first two and the last three joints distinct, the intermediate part being faintly divided into four small joints. In the second antennae there may be a short basal joint in addition to the long one which carries the unguis. The small oral cavity seems to contain some minute pointed organs. The tubercles representing the second pair of legs are close to the first pair, but are larger and more prominent. The egg-strings attached to the distal corners of the long genital segment are somewhat longer than the animal.

Length, 3 mm.

Habitat. Blanche Bay, New Britain, parasitic on gills of Conger.

The generic name is chosen in compliment to Mr P. W. Bassett-Smith, R. N., whose contributions to our knowledge of parasitic Copepoda are of high value.

GEN. PSEUDOCYCNUS, Heller.

1868. *Pseudocychnus*, Heller, Reise der Novara, Crustacea, p. 218.

1899. *Pseudocychnus*, Bassett-Smith, Proc. Zool. Soc. London, p. 475.

To this genus only one species has as yet been assigned.

PSEUDOCYCNUS APPENDICULATUS, Heller.

1868. *Pseudocychnus appendiculatus*, Heller, Reise der Novara, Crustacea, p. 218, pl. 22, fig. 7.

1898. *Pseudocychnus appendiculatus*, Bassett-Smith, Ann. Nat. Hist., Ser. 7, vol. 2, p. 368.

1899. *Pseudocychnus appendiculatus*, Bassett-Smith, Proc. Zool. Soc. London, p. 475.

So far as could be seen without dissection, the single specimen in the present collection conforms with the accounts given by Heller and Bassett-Smith. The latter writer, however, in 1899, includes in the generic account the character, "caudal appendages very small, simple," whereas Heller says "cauda brevis, appendicibus valde elongatis." The pair of long tapering appendages underneath the egg-sacs are indeed a prominent feature of the species. Heller figures nineteen pairs of indents along the back of the genital segment, the series stopping at some distance from its apex. In the

present specimen the flattened back of the segment in question has twenty-three pairs of indents, not quite evenly or symmetrically spaced, but covering the whole length.

The specimen is 13.5 mm. in length, the genital segment being about thrice as long as the anterior part, and about twice as long as the terminal appendages. The segment preceding the genital overlaps it with its lateral lobes and is dorsally coalesced with it, so that it is difficult to give exact proportionate measurements. The egg-sacs reach a length of 25 mm. or more.

Heller's specimens, 12 mm. long, were from the gills of an Atlantic *Coryphaena*; Bassett-Smith's, 10 mm. long, were found attached to the gills of *Thynnus macropterus* at Aden; the labels with the present specimen explained it to be a Lernaeid from the gills of Bonito, Uvea, Loyalty Islands.

THYROSTRACA.

(CIRRIPEDIA.)

FAM. LEPADIDAE.

GEN. POECILASMA, Darwin.

1851. *Poecilasma*, Darwin, Lepadidae, Ray Soc., p. 99.

1883. *Poecilasma*, Hoek, Challenger Reports, vol. 8, Cirripedia, p. 44.

1893. *Poecilasma*, Aurivillius, K. Svenska Vet.-Akad. Handl., vol. 26, No. 7, p. 9.

Darwin, who rejected *Trilasmis*, Hinds, 1844, as an impossible name for a genus in which the valves might be five or seven as well as only three, spells the new name *Poecilasma*, but, as he derives it from *ποικίλος* (printed *ποκιλος*), the change of diphthong subsequently adopted is obviously proper.

POECILASMA VAGANS, Aurivillius.

1892. *Poecilasma vagans*, Öfversigt af K. Svenska Vet.-Akad. Förh., No. 3, p. 123.

1893. *Poecilasma vagans*, Aurivillius, K. Svenska Vet.-Akad. Handl., vol. 26, No. 7, p. 9, pl. 1, figs. 9—12; pl. 8, figs. 10, 16, 22.

Of Darwin's species only one, *Poecilasma fissum*, has seven valves. All the four added to the genus by Aurivillius in 1892 and 1893 were so provided. The species to which Dr Willey's specimens are referable is distinguished from the others by the circumstance that the occludent margin of the terga does not reach the orifice of the capitulum, so that the apex of the latter is uncalcified. Also the basal edge of the scuta is more emarginate than in other species.

Length, of the largest specimen, 12.5 mm., by a breadth of 6.25 mm., with the wrinkled peduncle constituting 2.5 mm. of the total length, but absolutely a little longer by reason of overlapping. Aurivillius speaks of the peduncle as $\frac{2}{3}$ of length of capitulum, but gives total length 12 mm., capitulum 7 mm., peduncle 4 mm., and further says that 'the peduncle is short and thick,' and figures it in the proportion of 2:5. As a matter of fact the proportions vary considerably in the spirit specimens, but whether Aurivillius intended to convey that idea I cannot say.

Habitat. Sandal Bay, Lifu, Loyalty Islands, and New Britain. Aurivillius' specimen was found attached to the umbilicus of *Nautilus umbilicatus*.

GEN. MEGALASMA, Hoek.

1853. *Megalasma*, Hoek, Challenger Reports, vol. 8, Cirripedia, p. 50.

Hoek defines the genus as follows:—Valves five, approximate; carina extending only to the basal points of the terga, with its lower end truncated and very wide. Scuta triangular, with their umbones at a considerable distance from the rostral angle. Mandibles with four teeth; maxillae slightly notched, with the lower part of the edge slightly prominent; anterior ramus of the first cirrus much thicker than the posterior ramus; the two rami of the second cirrus nearly equal; caudal appendages unarticulate, short and spinose at the extremity.

MEGALASMA STRIATUM, Hoek.

1853. *Megalasma striatum*, Hoek, Challenger Reports, vol. 8, Cirripedia, p. 51, pl. 2, figs. 5—9; pl. 7, figs. 8, 9.

A notable character of this species is that 'the short peduncle is quite covered by the capitulum,' producing the impression at the first glance of our having to do with a pedunculate cirripede devoid of a peduncle. The species is fully described and figured by Dr Hoek. According to his description of the mouth-organs, these show a near resemblance to those of *Oxynaspis aurivillii* described in this report.

Length, 9·5 mm. One of Dr Hoek's specimens was 11 mm. long.

Habitat. Blanche Bay, New Britain, on Echinus-spines measuring two to three inches in length, and carrying also some small Balauids, Foraminifera, etc.

GEN. OXYNASPIS, Darwin.

1851. *Oxynaspis*, Darwin, Lepadidae, Ray Soc., p. 133.

1893. *Oxynaspis*, Aurivillius, K. Svenska Vet.-Akad. Handl., vol. 26, No. 7, p. 38.

Darwin's account of this genus is:—'Valves 5, approximate; scuta with their umbones in the middle of the occludent margin; carina rectangularly bent, extending up between the terga, with the basal end simply concave. Mandibles with four teeth; maxillae notched, with the lower part of edge nearly straight, prominent; anterior ramus of the second cirrus thicker than the posterior ramus; caudal appendages, unarticulate, spinose.'

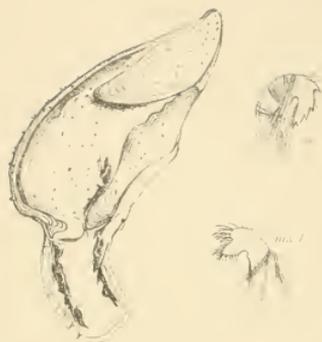
The single species assigned to the genus by Darwin was *Oxynaspis celata*, found attached to an *Antipathes*, from Madeira. In 1892 Aurivillius introduced a new species, *Oxynaspis patens*, also attached to an *Antipathes*, taken at a considerable depth off the Island of Anguilla, in the sea of the Antilles. Besides a much larger size and differences in the shape of the valves, this species is distinguished from Darwin's by entire absence of caudal appendages, so that in regard to these the generic account must be modified. Also to some extent the first maxillae differ in the two species. Darwin says of the capitulum of his species, that "it seems always entirely covered

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Fig. 1

Glyptotus hygonemus



Glyptaspis aurivillii sp.

Fig. 2



Fig. 3

ped 1

ped 5

ped 2

ped 3

ped 4



Glyptotus aurivillii sp.

Fig. 4

E



Fig. 5

Schizotetranychus aurivillii sp. n.

Fig. 6

Schizotetranychus aurivillii sp. n.

by the horny muricated bark of the *Antipathes*, and hence externally is coloured rich brown and covered with little horny spines. The membrane over the valves is very thin, and is with difficulty separated from the *Antipathes*." But in *Oxynaspis putens* the little horny spines belong to the cirripede itself, and are a kind of mimicry of the similar spines of the *Antipathes*. Aurivillius is strongly inclined to believe that in reality the same is the case with *Oxynaspis celata*. It is clearly true of the new species about to be described.

OXYNASPIS AURIVILLII, n. sp.

Plate LXXIV c.

The capitulum and peduncle are beset, though not very closely, with little spines, somewhat similar to those of the host. The peduncle is considerably less than half the length of the capitulum.

The scuta are between three and four times as long as broad, widest at the middle, the ends rounded, the upper end adjacent to the middle of the tergum, the lower not far from the base of the carina. The terga are semi-oval, about three times as long as broad, the convex margin adjacent to the orifice at its upper end. The carina reaches half way between the terga, is strongly bent at the opposite extremity, and has its apex deeply emarginate. The five valves together leave a large part of the capitulum unoccupied.

The labrum has a convex margin, smooth in the middle, a little furred at the sides; the palps are rather narrow, conical, armed with several setae or slender spines. The mandibles are setulose on surface and margins, the distal border consisting of a moderately large separate tooth and a cutting plate divided into four smaller teeth, of which the lowest two are nearer together than the rest, and in one mandible the lowest has a subsidiary denticle outside. The first maxillae are setose on the outer margin, carry four unequal spines on the blunt outer lobe, and have the broadly conical inner lobe fringed with spines of varying slenderness. The second maxillae have their rotundo-quadrate distal margin fringed with slender spines or spinules. The cirri are nearly as in Darwin's typical species, with the important exception that the second pair, like all but the first, have the rami apparently of equal thickness. Caudal appendages seem to consist of two little, adjacent rounded plates, and therefore not to be wanting as in *O. putens*. The penis is long, and has a tuft of setae on the narrow apex.

Colour, in spirit, pale, with brown streaks adjacent to lower part of scuta and terga and along the peduncle.

Length, 3 mm. and sometimes a little over, the capitulum between two and a half and three times the length of the peduncle.

Habitat. New Britain, taken at 40 fathoms depth. The specimens are firmly attached, at various angles, to the light brown scabrous branches of an Antipatharian.

The specific name is given out of respect to C. W. S. Aurivillius. By the scuta and terga the new species is easily distinguished from the two earlier members of the genus.

GEN. CONCHODERMA, Olfers.

1814. *Conchoderma*, Olfers, Mag. Gesellsch. Nat. Freunde zu Berlin, Drittes Quartel.
 1851. *Conchoderma*, Darwin, Lepadidae, Ray Soc., p. 136.
 1883. *Conchoderma*, Hoek, Challenger Reports, vol. 8, Cirripedia, p. 53.

The date and synonymy of this genus are discussed in Darwin's work.

CONCHODERMA HUNTERI, Darwin.

1851. *Conchoderma Hunteri*, Darwin, Lepadidae, Ray Soc., p. 153, pl. 3, fig. 3.

The specimens in the present collection agree so fully with Darwin's description and figure that it is unnecessary to do more than mention the salient features of the species. All three lobes of the scuta are narrow. The carina in two of the specimens runs up between the terga, which are abruptly bent at the top as in Darwin's figure, rather than in his description, for the angle formed is much, instead of little, greater than a right angle.

