CICHLIDÆ.

37. HEMICHROMIS FASCIATUS Ptrs.

38. PELMATOCHROMIS JENTINKI Stdr.

39. TILAPIA GALILÆA Gm.

40. TILAPIA LATA Gthr.

"Known as 'Furu.' Much esteemed as food. Very common, the largest seen being 10 inches in length; great numbers taken with the seine-net. They are chiefly found in shallow water."

PLEURONECTIDÆ.

41. CYNOGLOSSUS SENEGALENSIS Kaup.

"Native name 'Juso' (heart). Taken from above McCarthy's Island."

May 22, 1900.

Dr. ALBERT GÜNTHER, F.R.S., Vice-President, in the Chair.

The Secretary announced that Mr. J. S. Budgett, F.Z.S., had left Liverpool on Saturday the 19th inst., on a second expedition to the Gambia, where he was proceeding in order to complete his studies of the Fish-fauna of that Colony, and especially to investigate the life-history and development of the remarkable Fishes *Polypterus* and *Protopterus*. On reaching Bathurst Mr. Budgett would go up the river to his former quarters on McCarthy's Island, in the neighbourhood of which he had already ascertained that these fishes breed during the rainy season.

A communication was read from Prof. G. B. Howes, F.R.S., and Mr. H. H. Swinnerton, B.Sc., on the development of the skeleton of the Tuatera, *Sphenodon* (*Hatteria*) *punctatus*, which was stated to be the outcome of 18 months' work on material supplied to the authors by Prof. Dendy, of Christchurch, N.Z. An account was given of the egg, the hatching, and the habits of the hatched young, which the authors reared till four months old. Thus a stage (T) was added to Prof. Dendy's series.

The main conclusions arrived at were stated to be as follows:—

Two kinds of inter-centra are formed, of which one persists as the chevrons. The cartilaginous vertebral bodies arise as paired structures, and the intra-vertebral plates are chordal in origin. Inter-vertebral plates are formed in the tail, and the intra-vertebral plates have a special relation to the "splitting" process; also a series of central chordal vesicles is formed at the points of greatest flexibility. The "uncinates" are mostly separate in origin. The brain-case is a product of the union of distinct ethmo- and oto-sphenoidal cartilages, and its fenestræ are primary. The trabeculæ represent a pair of pre-oral visceral arches, and the epipterygoid bone is an ossification of the ascending process of the pterygo-quadrate cartilage. The columella auris and stapedial processes are at all stages continuous with the hyoid arch, and that is attached only to the quadrate above. The meeting of the pterygoids and vomers is of an order leading to the Chelonia and Plesiosauria, and the pterygo-quadrate cartilage closely resembles that of *Ichthyophis*. The "abdominal ribs" arise by numerous calcifications and their median segment may be paired. There is no supra-temporal bone present at any stage. The hip-girdle is simpler than in the Lacertilians, and two types of pelvis are represented. There is no trace of the fifth *tarsale* in the ontogeny, and while a *centrale* is incorporated in the "*astragalus*," there are three *centralia carpi* represented during development.

Two types of cheek-teeth, and sustentacular ligaments which support the medulla and spinal cord, were also described.

This paper will be published in the Society's 'Transactions.'

The following papers were read :—

1. On some Crustaceans from the Falkland Islands collected by Mr. Rupert Vallentin. By the Rev. Thomas R. R. Stebbing, M.A., F.R.S., F.L.S., F.Z.S.

[Received March 24, 1900.]

(Plates XXXVI.–XXXIX.)

The materials on which this paper is founded were collected by Mr. Rupert Vallentin, F.L.S., in Stanley Harbour and the adjacent district during the closing weeks of 1898 and the opening weeks of the following year. During the course of the present century this locality has been visited by several important scientific expeditions. It may be worth while to mention the voyage of 'La Coquille' under Duperrey in the years 1822–1825, the Crustacea of which were described by Guérin-Méneville between 1828 and 1838; the voyage of 'L'Astrolabe' and 'La Zélée' under Dumont d'Urville, 1837–1840, Crustacea by Jacquinot and Lucas, 1842–1853; the United States Exploring Expedition under Wilkes, 1838–1842, Crustacea by Dana, 1846–1855; Voyage of the 'Erebus' and 'Terror' under Sir J. C. Ross, 1839–1843, Crustacea by Miers, 1874; the 'Challenger' Expedition, 1873–1876, Crustacea by several writers, 1880–1888. Crustacea from the vicinity have also been described by R. O. Cunningham in 1871, by Targioni-Tozzetti in 1877, and by Professor Studer in 1884. Consequently the general features of the zoology of the Falklands are tolerably well known.

None the less, the specimens, in ample variety, which have rewarded Mr. Vallentin's assiduous and systematic researches, serve to throw new and much needed light on many interesting questions. At least in the single group of the Malacostraca I have found so much to say on a dozen species, of which only one is new, that the discussion and description of numerous other species must be left over to some future opportunity. It can scarcely be regarded as a reproach to the earlier naturalists that they had not prophetic eyes to make them acquainted with the requirements of modern classification. We are perhaps industriously preparing equivalent stumbling-blocks for a future age, which possibly will only care to distinguish species by the internal structure as seen working in the living animal under the Röntgen rays. But for the difficulty of identifying forms described by our predecessors, we ought not to lay all the blame on the imperfection of the original accounts. It should be shared by the naturalists who sometimes in a long succession are content to quote the name of a species, without using the means at their disposal of making it thoroughly well-known. There is a sort of superstition that a new species is worth publishing, but that to deal with one to which some other person's name and some ancient date is attached, is a poor affair, stale and unprofitable.

There are indeed some specimens in Mr. Vallentin's collection to which these remarks will not apply, such as *Serolis paradoxa* (Fabricius), re-described by Beddard in his 'Challenger' Report on the Isopoda. Among the Amphipoda there is the well-marked *Talorchestia scutigerula* (Dana), and there is Dana's *Iphimedia nodosa*, a beautiful species, easily identified with Dana's account specifically, though the genus remained doubtful till a specimen was available for dissection. These are mentioned to indicate that the interest of the specimens gathered is by no means exhausted n the present paper.

BRACHYURA.

Cyclometopa.

Fam. Atelecyclidæ.

1893. *Atelecyclidæ*, Ortmann, Zool. Jahrb. vol. vii. p. 421.

1896. *Atelecyclidæ*, Ortmann, Zool. Jahrb. vol. ix. p. 444.

1899. *Atelecyclinæ* (subfam. of Cancridæ), Alcock, J. Asiat. Soc. Bengal, vol. lxviii. pt. 2, p. 96.

Ortmann defines this family as follows :—" Inner antennæ longitudinal. Outer antennæ occupying the interior hiatus of the orbits, their second joint cylindrical, just reaching the front, the third joint only a little smaller ; flagellum hairy. Cephalothorax rounded, not widened, antero-lateral margin at least as long as the postero-lateral."

He places it among the Cancrini, his second subsection of the Cyclometopa, which in his system form the second section of the Cancroidea, these latter being the second subdivision of the

Brachyura proper. To the Atelecyclidæ he assigns the genera *Hypopeltarion* and *Atelecyclus*. Miers, who in 1886 placed *Hypopeltarium* together with *Gomeza* in a legion Corystoidea, recognized that *Hypopeltarium* was nearly allied to *Atelecyclus*, and that these approached the Cyclinea, while *Gomeza* was a typical Corystoid. Alcock includes in his subfamily *Atelecyclus* M.-Edw., *Erimacrus* Benedict, 1892, *Hypopeltarium* Miers, *Pliosoma* Stimpson, 1862, *Telmessus* White, 1846, *Trachycarcinus* Faxon, 1893, and *Trichopeltarium* A. M.-Edwards, 1880.

Genus PELTARION Jacquinot.

1843–1847[1]. *Peltarion*, Jacquinot, D'Urville's Voy. au Pôle Sud, Atlas, Crustacés, pl. 8. fig. 1 (without definition).

1847. *Peltarion*, White, List of Crustacea in British Museum, p. 52.

1852. *Peltarion*, Dana, U.S. Expl. Exp. vol. xiii. p. 298.

1853. *Peltarion*, Lucas, D'Urville's Voy. au Pôle Sud, Zoologie, vol. iii. Crustacés, p. 80.

1871. *Peltarion*, Cunningham, Tr. Linn. Soc. London, vol. xxvii. p. 494.

1881. *Peltarion*, Miers, Pr. Zool. Soc. London, 1881, p. 68.

1886. *Hypopeltarium*, Miers, 'Challenger' Brachyura, Reports, vol. xvii. p. 210.

1893. *Hypopeltarion*, Ortmann, Zool. Jahrb. vol. vii. p. 421.

1897. *Hypopeltarium*, M. J. Rathbun, Pr. Biol. Soc. Washington, vol. xi. p. 165.

1899. *Hypopeltarium*, Alcock, J. Asiat. Soc. Bengal, vol. lxviii. pt. 2, p. 96.

Miers considered that the name *Peltarion* was preoccupied, apparently because in 1844 Fischer de Waldheim had named a genus of Coleoptera, not *Peltarion* but *Peltarium*. He distinguishes the genus from *Atelecyclus* "by its narrower, three-spined front, the spinuliferous, not dentated, antero-lateral margins of the carapace, and the shorter, more truncated merus [fourth] joints of the exterior maxillipeds."

PELTARION SPINOSULUM White.

1843. *Atelecyclus spinosulus*, White, Ann. Mag. Nat. Hist. ser. 1, vol. xii. p. 345 (quoted by White in 1847 as '*Corystes spin.*').

1843–1847. *Peltarion magellanicus*, Jacquinot[2], Voy. au Pôle Sud, Atlas, Crust. pl. 8. figs. 1–3.

[1] The Atlas to the Voyage of the 'Astrolabe' and 'Zélée' 'au Pôle Sud et dans l'Océanie,' 1837–1840, has a general titlepage dated 1842–1853. Of the Crustacea, plate 8 is quoted by White in 1847.

[2] The genus and species are sometimes assigned to Hombron and Jacquinot, who appear to have been both engaged in collecting the specimens obtained by the expedition; but as the figures of the Crustacea are attributed to Jacquinot by Lucas, who drew up the descriptions, there is nothing on which Hombron's claim to authorship can properly be founded.

1847. *Peltarion spinosulum*, White, List of Crustacea in British Museum, pp. 52, 139.

1852. *Peltarion spinulosum*, Dana, U.S. Expl. Exp. vol. xiii., Crustacea, p. 304, pl. 18. figs. 6 *a b*.

1853. *Peltarion magellanicus*, Lucas, Voy. au Pôle Sud, Zoologie, vol. iii. Crustacés, p. 83.

1871. *Peltarion spinulosum*, Cunningham, Tr. Linn. Soc. Lond. vol. xxvii. p. 494.

1881. *Peltarion spinulosum*, Miers, Pr. Zool. Soc. Lond. p. 68.

1886. *Hypopeltarium spinosulum*, Miers, 'Challenger' Brachyura, Reports, vol. xvii. p. 211.

1893. *Hypopeltarion spinulosum*, Ortmann, Zool. Jahrb. vol. vii. p. 421.

The carapace, except on the hind margin, is entirely begirt with little unequal teeth. Why they have been called spinules is not easy to explain. They are not movable, but continuous with the carapace which they fringe.

A single specimen, about $1\frac{1}{3}$ inch (34 mm.) in length and just the same in breadth, was "found during low-water in sandy bay, Port William," by Mr. Vallentin. Cunningham speaks of it as burrowing in sandy beaches, as well as of its being taken by dredging.

CATOMETOPA.

Fam. HYMENOSOMIDÆ.

1858. *Hymenosomidæ*, Stimpson, Pr. Acad. Philad. p. 108 (Prodromus, p. 54).

This family is more commonly regarded as a subfamily of the Pinnotheridæ, called Hymenicinæ by Dana, Targioni-Tozzetti, and Haswell, but Hymenosominæ by Milne-Edwards and Miers. Of the genera assigned to this group, *Hymenosoma* Leach is much older than Dana's *Hymenicus*. In the Hymenosomidæ the third joint of the third maxillipeds is not diminutive as in the Pinnotheridæ.

Professor Haswell considers the genera *Hymenosoma*, *Hymenicus*, and *Halicarcinus* to be synonyms, and inferentially unites with them *Elamena* Milne-Edwards. For in a note upon "*Hymenosoma planatum*" he says: "The *Elamena Mathaei* of Milne-Edwards (Ann. Sci. Nat. (3 sér.) xx. p. 223, pl. xi. fig. 4, and Hist. Nat. Crust. ii. p. 35) is probably the young male of this species. It is quite distinct from the *Hymenosoma Mathaei* of Desmarest (Consid. p. 163), which is described as having the form of an equilateral triangle, with the anterior angle (rostrum) a little rounded. As to which of these two species may be Rüppell's *Hymenosoma Mathaei*, I am unable to form an opinion—the 'Krabben des Rothen Meeres' not being here [Sydney] obtainable."

