

*Part IV. of Volume II. will be published on
January 15, 1905.*

The Fauna and Geography of the Maldive and Laccadive Archipelagoes

Being the Account of the Work carried on and
of the Collections made by an Expedition
during the years 1899 and 1900

Edited by

J. STANLEY GARDINER, M.A.

Fellow of Gonville and Caius College and late Balfour Student
of the University of Cambridge.

VOLUME II. PART III.

With Plates XLIX—LXVI.

CAMBRIDGE:
at the University Press.

LONDON: C. J. CLAY AND SONS,
Cambridge University Press Warehouse,
Ave Maria Lane.

Price Fifteen Shillings net.

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London: C. J. CLAY AND SONS,
CAMBRIDGE UNIVERSITY PRESS WAREHOUSE,
AVE MARIA LANE,
AND
H. K. LEWIS,
136, GOWER STREET, W.C.



Glasgow: 50, WELLINGTON STREET.
Leipzig: F. A. BROCKHAUS.
New York: THE MACMILLAN COMPANY.
Bombay and Calcutta: MACMILLAN AND CO., LTD.

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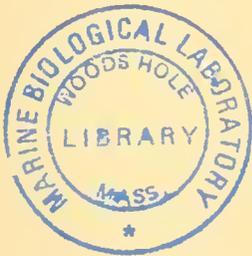
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1904

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CONTENTS OF VOL. II. PART III.

Reports.

	PAGE
1. Marine Crustaceans. XII. Isopoda, with Description of a New Genus. With Plates XLIX—LIII	699
By the Rev. T. R. R. STEBBING, M.A., F.R.S.	
2. Hydromedusae, with a Revision of the Williadae and Petasidae. With Plates LIV—LVII	722
By EDWARD T. BROWNE, B.A.	
3. Marine Crustaceans. XIII. The Hippidea, Thalassinidea and Scyllaridea. With Plate LVIII	750
By L. A. BORRADAILE, M.A.	
4. Madreporaria. I. Introduction with Notes on Variation. II. Astreaeidae. With Plates LIX—LXIV	755
By J. STANLEY GARDINER, M.A.	
5. Antipatharia. With Plate LXV	791
By C. FORSTER-COOPER, M.A.	
6. Arachnida. With Plate LXVI	797
By R. I. POCKOCK.	

MARINE CRUSTACEANS.

XII. ISOPODA, WITH DESCRIPTION OF A NEW GENUS.

BY THE REV. T. R. R. STEBBING, M.A., F.R.S., SEC. L.S.

(With Plates XLIX.—LIII.)

THIS small collection of Isopoda was entrusted to me for identification and description by my friend Mr L. A. Borradaile, M.A., F.Z.S., of Selwyn College, Cambridge. Of the fourteen species contained in it eight appear to be new, and for some of those which are not new the collection has supplied information likely to be of service. Especially attention may be called to the opinion expressed about Dana's genus *Corallana*, that opinion, if correct, involving the transfer of several species from Dana's genus to a new one named *Excorallana*.

FLABELLIFERA.

Flabellifera, 1882, Sars, *Forh. Selsk. Christian.*, No. 18, p. 15; 1893, Stebbing, *History of Crustacea*, p. 330; 1897, Sars, *Crustacea of Norway*, Vol. II. Pt. 3, p. 43; 1901, Harriet Richardson, *Proc. U.S. Mus.* Vol. XXIII. p. 505.

Sars observes that 'the tribe includes six very distinct families, viz. *Anthuridae*, *Gnathiidae*, *Cymothoidae*, *Serolidae*, *Sphaeromidae*, and *Limnoriidae*; but of these the third has generally been again subdivided into six families, viz. *Aegidae*, *Cirolanidae*, *Corallanidae*, *Alcironidae*, *Barybrotidae*, and *Cymothoidae*, thereby increasing the number of families to no less than eleven in all.' That the existing classification requires to be slightly modified will be argued in the following pages. The number of the families, however, will not be altered, and species representing six of them will have to be considered.

Fam. *Anthuridae*.

In Willey's *Zoological Results*, Part 5, pp. 618—620, 1900, I have rather fully discussed the history of this family from its institution by Leach in 1814 to the end of the nineteenth century, and am unwilling therefore to repeat what has been so recently published.

The resemblance that often exists between some at least of the limbs in species of this family and those in the *Cryptoniscus*-stage of the *Epicaridea* is perhaps not unworthy of remark.

A single specimen, about 6 mm. long, of a species apparently belonging to *Anthura* or *Cyathura*, was 'found on the back of a teat-fish at Minikoi.' As the specimen had gone dry, it seemed expedient to wait for further material before attempting to give this form its place in classification.

Gen. *Calathura*, Norman and Stebbing.

Calathura, 1886, Norman and Stebbing, *Trans. Zool. Soc. London*, Vol. XII. Pt. 4, p. 122; 1893, Stebbing, *History of Crustacea*, p. 332; 1897, Sars, *Crustacea of Norway*, Vol. II. Pt. 3, p. 44; 1901, H. Richardson, *Proc. U.S. Mus.* Vol. XXIII. p. 509; 1901, Axel Ohlin, *Bihang till K. Svenska Vet.-Akad. Handlingar*, Vol. XXVI. Pt. 4, p. 17.

The genus was instituted to receive *Anthura brachiata*, Stimpson, of which *Paranthura norvegica*, Sars, and *Paranthura arctica*, Heller, were considered to be synonyms. Sars in 1897 maintains the distinctness of his *C. norvegica*, which Ohlin in 1901 refuses to admit. The *C. affinis* of Bonnier belongs, as I have earlier argued, rather to *Paranthura* or *Leptanthura*. In 1901 Miss Richardson added a new species, *C. crenulata*, from the Bahamas and Yucatan. If we admit the presence of eyes in *C. brachiata*, as affirmed by Harger and Heller and Sars, but denied by Ohlin, the species of the genus may be distinguished as follows:—

- | | | |
|---|---|--------------------------------------|
| 1 | { Eyes wanting. | 1. <i>C. norvegica</i> , Sars. |
| | { Eyes present.—2. | |
| 2 | { Eyes feebly developed, with pigment white. | 2. <i>C. brachiata</i> (Stimpson). |
| | { Eyes well developed, with pigment black.—3. | |
| 3 | { Head only half as long as first peraeon-segment. | 3. <i>C. crenulata</i> , Richardson. |
| | { Head much longer than half the first peraeon-segment. | 4. <i>C. borradailei</i> , n. sp. |

It is not altogether improbable that the second species which Haswell referred to his genus *Haliophasma*, namely *H. maculatum*, may when more fully described have to be transferred from that genus to *Calathura*.

1. *Calathura borradailei*, n. sp. Pl. XLIX A.

Head with distinct rostral point, the lateral angles strongly produced. Segments of peraeon stout, apparently not carinate at the sides, the first as usual closely attached to the head, and the second distally narrowed, the seventh segment much the shortest. Segments of the pleon all distinct. The long narrowly oval telson has the apex fringed with setae nearly as long as itself, with scarcely perceptible crenulation. There is no appearance in it of 'statocysts' such as those described in *Anthura gracilis* by A. Thienemann (*Zool. Anzeiger*, Vol. XXVI. May 8, 1903).

The eyes are black, subtriangular, with the apex upward, situated near the antero-lateral angles of the head, which are rounded, not acute as they appear in a dorsal view.

The first antennae have the first joint of the peduncle longer than the other two combined, and a flagellum of twenty-one joints, the first seven stout, the rest filiform. The second antennae have a long second joint between two shorter joints, the fourth much longer than the third, and the fifth as long as the second. The flagellum, fringed with short setae, is composed of twenty-two joints.

The horny-pointed mandibles have the third joint of the palps the longest and probably armed with spines, though they were not actually seen. The second maxillae are evidently present, very slender, armed with long setae, and joining with the lower lip and maxillipeds to form a tube. In the maxillipeds it is difficult to determine whether that which Sars claims as the very short first joint of the palp may not be the base of the large joint

which he makes the second. Should that be so, the palp in *Calathura* will be not three-jointed, but, in accordance with Harger's view, two-jointed.

The first gnathopods are robust, but so provided with lobes and grooves that the various joints may be compactly folded together. As usual the fourth joint is broad, and the fifth very small, resting on the boss which projects at the base of the palm. The sixth joint is massive, with the convex front margin longer than the hinder one, which differs from what is found in the other species by forming a convex instead of a concave palm. This is bordered with spinules and flanked with setae projecting from the surface on either side. The finger is long and curved.

The second gnathopods were mutilated, wanting the last three joints, but they were evidently in agreement with the first peraeopods, which have the fifth joint very small, triangular, underriding the narrowly oblong oval sixth joint. The latter is fringed along the hind margin with setae and six spines, which are followed near the junction with the finger by a series of trifurcate spines. The finger has some little stiff hairs along the inner margin and many setules on the convex outer margin. It ends in a spine and a small nail.

The remaining peraeopods are more slender, and have the fifth joint attached end to end to the neighbouring joints, attaining its greatest length in the fourth pair. The second and third pairs are the shortest. In all the finger is shorter than the sixth joint.

The pleopods have the inner branch narrowly oblong. The male appendage of the second pair reaches beyond the branches and is slightly widened at the apex.

The uropods appear nearly to resemble those of *C. crenulata*, but to be fringed with much longer setae. The upper ramus, however, though elongate, does not reach beyond the basal joint of the lower one. The terminal joint of the latter is only a third as long as the basal. There seems to be a short peduncle distinct from the rami. The specimen in spirit had a few brown spots and stellate markings on a light ground.

Length of the specimen in strongly curved position 6 mm.; actual length about 10 mm.

Locality. A single specimen, male, taken at 23 fathoms depth, on hard ground, in Fadifolu Atoll.

The specific name is chosen out of respect to Mr L. A. Borradaile, the zealous carcinologist, through whom the present collection of isopods was entrusted to me.

Fam. **Cirolanidae.**

For the bibliography of this family reference may be made to Willey's *Zoological Results*, Part 5, p. 628, 1900, and *South African Crustacea*, Part 2, p. 49, 1902.

2. *Cirolana sulcicauda*, n. sp. Pl. XLIX B.

This small species belongs to the group in which the angles of the fifth pleon segment are enclosed by those of the fourth, and in which the hind limbs are not adorned with long setae. By the longitudinal medio-dorsal furrow of the telsonic segment its close approximation to *C. sulcata*, Hansen, is established. In other respects the pleon clearly separates the present from the South African species.

The first segment of the peraeon is much the longest, the last three are somewhat transversely rugose, with a line of tubercles adjacent to the hind margin. The first two segments

of the pleon are short and smooth; the following three have each three conspicuous tubercles, of which the middle one is the largest. In a lateral view the large median tubercle of the fifth segment has the appearance of a great boss overhanging the telsonic segment. The latter, though like *C. sulcata* furrowed down the centre between two tuberculate carinae, differs by the greater parallelism of these keels which in the other species bend towards one another at each extremity. Here the telson has eight spines at the apex instead of six; its convergent sides are ridged, but not notched near the base. The setae are plumose.

The eyes are dark, of moderate size. The first antennae have the peduncle clearly three-jointed, especially on the under side; in the short six-jointed flagellum the first joint is considerably the longest. The second antennae have a peduncle as long as the first antennae, its first three joints subequally short, the fifth a little longer than the fourth; the thirteen-jointed flagellum rather longer than the peduncle.

The frontal lamina has its apex rounded, the sides converging slightly to the short wide epistome. The upper lip has the lower margin slightly concave. The spines of the mandibular palp are short, finely denticulate. The inner plate of the first maxillae carries three short hirsute setae. The plates on the second joint of the maxillipeds are held together by two pairs of hooked spines; the fourth joint is short, the seventh narrow.