Darwin gives length of the capitulum in his largest specimen as four-tenths of an inch. The largest of Dr Willey's specimens is 21 mm. long, of which length 7.5 mm. belongs to the peduncle, the capitulum being rather over five-tenths of an inch long.

Habitat. Blanche Bay, New Britain. Attached to cables. The specimens described by Darwin were attached to the skin of a snake, for which the specimens here noticed perhaps regarded submarine cables as a satisfactory equivalent. They do not seem to have suffered from settlement on a stationary host.

Hoek says (*loc. cit.*), "This may be a different species [from *C. virgatum*, Spengler]; but I think on account of its strong resemblance to the variety *Conchoderma virgatum*, var. *chelonophilus*, Leach, and the complete conformity of all its interior characters to those of *Conchoderma virgatum*, it would be a great deal more rational to regard it also as a variety of *Conchoderma virgatum*." I have not materials for comparison, to justify my offering an opinion on this point.

GEN. SCALPELLUM, Leach.

1817. *Scalpellum*, Leach, Journ. de Physique, vol. 85, July, 1817.
 1851. *Scalpellum*, Darwin, Lepadidae, Ray Soc., p. 215.
 1883. *Scalpellum*, Hoek, Challenger Reports, vol. 8, Cirripedia, p. 59.

SCALPELLUM sp.

A single specimen agrees in general outline with *Scalpellum rubrum*, Hoek, is coloured red and white like that species, and has like it a capitulum 5 mm. long. Also it occurs on a spine evidently of the same Echinoderm dredged in Blanche Bay as that on the spines of which *Megalasma striatum*, Hoek, was found, and it may be remarked that Hoek's two species were taken by the Challenger at one and the same station, namely, near Luzon, in 100—115 fathoms. On the other hand the Blanche Bay *Scalpellum* has a peduncle half, instead of 'about one-third,' as long as

the capitulum, and the scales of the capitulum are not very prominent. Also it is a hairy species like *Scalpellum hirsutum*, Hoek, with which it agrees in having the upper latus triangular, instead of quadrangular as it is in *Scalpellum rubrum*. But the apex is not considerably produced as in *Scalpellum hirsutum*. Each of Dr Hoek's species was represented by a single specimen, and as there is only a single specimen at my disposal, I abstain from establishing a third of these small species, without further opportunity for comparison and examination.

KOLEOLEPAS, n. g.

Capitulum without valves. Adhesive disk forming with the basis of attachment a sheath for the elastic peduncle. Labrum large, with denticulate deep emargination. Palpi strong. Mandibles with cutting edge quadripartite. First pair of cirri longer than the rest, the rami in all six pairs shorter than the peduncle.

The same is from *κολεός*, a sheath, and *Lepas*, a kindred genus.

By the absence of valves this genus is associated with *Anelasma*, Darwin, *Alcippe*, Hancock, and *Gymnolepas*, Aurivillius, 1894, the last of which, having a preoccupied title, has been re-named *Eremolepas* by Weltner in 1897. Species of *Alepas*, Sander Rang, may also be entirely destitute of valves. From all of these genera the present genus is decisively separated by the combination of characters above given. The typical species was found in symbiosis with a Pagurid, and the fact that the mollusc-shell inhabited by the two in common had in some way been broken into or out of in the immediate neighbourhood of the cirripede's position may imply that this genus belongs to the boring groups. To these Aurivillius has lately added the family Lithoglyptidae, with one genus and three species, which he places in the order Abdominalia, originally founded by Darwin for the single genus and single species *Cryptophialus minutus*, but subsequently augmented by inclusion of *Kochlorine hamata*, Noll, 1872. H. J. Hansen in 1899 (*Die Cladoceren und Cirripeden der Plankton-Expedition*, p. 52) considers that the group Abdominalia is untenable, as having been based by Darwin on an entire misconception of the homologies of the cirri in the type species.

KOLEOLEPAS WILLEI, n. sp.

Plates LXXIII and LXXIV D.

Dr Willey's notes on the single specimen obtained supply several important details. He describes it as a 'Sheathed and crested Cirripede living in a Turbo shell in which was a Pagurid and on surface of which were many Actinians (seven large ones). There was a hole in the shell exposing the end of the abdomen of the Pagurid, and inside this hole was the cirripede attached, as shown above, to inside of shell.' The illustration referred to (Pl. LXXIV D) gives an outline of the animal with the sheath reposing in the shallow cavity of a piece of shell, just as it came into my hands, but the capitulum and the part of the peduncle outside of the sheath together reach a length twice that of the sheath, without the twisting which has befallen the specimen in spirit. Of the living form Dr Willey observes that 'It can retract itself rapidly

and extend itself slowly again.' The notes on colour will be given in the course of the general description.

The adherent disk is oval, with the narrower end towards the capitulum. On the upper surface its skin appears to be smooth, but roughened on the lower adhesive side. Between the two surfaces there is a pulpy mass containing numerous short muscles. Over the peduncle, however, the sheath forms only a thin transparent skin, and on the side next the shell this seems to be wanting or else of extreme tenuity. The colour of the disk in life is described as light reddish brown, a thin red line (nigrescent in spirit) running round the translucent part which covers the base of the peduncle, which itself is faintly roseate in life (greyish in spirit). On the under surface, though the boundary between disk and peduncle is strongly marked, laterally by separation and apically where they meet by colouring, yet the longitudinal muscles of the peduncle run without flexure or any sort of interruption through the coloured band into the disk.

The capitulum is distinguished from the peduncle by a slightly greater thickness and by its rigidity, these characters being obviously due to its containing the chief mass of the animal's body. The hue in life may be gathered from its description as a white mass with a deep chocolate-brown band at its base. It is not quite cylindrical, being laterally somewhat compressed and becoming distally carinate with a pellucid, crest-like border, which overarches the fissure-like orifice. The sides of the fissure close tightly together, not meeting edge to edge but with lateral compression. They rest at the base upon a projecting bulb, and appear to be comparable with the corresponding part of *Alcippe lampas*, in which, however, there are two sharp projections at the base, instead of a single bulb. Of this latter the function may be to give some support to the long first cirri when protruded.

The upper lip or labrum has the free margin rather deeply concave, and fringed with forty-six denticles. From the rounded angles two rows of fine hairs converge backward on the surface. It has points of resemblance to the corresponding appendage in *Eremolepas pellucida* (Aurivillius) and to that in *Alcippe lampas*, but the bullate or swollen part extending beyond the transverse crest escaped my observation, perhaps through a mishap in the dissection, rather than from the absence of a feature said by Darwin to be common to all the Lepadidae. It is not shown in the figure of the labrum of *E. pellucida* by Aurivillius.

The palps are firmly connected with the labrum, the free lobe of each projecting in advance of or beside the rounded angle of the labrum, and having the forward margin fringed with seta-like spines, as also the inner margin for half the depth, behind which the lobe is emarginate. These 'palps,' though attached to the labrum, are regarded as really palps of the mandibles. One may suppose that from the extreme compression of the mouth-organs in the cirripedes there has resulted an anastomosis between labrum and mandibles which has ended in the mandibular palp having a firmer attachment to the labrum than to its own stock. (See Darwin, Balanidae, pp. 75, 78.)

The mandibles are rather peculiar. The upper tooth and the longer lower tooth of the cutting edge are as usual acute, but the two intermediate processes are convex

projections, the upper, which is the shorter, but the more prominent, being cut into five denticles, the lower into ten. Between the upper tooth and the upper process there is a close-set row of short, unequal, delicate spines, and there is similar but less conspicuous armature at other points of the cutting edge. In one mandible the lower tooth has a subsidiary denticle to the rear.

The first maxillae have a broad front edge, narrowing backward to a kind of neck. The front edge has three strong spines at the upper corner, which is separated by a notch from the rest of the margin, the spines of which are slighter, but numerous and broken up into slightly separated groups. The cavity formed by the neck is occupied by a thin, smooth plate. As to this the suggestion may be hazarded that it represents the missing lower lip of the cirripedes.

Second maxillae. These appendages are represented by a pair of oblong plates completely coalescent at the base, their outer ends rounded and fringed with spinules, both surfaces scabrous, but the inner protruding and spinose.

Cirri. The first pair is the longest, and set at some distance from the rest. It is sinuous in shape, the first joint of the peduncle narrow, much longer than the second. The rami are a little shorter than the peduncle, of five or six joints respectively, of which the basal and the penultimate are the longest, the articulations not very distinct and much obscured in the crowd of slender setae. The other five pairs are nearly alike, except that the sixth appears to be rather the longest and to have a narrower peduncle, this having in the others a very broad basal joint. The rami have seven or occasionally eight joints, and are shorter than the peduncle. The upper ramus is the narrower, armed only with a scanty supply of seta-like spines. The lower ramus has here and there a slender spine, but is chiefly remarkable for the short spines on the upper or hind margin of the last four joints, one on the short rounded terminal joint and on the others from three to five, which are short and stout. Dr Willey mentions that the cirri had a white spot on each.

The pleon is minute.

An immense number of small fusiform eggs were present in the specimen.

It was taken in a fish-basket, at Sandal Bay, Lifu, Loyalty Islands.

The disk measured 15 mm. in length by 11 mm. in breadth. The portion of the animal outside of the disk was about 15 mm. long, of which the capitalum occupied 8 mm., with a breadth at the crest of 5 mm. But from Dr Willey's drawing it may be assumed that the animal can extend itself beyond the sheath to about twice the length of the disk.

It is only fair that Dr Willey's own name should be associated with this highly interesting discovery.

DESCRIPTION OF PLATES LXIV—LXXIV.

PLATE LXIV A.

Nannastacus ossiani, n. sp. ♂.*n.s.* Natural size of specimen, with enlarged lateral view above, and dorsal view below.*a.s., a.i.* First and second antennae.*m.* Mandible, distal portion.*mxp.* 1. First maxilliped, without respiratory apparatus (epipod and exopod).*mxp.* 2. Second maxilliped.*Prp.* 1, 2, 3, 5. First, second, third, and fifth peraeopods.

PLATE LXIV B.

Nannastacus georgi, n. sp. ♂.*n.s.* Natural size of specimen, with enlarged lateral, and less enlarged dorsal view below. To the latter is appended a figure showing shape of the antero-lateral corner and the pseudo-rostral projection with protruding respiratory plate of first maxilliped.*Pl.* Dorsal view of pleon.*a.s., a.i.* First and second antennae.*m.* Mandible.*mxp.* 2, 3. Second and third maxillipeds.*prp.* 1, 2, 4, 5. First, second, fourth, and fifth peraeopods, fifth in attachment to the terminal segment of the peraeon.

PLATE LXIV C.

Leptochelia lifuensis, n. sp. ♀.*n.s.* Natural size of female, with dorsal view above.*oc.* Eye.*a.s., a.i.* First and second antennae.*m.m.* Mandibles; the right mandible above, the left below, with molar seen end on.*li.* Lower lip.*mx.* 1. First maxilla, with apex still more magnified.

- mxp.* Maxillipeds.
gnp. 1, 2. First and second gnathopods.
prp. 2, 5. Second and fifth peraeopods.
T., urp. Telson and uropods.

PLATE LXIV D.

Leptochelia lifuensis, n. sp. ♂.

- n.s.* Natural size of a male specimen.
a.s., a.i. First and second antennae of the specimen.
gnp. 1. First gnathopod.
prp. 5. Fifth peraeopod.

PLATE LXV A.

Apanthura sandalensis, n. sp.