On this it must be remarked that practically there is no disagreement between the original account given by Milne-Edwards and that of Desmarest, since the former in his generic description uses the expression "il a la *carapace* à peu près triangulaire." Like

Desmarest he quotes the Museum name of the species, "*Hymenosoma Mathaei*, Latreille." Like Desmarest he refers to the Île-de-France as the place of origin, but adds the Red Sea, because he is able to refer to Rüppell. It is indeed reasonable to suppose that Desmarest and Milne-Edwards were describing identically the same specimen. It must be admitted that Desmarest says that it is 6 lines long, while in Milne-Edwards's 'Histoire' it is 4 lines in length. But to those who would lay any overwhelming weight on a discrepancy of that kind, it may be pointed out that Rüppell, at the outset of his description of this very species, says "This minute crustacean appears never to overstep a length (Längendurchmesser) of three lines," although at the close he says: "Comparisons in the Paris Museum convinced me of the identity of the species here described by me with that which M. Desmarest (Considérations sur les Crustacés, page 163) has published under the same name." It will be remembered that Desmarest gives the length not as three lines but as six. It seems clear that Paulson (Crustacea of the Red Sea, p. 71, 1875) is right in regarding the species described by Desmarest, Rüppell, and Milne-Edwards under the name *mathaei* (*mathei* Rüppell) as one and the same.

Nevertheless, Professor Haswell's suggestion is likely enough to be right with regard to the second account given by Milne-Edwards, in 1853, when he changes *Elamena* into *Elamene*, figures parts of a male specimen, which on the earlier occasion he had confessedly not had an opportunity of examining, and introduces into the generic character a tridentate rostrum which is conspicuous by its absence in the figure of his *Elamene quoyi*.

Gen. Halicarcinus White.

1846. *Halicarcinus*, White, Ann. Mag. Nat. Hist. ser. 1, vol. xviii. p. 178.
1849. *Liriopea*, Nicolet, Gay's Hist. Chile, Zool. vol. iii. p. 158.
1852. *Halicarcinus*, Dana, U.S. Expl. Exp. vol. xiii. Crust. pt. i. p. 379.
1853. *Halicarcinus*, Milne-Edwards, Ann. Sci. Nat. ser. 3, vol. xx. p. 222.
1876. *Halicarcinus*, Miers, Catal. Crust. New Zealand, p. 49.
1877. *Halicarcinus*, Targioni-Tozzetti, Crost. della Magenta, p. 172.
1882. *Hymenosoma* (part), Haswell, Catal. Australian Malacostraca, p. 114.
1886. *Halicarcinus*, Miers, 'Challenger' Brachyura, Reports, vol. xvii. p. 280.

White in 1846 placed this genus in the family Myctiridæ, as a subgenus distinguished from *Hymenosoma* "by the great size of the thickened fore-feet, by the carapace being generally wider than long, and having the edge of the strongly depressed upper surface with two teeth or angles on each side. The four last pairs of legs are cylindrical and free from hairs, while the claws are considerably curved and compressed. The tail of the male is 6-jointed and deeply notched on each side about the middle. The outer pedipalps, as in *Hymenosoma*, are covered on the outside with short hairs."

It seems a fairly clear and innocent account, till you begin to work with it. White assigns to his subgenus two species, the second being *Hymenosoma depressum* Jacquinot, which in 1852 was referred to *Hymenicus* by Dana. Miers, however, in 1876 informs us that the specimens referred by White to Jacquinot's species are distinct from it, and he names them *Elamena whitei*. White's first species is *Halicarcinus planatus*, with the synonymy *Leucosia planata* Fabricius, *Hymenosoma leachii* Guérin, and *Hymenosoma tridentatum* Jacquinot. This last synonym is accepted without reserve by Milne-Edwards in 1853, by Heller in 1868, and Tozzetti in 1877, all of whom quote it accurately from Jacquinot's plate as *Hymenosoma tridentata*. It is accepted with doubt by Dana in 1852, by Miers in 1876, and by Haswell in 1882. Miers drops the query in 1879, and inferentially in 1886. Lucas in 1853 describes under the name "*Hymenosoma? tridentatum*," not Jacquinot's specimen, but Jacquinot's figures of it, adding the information that it was taken under stones at low-tide on the coasts of the Auckland Islands, and proposing to make it the type of a new genus *Hombronia*, most likely in total ignorance of White's *Halicarcinus*. In 1885 Filhol states that *Halicarcinus planatus* has been recorded from the Auckland Isles by Hombron and Jacquinot, and then proceeds to establish as a separate species *Halicarcinus tridentatus* (Jacquinot & Lucas), of which he gives a figure (pl. 50. fig. 3), having found the species, he says, in Cook's Straits. To the work in which Hombron and Jacquinot record *H. planatus* he gives no clue. He does not refer in his text to his figure of *H. tridentatus*, which has a much less comparative width of carapace and much more slender chelipeds than the figure on Jacquinot's plate. He speaks of the description of this species given by Jacquinot and Lucas as being incomplete, which it might well be, since Jacquinot did not describe it at all, and Lucas only described what Jacquinot figured. It is difficult to tell whether Lucas is quite serious about some of the details, but he had no specimen by which to control the drawings. M. Filhol tells us that the maxillipeds present very slight differences from those of *H. planatus*, but what those differences are he neither says nor shows, though Jacquinot's figure, with the last joint attached in the middle of the penultimate, absolutely excludes *Halicarcinus*. That the carapace is without lateral teeth M. Filhol does mention, and this may well be in agreement with Jacquinot's species, but it is contrary to the character of *Halicarcinus* given by White.

White's other synonym, *Hymenosoma leachii* Guérin, is not wholly free from difficulty, for though Dana, Miers, and Haswell accept it as identical with *A. planatus*, Milne-Edwards (1853) upholds it as an independent species, and Miers in 1886 regards *Halicarcinus ovatus* Stimpson as the representative on the Australian coast of

H. planatus. But Guérin's *H. leachii* came from the coasts of New Holland, and may therefore quite as well be *ovatus* as *planatus.*

Miers in 1876 observes that the abdomen of the male is concave, not "deeply notched" on each side as stated in White's description. This criticism certainly applies both to Falkland Islands and Australian forms, and raises a question whether White took his character, not from observation, but from the figure of the pleon in Guérin's 'Iconographie.' White also says that the claws of the last four legs are "considerably curved," which is in correspondence with Guérin's figure and with the term "crochu" applied to them by Guérin in the 'Voy. de la Coquille.' Dana, who is not over-satisfied with White's account of his new genus, describes this claw (or tarsus) in *H. planatus* from Tierra del Fuego as "nearly straight"; and though the difference in this respect between the Patagonian and Australian species is not really very great, yet, the limbs in the latter being more slender, the curvature of the claw is in them more effectively apparent. The massive chelipeds shown in White's figure, and alluded to in his generic account, may be those of an old male. They agree pretty well with the claws of Jacquinot's *Hymenosoma tridentata*, but not with those of Guérin's *H. leachii*, which are less inflated and very unequal, nor with those figured by Dana, which are small and equal, probably drawn from a female specimen.

Whatever may be the *Liriopea leachii* (Guérin) and *Liriopea lucasii*, both from Chile and both described by Nicolet, it is not improbable, as already observed, that the *Hymenosoma leachii* of Guérin is identical with *Halicarcinus ovatus* Stimpson. Professor Haswell makes them both synonyms of *Hymenosoma planatum*, the separation of *Halicarcinus* and *Hymenicus* from *Hymenosoma* seeming to him to rest "on extremely slight points of distinction"; and indeed the points are not of imposing magnitude as exhibited in species all of inconsiderable size. But whereas Haswell in 1882 thus unites *planatus* and *ovatus*, Miers, who in 1876 had done the same, in 1886 keeps them separate, apparently converted to this view by Tozzetti's work in 1877. For Tozzetti not only makes them separate species, but thinks that there are grounds for allotting *planatus* to a new genus, overlooking the fact that it is *ovatus*, as the later species, that would have to change its generic name, if a change were to be made.

Tozzetti, after discussing the facial structure in *Hymenosoma*, continues:—"In a second form the front broad at the base, continued outward by a supra-orbital margin, is inflected below by a distinct and acute tridentate epifrontal fold, produces with the free margin an interantennulary septum which divides the antennary fossettes on one side and the other, closed further behind and below by a distinct epistome. This form (*Halicarcinus planatus*, see p. 178) seems to us a new type by the construction indicated.

"In the third form the front proceeds straight forward, covering with the base part of the orbital fossette, which has no proper superior margin, and receives the eyes and the antennæ without intermediate division in front of the epistome, although that is present. This (*Halicarcinus ovatus*, see p. 173) belongs in our opinion to the genus *Halicarcinus*."

The emphasis which Tozzetti lays on the presence of the epistome is in criticism of Milne-Edwards, who had distinguished *Hymenosoma* and *Halicarcinus*, with the epistome less prominent, from *Elamena* and *Trigonoplax*, with the epistome more prominent.

After prolonged attention to Tozzetti's discussion, I cannot help feeling that he has made out but a feeble case for the generic distinction of his second and third forms, nor can I feel quite certain that his *Halicarcinus ovatus* is the same as that which I suppose to be Stimpson's. On this and many other points of Australian carcinology, precise and detailed investigations are needed.

HALICARCINUS PLANATUS (Fabricius). (Plate XXXVI B.)

1775. *Cancer planatus*, Fabricius, Syst. Ent. p. 403, 18.

1781. *Cancer planatus*, Fabricius, Spec. Ins. vol. i. p. 499, 19.

1783. *Cancer planatus*, Herbst, Krabben und Krebse, Heft. 2–5, p. 142.

1793. *Cancer planatus*, Fabricius, Ent. Syst. vol. ii. p. 446.

1798. *Leucosia planata*, Fabricius, Suppl. Ent. Syst. p. 350.

1846. *Halicarcinus planatus*, White, Ann. Mag. Nat. Hist. ser. 1, vol. xviii. p. 178, pl. 2. fig. 1.

1852. *Halicarcinus planatus*, Dana, U.S. Expl. Exp. vol. xiii., Crust. p. 385, pl. 24. figs. 7 *a b*.

1853. *Halicarcinus planatus*, Milne-Edwards, Ann. Sci. Nat. ser. 3, vol. xx. p. 222.

1868. *Halicarcinus planatus*, Heller, Reise der Novara, Crust. p. 66.

1871. *Halicarcinus planatus*, Cunningham, Tr. Linn. Soc. Lond. vol. xxvii. p. 492.

1876. *Halicarcinus planatus*, Miers, Catal. New Zealand Crust. p. 49.

1876. *Halicarcinus planatus*, S. I. Smith, Bull. U.S. Mus., Nat. Hist. Kerguelen, p. 57.

1877. *Halicarcinus planatus*, Targioni-Tozzetti, Crost. della Magenta, p. 176, pl. 10. figs. 4 *a–f*, pl. 11.[1] figs. 2, 2 *a* [?].

1879. *Halicarcinus planatus*, Miers, Phil. Trans. vol. 168. p. 201.

1882. *Hymenosoma planatum*, Haswell, Catal. Australian Malacostraca, p. 114.

[1] At p. 173 under *Halicarcinus ovatus* we read "Tav. x. Fig. 5, *a–d*; Tav. xi. Fig. 3, 3 *a*"; on p. 178, under *Halicarcinus planatus*, "Tav. x. Fig. 4, *a–f*." On p. 255 the explanation of Tav. x. assigns *H. planatus* to fig. 4, and *H. ovatus* to fig. 5; but Tav. xi. has "Fig. 1, 1 *a*, 2 *a*" for *H. ovatus* with a reference to fig. 4 of the preceding plate, "Fig. 1, 2" for *H. planatus*, with a reference to fig. 5 of the preceding plate, and "Fig. 3, 3 *a*, 3 *b*, 3 *c*, 3 *d*, 3 *e*" for *Hymenosoma læve*.

1885. *Halicarcinus planatus,* Filhol, Recueil de Mém., Exp. pass. de Vénus, Zool. p. 396.

1886. *Halicarcinus planatus*, Miers, 'Challenger' Brachyura, Reports, vol. xvii. p. 281.

From what has been said on the genus it will be understood that the mere record of *H. planatus* is no very certain guarantee that precisely this species was obtained in the locality assigned. In the works of Fabricius and Herbst above mentioned, between 1775 and 1793, a species named *Cancer orbiculus* from New Zealand takes precedence of the Fuegian *Cancer planatus.*

Miers in 1876 says : "The type specimen of the *C. orbiculus* of Fabr. is in the Collection of the British Museum. It is very much injured, but I think it can be nothing but a specimen of *H. planatus* with the marginal teeth obsolete." He does not, however, endorse his opinion by substituting the name *orbiculus* for *planatus*, and this is prudent, unless the state of the specimen permits of its being distinguished, for example, from *Hymenicus varius* Dana, which also comes from New Zealand and is without teeth to the carapace.

In the following notes on specimens brought by Mr. Vallentin from the Falkland Islands, which specimens I take to be with little doubt *H. planatus*, I propose to compare with them specimens from Jervis Bay in Australia, sent to me by Prof. Haswell, unnamed, but agreeing in my opinion with *H. ovatus* Stimpson (Plate XXXVI A.).

In regard to the upper surface, there is a general agreement that in the latter species the frontal margin is narrower and the teeth of the tridentate depressed rostral projection more closely approximate than in the former. In both species the teeth are setiferous. Of the marginal teeth the hinder, which is much the more pronounced, is more setose in *H. planatus*; and in this species, as Miers notices, the carapace is much more hairy in some instances than in others, but that variability, for aught we know, may belong to other species of the genus, or even be an incident in the life of the individual. In front of the epistome there is, so far as I can make out, a similar median septum in both species. In both the eyes and antennæ agree, unless it may be that the eyes in *H. ovatus* are apically a little narrowed. The second antennæ have in both the narrow peduncle much shorter than the stout one of the first; while Guérin in his *Hymenosoma leachii* describes and figures them as being nearly equal in length.