The first gnathopods have five stumpy spines on the hind border of the fourth joint; the fifth scarcely asserts its existence except by a blunt projection of its hind margin; the sixth has two blunt spines; the finger is tolerably stout with a well pronounced nail.

In the following limbs the fifth joint successively gains in prominence, till in the fifth pereopods it is subequal to the fourth or sixth. In the hind limbs the fourth and fifth joints carry some long spines which are finely serrate.

In the second pleopods the male appendage is rather longer than the ramus to which it is attached. The rami of the uropods are fringed with spines and plumose setae, the setae at the apical notched angles being the longest. The inner ramus is very broad, reaching beyond the outer one and the telson.

The specimen was 5 mm. long, with a breadth of about 2 mm.

Locality. The single specimen, a male, was taken at Hulule, along with some of Dana's *C. latistylis*.

The specific name is chosen to call attention to the relationship between this and the species with which it has been compared.

3. *Cirolana latistylis*, Dana.

Cirolana latistylis, 1853, Dana, *U.S. Expl. Exp.*, Vol. XIII. p. 772, Pl. 51, fig. 6 a—c; 1884, Miers, *Report Zool. H.M.S. Alert*, pp. 303, 304; 1890, Hansen, *Vid. Selsk. Skr.*, Ser. 6, Vol. v. Part 3, p. 356; 1897, Whitelegge, *Mem. Australian Museum*, Vol. III. Pt. 2, p. 149; 1900, Borradaile, *Proc. Zool. Soc. London*, p. 797.

Body smooth, naked, but slightly interrupted at base of abdomen. Head transverse, anteriorly rounded, not longer than next segment. Abdomen six-jointed; first segment nearly concealed under the thorax; caudal segment subtriangular, a little oblong, broadly rounded at extremity and crenulate, and ornate with spinules and shortish hairs. Caudal appendages not reaching beyond line of abdomen, inner lamella broadly subovate, having crenulations, spinules, and hairs like the caudal segment; the hairs not half as long as the lamella; outer lamella

considerably the shorter and half narrower.' This description given by Dana agrees excellently with our specimens, except that in them the inner ramus of the uropods extends slightly beyond the telsonic segment, and the outer ramus is as in Dana's own figure a little over half as broad as the inner. The hind margin of the head is concave. The second and third segments of the peraeon are rather shorter than the rest. The eyes are large, black, wide apart, so that their size is more apparent in a ventral than a dorsal view.

The upper antennae are separated only by the meeting apices of the head's underfolding triangular rostral point and the pentagonal frontal lamina. The first two joints of the peduncle are only faintly separated, and the third joint is subequal in length to the two combined; the first joint of the nine-jointed flagellum is much shorter than the second, the whole reaching a little beyond the peduncle of the second antennae. In these the first three joints are short, the fifth slightly longer than the fourth, the elongate flagellum in the specimen examined consisting of 21 joints.

The mouth-organs are characteristic of the genus.

The limbs are of the same general type as in the preceding species, the sixth joint in the first gnathopod is considerably broader than in the two following pairs of legs. Dana observes that 'the fourth joint of the third pair is a little shorter than either the third or fifth pairs, and longer than the tarsus.' In our notation this should read that the fifth joint is a little shorter than the fourth or sixth, and longer (but only a little longer) than the seventh.

In the telsonic segment there are four spines on each side of the bifid apical point.

Colour (in spirit) light, with brown speckling of very variable density.

Length 5 mm. by a breadth of 2 mm. or a little over. Dana gives the length as three lines, which would be something more than 6 mm.

Locality. North Malé Atoll, 35 fathoms, hard sand; Hulule; Suvadiva Atoll, 44 fathoms, hard muddy bottom; Kolumadulu Atoll, 38 fathoms, mud and weed.

Dana obtained the species from Straits of Balabac, north of Borneo, Whitelegge from 'sponges in sandy pools' at Funafuti Atoll, Borradaile also from Funafuti, 'three examples found on weed in the lagoon, one dredged in the lagoon in 15—25 fathoms of water.'

A specimen from Minikoi, noted as an 'Isopod living in tentacles of large tubicolous worm (Polychaeta 4),' measured 5 mm. in length, by only 1.25 mm. in breadth. But after drawing and dissecting it I could find no character but the narrowness to separate it from Dana's species. It was a female, but not carrying eggs or young. The marsupial plates have the hind margin cut into a fringe.

Fam. **Corallanidae.**

Corallanidae (part), 1890, Hansen, *Vid. Selsk. Skr.*, Ser. 6, Vol. v. Pt. 3, p. 280; *Alcironidae*, 1890, Hansen, *Vid. Selsk. Skr.*, Ser. 6, Vol. v. Pt. 3, pp. 285, 312, 390; 1893, *Corallanidae* (part), Stebbing, *History of Crustacea*, p. 345; *Alcironidae*, 1893, Stebbing, *History of Crustacea*, p. 346; *Corallanidae* (part), 1901, Richardson, *Proc. U.S. Mus.*, Vol. XXIII, p. 517; *Alcironidae*, 1901, Richardson, *Proc. U.S. Mus.*, Vol. XXIII, p. 519.

In 1895 Dr H. J. Hansen reduced these two families to the rank of subfamilies. Whatever the systematic dignity allowed them, they must, I think, be united. Were the *Alcironidae* independent that group would more properly take its name from *Tachaea* of Schiödte and Meinert,

that genus being older than *Alcirona* and *Lanocira*, both instituted by Hansen in 1890 to be its companions. At the same date that author beautifully illustrated and described with his accustomed clearness seven species from western waters, which he assigned to Dana's genus *Corallana*. Miss Harriet Richardson in 1901 added to this set an eighth species from Florida. Hansen had further noted eleven species earlier than his own as with more or less probability belonging to the same genus or at least to the same family. One of them, however, is *Corallana hirticauda*, the single species on which Dana founded his genus. Although the description does not satisfy all modern requirements it enables the species when obtained to be recognized, and the conclusion cannot be escaped that its generic character is distinct from that of the species assigned to *Corallana* by Hansen and Richardson. These, accordingly, I have referred to a separate genus *Excorallana*, distinguished by the great length of the apical tooth of the mandibles, the bifid termination of the second maxillae, and the elongate antepenultimate joint of the maxillipeds. The true *Corallana* agrees with *Tachaea*, *Alcirona*, and *Lanocira*, in not having the point of the mandible very strongly produced, in having the apex of the second maxillae simple, and in having the antepenultimate joint of the maxillipeds not longer than broad. Hansen's definition of the *Alcironidae* appears very well to suit the *Corallanidae*, taken to include the above-named four genera, but excluding *Excorallana*, which will become the representative of a family *Excorallanidae*.

Gen. *Corallana*, Dana.

Corallana, 1853, Dana, *U.S. Expl. Exp.*, Vol. XIII. pp. 748, 773; 1879, Schiödte and Meinert, *Naturhist. Tidsskrift*, Ser. 3, Vol. XII. p. 286.

Schiödte and Meinert, in their treatise *De Cirolanis Aegas simulantibus*, group together *Barybrotos*, *Tachaea*, new genera, with Dana's *Corallana*. The first of these was placed by Hansen in a separate family, *Barybrotidae*. To the third the joint authors assigned six species, one of them being Heller's *Aega basalis* from the Nicobar Islands, the remaining five (of which four were new) having all been found at Ubay in the Philippines. Two of their species they distinguished as *Corallana hirticauda*, Dana, and *Corallana hirsuta*, n. sp. Their figures and descriptions leave no doubt in my mind that they have had before them the original species for which the genus was instituted.

For distinguishing this genus from the other members of the family it is convenient to remember that *Alcirona* alone has the apex of the outer plate in the first maxillae armed with two spines, that *Tachaea* alone has the joints of the maxillipeds reduced to six, apparently by coalescence of the second and third, and that in *Lanocira* the second joint of the maxillipeds (leaving out of count the expansion in the female) is very little longer than broad, but very much longer than broad in *Corallana*.

4. *Corallana hirsuta*, Schiödte and Meinert. Pl. L B.

Corallana hirsuta, 1879, Schiödte and Meinert, *Naturhist. Tidsskr.*, Ser. 3, Vol. XII. pp. 287, 297, Pl. 5, figs. 11, 12.

Dana, in describing *Corallana hirticauda*, from the coral reefs of Tongatabu, writes as follows:—'Body moderately narrow, posterior half of back to extremity of abdomen hirsute. Head a little transverse. Eyes large. Antennae very unequal; second pair long, reaching to fifth segment of thorax; flagellum about eighteen-jointed; first pair not much longer than

base of second. Abdomen six-jointed, last segment triangular; sides straight; extremity rounded. Caudal stylets not extending beyond abdomen, branches obtuse, outer much the narrower, not longer than the inner. Feet short setulose.'

Neither in this nor in the much fuller account given by Schiödte and Meinert can I find any character except one to justify the separation of their *C. hirsuta* from Dana's *C. hirticauda*. Dana says that the outer branch of the uropod is 'not longer than the inner,' and figures it as somewhat shorter. Schiödte and Meinert say that the inner branch is scarcely shorter than the outer, implying that the outer if anything has the advantage, which in their figure they give it very decidedly. But on the other hand they say that in their own *C. hirsuta* the inner branch is much shorter than the outer. This again is borne out by their figure and corresponds with what is observed in the specimens of the present collection. All of them appear to have this particular feature, so that with reluctance I allow them to stand under the name which separates them from Dana's original species.

The body is depressed, so that here, as in other species of the genus, it shows the side-plates even in a dorsal view. The very hirsute telsonic segment has bisinuate sides converging to a rather broad slightly convex apex which carries eight spines.

The first antennae are prominent and contiguous at the base, with a broad, not very long, composite basal joint, only a little longer than the next or true third joint. The flagellum has 11 joints, most of them carrying sensory filaments, the first joint much shorter than the second. The second antennae have the first three joints very short, the fourth subequal in length to the fifth, widest at its base, this character appearing in both sexes and the young, but most developed in the male. The joints of the flagellum numbered 21 in one male specimen, but only 15 in another, 20 in a female, 14 in a little young specimen.

The mandibles end in a short uncinatè tooth accompanied by a small trifid plate; there is a slight marginal prominence, perhaps representative of a vanished molar; the second joint of the palp is the longest, both this and the third being in the distal part fringed with setiform spines.

The first maxillae have a narrow inner plate, slightly expanded at its apex; the outer plate ends in a strong unciform tooth.

The second maxillae are feeble, simple, with narrowly rounded apex.

The maxillipeds are narrow, only the second joint elongate, the fourth and fifth with length and breadth subequal in the male but broader than long in the female, the sixth and seventh joints small in both sexes.

The first gnathopods are short and stout, with four robust spines on the fourth joint, between which and the sixth joint the fifth makes very little show. The spines on the sixth joint are not robust. The finger is curved with a strong unguis.

The second gnathopods have the fifth joint very short but quite distinct, being otherwise very similar to the first gnathopods.

The first peraeopods are very like the second gnathopods. In the following pairs the fifth joint attains greater importance, and the joints from the third to the sixth have longer spines and a greater variety. In the last three pairs the fifth joint carries several spinose spines on the apical border.

The very broad inner ramus of the uropods in addition to numerous setae carries nine spines on the broadly rounded distal margin. The longer but very much narrower outer ramus has a fringing of long setae with spines at intervals, the apex subacute.

Colour, a pale ground sometimes strongly marbled with dark-brown stellate flecks, sometimes carrying only more or less distant spots of brown.