- n.s.* Line showing natural size, with lateral view of specimen below.
c. Dorsal view of cephalon.
Pl. Dorsal view of pleon.
a.s., a.i. First and second antennae.
l.s. Epistome and upper lip.
m. Mandible.
l.i., mx. 2. Lower lip and second maxillae in combination. The much more highly magnified figure at the lower right-hand corner is from a second specimen.
mx. 1. First maxilla.
mxp. Maxillipeds.
gnp. 1, *gnp.* 2. First and second gnathopods.
prp. 5. Fifth peraeopod.
urp. Uropods in connection with pleon. Upper and lower divisions of the same shown separately (somewhat broken).

PLATE LXV B.

Leptochelia lifuensis, n. sp. ♂.

- n.s.* Line representing length, natural size, with dorsal view of animal just below.
a.s. First antenna.
a.i. Second antenna.
l.s. Upper lip.
or. p. Oral parts below the upper lip.
gnp. 1, 2. First and second gnathopods.
prp. 1, 2, 4, 5. First, second, fourth and fifth peraeopods.
plp. One of the pleopods.
urp. Uropod.
T. Telson.

PLATE LXVI A.

Gnathia aureola, n. sp.

n.s., *n.s. juv.* Lines indicating actual length of full-grown and younger larvae, of which enlarged dorsal views are given above the respective lines.

L. Lateral view of full-grown larva.

Per. segm. 7. Seventh peraeon segment, embedded in the sixth.

a.s., *a.i.* First and second antennae.

ep. Supposed epistome and upper lip.

m. Mandible.

mx. 1, *mx. 2.* First and second maxillae.

mxp. Maxilliped.

gnp. 1, *2.* First and second gnathopods.

prp. 4. Fourth peraeopod.

plp. Pair of pleopods (the fifth).

urp. Uropod.

T. Telson

PLATE LXVI B.

Paranthura lifuensis, n. sp.

n.s. Line showing natural size, with lateral view of specimen below.

c. Dorsal view of cephalon, tips of first maxillae showing between the second antennae.

Pl. Dorsal view of pleon.

a.s., *a.i.* First and second antennae.

l.s. Upper lip.

m. Mandible.

l.i., *mx. 2.* Lower lip and second maxillae, the latter pulled aside from their natural position facing the lip.

mx. 1. First maxilla.

mxp. Maxillipeds.

gnp. 1, *gnp. 2.* First and second gnathopods.

prp. 5. Fifth peraeopod.

plp. 1. First pleopods.

urp. T. Telson and uropods in position on the pleon.

PLATE LXVII A.

Cirolana pleonastica, n. sp. ♂.

n.s. Lines showing natural size, underneath the enlarged dorsal view of a specimen.

a.s., *a.i.* First and second antennae.

l.s. Upper lip or labrum.

m.m. Mandibles, inner surface, the left mandible on the left hand, portion of right mandible on the right.

mx. 1, *mx. 2.* First and second maxillae.

mxp. Maxilliped, inner surface.

gnp. 1, 2. First and second gnathopods.

Prp. 5. Fifth peraeopod.

Plp. 2, 5. Second and fifth pleopods.

urp. Uropod.

T. Dorsal view of telson, with one uropod attached, and fourth and fifth segments of the pleon.

The pleopods, uropod, and pleon, from the specimen figured in full, the other detail figures from a different specimen. The mouth-organs more highly magnified than the other details, each set to a uniform scale.

PLATE LXVII B.

Cirolana albicaudata, n. sp.

n.s. Lines showing natural size, underneath enlarged dorsal view of a specimen.

oc. Eye in profile view.

a.s., a.i. First and second antennae.

m.m. Mandibles, inner surface, right mandible complete, only cutting edge of left.

mx. 1, *mx.* 2. First and second maxillae.

mxp. Maxilliped, inner surface.

gnp. 1, 2. First and second gnathopods.

prp. 3, 5. Third and fifth peraeopods.

plp. 2, 5. Second and fifth pleopods.

T., urp. Telson (or caudal segment) and uropod.

Mouth-organs magnified to the same scale; other details less highly magnified, but to a uniform scale, except the lateral view of the eye.

PLATE LXVIII A.

Hansenolana anisopous, n. sp.

n.s. Lines showing natural size of the animal figured in dorsal view at the top of the plate.

C.D. Dorsal view of the head.

C.V. Ventral view of head (with left gnathopod attached) showing second antennae, frontal lamina, epistome, upper lip, right mandible and part of left, spines of first maxillae, and right maxilliped.

a.s., a.i. First and second antennae.

m.m. Mandibles—the right mandible on the left hand, the left on the right.

mx. 1, *mx.* 2. First and second maxillae.

mxp. Maxilliped.

gnp. 1, 2. First and second gnathopods.

prp. 5. Fifth peraeopod.

urp. Uropod.

The mouth-organs are drawn to a uniform scale, and the more highly magnified details also to a uniform scale; the other appendages are less magnified than the mouth-organs, but these likewise uniformly.

PLATE LXVIII B.

Renocula periophthalmi, n. sp.

n.s. Natural size of specimen, of which much enlarged dorsal view is given at the top of the plate.

C.D. Head and first peraeon segment, in dorsal view, after separation from the rest of the trunk.

C.V. The same in ventral view, one of the first gnathopods removed from the peraeon segment to show the mouth-organs.

a.s., a.i. First and second antennae.

l.s. Upper lip.

m.m. Mandibles.

mx. 1, 2. First and second maxillae.

mxp. Maxillipeds.

gnp. 1, 2. First and second gnathopods.

prp. 5. Fifth peraeopod.

plp. 2. Second pleopod.

The mouth-organs are magnified to a higher scale than the other details.

PLATE LXIX A.

Cubaris cinctatus (Kinahan).

n.s. Lines indicating natural size of specimen of which a magnified dorsal view is given above.

C.V. Ventral view of anterior part of head, with first antennae and upper lip in position.

Per. s. 1. Ventral view of first peraeon segment, with first gnathopod in position.

T.D. Dorsal view of pleon from the fourth segment to the telson and uropods.

T.V. Ventral view of uropods and telson.

a.s., a.i. First and second antennae to the same scale, and higher-magnification of first.

l.s., l.i. Upper lip, and lower.

m. Mandible, with distal part more magnified.

mx. 1, *mx.* 2. First and second maxillae partially shown, with distal extremity more magnified.

mxp. Maxilliped, with distal part more magnified.

gnp. 1, *prp.* 5. First gnathopod and fifth peraeopod, distal part of former more magnified.

C.D. Dorsal view of head with part of first peraeon segment, from a second specimen.

In this and in the fig. *T.D.* the colour pattern is shown.

The two scales of magnification used for the mouth-organs are respectively higher than those used for the other details.

PLATE LXIX B.

Philoscia lifuensis, n. sp.

n.s. Lines showing natural size of specimen figured above.

m. Mandible.

mx. 1. First maxilla, without inner plate.

mxp. Maxillipeds.

gnp. 1. First gnathopod.

prp. 4. Terminal portion of fourth peraeopod or sixth trunk-leg.

T., urp. Caudal segment with one of the uropods.

PLATE LXIX c.

Paraphiloscia stenosoma, n. g. et sp.

n.s. Lines showing natural size of specimen figured above.

oc. One of the eyes.

a.s., a.i. First and second antennae.

m. Mandible.

mx. 1, mx. 2. First and second maxillae.

mzp. Maxillipeds.

gnp. 1, gnp. 2. First and second gnathopods.

prp. 5. Fifth pereopod, or seventh trunk-leg.

plp. 2. Male organ of second pleopod.

T., urp. Caudal segment with one of the uropods, inner ramus of uropod also shown breadthwise.

PLATE LXX.

A. *Cubaris lijueusis*, n. sp.

n.s. Length of specimen from which the figures were taken.

C.F. Frontal view of head, showing small first antenna on the right, and second antenna (*a.i.*) on the left, with upper lip (*l.s.*) *in situ* below.

Per. s. 1. V. Ventral view of part of first segment of pereaeon.

T., urp. Dorsal and ventral views of caudal (telson) segment and uropods.

B. *Cubaris dollfusi*, n. sp.

n.s. Lines showing natural size of specimen partly figured.

C.F. Frontal view of head, with upper-lip (*l.s.*), and portion of second antenna.

Per. s. 1. V. Ventral view of part of first segment of pereaeon.

T., urp. Dorsal and ventral views of caudal segment and uropods.

C. *Cubaris lundii*, n. sp.

n.s. Lines showing natural size of specimen partly figured in lateral view.

C.D. Dorsal view of head.

Per. s. 1. V. Ventral view of part of first segment of pereaeon.

a.s., a.i. First and second antennae.

T., urp. Dorsal and ventral views of caudal segment and uropods.

D. *Cubaris zebriicolor*, n. sp.

n.s. Lines showing natural size of specimen from which the figures were taken.

C.F. Frontal view of head, with second antenna (*a.i.*) and upper lip (*l.s.*) in position.

Per. s. 1. V. Ventral view of part of first segment of pereaeon.

T., urp. Dorsal and ventral views of caudal segment and uropods.

Par. D., Par. L. Dorsal and lateral views of parasite, with the apex more enlarged.

E. *Panaetis incamerata*, n. g. et sp.

n.s. Length of specimen, of which enlarged dorsal (*D*) and ventral (*V*) figures are given.

a.s., a.i. First and second antennae.

os. Complex of oral parts, as seen without dissection.

ped. 2. Second foot.

F. *Bassettia congri*, n. g. et sp.

n.s. Length of specimen, of which ventral (*V*) and lateral (*L*) views are given.

a.s., a.i. First and second antennae.

os. Complex of oral parts.

ped. 4. Fourth pair of legs.

c.a. Caudal appendages, attached to terminal segment.

PLATE LXXI.

Anchicaligus (n. g.) *nautili* (Willey).

♂, ♀. Male and female in dorsal view.

n.s. Lines indicating the natural size.

♂, *V*. Male, more highly magnified, in ventral view.

r. Rostrum of the female specimen.

c.p. Caudal plates of the female specimen.

l., a.s., a.i. Lunula, with first and second antennae. These and the following figures, drawn all to one scale, from another female specimen.

m.xp. 1, 2. First and second maxillipeds.

ped. 1, 2, 3, 4. First, second, third, and fourth thoracic feet; of the first and second pairs both limbs are shown with their ventral attachment.

PLATE LXXII A.

Asterope arthuri, n. sp.

n.s. Natural size of specimen, ♀, of which the much enlarged lateral view is given above.

n.s..* Natural size of one of the largest specimens.

f.t. Frontal tentacle.

oc. Eye.

a.s., a.i. First and second antennae, with two spines of first antenna much more highly magnified.

m. Mandibular foot.

m.x. 1, *m.x.* 2, *m.xp.* First and second maxillae and maxillipeds.

app. v. Appendix vermiformis, with apex much more highly magnified.

c.l. Caudal laminae.

All the details are magnified to the same scale, except the extra enlargements of parts of the first antenna and the vermiform appendage. This last organ is from the specimen of which the full figure is given, the other details are from another specimen.

v.d. Right valve, with body of the animal displayed by removal of the left valve. Below are seen the branchial laminae, with the vermiform limb immediately above, followed on the right by the eye and the second antenna, while on the left are successively the maxilliped, the second and first maxillae. To the extreme left are seen protruding the unguis of the caudal furca. Almost in the centre are the ends of the adductor muscle.

PLATE LXXII B.