The mouth-organs are practically the same in both species, and their characters are sufficiently shown by the figures. The external or third maxillipeds of *H. planatus* are on the outer surface of the third and fourth joints much more setose than those of *H. ovatus*, and there are small but trivial differences in the outline of the fourth joint. In the three terminal joints, both species have numerous finely pectinate spines on or projecting from the inner surface, which is shown in the figure. All three maxillipeds have a long narrow epipodal lamina, and the transversely placed second joint of the exopod traversed by a muscle evidently adapted for moving the terminal fascicle of long setæ, about six in number.

From the chelipeds specific distinctions can scarcely be derived, since in well-developed males of *H. planatus* there appear to be greater differences than any which can be pointed out between the chelipeds of that species and those of *H. ovatus*. Nicolet's *Liriopea lucasii* from Chile is founded almost exclusively on the robust character of the chelipeds, " ending in a hand almost globose, much inflated and of dingy blackish colour," the movable finger having a strong dentiform tubercle near the proximal end of the inner margin. These, however, are characters which may be rather indicative of age than species.

The four following pairs of trunk-legs (or peræopods) are naturally stouter in *H. planatus*, that being much the larger species; but in the flattened terminal joint or finger there is also some difference of shape and armature, this joint in *H. planatus* being broader in comparison with its length, less curved, with the teeth of the inner margin not reverted, and implanted some on one side and some on the other of the border, whereas in *H. ovatus* they are in single file and provide the joint with a slightly backward directed serrature. In both species the two teeth nearest the acute nail are the largest, and the spaces between the spines have finely serrate setæ, of which there is a group at the base of the margin.

The broad, rounded pleon of the female and the terminally narrowed pleon of the male exhibit no characters for distinguishing the two species.

Breadth of *H. planatus* about 9 mm., length a little less; breadth of *H. ovatus* scarcely 7 mm., length a little less than the breadth.

Mr. Vallentin reports *H. planatus* as " common under stones and kelp, Stanley Harbour."

OXYRRHYNCHA.

Fam. INACHIDÆ.

1886. *Inachidæ*, Miers, 'Challenger' Brachyura, Reports, vol. xvii. pp. x, 2.

Dana in 1852 (U.S. Expl. Exp., Crust. p. 77) in the Maiinea distinguished a family Eurypodidæ, as having eyes retractile to the sides of the carapace, but without concealment below it. To this he referred three genera, *Eurypodius*, *Oregonia*, and *Amathia*. Miers in 1886 refers the family to Stimpson, who adopted it in 1870 with an acceptation regarded by Miers as equivalent to his own subfamily Inachinæ (see J. Linn. Soc. Lond., vol. xv. p. 644, and 'Challenger' Report, p. 11). Alcock in 1895 divides the subfamily Inachinæ into two alliances, Leptopodioida and Inachoida, to the latter of which *Eurypodius* is assigned with a score of other genera (J. Asiat. Soc. Bengal, vol. lxiv. pt. 2, p. 164). If the genus *Leptopodia* has to relinquish its name, as Miss Rathbun argues that it ought to do, the alliance Leptopodioida would naturally, in conformity with her view, be called Macropodioida.

Genus EURYPODIUS Guérin.

1828. *Eurypodius*, Guérin, Mém. Mus. Hist. Nat. Paris, vol. xvi. pp. 349, 350.

1829. *Eurypode* (French), Latreille, Règne Anim., ed. 2, vol. iv. pp. 63, 583.

1829–1843. *Eurypodius*, Guérin, Iconographie, Crustacés, p. 10.

1834. *Eurypodius*, Milne-Edwards, Hist. Nat. Crust. vol. i. p. 283.

1838. *Eurypodius*, Guérin, Voy. de la Coquille, Zool. vol. ii. pt. 2, Crust. p. 23.

1839. *Eurypodius* (subgenus), de Haan, Fauna Japonica, Crust. pp. 79, 87.

It is unnecessary to carry the synonymy further, as both the name and the description of the genus by its author have been generally accepted, and the numerous references will be found prefixed to the account of the species given by Miers in 1881. Guérin's dates are often perplexing, but his figure of *Eurypodius latreillii* in the 'Iconographie,' pl. 11. fig. 1, is referred to by Milne-Edwards in 1834. In the 'Voy. de la Coquille,' his text has a title-page dated 1830, immediately followed by an 'Avant-propos' dated 1838, and signed Guérin-Méneville, after which comes the description of the Crustacea by Guérin, which was therefore printed and perhaps issued earlier than the preface, and before he had taken the addition to his name. The excellent figures in the Atlas to the Voyage, pl. 2. figs. 1–11, may have appeared in 1828; the date 1826 on the titlepage of the complete volume not testifying to anything except perhaps that the titlepage itself was printed in that year.

The name of the genus expressly alludes to the dilatation of the penultimate joint towards its distal extremity in the four pairs of walking-legs. The species *Eurypodius longirostris* Miers, 1886, differs from other forms in having the penultimate joint of the trunk-legs very little dilated, as also in having the rostrum bent upward with its two horns apically divergent, somewhat recalling Dana's genus *Oregonia*.

EURYPODIUS LATREILLII Guérin.

1828. *Eurypodius latreillii*, Guérin, Mém. Mus. Hist. Nat. Paris, vol. xvi. p. 354, pl. 14.

1828 (?). *Eurypodius latreillii*, Guérin, Voy. de la Coquille, Atlas, pl. 2. fig. 1.

1877. *Eurypodius latreillei*, Targioni-Tozzetti, Crost. della Magenta, p. 9, pl. 1. figs. 14–18, 20.

1881. *Eurypodius latreillei*, Miers, Pr. Zool. Soc. Lond. p. 64.

1886. *Eurypodius latreillei*, Miers, 'Challenger' Brachyura, Reports, vol. xvii. p. 22.

1898. *Eurypodius latreillii*, M. J. Rathbun, Pr. U. S. Nat. Mus. vol. xxi. p. 571.

In the Hist. Nat. Crust. vol. i. p. 284, 1834, Milne-Edwards is made by the printer to call this species "*Erypodius Latreillia*." In a preliminary catalogue of the Crustacea of the 'Magenta,' 1870, Tozzetti inadvertently referred it to *Paramithrax peronii* Milne-Edwards. The synonymy given above is additional (except for the first item) to the list of authorities supplied by Miers in 1881. Miers considers that one specific name should suffice for *latreillii* Guérin, 1828, *tuberculatus* Eydoux & Souleyet, 1841, *audouinii* Milne-Edwards & Lucas, 1843, *septentrionalis* Dana, and *brevipes* Dana, both dating from 1851. He does not make any reference to "*Eurypodius Cuvieri*, Audouin," the name attached by de Haan to figures of a first and a third maxilliped in plate H of his great work. Cunningham in 1871, as Miers notices, accepts four species of *Eurypodius*, though the former is doubtful whether *septentrionalis* is distinct from *audouinii*, and not very sure about *brevipes*, nor does he name any character which he thinks trustworthy for separating any of the three from *latreillii*. Tozzetti unites *septentrionalis* with *audouinii*, neither he nor Dana himself making any remark on the fact that in the figure of *septentrionalis* in Dana's Atlas, pl. 2. fig. 6 *a*, the points of the rostral horns are divergent instead of convergent. From Guérin's *latreillii* Tozzetti thinks it necessary to distinguish not only Dana's *brevipes*, but also Dana's *latreillii*, for which he proposes a new name, *Eurypodius danæ*. But I am much disposed to regard this new species as founded on a misapprehension.

In an elaborate comparison of the characters, Tozzetti states that of Guérin's *latreillii* the length is more than three inches, the rostrum one-fifth of the length of the shield, the last segment of the pleon in the male rounded; that of Dana's *latreillii* the length is doubtful, the rostrum one-fourth of the length of the shield, the last segment of the pleon triangular. But this is by no means an accurate account of what Dana says. He speaks distinctly of "a specimen an inch in length;" in which he states that "the beak is about one-fourth the whole length of the carapace," and that the last segment of the pleon in the male is subtriangular. Between specimens respectively an inch and three inches in length it is obvious that there may be many differences, without any of them being specific. Still it must be admitted that even a "subtriangular" ending to the male pleon in *latreillii* would be very difficult to explain. It is very decidedly rounded in full-grown specimens. But we have to remember that the drawings for Dana's Atlas of Crustacea "were to a large extent made during the years 1838 to 1842, in the course of the cruise of the Expedition"; that after the engraving of the plates, and before their publication in 1855, a large part of the original drawings were destroyed by fire; and further, that before Dana's return to America many of the specimens had through ignorance been rendered to a great extent useless for scientific purposes. It is tolerably clear that, under these circumstances, in drawing up his descriptions he chose or was forced to rely, not on the specimens, but on his own drawings or the engravings from them. That this has happened in regard to his *Eurypodius latreillii* seems almost certain, because he does not begin according to custom with a Latin, followed by an English description of it, but with the explanation of the figures in the plate, appending as usual more or less desultory descriptive observations. The explanation of the figures refers to plate 3. figs. 1 *a–c*, without any mention of fig. *d*, which appears three years later in the explanation of the Plates of the Atlas as representing the "abdomen, enlarged two diameters." On Plate 3 of the Atlas there is indeed an abdomen or pleon, enlarged two diameters, and its last segment is subtriangular, or one might fairly say triangular; but there is no letter or number on the plate to show that the figure belongs to *Eurypodius latreillii*, and it may, I think, be argued that Dana assigned it at a venture to his *latreillii* and then described the pleon of that species from it.

According to Dana, "the posterior margin of the inter-antennary cavity, next to the outer antennæ, is reflexed downward" in his *septentrionalis* and *brevipes*, but not so reflexed in his *latreillii*. Tozzetti does not take any notice of this distinction, in which Guérin's *latreillii* agrees with *septentrionalis*.

In *Eurypodius latreillii* from the Falkland Islands there is on the underside of the rostrum behind the cusps a groove ending in a strong forward pointing hook, as described by Guérin and indicated in Tozzetti's figures, pl. 1. fig. 18 (*latreillei*) and pl. 1. fig. 9 (*audouini*), as well as in Dana's pl. 2. fig. 7 *a* (*brevipes*), but not in his pl. 2. fig. 6 *a* (*septentrionalis*) nor yet in his pl. 3. fig. 1 *a* (*latreillii*).

The opinion of Miers that all the forms assigned to *Eurypodius* prior to 1886 belong to a single variable species is highly probable. It is unfortunate that he should have overlooked the discussion by Tozzetti, on which his judgment would have been so valuable.

Of two dried specimens brought home by Mr. Vallentin, the larger is 52 mm. long from tip of rostrum to end of the carapace, and 32·5 mm. broad at the widest part; the carapace, excluding the rostrum, is nearly 4½ times as long as the rostrum.

Found clinging to the stems of *Macrocystis*. Mr. Vallentin says: "I have frequently detected one of these crustaceans slowly retiring to the root, as the stem of *Macrocystis* was being hauled into my boat for examination, and if the rate of hauling was suddenly quickened, one might possibly secure the specimen by making a frantic grab at it before it slipped off. All the four pairs of ambulatory appendages modified to enable the animal to cling to this weed." Guérin fancied that they were modified for swimming.

MACRURA.

ANOMALA.

Section **Lithodinea**.

1849. *Lithodeacea*, de Haan, Fauna Japonica, Crustacea, pp. viii, xxii, 197, 213, etc.

1850. *Lithodina*, Brandt, Bull. phys.-math. Acad. St. Pétersbourg, vol. viii. p. 54.

1852. *Lithodea,* Dana, U.S. Expl. Exp. vol. xiii., Crust. pt. i. p. 426.

1858. *Lithodidea,* Stimpson, Pr. Acad. Philad. p. 244 (Prodromus, p. 68).

1859. *Lithodea,* Stimpson, Mem. Boston Soc. N.H. vol. vi. p. 472.

1877. *Lithodea,* Tozzetti, Crost. della Magenta, pp. 225, 227.

1882. *Lithodidea,* S. I. Smith, Bull. Mus. Comp. Zoöl. Harvard Coll. vol. x. p. 8.

1886. *Lithodoidea,* S. I. Smith, Ann. Rep. Fish & Fisheries for 1885, Crust. 'Albatross,' p. [34].

1888. *Lithodea,* Henderson, 'Challenger' Anomura, Reports, vol. xxvii. p. 41.

1893. *Lithodinea,* Stebbing, Hist. Crust., Internat. Sci. Ser. vol. lxxiv. p. 152.

1895. *Lithodinés,* Bouvier, Ann. Sci. Nat., Zool. ser. 7, vol. xviii. p. 157.

1896. *Lithodinés,* Bouvier, Ann. Sci. Nat., Zool. ser. 8, vol. i. p. 1.

This section, tribe, or legion contains at present the single family Lithodidæ. Henderson makes it section A of the Paguridea. Boas (Vidensk. Selsk. Skr., 6. Række Nat. og math. Afd. i. p. 110, 1880) includes in the 'Paguroiderne' *Pagurus, Cœnobita, Birgus, Lithodes,* and the related forms. Bouvier divides the great family of the Paguridés into 3 subfamilies—the Pagurinés, Lithodinés, Lomisinés.

Fam. LITHODIDÆ.

1853. *Lithodidæ,* Dana, U.S. Expl. Exp. vol. xiii., Crust. pt. ii. p. 1430.

1888. *Lithodidæ,* Henderson, 'Challenger' Anomura, Reports, vol. xxvii. p. 42.

1892. *Lithodidæ,* Ortmann, Zool. Jahrb. vol. vi. pp. 271, 320.

1893. *Lithodidæ,* Stebbing, Hist. Crust., Internat. Sci. Ser. vol. lxxiv. p. 153.