Length. A specimen here and there a little exceeded the length of 10 mm., but as a rule specimens, even those loaded with young ones, did not reach fully 9 mm. Dana gives the length of his species as nearly five lines, which may be reckoned as equivalent to 10 mm. Schiödte and Meinert describe an ovigerous female of Dana's species, which was 6.5 mm. long. Of their own species the ovigerous female described was 8.5 mm. in length, and the 'virgo' 9—9.5. As they had two specimens of the latter form, it may be inferred that they differed slightly in size. In their 'conspectus specierum' these authors distinguish *C. hirticauda* as having 'Cauda media obscure bisulcata vel subaequata' and 'Oculi aequati vel subaequati' from *C. hirsuta*, with 'Cauda media manifesto bisulcata' and 'Oculi manifesto granulati.' In the present collection the bisulcation of the pleon is quite obscure, but whether the eyes are less granular than in Schiödte and Meinert's specimens I have no means of determining.

Locality. Minikoi, from rotten log in the lagoon, some of them marked as coming from borings (possibly of *Teredo*) in the rotten wood. With them were some specimens of *Limnoria*.

Gen. *Lanocira*, Hansen.

Lanocira, 1890, Hansen, *Vid. Selsk. Skr.*, Ser. 6, Vol. v. Pt. 3, pp. 287, 313, 391, 395; 1893, Stebbing, *History of Crustacea*, p. 346.

Hansen, having only a single species at command, notes that in this genus, as distinguished from *Alcirona*, the hinder part of the body is naked, that is to say, not setigerous. But this character is not applicable to the new species about to be described.

5. *Lanocira gardineri*, n. sp. Pl. LI A.

The head (at least in the adult male) has the front upturned into a little horn, and near the hind margin, adjacent to the rather large dark eyes, there are a pair of tubercles. The appearance is therefore something like that of *Excorallana tricornis* (Hansen). The first segment of the peraeon is considerably the longest, the seventh the shortest. The front side-plates are rounded behind, the three hinder pairs somewhat quadrate and obliquely ridged. The first segment of the pleon is medio-dorsally obsolete; the fifth has its angles a little produced but flanked by those of the fourth segment. The telsonic segment has the sides very slightly sinuous, fringed with setae, and converging to a rather broad truncate apex carrying plumose setae and six spines. The dorsal surface of this segment is armed with twenty-six rather spine-like setae, and there are a few on other parts of the back.

The first antennae have the first and second joints coalescent, lying under the projecting front of the head, the third joint a little shorter than the composite one, the six-jointed flagellum shorter than the peduncle, and the whole appendage not longer than the peduncle of the second antennae. This is robust, with the first three joints together equalling the stout but not very elongate fourth, the fifth shorter and much narrower than the fourth. The flagellum, slightly longer than the peduncle, has numerous setae on the first seven of its thirteen joints.

The frontal lamina is pentagonal. The mandibles, as usual in this family, are very firmly attached to the lower lip, and have their free ends closely clipped in by the short upper lip. The trunk of the mandible, besides having a curved margin, makes a rather strong bend of the whole plate near the narrowed centre. The apex has no well-defined unciniate tooth as in *Corallana* and *Excorallana*, but some ill-defined dentations, accompanied by a row of spine-teeth, which on one of the mandibles point backward. The palp is attached near the base, and has the middle joint the longest.

The outer plate of the first maxillae ends in a single, very long, strongly curved spine, which is only seen in its natural shape when the trunk of the maxilla is set more or less edgewise.

The second maxillae are nearly as in *L. kröyeri*, Hansen, the broad 'lacinia of the second joint' being surmounted by an almost linear third joint which here carries a short seta in addition to the long one described for *L. kröyeri*.

The maxillipeds have the second joint a little longer than wide, the third, fourth, and seventh joints small, and the fifth and sixth not very large.

The first gnathopods have the second and third joints channelled, the third carrying a long spine on the front apex and a stout one on the hinder, the fourth joint is bordered with five stout spines, the apical much the largest; the fifth joint is hidden between its neighbours; the sixth is not strongly armed; the finger is large, and by help of its long nail strongly curved. The second gnathopods scarcely differ from the first in structure, except that the fifth joint is rather more conspicuous. The first peraeopods are like the second gnathopods. The four following pairs are successively longer, otherwise agreeing closely together in structure, the second joint broad, broadest in the fourth peraeopods, the fourth joint with the hind apex broadly produced, the third to the sixth but especially the fifth furnished with numerous spines on the apical border, the sixth joint short, a little longer than the strongly curved finger.

In the second pleopods the male appendage has an acute apex, not nearly reaching the end of the ramus.

The inner branch of the uropods reaches beyond the telsonic segment; it is fringed with plumose setae and has nine spines on the broadly rounded distal margin. The much narrower outer ramus does not reach beyond the telsonic segment; it carries eight spines among a fringing of long setae.

The colour is light, speckled with scattered flecks of brown.

Length a little under 7 mm., by a breadth of nearly 3 mm. Another specimen, smooth-headed, but apparently of the same species, was 4.5 mm. long by 2 mm. broad.

Locality. Mahlosmadulu Atoll, at 20 fathoms, on coarse sand and rubble.

The species is named out of respect to Mr Stanley Gardiner, by whom it was obtained.

6. *Lanocira rotundicauda*, n. sp. Pl. L A.

There is so much resemblance between this and the preceding species that, when the points of difference have been noticed, the question will still remain whether they may not possibly depend on difference of sex and age in the specimens examined.

The form about to be described was a female carrying numerous young ones, with their dark eyes showing conspicuously through the marsupium.

The head is smooth, the telsonic segment is broadly rounded, not at all apically truncate dorsally sprinkled with setiform spines, which seem to be less stiff than those in the other species and not arranged in the same order. Round the apical border the armature was for the most part worn away, but in the young there are six spines with intervening setae just as in *L. gardineri*.

The first antennae have a five-jointed flagellum, its first joint much the longest, the last two minute, as is the case in the young taken from the marsupium.

The second antennae are not specially robust; the flagellum is thirteen-jointed.

The mouth-organs do not give much assistance, because as shown in the figure the first maxilla of the young one is normal, as was also the case with a larger juvenile specimen not taken from the pouch of the mother, but this organ in the mother itself has a comparatively short terminal hook and a short oval inner plate. This form of the first maxilla is probably therefore a casual abnormality. The maxillipeds are very short, with the vibratory plate of the second joint extending to the top of the sixth joint. In the maxillipeds of the juvenile specimens there is nothing to show that the shortness of these appendages is abnormal, but as they are without the vibratory plate of the female comparison is not easy.

The pereopods are rather more slender than in *L. gardineri*.

Length 5.25 mm., by a breadth of 2 mm. There were also two small specimens, each under 3 mm. long.

Locality. Mahlosmadulu Atoll, taken along with *Lanocira gardineri* at 20 fathoms.

L. kröyeri, Hansen, the type species of the genus, from Rio Janeiro, among other differences has only four spines on the apical margin of the telsonic segment.

Gen. *Alcirona*, Hansen.

Alcirona, 1890, Hansen, *Vid. Selsk. Skr.*, Ser. 6, Vol. v. Pt. 3, pp. 285, 313, 391; 1893, Stebbing, *History of Crustacea*, p. 346.

This genus is well characterized by the very broadly crescentic epistome, the elongate peduncle of the second antennae, and the two-spined apex of the first maxillae.

To the two species for which it was instituted by Hansen, a third is now added. The three may be distinguished as follows:

- | | | |
|---|---|-----------------------------------|
| 1 | {Hinder part of body remarkably setose. | 1. <i>A. krebsii</i> , Hansen. |
| | {Hinder part of body very moderately setose.—2. | |
| 2 | {First gnathopods with robustly pectinate finger. | 2. <i>A. insularis</i> , Hansen. |
| | {First gnathopods with the finger simple. | 3. <i>A. maldivensis</i> , n. sp. |

7. *Alcirona maldivensis*, n. sp. Pl. LI B.

The head is smooth, with a rather blunt rostral point. At the centre of the back the fourth segment of the pereon is nearly as long as the first, and the seventh not much shorter than the fourth. The first two segments of the pleon are much concealed, the first, however, though very short at the middle is not at that part obsolete as in the species of *Lanocira* here described. The angles of the fourth segment are strongly produced, outflanking the rounded slightly produced corners of the fifth segment. The telsonic segment has the sides

slightly bisinuate, strongly convergent to an apex of very moderate breadth, with four spines on what may be called the truncate part, but another on each side not quite in line with the four, yet completing the series. The distal part of the whole margin is fringed with rather short setae and about eighteen are sprinkled on the surface.

The eyes are large and dark. The first antennae have the third joint at least as long as the composite first and second. The ten- or eleven-jointed flagellum is rather longer than the peduncle, and the whole appendage longer than the peduncle of the second pair. In that the fourth joint is longer than the first three combined, the fifth considerably longer than the fourth, the eighteen-jointed flagellum a good deal longer than the peduncle.

The frontal plate is pentagonal. The epistome stretches on either side much beyond the short and narrow upper lip. The mandibles as mounted *in situ* with their cutting edges under the lip appear to be much like those in *Lanocira*. The first maxillae have a slender, blunt-headed inner plate, and two strong spine-teeth at the apex of the outer plate. The second maxillae end in a smooth ovoid joint with the narrow end uppermost. The maxillipeds are short and compact, a little more robust and with a larger seventh joint than in the female *Lanocira rotundicauda*.

The limbs of the peraeon differ little from the pattern of those in the preceding genus, except that the hinder peraeopods are more slenderly built, with the apical spines of the sixth joint more strongly spinose, and the sixth joint more elongate.

The inner branch of the uropods reaches considerably beyond the telsonic segment. It is fringed with nine spines and numerous setae. The outer ramus is much shorter and much narrower, with eight spines and many setae. Each ramus has a little notch, clearly apical in the outer one, and occupying the outer angle of the inner one.

Colour, light with brown speckling.

Length, about 5 mm., by a breadth of about 2.5 mm.

Locality. Hulule, Maldive Islands. A single specimen, female with young.

Specific name from the locality. Hansen's *A. krebsii* was from the West Indies, his *A. insularis* from Samoa.

Fam. **Cymothoidae.**

For the limitation and extension in which this family is accepted I may refer to the discussion of the synonymy in *South African Crustacea*, Part 1, p. 55, 1900.

Gen. *Cymothoa*, Fabricius.

Cymothoa, 1793, Fabricius, *Entomologia systematica*, Vol. II. p. 503; 1884, Schiödte and Meinert, *Naturhist. Tidsskr.*, Ser. 3, Vol. XIV. p. 223.

The synonymy of the genus could be produced to a considerable length, but would be inappropriate here.

8. *Cymothoa borbonica*, Schiödte and Meinert, 1884.

Cymothoa borbonica, Schiödte and Meinert, *Naturhist. Tidsskr.*, Ser. 3, Vol. XIV. pp. 226, 282, Pl. X. figs. 7-10.

As the present collection includes only two of the small males, this identification may remain open to some question. The head has the incurved, broadly rounded front described by the above-named authors, but the eyes which they speak of as 'evanidi,' are rather large and though dull fairly conspicuous. The first antennae are well separated at the base, eight-jointed, equal in length to the much more slender, nine-jointed second pair. The anterior margin of the first peraeon segment is not so markedly trisinate as figured in the *Tidsskrift*, and the telsonic segment there spoken of as sulcate in the middle shows in our specimens a slight transverse depression near the base but no longitudinal furrow. It is, as Schiöde and Meinert say, a little wider than the fifth segment of the pleon, but this is in contradiction to the character which they give of their sub-family *Cymothoinae* (*op. cit.* p. 222), in which they say that the pleon has the fifth segment broader than the terminal one. Their statement that the uropods are much shorter than the telsonic segment is quite opposed to their figure, which shows them not at all shorter. In our specimens the difference in length is very small. The rami of the uropods agree with the description by the joint authors, both being obtuse-ended, the outer a little the longer, slightly curving inward, the inner a little the broader.

The male appendage of the second pleopods is stiliform, reaching a little beyond the very broad rami.

Colour, pale, with dark dots minute and distant, little affecting the general appearance.