Cypridina baravoni, n. sp.

n.s. Natural size of specimen, with enlarged lateral view above.

oc. Eye.

a.s., a.i. First and second antennae.

m. Mandible.

m.x. 1, 2, *m.xp.* First and second maxillae and maxilliped.

- app. v.* Vermiform appendage.
c.l. Caudal laminae.
v.d. Dexter valve, with second maxilla *in situ*.

PLATE LXXIII.

Koleolepas willeyi, n. g. et sp.

Fig. at the top of plate represents the whole animal as seen attached to the internal surface of the mollusc-shell; *or.* orifice; *cr.* crest.

n.s. Natural size of the animal, when dislodged; the under surface of the disk is shown; the twisting of the peduncle exhibits the upturned orifice of the capitulum.

Cap. Fig. to the right, lateral view of upper part of capitulum; fig. to the left, three-quarter front view of the same.

l. Labrum; *pp.* palps.

m. Mandible.

mx. 1, *mx.* 2. One of the first and both of the second maxillae.

Cir. 1, 2, 5, 6. First, second, and sixth cirri; terminal portions from first, fifth, and sixth more highly magnified.

T. Telson or pleon.

d. Portion of inner skin of disk.

The mouth-organs are to the same scale, more highly magnified than the cirri.

PLATE LXXIV A.

Gloiopotes hygomianus, Steenstrup and Lütken.

n.s. Natural size of the male, of which an enlarged dorsal view is given.

PLATE LXXIV B.

Linckiomolgus caeruleus, n. g. et sp.

n.s. Natural size of female, of which dorsal view in full is given in the centre, and, to the same scale on the right, terminal part of the thorax, with male attached over the pleon.

a.s., a.i. First and second antennae. These and the following details are from the female.

m., mx. 1. Mandible and first maxilla, or perhaps together representing the mandible only.

ped. 1, 2, 3, 4, 5. The five thoracic feet; in *ped.* 4, both members of the pair are shown.

PLATE LXXIV C.

Oxyaspis aurivillii, n. sp.

Specimen in lateral view much magnified.

m., mx. 1. Mandible and first maxilla.

PLATE LXXIV D.

Koleolepas willeyi, n. g. et sp.

A sketch of the animal from life, made by Dr Willey in the East.

PLATE LXXIV E.

Gnathia aureola, n. sp.

The animal in dorsal and lateral view, sketched from life by Dr Willey, chiefly to indicate colour markings in the living condition.

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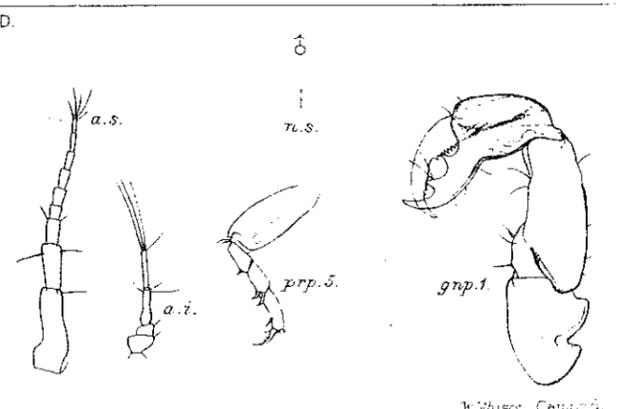
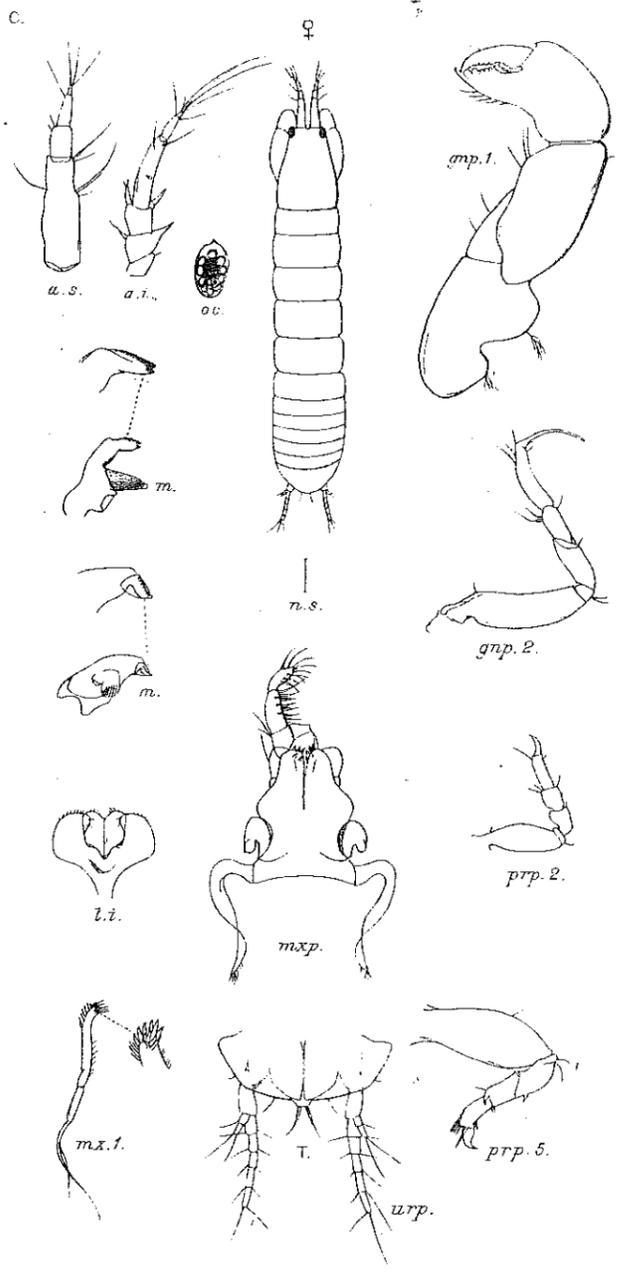
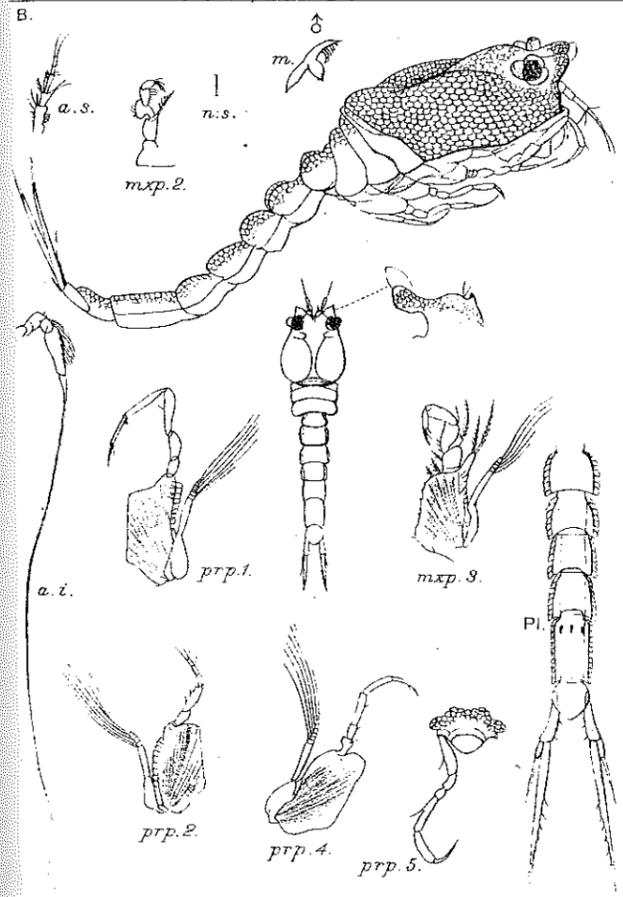
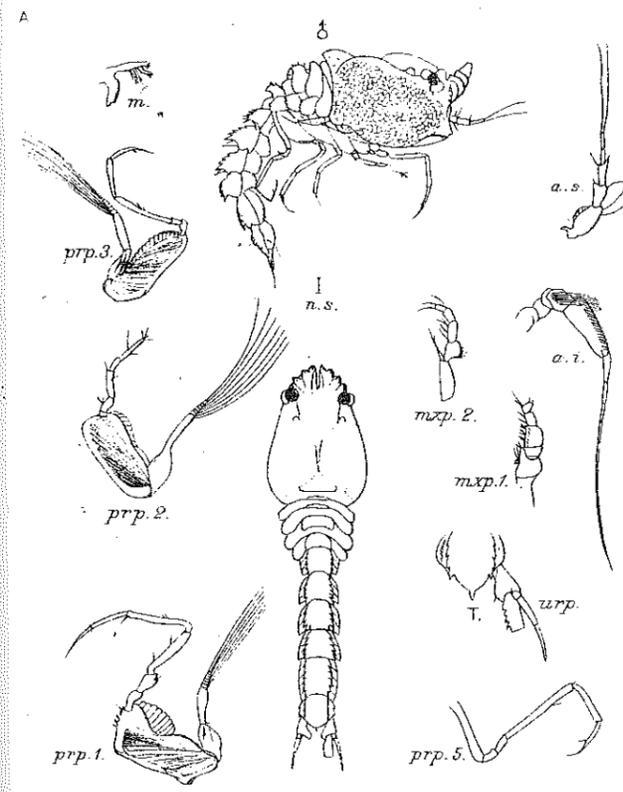
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¹ For "Copepoda semiparasitica" on pp. 607 and 664 read "Podoplea semiparasitica" and for "Copepoda parasitica" on pp. 608 and 667 read "Podoplea parasitica."

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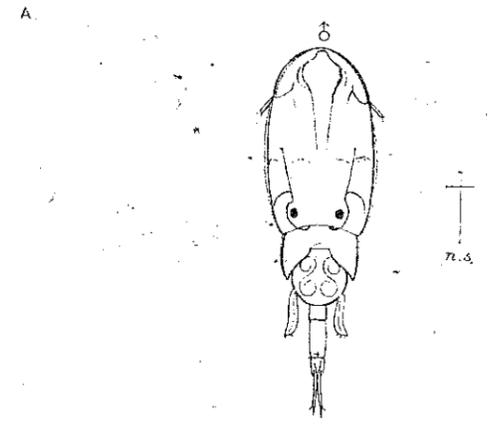


T.R.S. Del

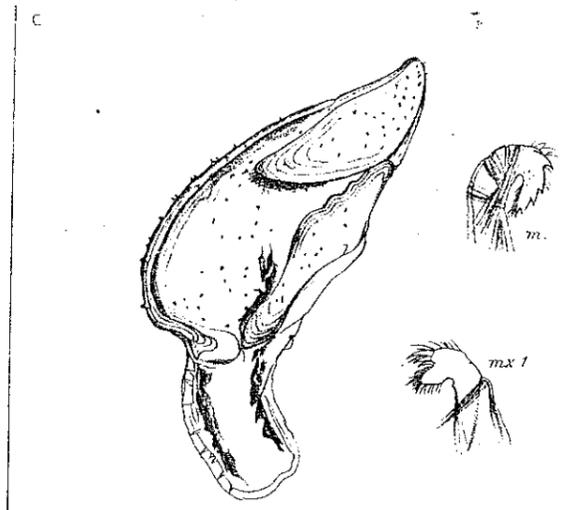
A *Nannastacus ossiani*, n. sp.
 B *Nannastacus georgi*