1894. *Lithodidæ,* Benedict, Pr. U.S. Nat. Mus. vol. xvii. p. 479.

1895. *Lithodidæ,* Faxon, Mem. Mus. Comp. Zoöl. Harvard Coll. vol. xviii. p. 42 (Crust. 'Albatross').

1899. *Lithodidæ,* Alcock & Anderson, Ann. Mag. Nat. Hist. ser. 7, vol. iii. p. 15.

The genera and species now included in this family are numerous, and have recently been made the subject of important discussions by Benedict, Faxon, and others, but especially Professor Bouvier's essay on their classification, above cited, will be found to throw light upon them all. He bestows high praise on the work of Stimpson, 1859, and the papers which appeared between 1849 and 1853 by J. F. Brandt, from whom he adopts the division of the Lithodina into the Hapalogastrica and Ostracogastrica, though not accepting his view that the Lomina might be a link between those two divisions.

Gen. Paralomis White.

1856. *Paralomis*, White, Pr. Zool. Soc. Lond. vol. xxiv. p. 134.
1858. *Paralomis*, Stimpson, Pr. Ac. Philad. p. 231 (Prodromus, p. 69).
1871. *Lithodes*, Cunningham, Tr. Linn. Soc. Lond. vol. xxvii. p. 494.
1881. *Paralomis*, Miers, Pr. Zool. Soc. Lond. p. 71.
1888. *Paralomis*, Henderson, 'Challenger' Anomura, Reports, vol. xxvii. p. 44.
1892. *Paralomis*, Ortmann, Zool. Jahrb. vol. vi. p. 321.
1893. *Paralomis*, Stebbing, Hist. Crust., Internat. Sci. Ser. vol. lxxiv. p. 154.
1894. *Echinocerus*, Benedict, Pr. U.S. Nat. Mus. vol. xvii. p. 484.
1895. *Paralomis*, Bouvier, Ann. Sci. Nat. ser. 7, vol. xviii. p. 185.
1895. *Paralomis*, Faxon, Mem. Mus. Comp. Zoöl. Harvard Coll. vol. xviii. p. 44 (Crust. 'Albatross').
1896. *Paralomis*, Bouvier, Ann. Sci. Nat. ser. 8, vol. i. p. 25.
1899. *Paralomis*, Alcock & Anderson, Ann. Mag. Nat. Hist. ser. 7, vol. iii. p. 15.

This genus was established by White for the species named *Lithodes granulosa* by Jacquinot in the Atlas of the 'Voy. au Pôle Sud.' It is strange that White should establish a genus, without any serious attempt at definition, on a figure which he pronounces to be "extremely bad." He does not explain how under the circumstances he was able to identify the specimen "in the British Museum" with the species in question. His observations that the species "has the beak scarcely projecting at all beyond the extra-orbital angle," that "the carapace and upper parts of its legs are thickly invested, as in some of the *Canceridæ*, with close straw-berry-surfaced granules, closely pressed together," and that it is a small species, "more allied to *Lomis*," are all the help he gives for distinguishing his new genus from *Lithodes*, not to speak of his own genera *Echidnocerus* and *Petalocerus*.

Two or three years later Stimpson gave distinguishing characters for ten genera of Lithodidæ, in two groups. The second, with the body depressed, comprised *Lomis* of Milne-Edwards with Brandt's *Dermaturus* and *Hapalogaster*. Of these genera, Bouvier in 1894 gives reasons for removing *Lomis* entirely from the Lithodinea and founding upon it a separate section, the Lomisinea (answering to the Lomina suggested by Brandt in 1851); but the other two he retains with *Placetron* Schalfeew, 1892, as constituting one division of the Lithodinea, the Hapalogastrica of Brandt. Benedict's *Œdignathus* is made a synonym of *Dermaturus* and his *Lepeopus* of *Placetron*, de Haan's *Lomis dentata* falling into the genus *Hapalogaster* as arranged by Stimpson. The latter author's first group, with body convex, comprised *Lithodes*, *Echidnocerus*, *Paralomis*, *Rhinolithodes*, *Acantholithus*, *Phyllolithodes*, and *Cryptolithodes*, the first established by Latreille, the next two by White, *Acantholithus* by Stimpson, and the remainder by Brandt, White's *Petalocerus* being a synonym of *Phyllolithodes*. To these Bouvier in 1896 adds *Paralithodes* Brandt, and *Neolithodes* M.-Edwards and Bouvier, as constituting together the other division of the Lithodinea, Brandt's Ostracogastrica. De Haan's *Lithodes histrix*, referred by Ortmann to *Paralomis*, is by Bouvier, in agreement with Stimpson, made the type of *Acantholithus*. The *Leptolithodes* and *Pristopus* of Benedict, 1894, are regarded as synonyms of White's *Paralomis*, to which eight species are assigned—*aculeata* and *formosa* of Henderson, *longipes* and *aspera* of Faxon, *multispina* and *papillata* from Benedict's *Leptolithodes*, *verrilli* from his *Pristopus*, and Dana's *verrucosa*, of which Jacquinot's *granulosa* is accepted as a synonym.

As characters common to all the Ostracogastrica, Bouvier gives "Lateral pieces of the pleon absolutely entire. Acicle spinulose or spinose, rarely laminar, simple, sometimes rudimentary." *Paralomis* he describes as agreeing with *Acantholithus* and *Rhinolithodes* in having "The habitus of *Lithodes*.—Carapace longitudinally oval, cordiform or triangular, very rarely a little broader than long, and not extending roof-like over base of walking-legs. Antepenultimate joint of first feet is very rarely provided with a salient internal crest, has no respiratory channel, and does not serve specially to protect the oral appendages. Median pieces of the pleon separated by a row of nodules more or less coalesced."

Paralomis, in common with *Rhinolithodes*, has the "acicle rather triangular, and ornamented with some spines, especially on its outer margin." From *Rhinolithodes* and *Acantholithus*, it is distinguished by the following characters:—"The marginal pieces of the third pleon-segment are fused with the corresponding lateral piece. Rostrum devoid of dorsal projection, but sometimes furnished below with a spinule or a tubercle."

PARALOMIS GRANULOSA (Jacquinot).

1843–1847[1]. *Lithodes granulosa*, Jacquinot, Voy. au Pôle Sud, Atlas, Crustacés, pl. 8. figs. 15–21.

1852. *Lithodes verrucosa*, Dana, U.S. Expl. Exp. vol. xiii., Crust. pt. i. p. 428, pl. 26. fig. 16.

1853. *Lithodes granulata*, Lucas, Voy. au Pôle Sud, Zoologie, vol. iii. Crustacés, p. 94.

1856. *Paralomis granulosa*, White, Pr. Zool. Soc. Lond. vol. xxiv. p. 134.

1858. *Paralomis granulosus*, Stimpson, Pr. Ac. Philad. p. 231 (Prodromus, p. 69).

1858. *Paralomis verrucosus*, Stimpson, loc. cit.

1871. *Lithodes verrucosa* (? *L. granulosa*), Cunningham, Tr. Linn. Soc. Lond. vol. xxvii. p. 494.

1881. *Paralomis verrucosus*, Miers, Pr. Zool. Soc. Lond. p. 71.

1881. *Paralomis granulosus*, Miers, loc. cit. p. 72.

[1] See footnote on *Peltarion*, p. 519.

1888. *Paralomis granulosus*, Henderson, 'Challenger' Anomura, Reports, vol. xxvii. p. 45.

1894. *Echinocerus granulatus*, Benedict, Pr. U.S. Nat. Mus. vol. xvii. p. 484.

1895. *Paralomis granulosa*, Faxon, Mem. Mus. Comp. Zoöl. Harvard Coll. vol. xviii. p. 45.

1895. *Paralomis granulosa*, Bouvier, Ann. Sci. Nat. ser. 7, vol. xviii. p. 186, pl. 11. fig. 9, pl. 12. fig. 11.

1895. *Paralomis verrucosa*, Bouvier, loc. cit. p. 187, pl. 13. fig. 3.

1896. *Paralomis verrucosa*, Bouvier, Ann. Sci. Nat. ser. 8, vol. i. pp. 14, 26.

1899. *Paralomis verrucosa*, Alcock & Anderson, Ann. Mag. Nat. Hist. ser. 7, vol. iii. p. 15.

While M. E. L. Bouvier appears to be certainly right in identifying *granulosa* with *verrucosa*, as suggested with less confidence by various other authors, among whom Dana himself may almost be reckoned, it must, I think, be conceded that the name *granulosa* takes precedence. No doubt its priority depends on the figures in Jacquinot's Atlas, but they give much more information than many an accepted specific description. There are cases in which authors have evidently described species only from figures; Lucas in some instances acknowledges that he had only the figures in Jacquinot's Atlas, and not the corresponding specimens, to guide him. It would be an absurdity to allow authority to a description made from a figure, but to discredit the figure itself.

In his synoptic table of the eight species of *Paralomis* above mentioned, Bouvier separates *verrilli*, *granulosa*, *formosa*, and *aspera* from the other four, as having the rostrum without any rudiment of projection below. He unites *verrilli* and *granulosa* by the common characters: "Acicle long triangular, acute, armed outside with 3 or 4 spines [? teeth]; carapace covered with verrucosities or very low and very obtuse tubercles; chelipeds unequal; walking-legs very compressed." He separates *granulosa* by the distinctive characters: "The right cheliped reaches considerably beyond the base of the finger of the first walking-leg; it is furnished on the inner margin of the antepenultimate joint with a salient crest armed with 5 or 6 spines [teeth]. Carapace verrucose, except in the large adults, in which it becomes tuberculose. The fourth joint of the walking-legs is compressed from front to rear, the three following joints from above to below. No unpaired gastric spine [tooth]." The species *indica* and *investigatoris* of Alcock and Anderson, added to the genus in 1899, both have the walking-legs longer than the chelipeds, and in *indica* the latter have the wrist not expanded to a foliaceous lobe.

The distinction drawn between warts and tubercles is not very easy to appreciate. Of Jacquinot's specimen, only 12 mm. long by 10 broad, Lucas says that the carapace is "entirely covered with little, close-set tubercles, flattened and granular at the top." Miers says of a very young example in the British Museum, "the granulated and wart-like tubercles of the carapace are closely crowded together, so that none of the smooth under-surface is visible." This is just the case with a perfect specimen from the Falkland Islands 36·5 mm. long by 36 mm. broad. A carapace, 62 mm. long by 62 broad, from which the radiating granules have been removed, shows the warts or tubercles solitary or in groups, with smooth intervening spaces.

Mr. Vallentin notes that this species was "Found during low-water amid a heap of rocks near Hooker's Point, Stanley, Falkland Islands. Mutilated specimens of this crab common on sands after S.E. gales. Only one perfect specimen seen."

PAGURINEA.

1888. *Pagurodea*, Henderson, 'Challenger' Anomura, Reports, vol. xxvii. p. 48 (with synonymy).

1893. *Pagurinea*, Stebbing, Hist. Crust., Internat. Sci. Ser. vol. lxxiv. p. 155.

Fam. PAGURIDÆ.

1852. *Paguridæ*, Dana, U.S. Expl. Exp. vol. xiii. Crust. pt. i. p. 435.

1858. *Paguridæ*, Stimpson, Pr. Ac. Philad., Prodromus, p. 70.

1888. *Paguridæ*, Henderson, 'Challenger' Anomura, Reports, vol. xxvii. p. 52.

1893. *Paguridæ*, Stebbing, Hist. Crust., Internat. Sci. Ser. vol. lxxiv. p. 159.

1893. '*Paguriens*,' A. Milne-Edwards & Bouvier, Mem. Mus. Comp. Zoöl. Harvard Coll. vol. xiv. No. 3, 'Blake' Report.

1898. *Paguridæ*, G. M. Thomson, Tr. New Zeal. Inst. vol. xxxi. p. 171.

Gen. EUPAGURUS Brandt.

1851. *Eupagurus*, Brandt, Middendorff's Sibirische Reise, Zool. pt. i. p. 105.

1888. *Eupagurus*, Henderson, 'Challenger' Anomura, Reports, vol. xxvii. p. 62.

1892. *Eupagurus*, Benedict, Pr. U.S. Nat. Mus. vol. xv. p. 1.

1893. *Eupagurus*, Stebbing, Hist. Crust., Internat. Sci. Ser. vol. lxxiv. p. 160.

1893. *Eupagurus*, Milne-Edwards & Bouvier, Mem. Mus. Comp. Zoöl. Harvard Coll. vol. xiv. No. 3, p. 139.

1898. *Eupagurus*, Thomson, Tr. N. Zeal. Inst. vol. xxxi. p. 172.

For the present purpose it is unnecessary to give more extended references to the bibliography of this genus. Milne-Edwards and Bouvier, after quoting its characters as given by Henderson, write as follows:—

"To these characters we shall add, from the study of a great number of specimens, that the anterior maxillæ are without flagellum on the exopod (dépourvues de fouet sur la palpe), but that this appendage exists, clearly articulated on the anterior maxillipeds; that the external maxillipeds are separated at their base by a calcareous sternum; that the branchiæ have two rows of undivided lamellæ; lastly that the fifth pair of legs end in an imperfect chela, with very short fingers, and having on it a well-developed rasp. The rasp of the legs of the fourth pair is sometimes broad, sometimes formed of a single row of scales, but the first case is much the more frequent. The branchial formula is that of *Parapagurus*." The authors do not give the branchial formula of *Parapagurus*, but probably accept Professor S. I. Smith's statement that there are eleven pairs of branchiæ, "two each at the bases of the external maxillipeds and the three first pairs of cephalothoracic legs, and three at the bases of the fourth pair of thoracic legs,—as in *Eupagurus bernhardus*."