Length of one specimen 10 mm., breadth 3.75 mm., of the other 8 by 4 mm. Schiöde and Meinert give the length 11.5—14 mm. The breadth, 'duplo longior quam latior,' does not correspond exactly with the figure, which is more than twice as long as the greatest breadth, so that the relation of length to breadth may be taken as to some extent variable.

Locality. Hulule, from 'Gills of large Parrot-fish.'

Fam. **Sphaeromidae.**

References to the literature of this family, with some remarks on the still rather obscure boundaries of the included genera, are given in the *Proc. Zool. Soc. London*, p. 552, 1900; in Willey's *Zoological Results*, Part 5, p. 643, 1900; and in *South African Crustacea*, Part 2, p. 64, 1902. From the Malay Peninsula Mr W. F. Lanchester has recently described a new species under the name *Sphaeroma felix*, in *Proc. Zool. Soc. London*, p. 379, pl. 35, fig. 10, 1902. The character of the maxillipeds is not specified.

Gen. *Exosphaeroma*, Stebbing.

Exosphaeroma, 1900, Stebbing, *Proc. Zool. Soc. London*, p. 553; 1902, *South African Crustacea*, Part 2, p. 64.

Sphaeroma serratum (Fabricius), for which the genus *Sphaeroma* was instituted by Bosc, has the maxillipeds differently constructed from those of almost all the later species, in regard to which these appendages have been described, for, while in those species the fourth, fifth and sixth joints are all produced into conspicuous lobes on the inner side, in the original species there are no such lobes. The species now to be noticed has the fourth and fifth joints very slightly lobed, but the sixth not at all. It therefore occupies an intermediate position between *Exosphaeroma* and *Sphaeroma*, yet so much nearer to the former than to the latter that it cannot well be left in the genus to which Dana assigned it.

9. *Sphaeroma* [*Exosphaeroma*?] *globicauda*, Dana.

Spheroma globicauda, 1853, Dana, *U.S. Expl. Exp.*, Vol. XIII. p. 781, pl. 52, fig. 9 *a, b*.

Dana gives the following description:—'Body nearly smooth, in part very fine granulous and pubescent. Abdomen subtriangular, very tumid, excepting the parts towards the margin around; at extremity a deep fissure, which at its inner end is produced a short distance transversely in either direction. Caudal appendages reaching slightly beyond line of abdomen; inner lamella the broader and slightly the longer, broadly rounded at apex; outer having the outer margin much reflexed.' Then, after stating that the habitat was 'Nassau Bay, Fuegia,' he adds:—'Length of body, two and a half lines. The fissure in the extremity of the abdomen is of peculiar depth and shape; the part of the surface of the abdomen anterior to its inner extremity is a little raised, independently of the general globose elevation which characterizes the whole segment anterior to this raised point. The minute hairs of the surface and slight granulation are seen with a lens most distinctly on the caudal segment.'

Specimens from the lagoon at Minikoi agree so well with this account that nothing but the difference of size, which in them scarcely exceeds 3 mm., could cause any doubt as to the identity of the species. An examination, however, of what may confidently be regarded as the sexes of one and the same species leads to the conclusion that the aperture in the telsonic segment belongs only to the male. It is probably a character of the adult, since all the smaller specimens as well as the female carrying young are devoid of this transversely rounded opening. *Cymodoce cordiforaminalis*, Chilton, has the aperture of a rather different shape, but is otherwise a species so similar to the present that it will be interesting to learn whether it exhibits the same sexual difference.

The head has a blunt rostral point between two emarginations. In the male the seventh segment of the peraeon is slightly indented at the middle of the hind margin, which is smoothly convex in the female. The pleon has a very short first segment overlapped by the peraeon. This segment is closely united to a composite segment, probably representing the second to the fifth, the angles of the fourth and fifth being to a certain extent distinct but strongly overlapped by those of the preceding segment.

The eyes are not very large, but prominent, conspicuously faceted. The first antennae have a stout composite basal joint, followed by a third joint not much longer than broad, and much shorter than the first joint of the eight-jointed flagellum, which exceeds the peduncle in length and has sensory filaments on the terminal joints. What is here regarded as the first joint of the flagellum corresponds with the third joint of the peduncle in Chilton's description.

The second antennae are rather longer than the first, the second joint longer than the first or third, the fourth than the second, the fifth than the fourth, but not 'nearly twice as long' as in Chilton's species. The flagellum is nine-jointed.

The mandibles have a strong molar and tridentate cutting edge with accessory plate and spine-row, and three-jointed palp. The inner plate of the first maxillae is tipped with four setae. But none of the mouth-organs appear to offer any very distinctive features except the maxillipeds. These differ in a marked degree from those of *Sphaeroma serratum*, as also from those of *Sphaeroma rugicauda*, Leach, but neither do they fully agree with those that have been described in any of the species of *Exosphaeroma* or *Cymodoce*. The fourth joint is considerably longer than the fifth, and each of these is distally expanded on the inner side,

but without forming an elongate lobe; the sixth is fully as long as the fifth, but much narrower; it is broader and longer than the seventh, but forms no distal lobe. The armature is feeble, except on the apex of the plate of the second joint.

The anterior limbs of the peraeon are rather robust, the first pair distinguished from the rest by the fifth joint underriding the sixth, its triangular form allowing the fourth and sixth joints to meet on their outer margin. In the more elongated limbs of the last three pairs the fifth joint has its share in the lengthening. In all the limbs the finger has a little hooked spine in advance of the small hooked unguis. The male appendages of the last peraeon-segment are elongate, close together at the base, with their stiliform apices a little divergent.

The male appendage of the second pleopod appears to be of unusual breadth at the base, then tapering to a narrow apex at some distance beyond the plate that carries it. In *Sphaeroma rugicauda* this appendage is very long and has a somewhat widened rounded apex.

In the uropods the movable outer ramus is serrate almost all along the outer margin as well as on the rounded apex, in the ramus coalesced with the peduncle the serration reaches up the outer margin barely halfway. Length 3 mm., by a breadth of 1.5 mm.

Locality. Lagoon, Minikoi, along with a specimen of *Ligia*.

Heller in the *Crustacea of the Novara Expedition*, pl. 12, figures three species each with a foramen in the telsonic segment, which he names respectively *Sphaeroma perforata*, Milne-Edwards, *S. stimpsoni*, n. sp., and *S. scabricula*, n. sp. None of them can be confused with the present species. The first is easily distinguished by the long median tooth of the last peraeon-segment. But it claims attention here as having the same sexual difference in the telsonic segment as our species exhibits. Heller is certainly wrong in attributing the circular aperture to the female and the simply notched telson to the male. He also says that the postero-median tooth of the peraeon is shorter in the male than in the female, as to which the reverse may be taken for granted. But his text is plainly contradicted by the explanation of the plate above cited.

Gen. *Cymodoce*, Leach.

Cymodoce, 1814, Leach, *Edinb. Encycl.*, Vol. VII. p. 433; 1902, Stebbing, *South African Crustacea*, Part 2, p. 73.

The difficulties connected with the definition of this and various other genera of the Sphaeromidae are discussed by Mr Beddard in his *Challenger Isopoda, Reports*, Vol. 17, p. 145. Until a monograph of the family is carried out by some patient and skilful hand these difficulties are likely to remain. The incapacity of the animal to become completely globular, the resistance to complete folding of one plate over the other in the uropods, and the presence of a lobe in the excavated apex of the telson, are superficial characters which do not offer very firm ground for generic distinction. The maxillipeds do not differ from those found in *Exosphaeroma gigas*, and in most of the species which I have assigned to that genus.

10. *Cymodoce bicarinata*, n. sp. Pl. LII B.

The head broad, the first segment of the peraeon the longest, the sides of the body very hirsute, and the hind margins of the segments hairy, the sixth and seventh also tuberculose. In the pleon a small first segment is covered by the peraeon, the composite

segment which follows has on the hind margin two sub-median bosses. These are followed on the telsonic segment by two slightly divergent carinae leading to two very large bosses each carrying a crest of hairs. To them succeeds a large median boss. This is followed by a convex-sided apically truncate process emerging beyond the convergent apices of the telsonic emargination. All these parts are strongly fringed with setae, and distinguish the species from *C. pilosa*, Milne-Edwards, which has an otherwise similar pleon, but ending in an almost cylindrical median plate, rounded at the end and not reaching beyond the two lateral apices. In *C. aculeata*, Haswell, the median plate projects beyond the lateral points, but it is differently shaped, and the bosses on the pleon are arranged transversely, not in successive pairs. In *C. tuberculata*, Haswell, the bosses are successive, but of quite different character, and the apices of the terminal notch project beyond the median process.

The eyes are wide apart, the anterior margin of the first peraeon-segment being deeply emarginate to receive them.

The first antennae have a large, bent, composite basal joint, with the following joint not very large. To the stoutly constructed peduncle succeeds a slender flagellum of 14 joints, of which the first is much the longest. In the second antennae the peduncle is not robust, the fifth joint a little longer than the fourth, the flagellum 17-jointed. In the mandibles the principal cutting edge is horny-looking, not dentate. The palp is rather slight. The maxillipeds have the fourth, fifth and sixth joints fully lobed. As will be seen in the figure the palp on one side of the specimen was in process of regeneration. The limbs of the peraeon are of the character usual in this family. The male appendages of the seventh peraeon-segment are rather long, not very acute. In the second pleopods the male appendage is very long, with its narrow inward-curving apical part reaching much beyond the plate to which it is attached.

The uropods are straight, rather narrow, very setose, the outer ramus more obliquely truncate than the inner, which it outreaches, both extending beyond the telsonic segment, the outer having a prominent spine at the apex of its raised outer border. In *C. longistylis*, Miers, the inner ramus has an outward curve, and decidedly outreaches the outer.

Length, 6 mm., breadth, 3 mm.

Locality. Minikoi, from 5 to 7 fathoms in centre of lagoon.

Specific name referring to the carinae on the pleon.

Fam. **Limnoriidae.**

Limnoriadae, 1850, White (part), *List of British Animals in Brit. Mus., Crustacea*, p. 68 (without definition); *Limnoriidae*, 1880, Harger, *Rep. U.S. Fisheries*, Part 6, p. 371; 1893, Stebbing, *History of Crustacea*, p. 367; 1897, Sars, *Crustacea of Norway*, Vol. II. Part 4, p. 74.

The family, as restricted by Harger, still contains a single genus.

Gen. *Limnoria*, Leach.

Limnoria, 1814, Leach, *Edin. Encycl.*, Vol. VII. p. 433; 1867, Bate and Westwood, *Brit. Sessile-eyed Crustacea*, Vol. II. Part 18, p. 349; 1880, Harger, *Rep. U.S. Fisheries*, Part 6, p. 373; 1897, Sars, *Crustacea of Norway*, Vol. II. Part 4, p. 76.

The full definition drawn up by Professor Sars was probably based on the species *L. lignorum* alone. To include the other species undoubtedly belonging to the genus it requires some slight modification. Thus the epipod of the maxillipeds is not always lanceolate, and the outer ramus of the uropods is not always unguiform. Authors generally (myself included) have agreed in speaking of the trunk limbs as similar in structure, but, while no doubt they have some features in common, especially in regard to the terminal couple of joints, they are at the same time uncommonly well provided with distinguishing points. Between the first gnathopod and the fifth pereopod the contrast is sufficiently striking.