C *Leptochelia lifuensis*, ♀
 D *Leptochelia lifuensis*, ♂

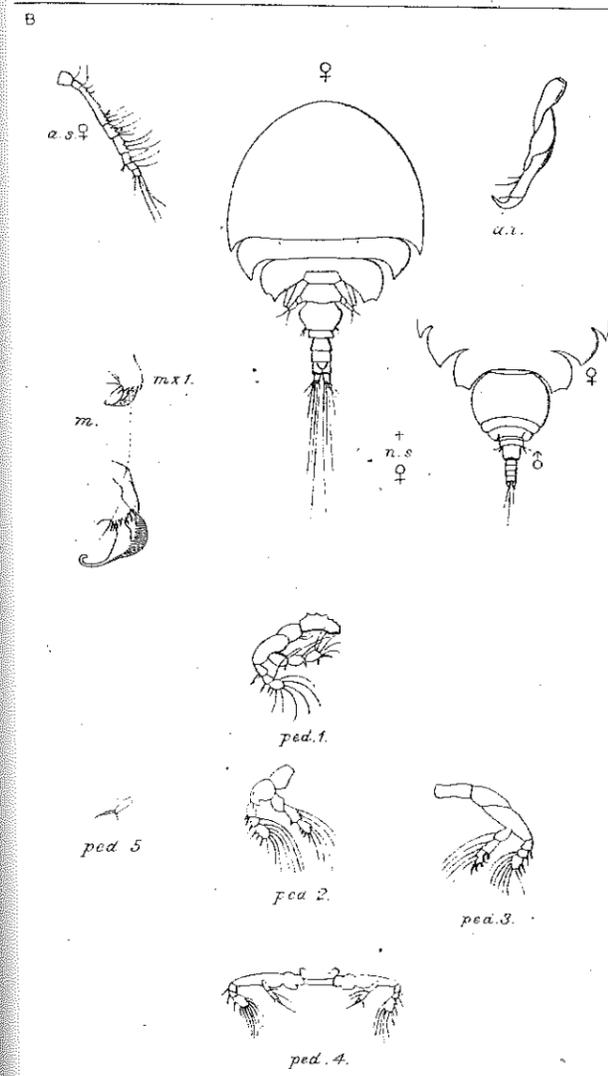
E. Wilson, Cantab.



Gloiopotes hygomanus.



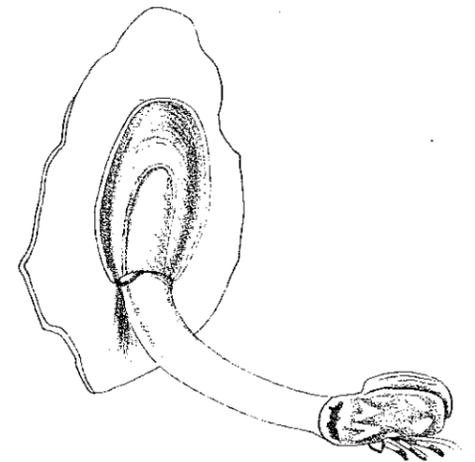
Oxyneaspis aurivillii n. sp.



Liackiomolgus caeruleus n. g. et sp.

T.R.R.S.

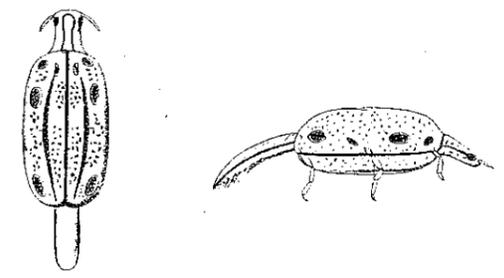
D.



Koleolepas willeyi n. sp.

Ad vitam. A.W.

E.

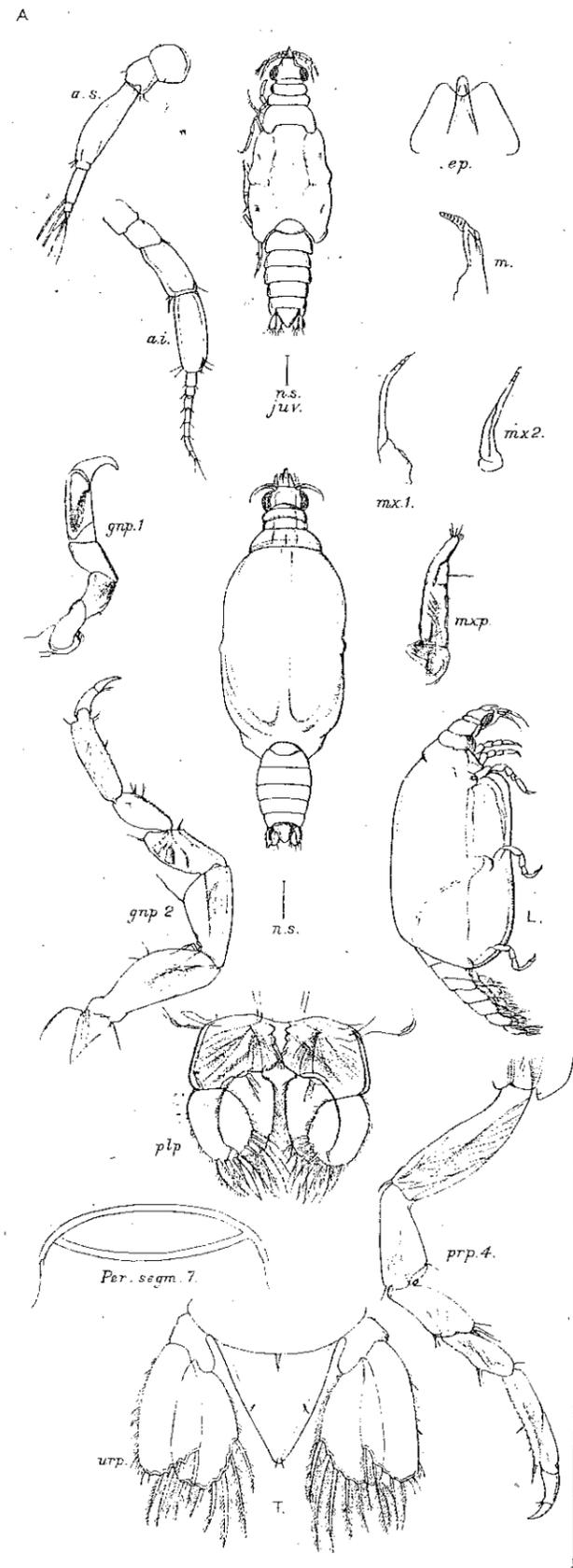


Gnathia aureola n. sp.

T.R.R.S. Del.

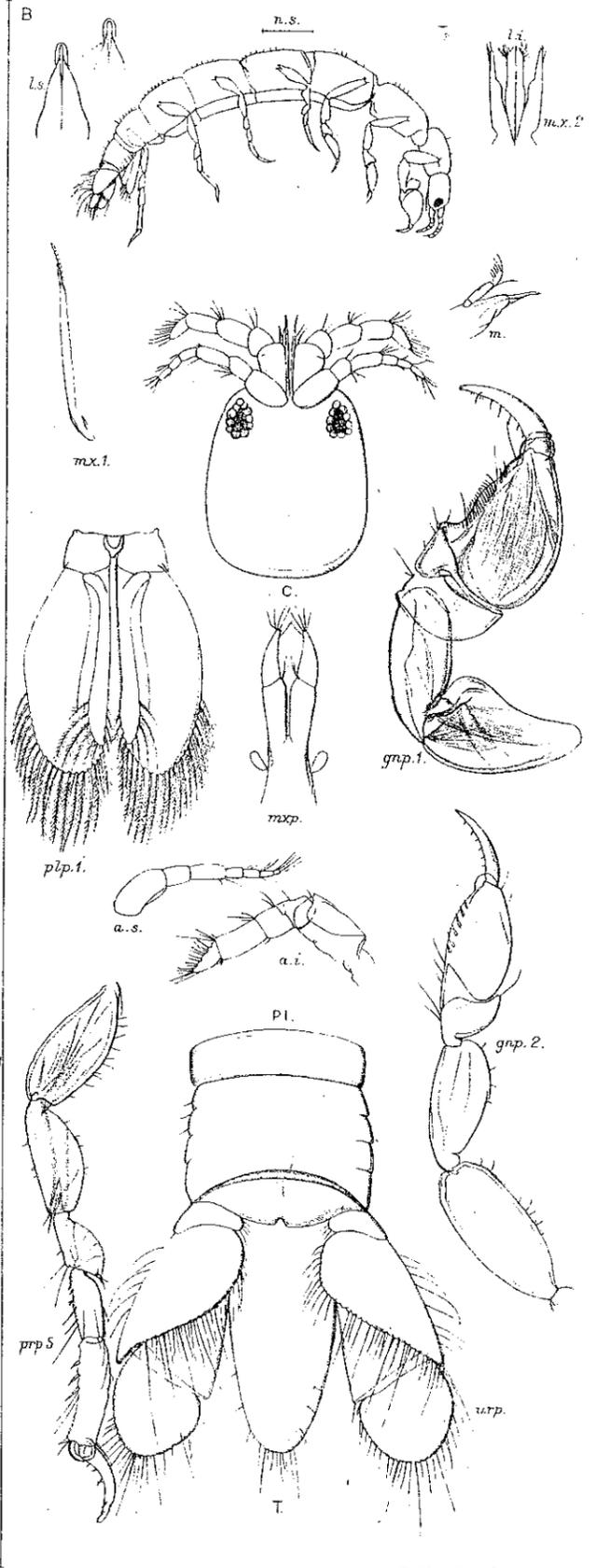
Ad vitam. A.W.

Edwards. Coll. 1927.



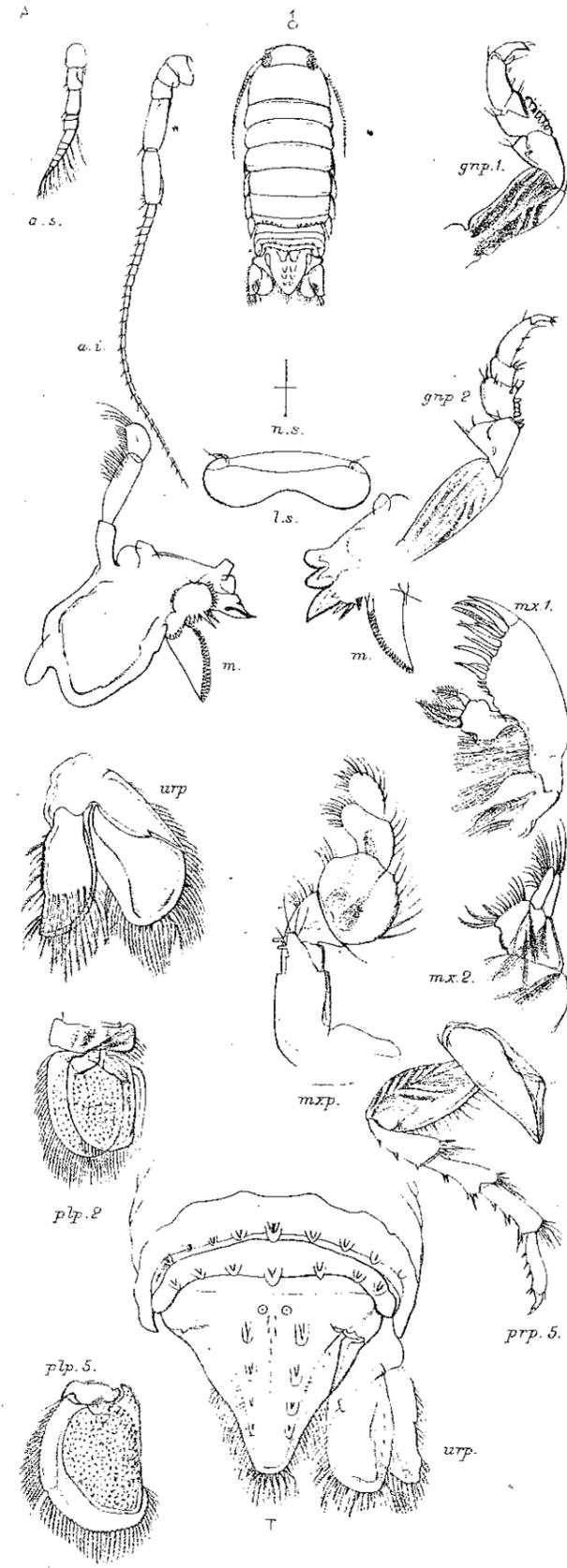
T.R.R.S. Del.