The first generic character given by Henderson is, "Front with a distinct rostral projection." This is modified by Thomson, who writes, "Front usually slightly rostrate." The change is obviously expedient, since Henderson says of his own *Eu. rubricatus* that the "frontal projections are scarcely indicated, the median being obtusely rounded;" Milne-Edwards and Bouvier make a similar remark in regard to their *Eu. stimpsoni*; and of *Eu. edwardsi* Filhol, Thomson declares that the front is "not at all produced on the median line." Thomson also omits the character that the basal scales of the ocular peduncles are "separated by a wide interval;" and this in fact seems little applicable to Dana's *Eu. novæ-zealandiæ*, while the two French authors just mentioned say of their *Eu. smithii*, that the ophthalmic scales are separated by a trifling interval ("intervalle médiocre").

Recently Miss Rathbun (Pr. U.S. Nat. Mus. vol. xxii. p. 302, 1900) has re-transferred *Eupagurus* Brandt to *Pagurus* Fabricius [1], and has given the name *Petrochirus* Stimpson to *Pagurus* as more commonly accepted. For this change there may be some subtle or simple explanation, but it is not supplied by the learned authoress, and without further discussion such an innovation should scarcely be accepted. If it be essential (as it may or may not be) to rescue the name *Pagurus* for one of the species originally assigned to it by Fabricius, it would be more correct and less confusing to sacrifice to it Dana's *Aniculus*, allowing Dana's own *Pagurus* to fall under Stimpson's *Petrochirus*, as Miss Rathbun proposes, but retaining Brandt's *Eupagurus*, with its numerous species, undisturbed.

EUPAGURUS COMPTUS (White).

1847. *Pagurus comptus*, White, Pr. Zool. Soc. vol. xv. p. 122.

1848. *Pagurus comptus*, White, Ann. Nat. Hist. ser. 2, vol. i. p. 224.

1858. *Eupagurus comptus*, Stimpson, Pr. Ac. Philad. p. 237 (Prodromus, p. 75).

1871. *Pagurus forceps*?, Cunningham, Tr. Linn. Soc. Lond. vol. xxvii. p. 495.

[1] So also S. J. Holmes (California Stalk-eyed Crustacea, p. 132, 1900), relying on J. E. Benedict (Ann. Nat. Hist. ser. 6, vol. xviii. p. 99, 1896), who relies on Latreille's Consid. gén. Crust. p. 421, 1810—a broken reed, as I have elsewhere ventured to maintain (Natural Science, vol. xii. no. 74, p. 239, 1898).

1874. *Eupagurus comptus*, Miers, Zool. Erebus and Terror, Crustacea, p. 3, pl. 2. figs. 5, 5 *a* (*Pagurus comptus* on plate).

1881. *Eupagurus comptus*, and var. *latimanus*, Miers, Pr. Zool. Soc. Lond. p. 72.

1888. *Eupagurus comptus*, var. *jugosa*, Henderson, 'Challenger' Anomura, Reports, vol. xxvii. p. 67, pl. 7. fig. 2.

1892. *Eupagurus comptus*, Ortmann, Zool. Jahrb. vol. vi. p. 298.

The *Pagurus forceps* of Milne-Edwards, to which this species is doubtfully referred by Cunningham, was originally described from Chile. Miers, in rejecting Cunningham's reference, says: "*E. forceps*, however, appears to be distinguished by the much shorter, broader, larger hand, and the much shorter and less slender fingers of the left anterior leg." Now, although Miers is probably right in his rejection of Cunningham's reference, it is difficult to understand the reasons he assigns for it. Milne-Edwards in his description of *forceps*, says that the right cheliped is very large, with the carpus much larger than the hand, and that the left cheliped has the fingers slender, long, and pointed, the movable finger almost filiform. In *Eu. comptus* the wrist of the right cheliped is not much larger than the hand, and the fingers of the left cheliped would have to be very thin to be more slender than those which are almost filiform.

Milne-Edwards describes the colour of his species as reddish violet, with the feet ringed; White describes his as "Whitish, the antennæ ringed with red, the legs with three or four broad red bands." The specimen here referred to *Eu. comptus*, as preserved in formalin, retains in many parts a violet hue, speckled with reddish points and lines, the distal half of the first antennæ is orange-coloured, the flagella of the second antennæ are brightly annulated with red and white, and the two pairs of walking-legs have three broad bands of brown, the uppermost bluish, the other two reddish.

The rostral point is well marked. The eye-stalks are slender. The ophthalmic scales are separated by no very wide interval. The flagella of the second antennæ, though not densely setuliferous, have numerous setules of various lengths. In the right cheliped the wrist is nearly or quite as broad and as long as the hand, the outer surface broadly triangular, a little convex, with sharp, granular or serrate margins, the lower surface two-sided; the hand and finger together form a broad oval, the outer edges of the fingers sharply serrate, the outer margin of the hand above the movable finger thickened, with two edges, meeting a slight expansion, rounded and serrate, of the wrist; the outer surface of the hand having a ridge from the movable finger to the wrist.

In the 'Voyage of the Erebus and Terror' some very rough figures are given of the type, the figures probably much older than the date of publication. They are left unexplained by Miers. They show a movable finger much shorter than the immovable one, which is produced to a sharp point. If they faithfully represent an actual specimen, the probability is that it was a deformed one. In the left cheliped, which is much smaller than the right, the fingers are rather longer than the palm, and certainly not filiform.

The subchelate penultimate legs have the penultimate joint broad and flat, with a very narrow rasp.

Mr. Vallentin's specimen was obtained from "root of kelp, 3 fms., Stanley."

SCHIZOPODA.

1817. *Schizopoda*, Latreille, Règne Animal, vol. iii.

1827. *Schizopoda*, Latreille, Règne Animal, Nouv. éd., vol. iv. p. 99.

1867. *Schizopoda*, Sars, Crust. d'eau douce de Norvège, p. 11.

1885. *Schizopoda*, Sars, 'Challenger' Schizopoda, Reports, vol. xiii.

In 1883 Boas, Morphol. Jahrb. vol. viii. pp. 487, 569, in place of the Schizopoda, adopts two orders, the Euphausiacea and the Mysidacea. In this he is followed by Ortmann, 'Ergebnisse der Plankton-Expedition der Humboldt-Stiftung,' vol. ii. 1893, who explains that in using "Decapoden und Schizopoden" for the titular heading to his work, he is only making a concession to long established usage. The advantage gained by cancelling the name Schizopoda is not easy to perceive, with full allowance made for the importance of the differences between the two groups which it has long conveniently embraced.

Claus in 1863, Zeitschr. für wiss. Zool. vol. xiii. pt. 3, p. 442, suggests the names Thysanopodea or Euphausidea for a group to be distinguished from the Mysidea; but probably he only intended to give the names of families, which should rather be Thysanopodidæ or Euphausiidæ, and Mysidæ, respectively. His reason for proposing Thysanopodea is obvious, inasmuch as *Thysanopoda* Milne-Edwards is far older than its companion genus *Euphausia* Dana.

Fam. Euphausiidæ.

1852. *Euphausidæ*, Dana, U.S. Expl. Exp. vol. xiii., Crust. p. 636.

1883. *Euphausiidæ*, Sars, Christiania Vidensk.-Selsk. Forh. no. 7, p. 11.

1885. *Euphausiidæ*, Sars, 'Challenger' Schizopoda, Reports, vol. xiii. pp. 10, 62.

1885. *Euphausiidæ*, Norman, Ann. Mag. Nat. Hist. ser. 6, vol. ix. p. 456.

1893. *Euphausiidæ*, Stebbing, Hist. Crust., Internat. Sci. Ser. vol. lxxiv. p. 261.

1893. *Euphausiidæ*, Ortmann, Decapoden u. Schizopoden, Plankton-Exp. vol. ii. p. 7.

To *Thysanopoda* Milne-Edwards, *Euphausia* Dana, and *Thysanoëssa* Brandt, Sars has added *Nyctiphanes*, *Nematoscelis*, *Stylocheiron*, and *Bentheuphausia*, and Calman in 1896 added *Nematodactylus*. The distinguishing feature of the family is found in the wholly uncovered, digitiform-arborescent branchiæ, these being partially covered in the Lophogastridæ and Eucopiidæ, wanting in the Mysidæ, and not arborescent in *Anaspides*.

Gen. EUPHAUSIA Dana.

1852. *Euphausia*, Dana, U.S. Expl. Exp. vol. xiii., Crust. pp. 637, 639.

1863. *Euphausia*, Claus, Zeitschr. für wiss. Zool. vol. xiii. pt. 3, p. 442.

1876. *Euphausia*, Claus, Genealog. Grundlage des Crustaceen-Systems, p. 7.

1883. *Euphausia*, Sars, Christiania Vidensk.-Selsk. Forh. no. 7, p. 11.

1885. *Euphausia*, Sars, 'Challenger' Schizopoda, Reports, vol. xiii. p. 63.

1893. *Euphausia*, Ortmann, Decapoden u. Schizopoden, Plankton-Exp. vol. ii. p. 10.

This genus is distinguished from others in the same family by having the last two pairs of trunk-legs (that is, the fourth and fifth peræopods) rudimentary, except in regard to the branchiæ, which are strongly developed.

The beautiful and elaborate figures with which Sars has illustrated this genus refer to a form which he calls *Euphausia pellucida* Dana. His reason for choosing the name is that so common a form cannot reasonably be supposed to have escaped the attention of Dana, and that of the four species described by Dana the one named *pellucida* seems to agree with it best. Against this reasoning there is much to be urged. Sars speaks of "the specimens examined by Dana;" but Dana's description would rather lead one to suppose that he had only at command a single specimen, of the female sex. A single specimen resulting from a four years' voyage may just as well belong to a rare species as to a common one. Dana's descriptions in some cases are, as Sars observes, anything but satisfactory. They are sometimes inconsistent one with another and with the figures to which they refer. In his account, for example, of *E. pellucida* he says that the last three joints of the feet are together nearly twice as short as the preceding joint. This is not borne out by his detail-figure even of the "posterior thoracic leg," and is still less likely to be true of the preceding feet. It is very far from true of any of the feet in the form described by Sars; but this is separated from Dana's by other characters. Dana describes each of his species as "brevissime rostratus," and it is difficult to suppose that he could have overlooked such a difference in the length of the rostrum as exists between the forms named by Sars respectively *E. pellucida* Dana and *E. splendens* Dana, the rostrum in the former reaching to the distal end of the eyes, and in the latter "scarcely projecting beyond the ocular segment." The *pellucida* of Sars is distinguished by the great length of the denticulate basal spine of the second antennæ, this spine being short in Dana's detail-figure. In *pel-*

lucida of Sars the second maxillæ "are distinguished more particularly by the short and broad form of the terminal joint," which is broader than long; whereas this appendage in the large and apparently careful figure given by Dana has the terminal joint considerably longer than broad. In Sars's figure the third peræopods have the last three joints together not shorter than the preceding joint; while in Dana's figure they are decidedly shorter, though not to so great an extent as in his description. Again, in Sars's *pellucida* the subapical processes of the telson are "finely denticulate along their inner edge," a character belonging also to *E. spinifera* Sars and *E. latifrons* Sars, but to none of the other species described in the 'Challenger' Report. A character of this minute kind might, it is true, easily have escaped observation by Dana, but it so happens that he expressly applies the epithet "naked" to these processes in *E. pellucida*. It follows therefore, I think, that for the *E. pellucida* of Sars some other name must be used, but this point will be considered to better advantage later on.

The identification of *E. splendens* Sars with the species so named by Dana is also, as Sars admits, beset with difficulties. Thus, in Sars's form the carapace has a denticle about the middle of each lower margin; but Dana says "carapace a little compressed, not toothed." As he does not show or speak of a toothed carapace in any of his four species, this particular negation remains rather mysterious. With another character it is different. Sars writes of *E. splendens*, "Antennular peduncle without any trace of dorsal lobes," having previously written in regard to the antennular peduncle of his *E. pellucida*, "it is more particularly distinguished by the basal joint having at the end above a conspicuous erect leaflet or membranous lobe." But Dana says of *E. pellucida*, "first basal joint of inner antenna not produced at apex," and of *E. splendens*, "first joint of inner antennæ oblong and produced at apex"; so that either this character is of no importance, or Dana's two species do not agree with the forms to which Sars has attributed their names. Rather curiously, too, Dana says of *E. pellucida*, "basal scale of outer antennæ a little longer than base," but of *E. splendens*, "basal scale of outer antennæ shorter than base" (or, in the Latin, "basin non superans"); whereas Sars states it is the basal scale of *E. splendens* that is decidedly longer than the base, that of his *E. pellucida* being scarcely at all longer, thus again inverting the relations as given by the two authors. According to Sars the inner plate of the uropods in *splendens* is a little shorter than the outer; in Dana's detail-figure it is fully as long. Sars says, "The length of the largest specimen reaches about 18 mm., and the species attains accordingly a somewhat larger size than *Euphausia pellucida*." Dana, on the other hand, who had some fifteen or twenty specimens at command, says: "Length about half an inch," half an inch being also the length which he gives for *E. pellucida*. The relative lengths of the joints in the thoracic legs appear to agree in the two forms; but later authors seem to have attached less specific importance to this character than Dana did, though it was on his part done in a somewhat tentative manner. On the whole, the identification of the 'Challenger' specimens with Dana's *E. splendens* seems to rest on a rather insecure foundation.