The four species now known, all of them small, pale, setose, and very much alike in general appearance, may be distinguished as follows:—

- | | | | |
|---|---|---|--|
| 1 | { | Maxillipeds with epipod shorter than the second joint,
outer ramus of uropods unguiform. | 1. <i>L. lignorum</i> (J. Rathke), 1799. |
| | { | Maxillipeds with epipod longer than the second joint,
outer ramus of uropods not unguiform.—2. | |
| 2 | { | Both rami of uropods very small. | 2. <i>L. antarctica</i> , Pfeffer, 1887. |
| | { | Only the outer ramus of uropods very small.—3. | |
| 3 | { | Epipod of maxillipeds narrow, mandibular
palp diminutive. | 3. <i>L. segnis</i> , Chilton, 1883. |
| | { | Epipod of maxillipeds broad, mandibular
palp well developed. | 4. <i>L. pfefferi</i> , n. sp. |

In the well-known species of the Atlantic coast Harger notices that in the mandibles 'below there is a slight tubercle, apparently the rudiment of the molar process.' His conjecture is supported by the rather stronger development of this tubercle in *L. segnis*. Between the acutely lanceolate epipod of the *L. lignorum*, and the forms with rounded apex in *L. segnis* and *L. pfefferi*, the narrow leaf shape in *L. antarctica* offers an intermediate term. In his elaborate description of the last-named species Dr Pfeffer broaches an extraordinary theory that 'the pleopods in general have not the value of a limb but of an epipod, so that accordingly the branchial plates of the Isopoda like those of the Decapoda are epipods, and therefore in a certain sense equivalent formations.' That this view has met with no acceptance was to be expected.

11. *Limnoria pfefferi*, n. sp. Pl. LII A.

The general appearance in close agreement with *L. lignorum*, like which it has the head almost globular, much narrower than the rest of the body, the first segment of the pereaeon much the longest with a conspicuous dorsal V-shaped grooving, the side-plates of the second and third segments quadrangular oval, the four following pairs more or less acute, the upper surface of the body beset with hairs of varying length. In the pleon the angles of the first segment are a little less prominent than those of the four following segments; the fifth at the middle is as long as the first four together, and about half as long as the almost circular, flatly saucer-shaped telsonic segment, with the proximal part of which it shares in forming a smoothly rounded median elevation.

The eyes are wide apart, very small.

The first antennae have the second joint subequal to the third, not shorter as in *L. segnis* and *L. lignorum*, and the second joint of the flagellum is not so abruptly narrower

than the first, as in the latter species. The long olfactory setae are present. The second antennae closely resemble those of *L. lignorum*. The epistome, lips, mandibles, and both pairs of maxillae agree with those of the last-mentioned species. The maxillipeds also are nearly the same in structure, but with a differently shaped epipod. This is little more than twice as long as broad, broadly rounded at both ends, reaching well beyond the long narrow second joint of the maxilliped, the ovoid form impaired only by the lower part of the inner margin being slightly concave. This appendage in *L. segnis* is about four times as long as broad, and is apically acute in the other two species.

The first gnathopods are as usual distinguished from the other limbs by the fifth joint underriding the sixth, and having no free hind margin. Along front and hind margins of the third and along the hind margin of the three following joints small blunt spines are discernible. At the hinder end of the sixth joint there is a prominent spine with a convex comb as in *L. lignorum*, and the finger just above its long curved nail has the well-known bifid spine. The other limbs agree closely in shape and armature with those of the last named species, the first and second pereopods being the smallest, but distinguished by their position as confronting one another. The fifth pereopods are the longest, with the second joint much narrower than in the preceding pairs; the fourth joint is produced far over the hind margin of the fifth, the length of its slender spine-fringed process being particularly conspicuous in the new species; the fringe of pectinate spines round the fifth joint is found in all the species. The spine above the finger-nail is bifid only in the first gnathopods. The pleopods except in the last pair have the inner plate narrowly oblong. The male stylet of the second pair I have not observed. Probably, as in the other three species, and as in the genus *Eurydice*, it is affixed near the middle of the inner margin.

The uropods have the inner ramus shorter than the stout peduncle, twice the length of the small straight outer branch, all the constituents being setose. The peduncle is much larger in comparison with the inner ramus than in *L. segnis*.

Length of unrolled specimen 3.5 mm., breadth 1.25 mm.

Locality. Rotten wood in lagoon, Minikoi.

EPICARIDEA.

Epicarida, 1882, Sars, *Forh. Selsk. Christian.*, No. 18, p. 18; *Epicaridea*, 1893, Stebbing, *History of Crustacea*, p. 392; *Bopyridae*, 1895, Hansen, *Isopoden...der Plankton-Exp.*, p. 18; *Epicarida*, 1898, Sars, *Crustacea of Norway*, Vol. II. Pt. 11, p. 193; *Épicarides*, 1900, Bonnier, *Contr. à l'étude des Épicarides les Bopyridae*, p. 90.

Of the seven families recognized by Giard and Bonnier, Sars rejects the Miconiscidae, 'as only representing transitory larval stages of different Epicarida,' and combines the Cyproniscidae, Cabiropsidae, and Cryptoniscidae under the last of those names. Bonnier a little later upholds the Miconiscidae, and distinguishes in all twelve families.

Fam. **Bopyridae.**

As this is not the place to explain the various extensions and restrictions which authors have assigned to this family name, it will be sufficient to refer to the bibliographical index in M. Jules Bonnier's admirable monograph, *Contribution à l'étude des Épicarides les Bopyridae*.

published in the year 1900, and to the discussion of this group by Professor Sars in 1898. The latter author, while highly commending the services rendered to our knowledge of the Epicaridea by MM. Giard and Bonnier in 1887 and subsequent years, raises a protest against the assumption that the mere statement of the host is sufficient to identify the parasite. He points out that 'one and the same species of Crustacea not seldom is found to be infested by several species of parasites.' So far as at present known the Bopyridae are parasitic only on decapod Malacostraca. It is a little confusing that M. Bonnier should make the Bopyridae one of the families of a section Bopyrinae, when Dr Hansen has already made the Bopyrinae one of the subfamilies of the Bopyridae.

Tylokepon, n. g.

Among the various genera closely allied to *Kepon*, Duvernoy, 1840, *Leidyia*, established by Cornalia and Panceri in 1861, is the only one founded on the male sex, and this is unique in the possession of elongate uropods. Among those dependent on characters of the female, *Gigantione*, Kossmann, 1881, alone has in that sex biramous uropods. *Ergyne*, Risso, 1816, the *Portunicepon* of Giard and Bonnier, agrees with *Kepon* and is distinguished from the rest by having the branches of the pleopods more nearly equal. *Cancricepon*, Giard and Bonnier, 1887, has a medio-dorsal boss on each of the last four peraeon-segments. *Trapezicepon*, Bonnier, 1900, has none of these. *Grapsicepon*, Giard and Bonnier, 1887, has a medio-dorsal boss on each of the last two peraeon-segments, and herein it agrees with the new genus, which differs from it in that, instead of a simple boss on the sixth peraeon-segment, the boss there is strongly trifold. The head also furnishes a striking character for the new genus, being formed as it were of two short stout cylinders with rounded ends, of which the inner ones look as if they were flattened below where they meet, forming nearly a right angle.

The name of the genus is formed in allusion to its affinity with *Kepon*, and to the fact that the parasitic species for which it is instituted was found in the branchial region of *Tylocarcinus styx* (Herbst) as identified by Mr L. A. Borradaile, through whom I received the specimens.

Though the generic characters above given may not be thought of very high value, they fall well into line with those of the kindred genera already established, and under existing circumstances a new generic name seemed rather a matter of necessity than of choice.

12. *Tylokepon bonnieri*, n. sp. Pl. LIII.

♀. The appearance of the prominent white head has been already described. The peraeon from its opaque orange colour did not show clearly either the division of the segments or the contour of the lateral bosses, but the triple boss in the middle of the sixth segment was white and stood out clearly. The single median boss on the seventh segment was also white and directed somewhat upwards. When mounted this proved to have its rounded end marked off by a slight constriction. The laminae of the first pleon-segment are very large, strongly tuberculate on the upper surface and edges. The following pairs are successively smaller.

The first antennae are very small, three-jointed; the second a little larger, five-jointed.

The 'buccal rostrum' and the pair of maxillipeds, each member of which is consolidated into a single piece of great breadth at the centre with a narrow incurving apex to represent the terminal joints, differ very slightly from the corresponding parts in *Cancricepon* (see

Bonnier, *op. cit.* Pl. VII, figs. 3, 4). The strong muscles are conspicuous in their large but shallow cavity. Below the maxillipeds is that which Bonnier designates as the lower cephalic lamina. This in *Cancricepon elegans*, Giard and Bonnier, forms three lobes on either side in such a way that the outermost are produced furthest backward and the innermost the least far. In the present species the central piece, though pretty strongly emarginate, is scarcely bilobed, and by extending back much beyond the two lateral pairs of lobes appears to differ from the corresponding part in all the neighbouring genera.

The vast marsupial plates attached to the minute first gnathopods have as usual the anterior section underlying much of the maxillipeds, this part being produced on the inner (upper) surface into a broad sculptured lappet overlying a piece of the plate's hinder section. On the outer (ventral) surface the two sections pass smoothly into union, the upper one having a convex groove near the proximal part of the leg. The first gnathopods differ from the rest of the limbs chiefly in having the fifth joint smaller and more completely overlapped by the compact sixth joint. The second and third joints increase in size in the successive pairs of limbs to the fourth peraeopods. In both the fourth and fifth peraeopods the second joint is rather remarkable for the bulging of the two margins, and the third joint is greatly widened distally.

The pleopods have the outer branch similar to the pleural laminae of the segment, but smaller, and the inner branch very much smaller than the outer, with the margins a little irregular, at least in the earlier pairs, and perhaps in all.

The uropods are single-branched, long and slender, very much crumpled in the spirit specimen.

Length 3 mm., with a breadth of about 2.5 mm.

Locality. The specimen had been already extracted from the host, *Tylocarcinus styx*, which was taken at 'Hulule, Malé Atoll, Maldives,' and which showed on the left branchial region of the carapace the cavity that had been occupied by the parasite.

The specific name is chosen in compliment to M. Jules Bonnier, whose finely executed and instructive work on this group of the Isopoda has been more than once referred to above.

In the same bottle with the specimen just described there were four other isopods, which I am disposed to regard as belonging to the same species, although, as Sars rightly argues, *Idem propterea non est, quia captus ibidem.*

♂. This minute creature bears a very near resemblance to the males of *Cancricepon elegans* and *Grapsicepon edwardsi*, as figured by M. Bonnier. It would be an extraordinary chance that the female parasite of *Tylocarcinus* should have reached England from the Maldives, without a male of its own species, but accompanied by a male belonging to some other species of the same family.

The present specimen is probably not mature, since it has second antennae reminiscent of the cryptoniscus-stage. The pleopods also are more strongly developed than in the adult of *Cancricepon elegans*, but in correspondence with the bopyrian stage of that species. No dorsal or ventral bosses were perceptible.

The eyes are dark, longer than wide. The limbs all nearly alike, with the fourth and fifth joints very small, the sixth compact. The terminal segment of the pleon is bilobed, the lobes a little prolonged, each with a minute seta at the apex and another at the side.

Length estimated at half a millimetre.

The cryptoniscus-stage, whether of this or some other species, was represented by three specimens, smooth, narrow, sharply tapering to the uropods, the head broader than long, with a pair of gleaming eyes. In describing *Liriopsis pygmaea* (Rathke) Sars says, 'eyes very distinct, each consisting of a dark pigment, within which is imbedded a single rather large, refractive lenticular body.' The dorsal view which he gives of that species is in fair agreement with the specimens now under notice, but in these the ocular pigment is not dark, and the fourth and fifth peraeopods have not the peculiar shape characteristic of *Liriopsis*.

The first and second gnathopods are compact, subchelate, with the fifth joint apparently in coalescence with the sixth. The peraeopods are slender, all having the fourth and fifth joints very small, the fifth triangular, underriding the sixth. The second joint is widest at the middle and narrow at both ends; the third, which is rather shorter but broader, is narrow only at the base; the sixth like the second and third has a convex outer and more or less straight inner margin; near the apex of the latter it carries a fine spine and in the first three pairs two minute spinules on the widened apical margin, but a single spine on the comparatively narrow apex of the last two pairs. The finger is thin, slightly curved, longer on the fourth and fifth peraeopods than on the three preceding pairs, but in none longer than the sixth joint.