Gnathia aureola, n. sp.



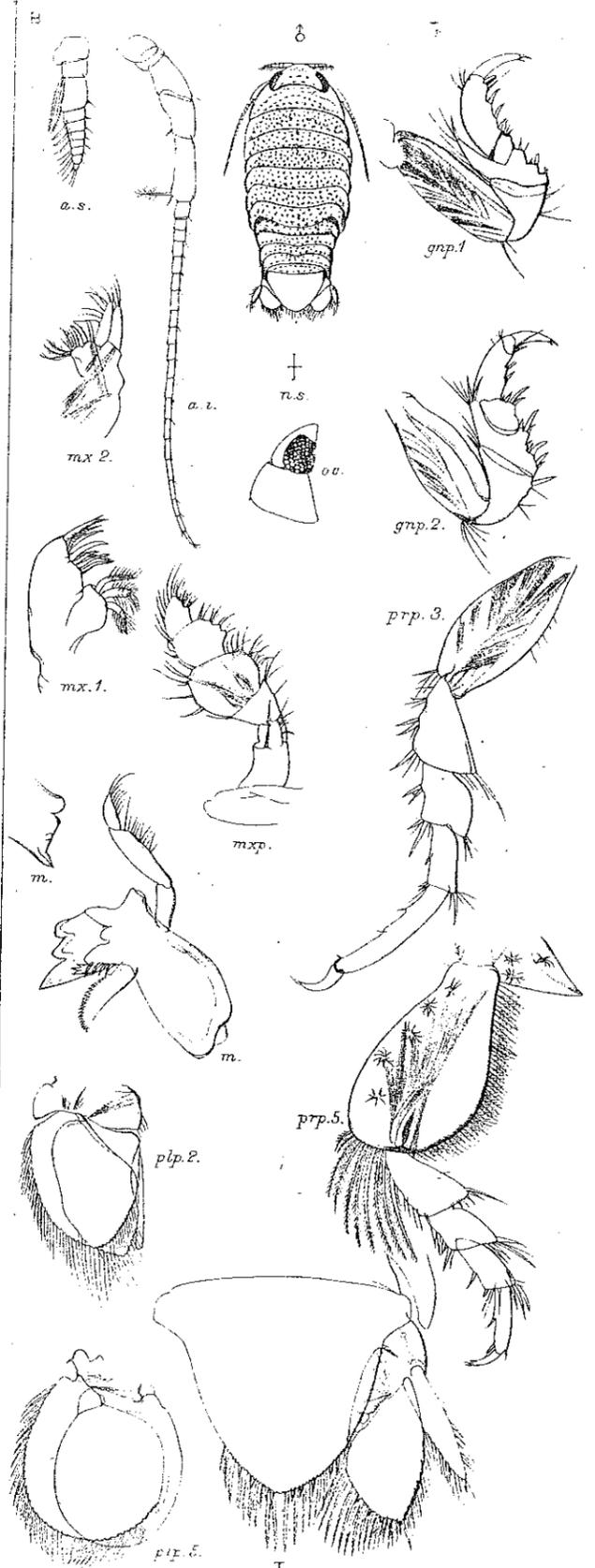
F. Wilson, Litt. Cambridge

Paranthura lifuensis, n. sp.



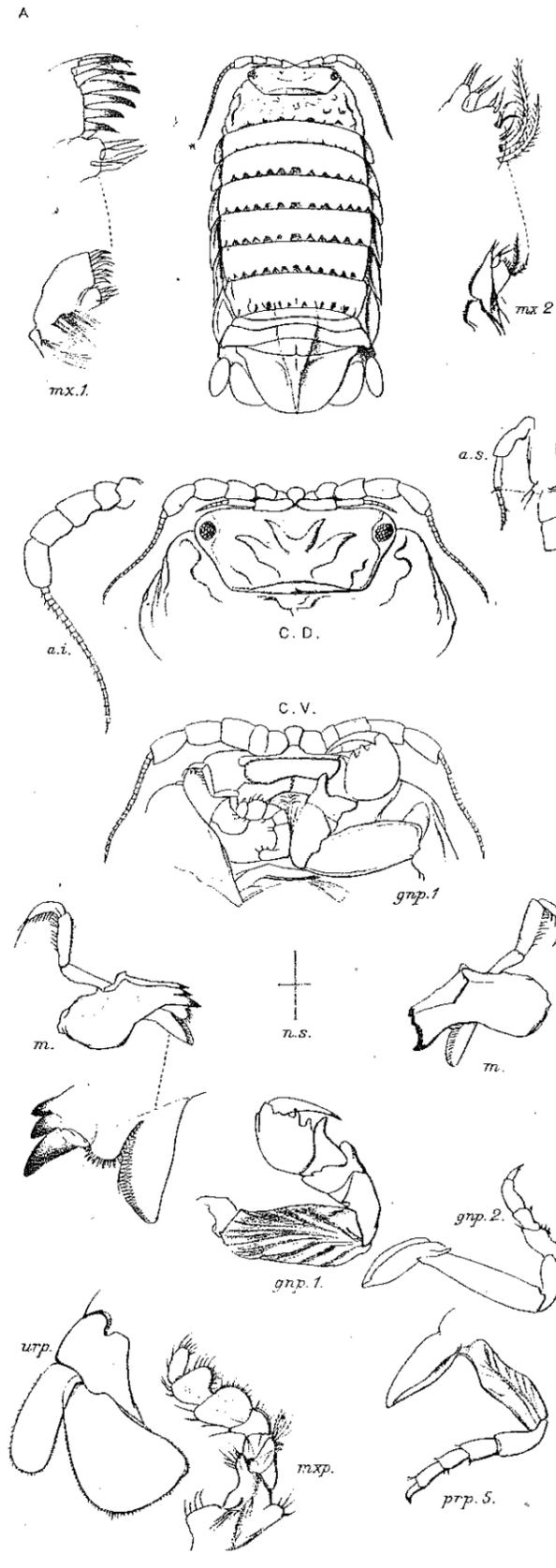
T.R.S. Del.

Circlana plecnastica n. sp.



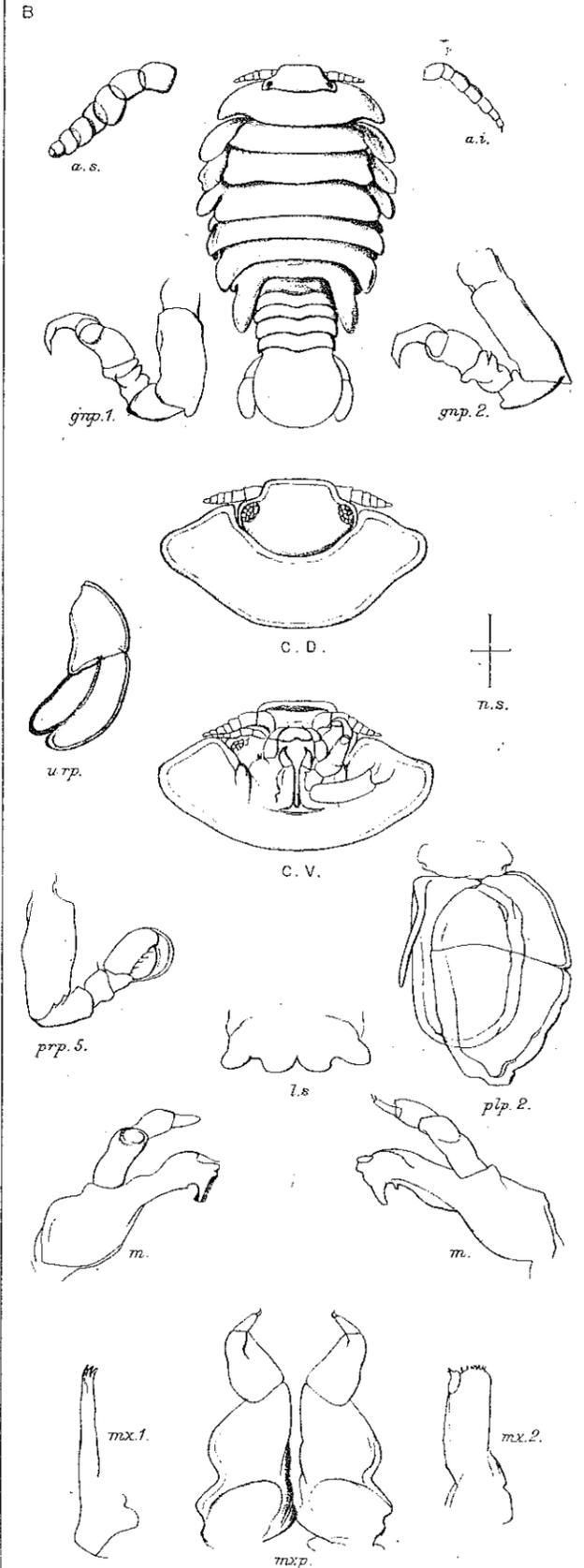
E. Wilson: Caminog.

Circlana albicaudata n. sp.



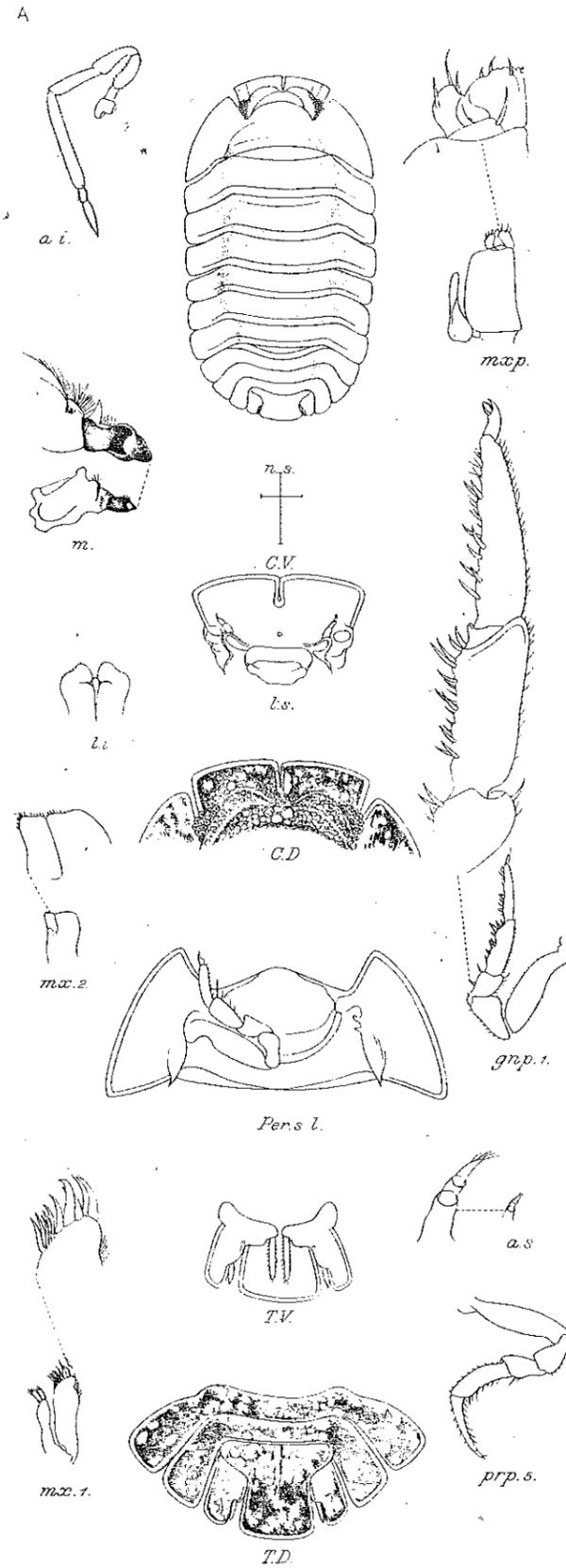
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Hansenolana anisopous, n. g. et sp