A third form is described by Sars as without doubt the *Euphausia gracilis* of Dana, a decision for which there is strong support in the figure given by Dana of his single, somewhat damaged, specimen. Still, even here there is room for remark. Sars says: "Antennular peduncle without any dorsal lappet, basal joint shorter than the other two taken together;" but Dana says: "First joint of inner antennæ sparingly produced and acute at apex," and figures it as decidedly longer than the two other taken together. Sars says that the inner plate of the uropods is much longer than the outer. Dana, in a detail-figure, represents the outer fully as long as, if not slightly longer than, the inner. Dana says: "Feet very slender, last three joints subequal, and together but little shorter than preceding joint." As already intimated, Dana carelessly speaks of these proportions as though they applied to all the feet indiscriminately, instead of varying in each pair. There is, however, reason to believe that he bases his statements on the last (developed) pair. In his lateral view of the animal the three terminal joints of the last leg appear in fact subequal, but together much longer than the preceding joint. As there is no detail-figure of the limb, there is no need to insist on the inconsistency between the figure and the description. But in the lateral view given by Sars the last three joints of the undescribed last leg are very unequal. Also the detail-figure of the gill of the last (rudimentary) leg, which is given by both authors, may possibly represent the same structure, but twins would never be confused if they were as little alike as these two drawings.

Of the large and splendid *Euphausia superba* Dana, Sars, like Dana, had but a single specimen. The agreement between the figures and between the two accounts where they touch one another, though not absolute, is sufficient to make it probable that both authors are treating of the same species.

Next after the four forms originally included in the genus comes *Euphausia mülleri* Claus, 1863, from Messina. In regard to this it is curious and perplexing that, while Sars deems it unquestionably identical with what he considers to be *Euphausia pellucida* Dana, Claus himself declares that it stands nearest to, without being the same as Dana's, *Euphausia splendens*. In one notable particular it agrees better with *pellucida*, both of Sars and Dana, than with the *splendens* of either of these authors—namely, judging by the detail-figure, it has the inner branch of the uropods reaching decidedly beyond the outer. Claus, however, in the text makes no mention of this character. On the other hand, he distinguishes his own species from *splendens* as being longer (16–18 mm.), as having a longer rostral projection, and the sixth pleon-segment relatively much shorter. The two latter distinctions are not borne out by his figure as compared with Dana's. From *E. pellucida* of Sars one might say that *E. mülleri* is distinguished by a shorter rostral projection, by having no lateral teeth on the margins of the carapace, and by having the subapical appendages of the telson smooth, not to speak of the evidently misrepresented mandible. To this it might be reasonably answered that the points in question are such as Claus might easily have overlooked while attending to features that were more striking or that seemed more important. But there is one feature to which both Sars and Claus have evidently paid exceptional attention—the metamorphosed first pleopods of the male. As each author gives a highly magnified drawing of the complicated inner branch of these organs, there is not the least reason to presume inattention or error, and yet the details are so different that, if such details have specific value, these must separate the forms described by Claus and Sars. In that case the *E. pellucida* of Sars (not Dana) will become *Euphausia bidentata* Sars, since that author had already described it in 1892 as *Thysanopoda bidentata*, from the Norwegian coast.

In 1883 seven species were added to the genus by Sars from the 'Challenger' gatherings, and three by Ortmann in 1893 from the Plankton Expedition. A new one is now contributed from the Falkland Islands, so that, if all be valid, there is a total of seventeen species, without reckoning the possibility that the name *splendens* may cover two distinct forms.

Since the keys for specific determination supplied by Sars and Ortmann will now require to be modified, it may be worth while, with reference to future as well as to past discoveries, to consider the characters which have been used or which are available for the distinguishing of species in this family. It should, however, be premised that in some instances the stability of a character within any particular species still awaits confirmation, and that characters which in words are the most clear, definite, and convenient are not always equally easy for observation. For example, the projecting tooth of the third pleon-segment may be so fine-drawn, so transparent, so closely adpressed to the following segment, as to beguile the observer into believing it to be absent, and the actual absence of so delicate a process might conceivably occur without transcending the limits of individual variation. It would be important also to learn whether the presence or absence, and position when present, of marginal teeth on the carapace can be depended on as specifically constant, and whether the sexual characters of the pleopods in the adult male are trustworthy for specific differentiation. Similar questions will readily occur at various points fo the list which follows :—

1. *The size and shape of the rostral projection.*—The subquadrate form, distally truncate in *latifrons* Sars, produced to a median spike in *schotti* Ortmann, is peculiar to those two species. Ortmann's species in the pectinate margin of the rostral plate and the postero-dorsal spike of the carapace uniquely retains two larval characters. In all the other species the rostral projection is more or less triangular, though varying much in length, breadth, and acuteness of the apex. Dana says of *E. superba*, "carapace with a very short and acute beak;" whereas Sars says, "rostral projection

very small, and obtusely rounded." In Dana's detail-figure the beak in question is apically emarginate !

2. *Lateral denticles of carapace.*—Of these there may be on, or approximate to, each side margin two, or only one, or none. When present they are not easily perceived without separation of the delicate carapace from the body of the animal. They are not mentioned or figured by Dana in any of his four species, but attributed by Sars to three out of those four, Sars finding them in all species except *superba* Dana and his own *antarctica* and *latifrons*; Ortmann also finding them in his three new species described in 1893. Only one species has two denticles on each side, namely, *E. bidentata* Sars. In *E. mülleri* Claus gives no clue to their presence. The single denticle is usually near the middle of the margin, but in *murrayi* Sars it is in front of the middle, and in *spinifera* Sars behind it.

3. *Third segment of pleon with a medio-dorsal backward projection.*—This character is common to *mucronata*, *gibba*, and *spinifera*, established by Sars, and to *gibboides*, *pseudogibba*, and *schotti*, established by Ortmann, and to the new species here described.

4. Length of sixth pleon-segment in relation to that of fifth, or of fifth plus fourth, or of the telson; the shape of the postero-lateral corners of the fifth segment; and the character of the postero-dorsal margin in this and the preceding segment.

5. *The compressed ventral tooth at distal end of sixth pleon-segment, called the pre-anal spine.*—This is unnoticed by Dana and Claus, but present in all the species described by Sars and Ortmann, except *murrayi* Sars, *superba* Dana, *mucronata* Sars, and *schotti* Ortmann. It is said to be simple in all the other species except *bidentata* Sars, in which it is tridentate; *spinifera* Sars, in which it is bidentate (as occasionally also in *gibba* Sars); and *pseudogibba* Ortmann, in which it is described as 2–4-dentate, rarely simple. In the new species of this paper it is tridentate, at least usually. The variability to which this character seems to be liable is very detrimental to its value.

6. *Dimensions of the eyes.*—The smallness of the eyes is characteristic only of *gracilis* Dana and Sars, *gibba* Sars, and *pseudogibba* Ortmann. Dana shows it in the figure of his species, without mentioning it in the text. Ortmann, who contrasts small eyes with eyes "tolerably large," makes the comment: "This distinction is apparently dubious; with some practice, however, the size of the eyes in relation to the body is easy to estimate and essentially determines the *habitus* of the species." One cannot help noticing that between *gibboides* Ortmann and *pseudogibba* Ortmann, both occurring in the same localities, there is scarcely any appreciable difference except in the size of the body and the size of the eyes. The smaller eyes pertain to the smaller species; and though the inferiority in the dimensions of the eyes is relative as well as absolute, some suspicion must still attach to the validity of Ortmann's *pseudogibba* until fuller details are given for separating it from *gibboides*.

7. *Apical lobes on basal joint of first antennæ.*—This feature is found wanting by Sars in the species he calls *splendens* and *gracilis*, as also in his own species *similis* and *mucronata*. Of his *antarctica* he says: "Antennular peduncle slender, without any dorsal lobe, but with the outer corner of the basal joint produced into a sharp spine." Ortmann's species *schotti* agrees in this respect with *antarctica*, except that the sharp spine instead of being small is very elongate. As already mentioned, it is not at all certain that the true *splendens* and *gracilis* of Dana are without the lobe, or that the true *pellucida* of Dana has it. The value of this character is further somewhat impaired by its variability, since in his description of *bidentata* Sars says: "In most of the specimens this lobe is divided into two acuminate lappets (fig. 3); but in some specimens, though differing in no other respect from the typical form, these lappets are much more numerous, forming a dense fringe along the free edge of the leaflet (fig. 4)." Dr. Ortmann says of *gibboides*, "basal joint of the inner antennæ above with an oval, obliquely forward and outward pointed lobe;" and of *pseudogibba*, "basal joint of the inner antennæ above with a triangular lobe, whose point is directed forward and outward." But the triangular lobe is not figured, and the oval one is, in the figure, itself apically pointed and verging on the triangular.

There are also lobes occurring on the second and third joints of the first antennæ which are available, though they have not yet been found important for specific discrimination.

8. *The basal scale of the second antennæ and the attendant basal spine.*—The extent to which the scale reaches beyond the peduncle would be a useful character, but information on this point is rather deficient. Apparently *bidentata* is distinguished from all other species by the fact that its basal spine extends far beyond half the length of the scale.

9. *Mandibular palp.*—Unfortunately for several species the features of this palp are known imperfectly or not at all. Judging from Dana's figure of it in *Euphausia superba*, that species agrees in this particular with *antarctica* of Sars, in which the palp in question is very slender, its terminal joint being nearly as long as the median. This is not the case in *pellucida* Dana, *mülleri* Claus, *bidentata* Sars, *splendens* of Sars, or *gracilis* of Sars, the last having "the terminal joint very small and oval in form."

10. *Second maxillæ.*—The shape, size, and armature of the apical joint seem to offer tangible characters for specific distinction, but such as can only be discovered by dissection.

11. *Proportionate length of the joints in the three pairs of maxillipeds and the three developed pairs of peræopods.*—The value that might attach to this character is strikingly illustrated by a comparison of the figures drawn by Sars of the last of these appendages in *bidentata* and *antarctica*. In the former species the third joint is shorter than the fourth, in the latter it is much longer than all the four succeeding joints combined. Unfortunately, beyond this one comparison, there is scarcely any definite and trustworthy

information available. Dana gives a detail-figure of the appendage in question for his *E. pellucida* and his *E. splendens*, but it is the latter rather than the former that agrees with the figure delineated by Sars for his *E. bidentata*. Of Dana's four species, as judged by the figures, it is only *superba* which has the third joint of the last (developed) leg longer than the fourth.

It has been already intimated that the limbs, in spite of their general resemblance, are by no means all of one pattern. It may be added that in the second maxillipeds there is an apical armature which may not be in all species identical.

12. *The branchiæ.*—The importance of differences in this apparatus is noticed both by Sars and Dana.

13. *First and second pleopods of the male.*—Characters derived from these organs appeal chiefly to highly skilled observers, and are not by any means always at their disposal.

14. *Uropods and telson.*—Characters, perhaps of not overwhelming importance, are derived from the lengths of the two branches of the uropods in relation one to the other and in relation to the telson, from the number and position of spinules on the telson, and from the smoothness or pectination of the telson's subapical processes.

So far, then, as at present known, the species will fall into two groups—the first, with the third pleon-segment not produced into a tooth, comprising *pellucida*, *splendens*, *gracilis*, *superba*, *mülleri*, *bidentata*, *similis*, *murrayi*, *antarctica*, *latifrons*; the second, with the third pleon-segment produced into a tooth, comprising *mucronata*, *gibba*, *spinifera*, *gibboides*, *pseudogibba*, *schotti*, *vallentini*. In each group there are some well-marked species, but others to which the facilities of a synoptic arrangement cannot be very safely applied. Without attempting, therefore, here to formulate such a table, I will only offer some characters by which closely coupled forms may be distinguished one from the other, or by which particular species are distinctly ear-marked.

In the first group we observe:—

With subquadrate rostral projection	*E. latifrons* Sars.
With broadly triangular rostral projection	*E. antarctica* Sars.
With very small eyes	*E. gracilis* Dana.
With two teeth on each lateral margin of carapace	*E. bidentata* Sars.

E. similis Sars is obviously so named from its supposed likeness to *E. bidentata*, from which it is distinguished by the unidentate margins of carapace, and inner branch of uropods shorter than outer.

Lateral margin of carapace not dentate; uropods reaching beyond telson................................	*E. superba* Dana.
Lateral margin of carapace unidentate; uropods not reaching beyond telson	*E. murrayi* Sars.

In *E. pellucida* Dana and *E. mülleri* Claus the inner ramus of the uropods reaches beyond the outer, but not so in *E. splendens* Dana. In *E. pellucida* the last three joints of the third peræopod are much shorter than the preceding joint, but not so in *E. mülleri*.

In the second group we observe:—

Carapace with postero-dorsal tooth		*E. schotti* Ortmann.
Uropods reaching apex of telson.	Eyes large	*E. gibboides* Ortmann.
	Eyes small	*E. pseudogibba* Ortmann.
Fifth and sixth pleon-segments with indentured hind margin		*E. spinifera* Sars.
Third pleon-segment with dorsal tooth strong		*E. mucronata* Sars.
Third pleon-segment with dorsal tooth weak.	First antennæ with basal leaflet acute, bifid	*E. gibba* Sars.
	First antennæ with basal leaflet rounded, simple	*E. vallentini*, n. sp.

EUPHAUSIA VALLENTINI, n. sp. (Plate XXXVII.)