The pleopods have a broad but short peduncle armed at the inner angle with two long spines. The rami are short, not longer than the peduncle, each carrying four long plumose setae, the outer which is the less robust having in addition a short plumose seta at the outer angle.

The uropods have short peduncles, quite as broad as they are long. The outer ramus, scarcely longer than the peduncle, carries a long seta and two that are shorter. The inner ramus, more than twice the length of the outer, tapers to the apex, which nearly agrees with that of the outer ramus in armature.

Length 1.5 mm., with a breadth of about 0.4 mm.

ONISCIDEA.

Fam. **Ligiidae.**

Gen. *Ligia*, Fabricius.

For references to the bibliography of tribe, family, and genus, the reader may be invited to consult Willey's *Zoological Results*, Part 5, p. 645, 1900.

13. *Ligia exotica*, Roux¹.

Ligia exotica, 1828, Roux, *Crust. de la Médit. et de son littoral*, Livr. III. Pl. XIII. fig. 9; 1885, Budde-Lund, *Isopoda terrestria*, p. 266.

Budde-Lund, from whom the reference to Roux is taken, gives a full synonymy. The single specimen in the present collection was a female without the uropods, the flagellum of the second antennae having about thirty-eight joints, the telsonic segment agreeing well with Dana's figure of that part in the species which he names '*Lyg. gaudichaudii*?' adopting the specific name from Milne-Edwards. Budde-Lund puts both the French author's and Dana's names in the synonymy of *L. exotica*.

Locality. Lagoon, Minikoi. Taken along with *Sphaeroma* [*Exosphaeroma*?] *globicauda*.

¹ See "Land Crustaceans," by L. A. Borradaile, *Fauna Geogr. Maldives*, etc., vol. I. p. 98.

EXPLANATION OF PLATES.

PLATE XLIX A. *Calathura borradailei*, n. sp. (p. 700).

- n. s.* Natural size, that is, length when fully extended, of specimen represented in the adjoining figure, lateral view, curved position.
- C.* Cephalon with first peraeon segment in dorsal view.
- Pl.* Pleon with last peraeon segment in dorsal view.
- a. s., a. i.* Upper and lower antennae.
- m., mx. 1, mxp.* Mandible, first maxilla, maxillipeds.
- gn. 1, prp. 1, prp. 5.* First gnathopod, first peraeopod, fifth peraeopod, with higher magnification of some spines of *prp. 1*, and of finger tip of *prp. 5*.
- plp. 1, plp. 2.* First and second pleopods, with higher magnification of distal part of male appendix.
- T., urp.* Telson and uropods, ventral view. This figure and all the figures of separate appendages are magnified to the same scale, except those of the mouth-organs, which are on the same scale as the enlarged details of *prp. 1, 5*, and *plp. 2*.

PLATE XLIX B. *Cirolana sulcata*, n. sp. (p. 701).

- n. s.* Lines indicating natural size of specimen figured below in dorsal and lateral views.
- a. s., a. i., m. m.* First and second antennae, and mandibles, above which are the upper lip, epistome, and frontal lamina.
- mx. 1, mx. 2, mxp.* First and second maxillae, and the maxillipeds.
- gn. 1, prp. 5.* First gnathopod and fifth peraeopod.
- plp. 2.* Second pleopod.
- Pl.* Pleon in dorsal view, less highly magnified than the rest of the details, which are on a uniform scale.

PLATE L A. *Lanocira rotundicauda*, n. sp. (p. 707).

- n. s.* Natural size of female specimen figured below in dorsal view.
- a. s., a. i.* First and second antennae.
- m., mx. 1, mx. 2, mxp.* Mandible, first and second maxillae, and maxilliped.
- gn. 1, prp. 5.* First gnathopod and fifth peraeopod.
- Pl.* Pleon less highly magnified than the foregoing details, and these than the following.
- mx. 1, juv.* First maxilla of young extracted from the maternal pouch.
- Pl. juv.* Pleon of the same juvenile specimen.

PLATE L B. *Corallana hirsuta*, Schiödte and Meinert (p. 704).

- n. s.* Lines indicating natural size of female specimen figured below in dorsal view.
- a. s. ♂.* First antenna of male, with part of head showing facets of eye.

a. i. ♂. Second antenna of male, flagellum incomplete.

mxp. ♂. Maxilliped of male.

prp. 5. ♂. Fifth peraeopod of male.

m. Mandible of female; this and following details not from the specimen figured in full.

l. i. Lower lip of female, in lateral view.

mx. 1, mx. 2, mxp. First and second maxillae, and maxillipeds of female.

gn. 1. First gnathopod of female.

Pl. Pleon of female, less highly magnified than the other details.

PLATE LI A. *Lanocira gardineri*, n. sp. (p. 706).

n. s. Natural size of male specimen figured below in dorsal and dorso-lateral view.

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

m. m. Mandibles, with cutting edge of one more highly magnified.

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

gn. 1, prp. 5. First gnathopod and fifth peraeopod.

plp. 2. Second pleopod.

Pl. Pleon, less highly magnified than the foregoing details.

PLATE LI B. *Alcirona maldivensis*, n. sp. (p. 708).

n. s. Natural size of female specimen figured below in dorsal view.

a. s., a. i., m. m. First and second antennae and mandibles surmounted by upper lip, epistome, and frontal lamina.

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

gn. 1, prp. 5. First gnathopod and fifth peraeopod.

Pl. Pleon in dorsal view, less highly magnified than the foregoing or following details.

a. s., a. i., juv. First and second antennae, with part of head showing the eyes, in a specimen extracted from the maternal pouch.

Pl. juv. Pleon of the same juvenile specimen.

PLATE LII A. *Limnoria pfefferi*, n. sp. (p. 714).

n. s. Natural size of specimen figured below in dorsal view.

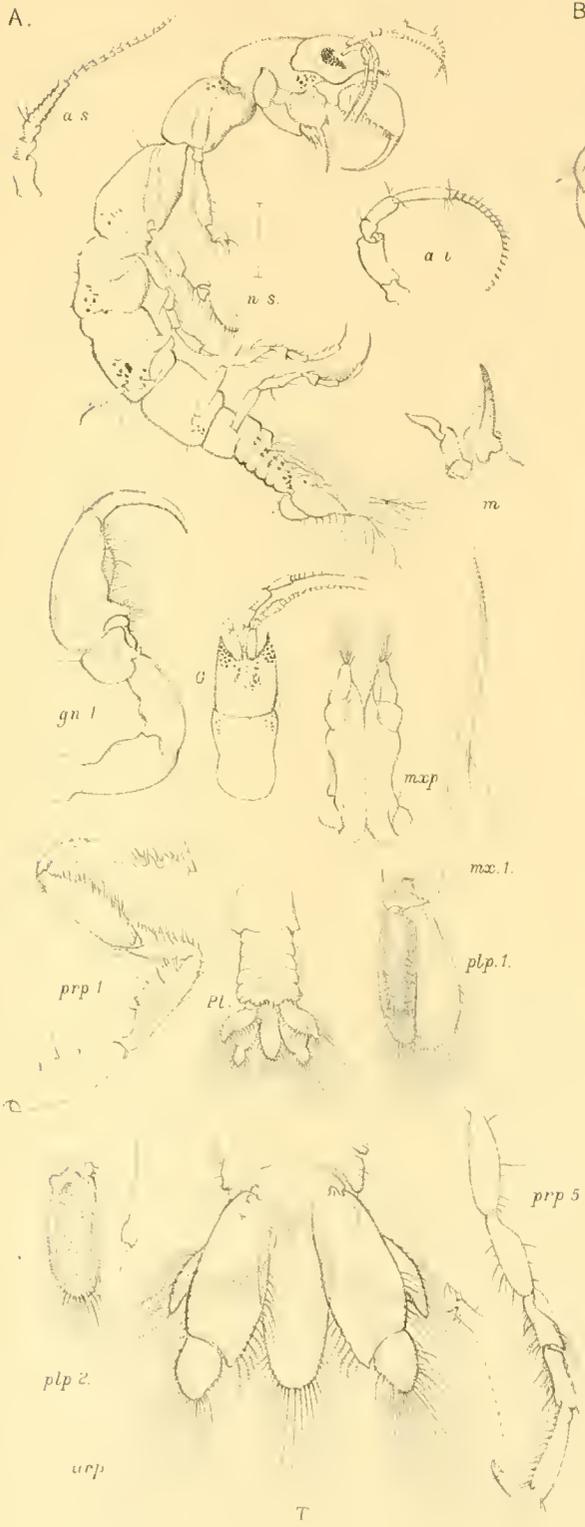
a. s., a. i. First and second antennae.

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

m. m., mx. 1, mx. 2, mxp. Mandibles, first and second maxillae, maxilliped.

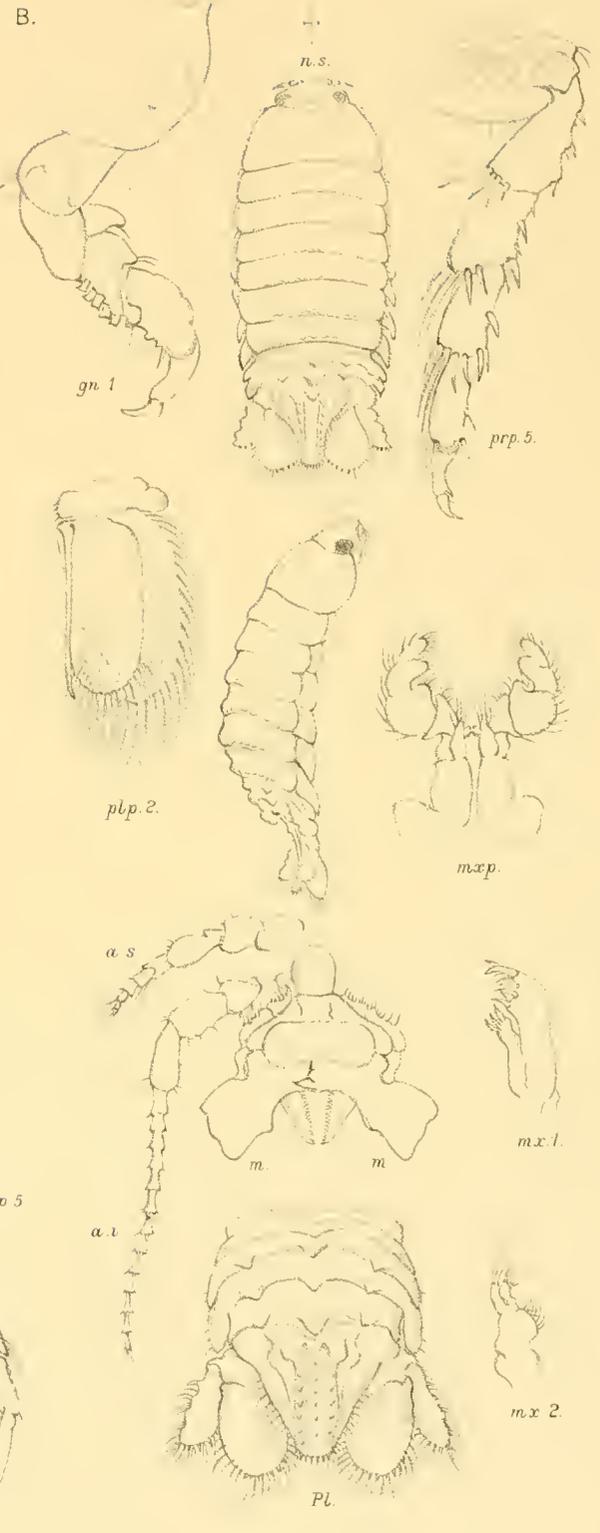
gn. 1, gn. 2, prp. 5. First and second gnathopods and fifth peraeopod, with parts more enlarged.

urp., Pl. Uropod in two aspects, pleon in dorsal view.