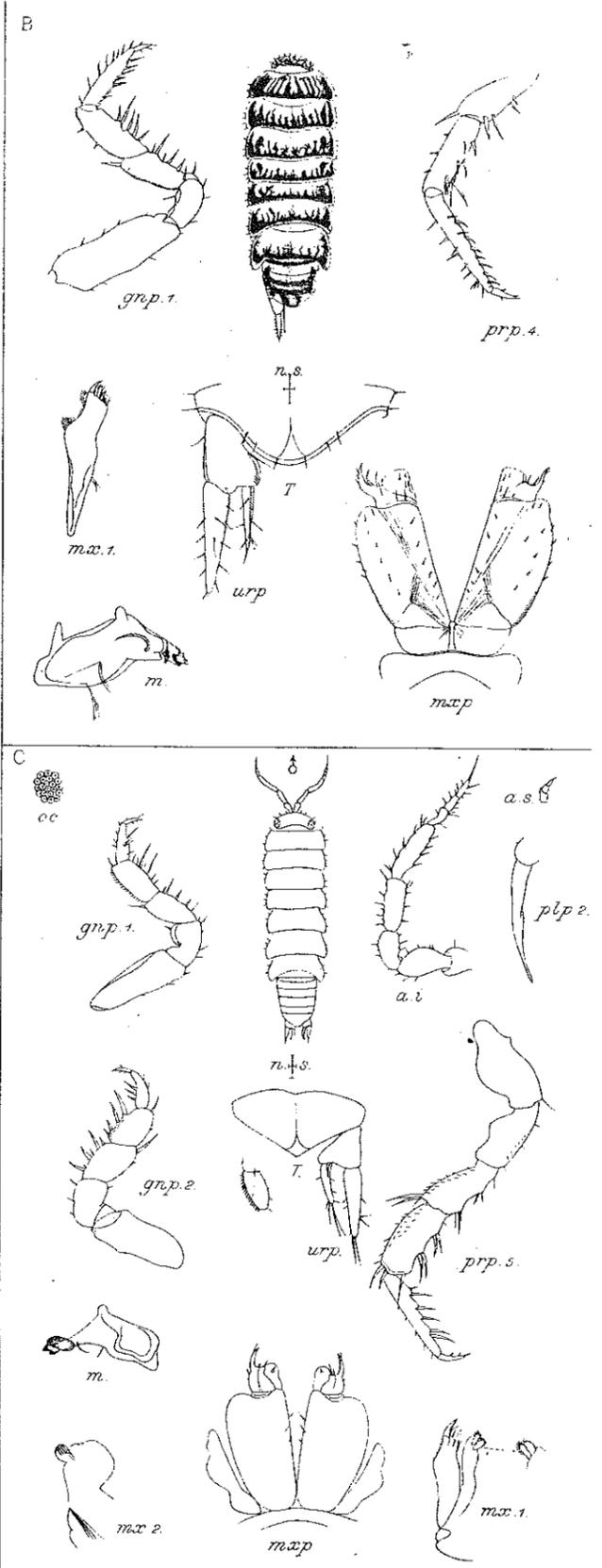
E. Wilson, Cambridge

Renocila periophthalmi, n. sp



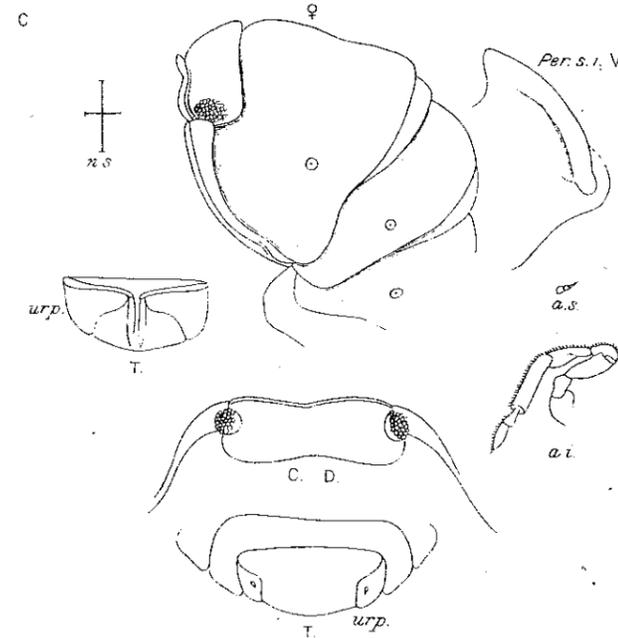
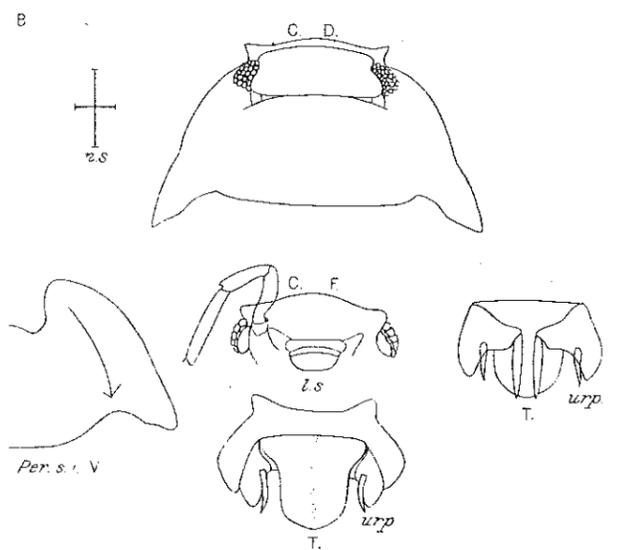
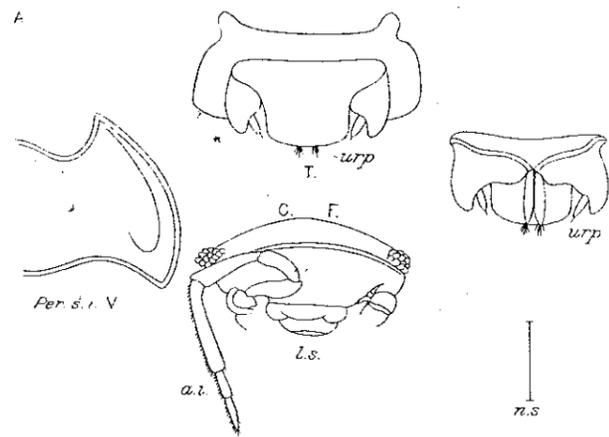
T.R.R.S. Del.

Cubaris cinctatus.
[Kinahan]



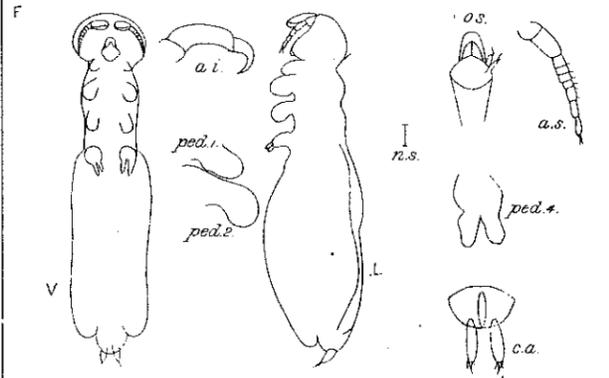
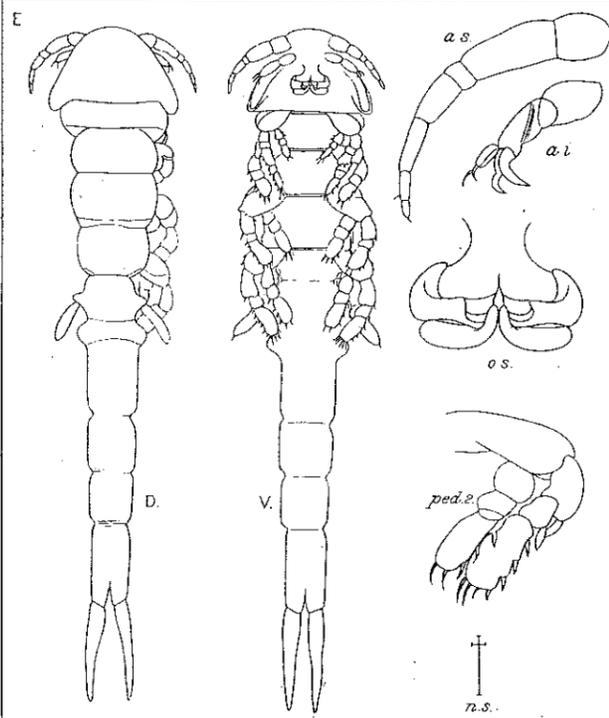
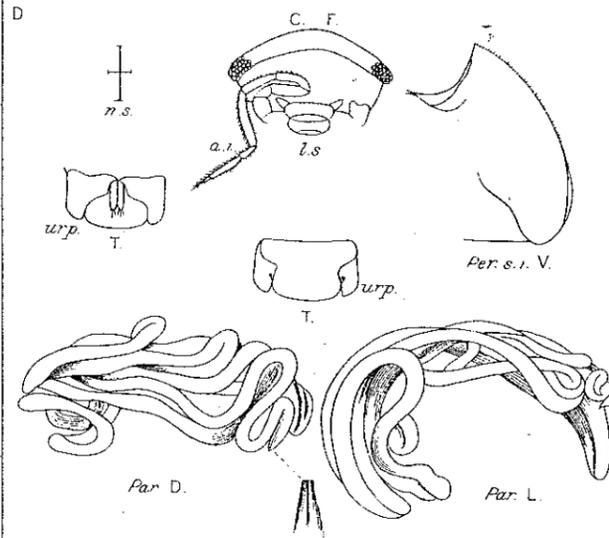
F. Wilson. Cambridge

Philoscia lifuensis n. sp.
Paraphiloscia stenosoma, n. g. et sp.