Rostral projection acute, short, not nearly reaching apex of eyes. Carapace with slight longitudinal elevation behind the rostrum; a single tooth on lateral margin at about the middle. Third pleon-segment produced backward in a thin, almost spine-like, tooth of no great length, so as easily to escape notice. Fifth pleon-segment with postero-lateral corners rounded, not quadrate as figured by Sars in *E. gibba*. Sixth pleon-segment nearly as long as fourth plus fifth. The preanal spine tridentate, the lowest tooth much the largest. In one specimen out of four the upper teeth seemed to be represented only by a tubercle.

The eyes are pear-shaped, of medium size.

First antennæ.—The first joint is longer than the second plus the third and has at the apex a smoothly rounded membranous leaflet, with a group of setæ adjacent on the inner side, and on the outer a strongly projecting angle furnished with various plumose setæ. The third joint has a small apical lobe on the underside and a membranous expansion along the upperside.

Second antennæ.—The scale extends well beyond the peduncle, the basal spine not nearly reaching the middle of the scale and only feebly pectinate on its inner margin.

Mandibles.—Cutting-edge broad and thin, with two prominent teeth at the top, of which both are double in one mandible, but only the upper one in the other; the molar prominent, its cylindrical crown radiated with finely pectinate teeth; palp strong, third joint about two-thirds of second, fringed on one margin with numerous spines, the second joint carrying setæ.

Lower lip.—The inner margin of each lobe with a fur of very short hairs extending nearly to the distal angle.

First maxillæ.—Unless by the greater breadth of the outer lobe, these maxillæ are not easy to distinguish from those which have been figured for other species.

Second maxillæ.—The part which seems to vary most in the several species is the terminal joint or palp. It is here distinguished by its very considerable size, and by its shape, which is more that of a parallelogram, with obliquely truncate apex, than is shown in any other species for which these maxillæ have been figured. Sars says of *E. gibba* that "the oral parts and the legs would not seem to exhibit any essential difference from those of *Euphausia gracilis*."

In regard to that species he says that the second pair of maxillæ "have the terminal joint not very large, of a rather regular ovoid form, and but sparingly supplied with bristles." The shape appears from the figure to be rather similar to that in the present species, but the size and armature very different.

First maxillipeds to the third peræopods.—In all these appendages the penultimate joint is longer than the ultimate and, to a less extent, than the antepenultimate, but these three joints combined differ greatly in their relation to the preceding joints, being at least as long as both third and fourth joints in the first maxillipeds, but shorter than the fourth by itself in the third peræopods. In the second and third peræopods their length is absolutely as well as relatively shorter than in the preceding limbs; but also the length of the third and fourth joints successively increases from the first maxillipeds onwards, and whereas in the first maxillipeds and to a less extent in the second the fourth joint is shorter than the third, in the following appendages it is increasingly longer. The exopods of all these six pairs of appendages have a close general resemblance. Sars, in describing the genus, speaks of the articulation between the peduncle and the flagellum as very oblique, and figures the flagellum as unjointed. But, at least in the present species, it appears that the flagellum has transverse lines of a feeble and perhaps evanescent articulation, and that the junction with the peduncle is also transverse, a strongly marked oblique line on the peduncle following the course of a muscle but not constituting an articulation. Claus's figures of *E. mülleri* seem to be in agreement with this view of the matter.

The uropods.—The rami are equal in length, and scarcely reach beyond the insertion of the subapical processes of the telson.

The telson.—The subapical processes are quite smooth. The apical piece of the telson between them narrows above the middle, carrying at this point two minute spinules, and then widens, passing with convex margins to an acute apex. Below the middle of its entire length the telson has a pair of dorsal spinules.

Length. The specimen of which the parts are figured measured 16 mm. Another measured 18 mm., and a third 21 mm. None had sexually metamorphosed pleopods.

Locality. Stanley Harbour, Falkland Islands.

Gen. THYSANOESSA Brandt.

1851. *Thysanoessa* (subgen.), Brandt, Middendorff's Sibirische Reise, Krebse, p. 52.

1882. *Thysanoëssa*, Sars, Christiania Vidensk. Forh. no. 18, p. 52.

1883. *Thysanoëssa*, Sars, Christiania Vidensk. Forh. no. 7, p. 25.

1885. *Thysanoëssa*, Sars, 'Challenger' Schizopoda, Reports, vol. xiii. pp. 63, 119.

1887. *Thysanoëssa*, Hansen, Vid. Medd., Malac. mar. Groenl. occid. p. 54.

1892. *Thysanoessa*, Norman, Ann. Mag. Nat. Hist. ser. 6, vol. ix. p. 462.

1893. *Thysanoessa*, Stebbing, Hist. Crust., Internat. Sci. Ser. vol. lxxiv. p. 264.

1893. *Thysanoëssa*, Ortmann, Decap. u. Schizop., Plankton-Exp. p. 14.

1896. *Thysanœssa*, Caullery, Ann. Univ. Lyon, 'Caudan' Crust., Schiz. et Decap. p. 367.

This genus is distinguished from the other Euphausiidæ by having the second maxillipeds greatly produced, with their two terminal joints carrying spiniform setæ on both margins. In his preliminary notices of the 'Challenger' Schizopoda, Professor Sars speaks of the long second maxillipeds as the second pair of legs, but in the 'Challenger' Reports he calls them the first pair of legs—a vacillation which points to the ever-perplexing question whether an appendage ought to be named according to its undoubted homology or according to its actual structure, or according to some better but not yet invented method. It is, to say the least, very convenient to speak of three pairs of maxillipeds throughout the Malacostraca, with exception of the Isopoda and Amphipoda, in which the terms first and second gnathopods have won acceptance in place respectively of the second and third maxillipeds.

Thysanoessa macrura Sars.

1883. *Thysanoëssa macrura*, Sars, Christiania Vidensk. Forh. no. 7, p. 26.

1885. *Thysanoëssa macrura*, Sars, 'Challenger' Schizopoda, Reports, vol. xiii. p. 125, pl. 23. figs. 1–4.

1893. *Thysanoëssa macrura*, Ortmann, Decap. u. Schizop., Plankton-Exp. p. 14.

This species, in common with *T. gregaria* Sars, is distinguished by a tooth on the lateral margin of the carapace from Kröyer's *neglecta* and *longicaudata*, the two other species of the genus, both of which are devoid of such a tooth. Kröyer's species also have a simple preanal spine, whereas that spine in *macrura* has from two to three teeth, and in *gregaria* may have a pectination of thirteen, though Ortmann reports a specimen in which it has only two teeth, thus undermining the value of this specific character.

The present species is distinguished from *T. gregaria* by the rostrum more broadly triangular and apically more acute, by the greater length of the sixth pleon-segment, and by the comparative length of the branches of the uropods, the inner being here considerably, instead of only slightly longer than the outer. Sars gives as a further distinction: "First pair of legs [second maxillipeds] much smaller than in last species [*gregaria*], meral [fourth] joint scarcely reaching beyond middle of antennal scale." He does not give a detail-figure of these appendages, but in the lateral view of the animal the three terminal joints combined are much shorter than the fourth joint of the appendage in question, and the penultimate joint is fully two-thirds the length of the antepenultimate. On the other hand, the specimen here identified with *macrura* has the three terminal joints of its second maxillipeds together longer than the fourth joint, and the antepenultimate thrice as long as the penultimate. But as Sars considers that none of his specimens were full-grown, I abstain from regarding the differences mentioned as of specific value. Mr. Vallentin's specimen, of which unfortunately I cannot give the measurements, was certainly longer than the 13 mm. reached by Sars's specimen.

Locality. Stanley Harbour, Falkland Islands.

ISOPODA.

Asellota.

1882. *Asellota*, Sars, Christiania Vidensk. Forh. no. 18, p. 58.

1885. *Asellota*, Sars, Den Norske Nordhavs-Exp. vol. xiv. pt. 1, p. 118.

1893. *Asellota*, Stebbing, Hist. Crust., Internat. Sci. Ser. vol. lxxiv. p. 376.

1895. *Asellota*, Hansen, Isop., Cumac. u. Stomat., Plankton-Exp., p. 4.

1897. *Asellota*, Sars, Crustacea of Norway, vol. ii. pt. 5, p. 94.

Fam. Janiridæ.

1897. *Ianiridæ*, Sars, Crustacea of Norway, vol. ii. pt. 5, p. 98.

The genus *Janira*, Leach, 1813–1814, established in the Supplement to his article "Crustaceology," was not spelt with an initial iota, but was trisyllabic.

Gen. Iais Bovallius.

1886. *Iais*, Bovallius, Notes on Fam. Asellidæ, pp. 4 & 50, Bihang K. Svenska Vet.-Akad. Handl. vol. xi. no. 15.

1886. *Jæra* (part), Beddard, 'Challenger' Isopoda, Reports, vol. xvii. p. 19.

1887. *Iais* (*Janthe*), Pfeffer, Krebse von Süd-Georgien, p. 18.

This genus may be distinguished from its very near neighbour *Jæra* Leach, by the narrowness of the body, the smallness of the eyes, the triunguiculate fingers on all the limbs of the peræon, and by the uropods which are not adjacent, not inserted in a notch of the pleon, and in which the peduncle is not longer than the rami.

On the last only of these four characters can much dependence be placed. Sars, indeed, in his definition of *Jæra* includes the character "dactylar joint 3-unguiculate," but the reckoning of spines which justifies this would allow us to say that the dactylus in *Iais* was quadriunguiculate. It is, however, a somewhat unsubstantial character. Still more so are those depending on the breadth of the body and the size of the eye. In the mouth-organs

Jæra and *Iais* closely correspond; though the antepenultimate joint of the maxillipeds is rather less strongly developed in *Iais* than in *Jæra*, and, on the other hand, the inner plate of the first maxillæ is broader in *Iais*.

IAIS PUBESCENS (Dana). (Plate XXXVIII.)

1853. *Jæra pubescens*, Dana, U.S. Expl. Exp. vol. xiii., Crust. p. 744, pl. 49. figs. 9 *a–d*.

1876. *Jæra pubescens*, S. I. Smith, Bull. U.S. Nat. Mus., Contr. Nat. Hist. Kerguelen, p. 63.

1882. *Jæra novæ zealandiæ*, Chilton, Tr. New Zealand Inst. vol. xv. p. 189.

1886. *Iais hargeri*, Bovallius, Notes on Fam. Asellidæ, p. 50.

1886. *Iais pubescens*, Bovallius, ibidem, p. 51.

1886. *Iæra novæ-zelandiæ*, Bovallius, ibidem, p. 49.

1886. *Jæra neo-zelanica*, Thomson & Chilton, Tr. New Zealand Inst. vol. xviii. p. 157.

1886. *Jæra pubescens*, Beddard, 'Challenger' Isopoda, Reports, vol. xvii. p. 19, pl. 2. figs. 6–13.

1887. *Iais* (*Janthe*) *pubescens*, Pfeffer, Krebse von Süd-Georgien, p. 19.

1887. *Jæra antarctica*, Pfeffer, ibidem, pp. 19 & 94, pl. 7. figs. 1–4.

1888. *Iais neo-zealanica*, Chilton & Thomson, Tr. New Zealand Inst. vol. xxi. p. 265 (*Iais pubescens* evidently intended).

1891. *Iais pubescens*, Chilton, Trans. New Zealand Inst. vol. xxiv. p. 266.

1893. *Jais pubescens*, Thomson, P. R. Soc. Tasmania for 1892, p. 15 (*Jais* misprint for *Iais*).

The association of this minute species with *Sphæroma lanceolatum* (or *gigas*) is recorded by Dana for Tierra del Fuego, by Professor Smith and Mr. Beddard for Kerguelen Island. That they are all three applying the name to the same species is, therefore, highly probable. But Smith gives no description; and Beddard's description is accompanied by figures which do not in all respects agree with our specimens from the Falkland Islands, the segments of the body showing little or no lateral interval, and the head having its front and sides curiously serrate. From the text, however, it must be inferred, as Dr. Chilton has already pointed out, that at least the second of these differences is due only to an error on the part of the draughtsman; the first apparently depends on a very advanced stage of the brood-pouch in the female. That the rami of the uropods are in the figure distally clubbed instead of tapering, may well be due either to a casual variation or a slight inaccuracy in the drawing. *Iais hargeri* Bovallius, from the Strait of Magellan, differs in nothing from the Falkland Island specimens, unless in size ("3–4 mm.") and in one or two comparative measurements of parts, which can scarcely be trustworthy, since they vary with the bending or straightening and other accidental conditions of the specimen measured. The distinction of *I. hargeri* from *I. pubescens* is only effected by attributing to Dana's description and figures a minute accuracy to which they have no claim, and which at the date of their production was scarcely ever accorded to small crustaceans. Dana, for example, says "Caudal stylets half as long as abdomen, three- or four-jointed," though his fig. 9 *d* shows the stylets with single-jointed rami and only about one-fourth as long as the pleon. That Pfeffer's *Jæra antarctica* may be an additional synonym is of necessity conjectural. The solitary specimen was imperfect and could not be dissected. The length is given as 3·2 mm., and the greatest breadth as not much more than one-fourth of the length; just as Bovallius says of *Iais hargeri*, "the body is elongate, linear, four times longer than broad." This, it is likely, refers to the male. In *I. pubescens* the female loses something of her slenderness of shape as the marsupium becomes inflated. On the other hand, Pfeffer definitely states that the finger is biunguiculate and that the 3-unguiculate finger, which he, like Sars, attributes to *Jæra*, was not to be found on any of the limbs of the peræon. He also gives the colour as brownish, whereas the Falkland Island specimens better agree with Bovallius's account of *I. hargeri*, as "greenish white, almost hyaline." Pfeffer's description of the damaged first antennæ and of the uropods tallies well with what is found in *I. pubescens*.