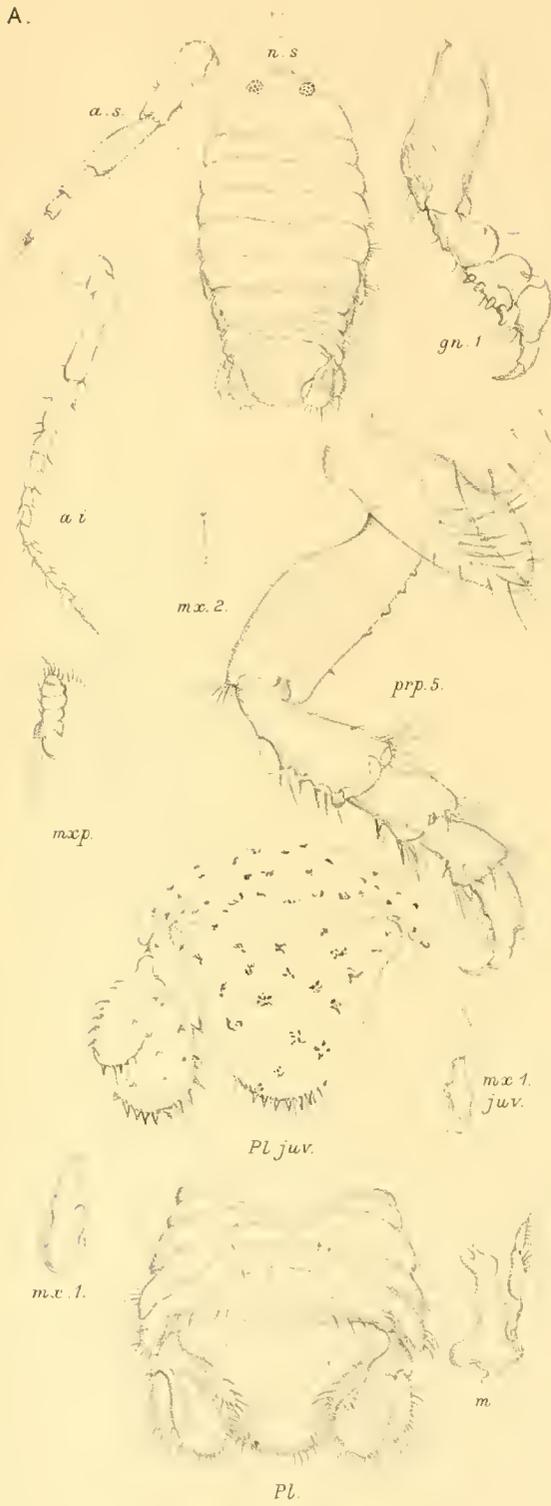
T.R.R. Stebbing del.

CALATHURA BORRADAILEI, n. sp.



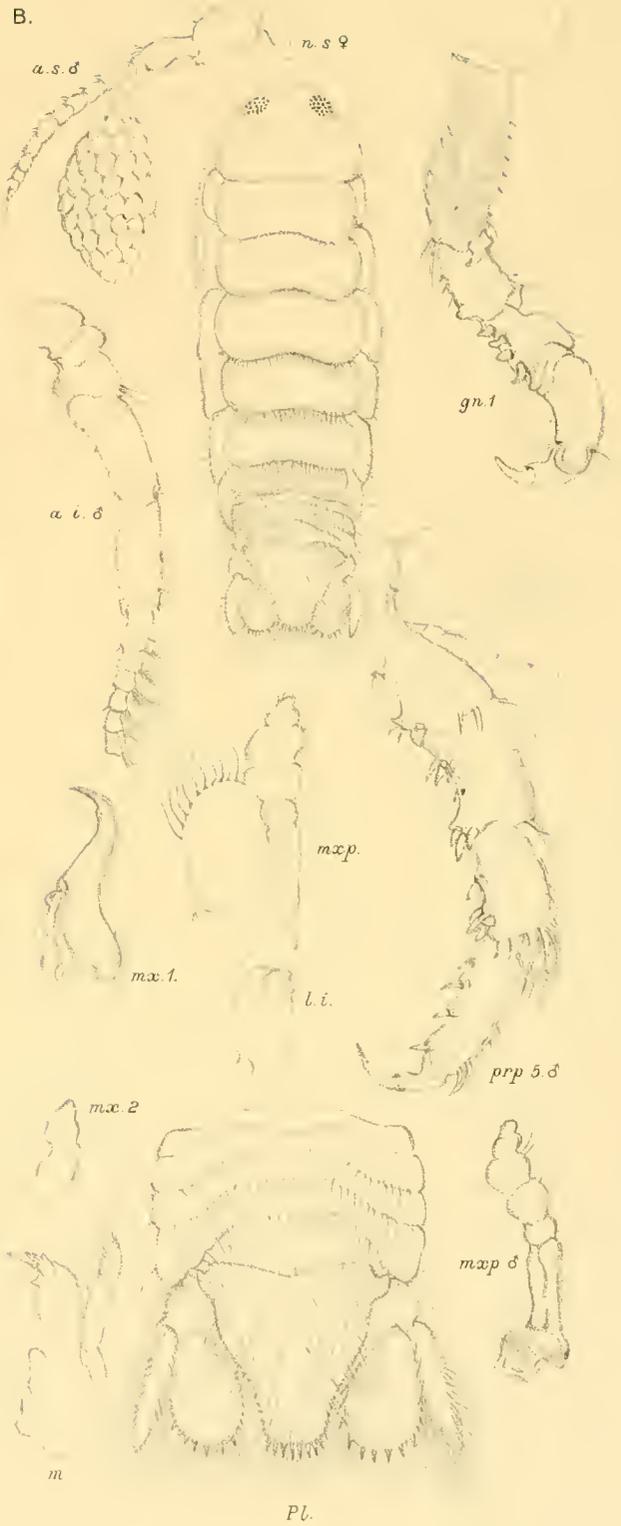
E Wilson, Cambridge.

CIROLANA SULCATICAUDA, n. sp.



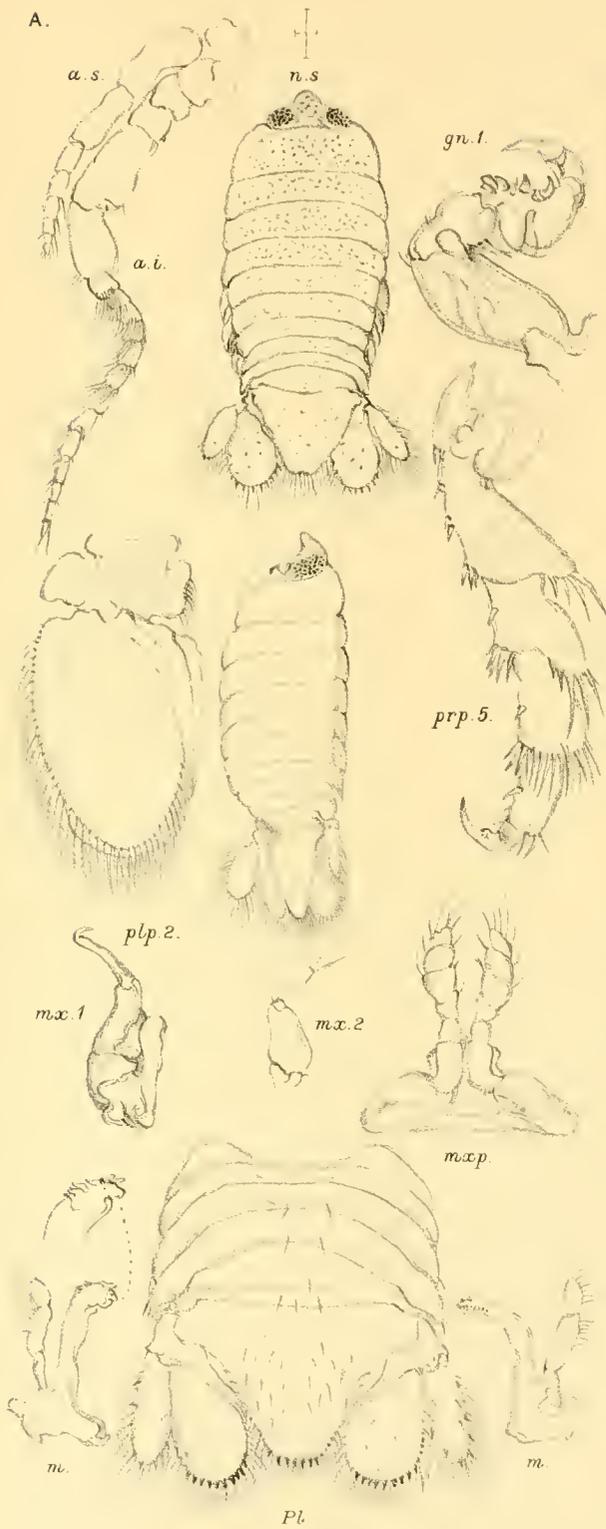
R. R. Stebbing, del.

LANOCIRA ROTUNDICAUDA, n. sp.