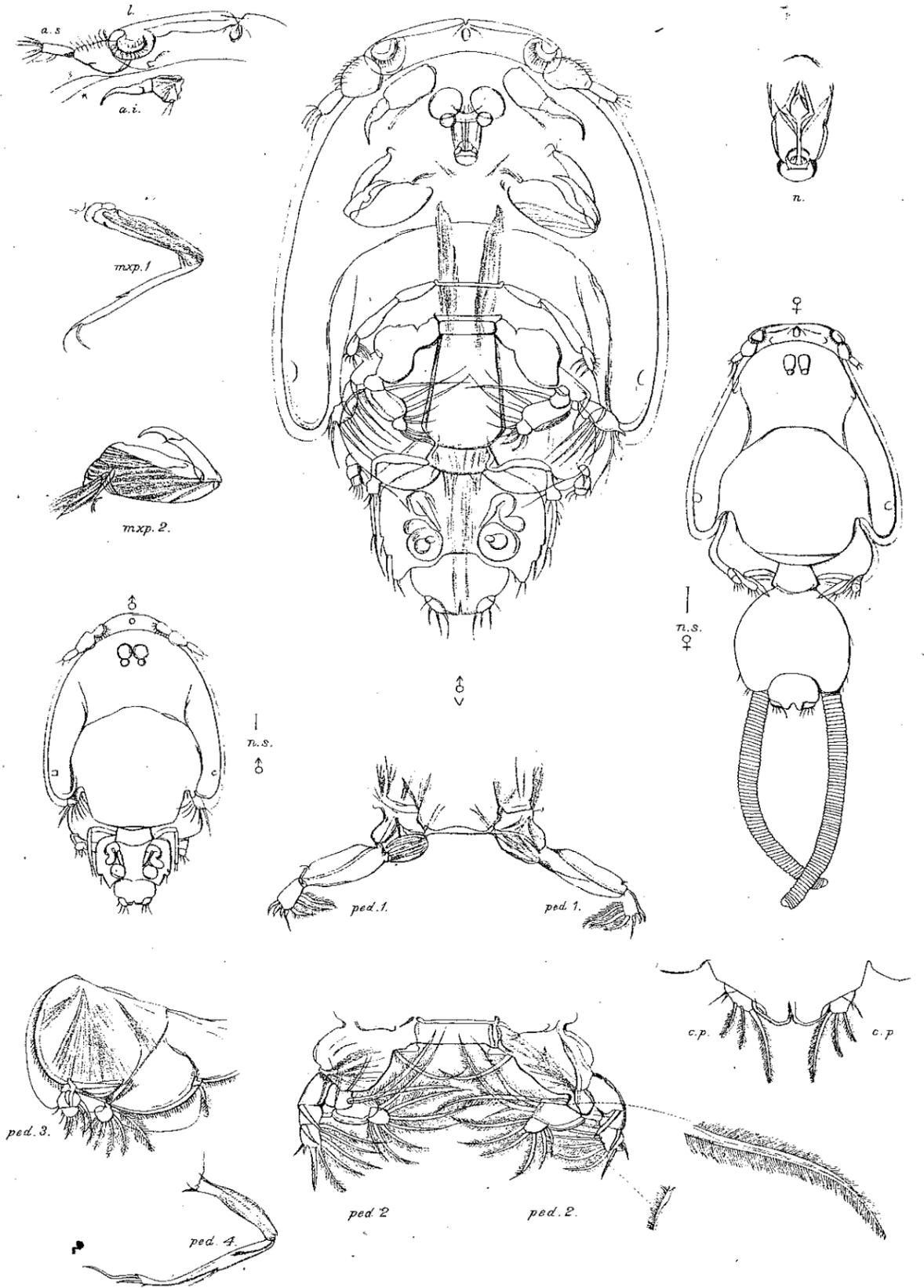
T.F.S. Ds.

Cubaris lifuensis, n. sp.
C. dollfusi, n. sp. *C. lundii*, n. sp. *C. zebri-color*, n. sp.



E. Wilson, Cambridge

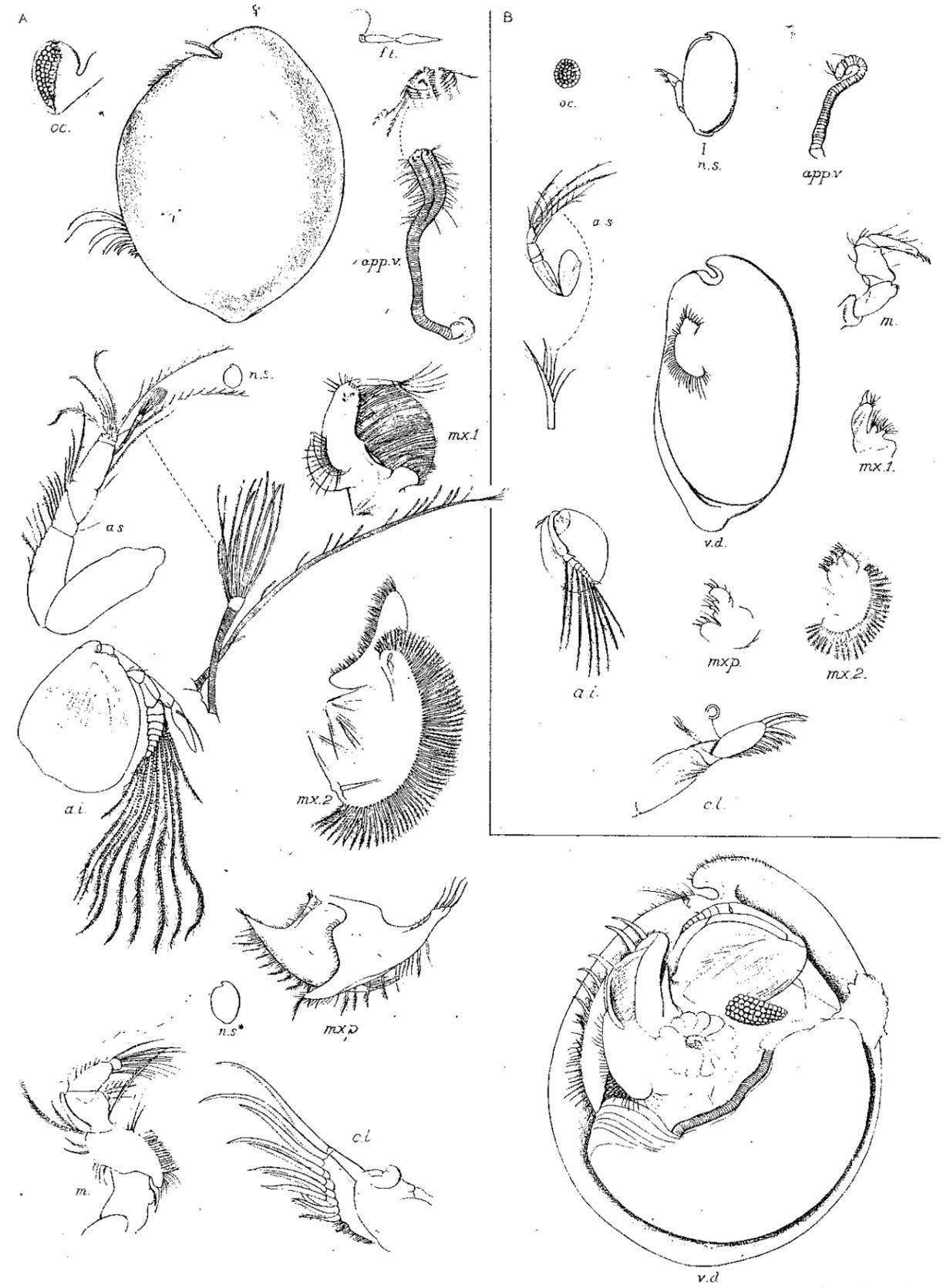
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Bassetia congri, n. g. et sp.



T.R.R.S. Del.

E. Wilson, Lith. Cambridge

Anchicaligus nautili (Willey)

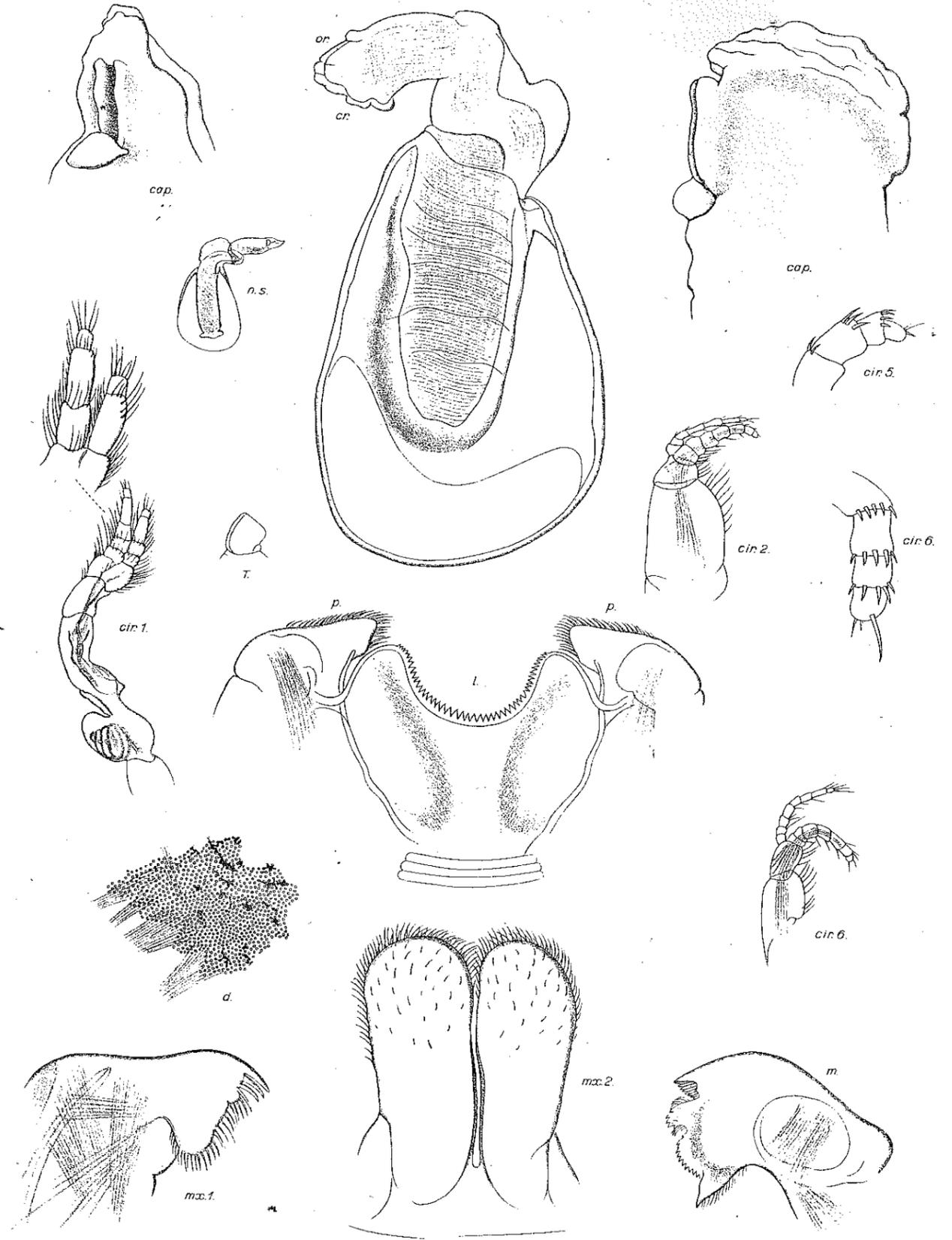


T.R.R.S. Del.

E. Wilson, Cantinogr.

A. *Asterope arthuri* n. sp

B. *Cypridina baravoni* n. sp



T.R.R.S. del.

E. Wilson, Cambridge

Koleolepas willeyi n. g. et sp.