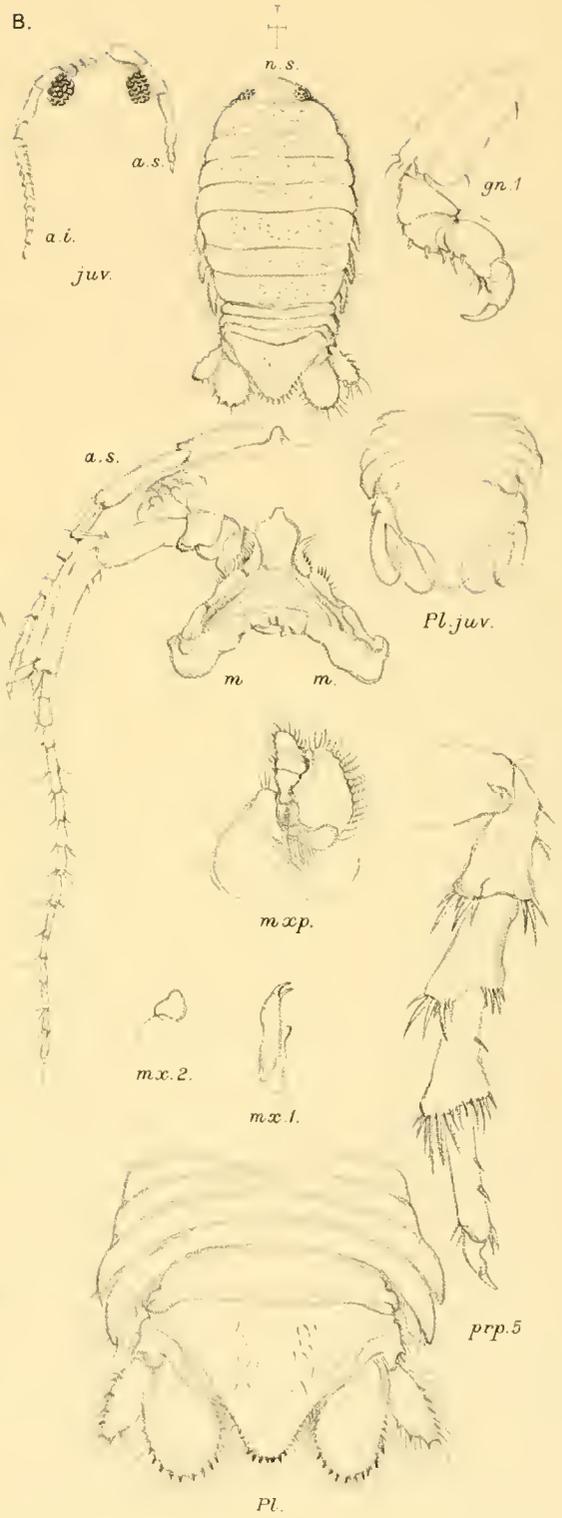
E. Wilson, Cambridge

CORALLANA HIRSUTA, Sch. & Mein



T.R.R. Stebbing, del

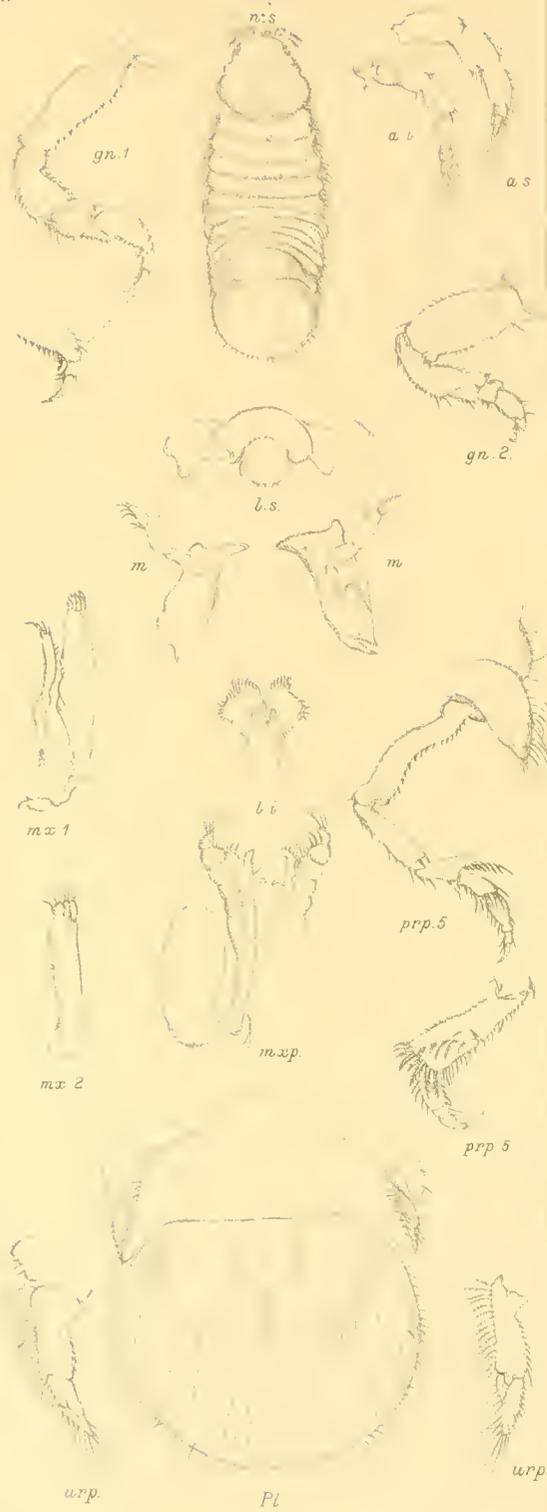
LANOCIRA GARDINERI, n. sp.



E. Wilson, Cambridge

ALCIRONA MALDIVENSIS, n. sp.

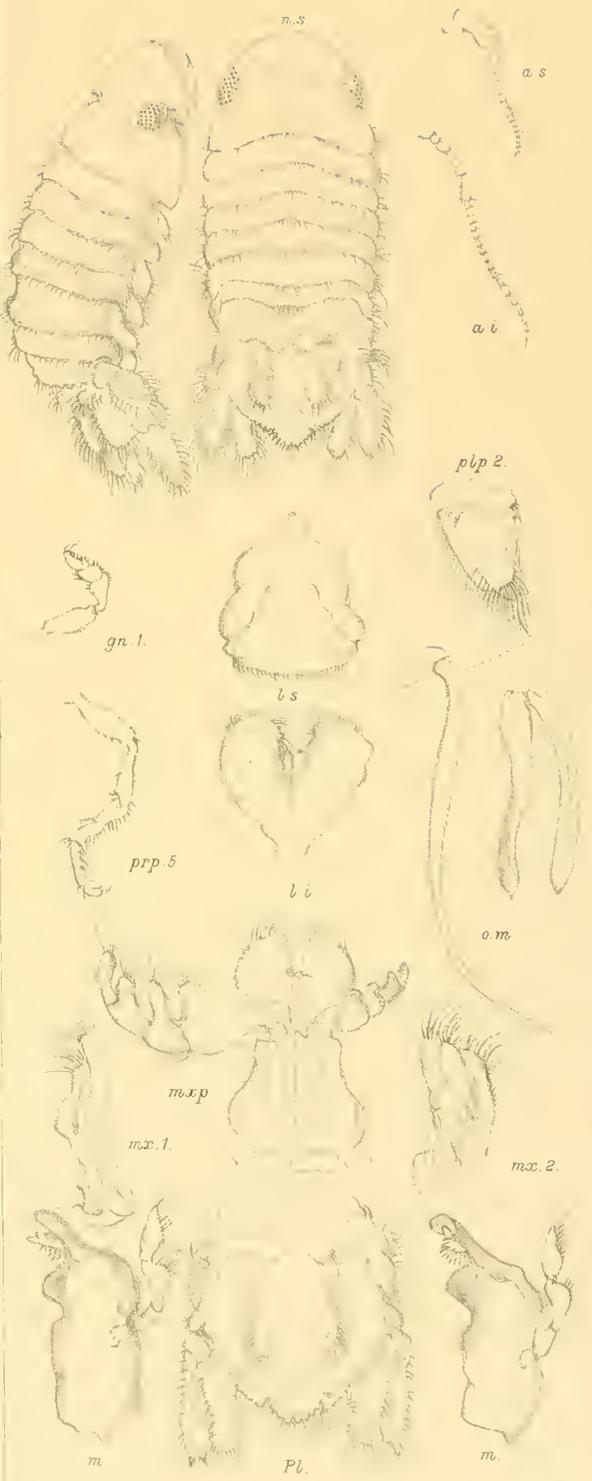
A.



F. R. Stebbing, det.

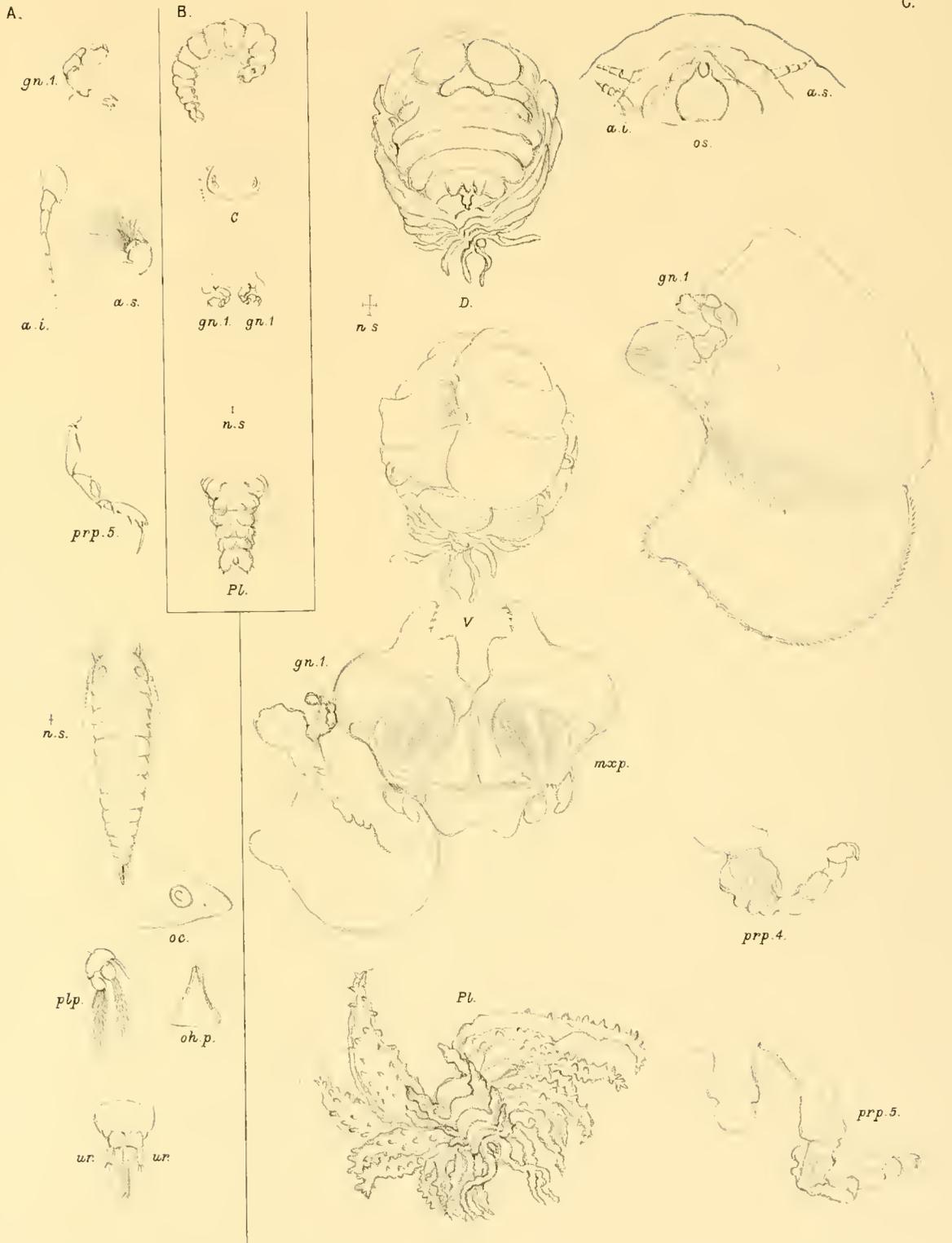
LIMNORIA PFEFFERI, sp.

B.



E. Wilson, Cambridge

CYMODOCE BICARINATA, n. sp.



T R R Stebbing, del

E Wilson, Cambridge

A CRYPTONISCUS. STAGE: C. ♂: B. ♀: TYLOKEPON BONNIERI n.g. et sp.

PLATE LII B. *Cymodoce bicarinata*, n. sp. (p. 712).

n. s. Natural size of male specimen figured below in dorsal and lateral views.

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

l. s., *l. i.* Upper lip with epistome, and lower lip.

m. m., *mx. 1*, *mx. 2*, *mxp.* Mandibles, first and second maxillae, and maxillipeds.

gn. 1, *prp. 5*, *plp. 2.* First gnathopod, fifth peraeopod, second pleopod.

o. m. Male appendages of seventh peraeon segment and second pleopod, these and the mouth-organs being much more highly magnified than the antennae, limbs, and pleon.

Pl. Pleon in dorsal view.

PLATE LIII A, B, C. *Tylokepon bonnieri*.

A. (p. 718).

n. s. Natural size of Cryptoniscus-stage in dorsal view to the right.

oc. Eye in lateral part of the head, as seen when flattened out.

a. s., *a. i.*, *or. p.* First and second antennae, and oral parts.

gn. 1, *prp. 5*, *plp.*, *urp.* First gnathopod, fifth peraeopod, a pleopod, uropods and end of pleon.

B. (p. 717).

n. s. Natural size of supposed male in curved position figured above laterally.

C. Head with antenna of one side.

gn. 1, *gn. 1.* First gnathopods in attachment to the segment.

Pl. Pleon in ventral view.

C. (p. 716).

n. s. Natural size of female specimen figured to the right in dorsal and ventral views.

a. s., *a. i.*, *os.* First and second antennae and mouth *in situ*.

mxp., *gn. 1.* Maxilliped and first gnathopod in their relative position, first gnathopod separately more highly magnified.

prp. 4, *prp. 5.* Fourth and fifth peraeopods on the same scale as the separated *gn. 1*.

Pl. Pleon in dorsal view.