Mr. G. M. Thomson found Tasmanian specimens of *I. pubescens* in a tube with "*Sphæroma quoyana* M.-Edw.," but it may be noticed that he also brought with him from Tasmania specimens of *Sphæroma gigas*. Dr. Chilton found some of his New Zealand specimens free, but others "on a large *Sphæroma* (probably *S. obtusa* Dana) in Port Chalmers." The following description refers to the specimens found at the Falkland Islands on *Sphæroma gigas* (or *lanceolatum*). This association has been spoken of as parasitic or semiparasitic. Apparently the small isopod makes use of the large one as a kind of floating island, affixing its eggs to it, and in adult life still clinging on but doing no harm to its animated lodging, which occasionally accommodates some minute zoophytes on similar terms.

Body narrowly elliptical, peræon wider than head or pleon, but almost parallel-sided except under the influence of the developing ova, when also the sides of the segments become less widely separated than before. The sides on the upper part are fringed with small hairs. The pleon has a very small first segment, followed by a rounded shield, fringed with minute hairs and slightly projecting obtusely between the uropods. Head widest at the eyes, obtusely projecting between the first antennæ; in dorsal view the epistome obtusely prominent in advance of the rostral projection.

Eyes very small, wide apart, about at middle of the lateral margins of the head, each with only two crystalline cones set in dark pigment (see figure in Beddard's Report). First antennæ

6-jointed, shorter than peduncle of second, first joint nearly as broad as long, second shorter and much narrower, third about half as long as second; flagellum small, its middle joint longest.

Second antennæ apparently with a minute rudiment of a process on the third joint, carrying 2 spinules, sixth joint of peduncle a little longer than 5th; flagellum sometimes nearly twice as long as peduncle, attaining to 25 joints (20–30 are given for *I. hargeri*).

Upper lip with rounded or somewhat flattened apical margin.

Under lip with rather strong setules on the obtuse apices.

First maxillæ.—Inner plate not linear, its margins convex, the apex carrying 4–5 setæ; outer plate much broader, apex fringed with 11 spines in two series.

Second maxillæ.—Inner plate moderately broad, with numerous setæ on apex; outer plates narrow, each with 4 apical setæ, longer than those on inner plate.

Maxillipeds.—First joint short, the epipod irregularly oblong or oval, not reaching beyond first joint of the palp; second joint broad, its terminal plate nearly as long as the base and more than half as broad, with one or two coupling spines on inner margin, and several spinules fringing the apex; first joint of palp short, second rather broad, scarcely longer than broad, third much shorter and narrower, distally narrowed, fourth as long as second but narrower even than third, fifth much shorter than fourth.

Limbs of peræon all nearly alike. First pair (gnathopods) are a little shorter than the others, and, so far as I could discern, are without the triangular prolongation of the sixth joint seen on the other pairs. In all, the second joint is little broader than the fifth and little longer than the sixth, the fourth is shorter than the third, the fifth is decidedly broader than the sixth, but scarcely so long. The short finger has a broadly oval base, from which issues a strongly curved nail on the outer side of the apex, and on the inner side two similar but shorter nails; between these and the longer nail a curved spine may sometimes be seen protruding. The two smaller nails are placed so close together that they often look like a single two-pointed nail. Over the broad part of the finger the apex of the sixth joint is produced in a triangular process.

In the female, the operculum of the pleon is broadly rounded, with a produced obtuse apical point.

The uropods are rather more (or slightly less, Bovallius) than a fourth of the caudal shield. The outer ramus is as long as the peduncle, and has several setæ on the truncate but narrowed apex, with one or two setules near the middle; the inner has a basal part as long as, but broader than, the outer, with a narrower and much shorter apical portion, separated as it were by a fringe of spinules and tipped with long setæ.

The specimens were of various sizes (including young with the seventh pair of trunk-legs undeveloped). All the adults seemed to be females, the largest scarcely exceeding 2·5 mm.

Locality. Falkland Islands. On *Exosphæroma gigas.*

Flabellifera.

1882. *Flabellifera*, Sars, Christiania Vidensk. Forh. no. 18, p. 58.
1897. *Flabellifera*, Sars, Crustacea of Norway, vol. ii. pt. 3, p. 43.

See also the references under the Tribe Asellota for other notices of the present tribe.

Fam. Sphæromidæ.

1840. '*Sphéromiens*,' Milne-Edwards, Hist. Nat. Crust. vol. iii. p. 197.
1847. *Sphæromidæ*, White, List of Crustacea in Brit. Mus. p. 102.
1853. *Spheromidæ*, Dana, U.S. Expl. Exped. vol. xiii., Crust. pt. ii. p. 748.
1857. *Sphæromidæ*, White, Popular Hist. British Crustacea, p. 244.
1867. *Sphæromidæ*, Bate & Westwood, Brit. Sessile-eyed Crust. vol. ii. p. 398.
1876. *Sphæromidæ*, Miers, Crustacea of New Zealand, p. 109.
1880. *Sphæromidæ*, Kossmann, Zool. Ergebn. einer Reise Rothen Meeres, p. 111.
1880. *Sphæromidæ*, Harger, Rep. U.S. Comm. Fisheries for 1878, pt. 6, p. 367.
1886. *Sphæromidæ*, Beddard, 'Challenger' Isopoda, Reports, vol. xvii. p. 145.
1893. *Sphæromidæ*, Stebbing, Hist. Crust., Internat. Sci. Ser. vol. lxxiv. p. 359.
1900. *Sphæromidæ*, H. Richardson, The American Naturalist, vol. xxxiv. p. 222.

By what must be regarded as a very unlucky accident this family is not at present represented in the fauna of Norway, so that we are without the light which would otherwise certainly have been shed upon it in the recently published work on Norwegian Isopoda by Professor G. O. Sars.

The genus *Sphæroma*, from which the family takes its name, was instituted by Bosc, or by Latreille in Bosc's Hist. nat. des Crustacés, vol. ii. p. 182, in the year 1802. As Guérin-Méneville has pointed out in his 'Iconographie,' there was for long a great confusion as to the synonymy of the typical species. All that can now be determined is, that Bosc included in the genus the *Oniscus conglobator* of Pallas, 1766 (which Pallas himself identifies with *Oniscus asilus* Linn., 1758), and as a synonym of this the *Cymothoa serrata* of Fabricius, 1793, earlier described as *Oniscus serratus* in the 'Mantissa,' 1787. Pallas had before this changed the name of his species to *globator*, and authors, in long succession, with the exception of Guérin-Méneville, have united the species of Pallas with that of Fabricius and yet inconsistently adopted the name *serratum* in preference to the earlier *globator* or *conglobator*.

Guérin-Méneville makes of them two separate species. But the fact is, I think, that we cannot now with any certainty determine what species Pallas had before him, and must therefore accept *serratum* as the type of the genus.

The question now arises whether the genus ought to retain all those species which have been hitherto grouped within it on the ground of their very close external resemblance. My reply to this is that, at least in some instances, the grouping can scarcely outlast a careful comparison of the appendages in the different species. It is only fair to Bate and Westwood to say that, in their discussion of *Sphæroma prideauxianum* Leach, they state that "The foot-jaws differ from those of the typical species, in having each of the three intermediate joints dilated into an internal flattened lobe, a character which, in conjunction with that of the short plates of the lateral appendages of the terminal segment of the body, seems to indicate a more than specific distinction." They show in their figures the remarkable difference between the maxillipeds of *serratum* and *prideauxianum*; the latter being almost undoubtedly a synonym of Leach's *Sphæroma curtum*, which at any rate has maxillipeds and second maxillæ of the same pattern. In very near agreement with this pattern is that of the maxillipeds of *Sphæroma gigas* Leach, which I propose to place in a new genus, though without attempting here the arduous task of re-arranging the other species. Among them *Sphæroma rugicauda* Leach may be mentioned as having maxillipeds certainly very distinct from those of *serratum*, yet not in very perfect agreement with those of *Sphæroma curtum*. Dana says that his *Sphæroma calcarea* has the maxillipeds nearly as in *S. lanceolata*, but in the figure to which he refers they agree better with those of *S. curtum*, and with those which Kossmann represents for a seemingly immature specimen which he doubtfully names *Sphæroma obtusum* Dana.

EXOSPHÆROMA, gen. n.

In general appearance agreeing with *Sphæroma*, but having the penultimate and two preceding joints of the maxillipeds lobed on the inner side, whereas in the type species of *Sphæroma* those joints are not lobed.

EXOSPHÆROMA GIGAS (Leach). (Plate XXXIX.)

1818. *Sphæroma gigas*, Leach, Dict. Sci. Nat. vol. xii. p. 346.

1823–5. *Sphæroma gigas*, Desmarest, Consid. gén. Crust. p. 301.

1840. *Sphæroma gigas*, Milne-Edwards, Hist. Nat. Crust. vol. iii. p. 205.

1841. *Sphæroma gigas*, Guérin-Méneville, Iconographie du Règne Animal, Crust. p. 31.

1843. *Sphæroma gigas* (var. *lanceolata*), White, Ann. Mag. Nat. Hist. ser. 1, vol. xii. p. 345.

1847. *Sphæroma gigas*, White, List Crust. Brit. Mus. p. 102.

1847. *Sphæroma lanceolatum*, White, List Crustacea Brit. Mus. p. 102.

1853. *Spheroma gigas*, Dana, U.S. Expl. Exp. vol. xiii., Crust. pt. ii. p. 775, pl. 52. fig. 1.

1853. *Spheroma lanceolata*, Dana, loc. cit. p. 775, pl. 52. figs. 1 *a–f*.

1871. *Sphæroma lanceolatum*, Cunningham, Tr. Linn. Soc. Lond. vol. xxvii. p. 499.

1876. *Sphæroma gigas*, Miers, Catal. Crust. New Zealand, p. 110.

1876. *Sphæroma lanceolata*, Miers. loc. cit. p. 111.

1881. *Sphæroma gigas*, Miers, Pr. Zool. Soc. Lond. p. 79.

1882. *Sphæroma gigas*, Haswell, Catal. Australian Crust. p. 287.

1884. *Sphæroma gigas*, Studer, Ak. Wiss. Berlin, Isopoden 'Gazelle,' p. 17.

1884. *Sphæroma lanceolatum*, Studer, loc. cit. p. 18.

1886. *Sphæroma gigas*, Beddard, 'Challenger' Isopoda, Reports, vol. xvii. p. 147.

1893. *Sphæroma gigas*, G. M. Thomson, P. R. Soc. Tasmania, p. 14.

Leach very briefly describes this species as having "the body smooth; last segment of pleon narrowed to a point, apically rounded; length, an inch; habitat unknown." Of the only two specimens he had seen, one, given him by Lamarck, was in his own cabinet, the other in the museum of the Linnean Society. The latter is still, I think, where it was seen by Leach, but a dried marine isopod is in the position of Tithonus: its immortality does not carry with it the gift of perpetual youth.

Desmarest copies the brief description by Leach. Milne-Edwards adds that the rounded apical angle of the telson extends beyond ("dépasse notablement") the inner lamina of the uropods, and that the outer lamina or ramus is long, obtuse, not serrate.

White in 1843 describes his var. *lanceolata* thus:—"Body smooth; last joint of the abdomen considerably arched above, and having near the base a slight elevation grooved in the middle; the last joint is also in most of the specimens considerably pointed, and extends very slightly beyond the extremity of the inner plate of the last false legs; the outer plate of these appendices is narrow and lanceolate; both of the plates are minutely punctured with black." The habitat is the Falkland Islands; the size reaches three-fourths of an inch to a whole inch in length; and it is admitted that "this species comes very near the *S. gigas* Leach," "from which it principally differs in the more elongated and narrower outer plate, and in the grooved elevation at the base of the more arched last joint of the abdomen." In 1847 White adopts it as a separate species, but with the synonymy "var. Sph. gigas *Leach*?"

Dana gives a ventral view of the caudal shield and uropods of "*Spheroma gigas*" from New Zealand. For his specimens he reports surface of body smooth, but with microscopic appearance of granulation, caudal shield evenly convex, sides arcuate (not sinuous), apex rounded, moderately narrow, not quite reached by lamellæ of uropods, the inner of which is "rounded at extremity, but subacute." The length of specimens was four to five lines, the colours brown to brownish black, with some irregular whitish spots. Of the "large" "*Spheroma lanceolata*" from Fuegia he figures and describes the mouth-organs. Further, he states that the peræon-segments fifth to seventh are scarcely shorter than the three preceding, that the caudal shield is evenly convex, its sides arcuate, its apex rather narrowly rounded, reached by the inner lamella of the uropods, which is equal to the outer lamella, and like it lanceolate, obtuse; the flagellum of the second antennæ 18–20 joints; "the texture of the shell corneous, as usual." Cunningham asks, as he well might, "Is this species truly distinct from *S. gigas* Leach?" Miers suggests that the differences may be only sexual. After describing specimens referred to the Aucklands, the Falklands, and Fuegia, he says that *S. lanceolata*, from the two latter localities, "differs only in the rami of the caudal appendages, which are narrower-lanceolate and acute at the extremity, and in the absence of the lateral marginal groove on the thoracic segments." In *S. gigas* he notes "inferior lateral margins of all the segments grooved," and "rami of the caudal appendages narrow-oval, rounded at the extremity." To these characters he adds that the front margin of the transversely oblong head has a very small lobe between the enlarged bases of the first antennæ, that the first segment of the peræon is rather the longest, "the rest short, subequal, slightly tending backward on the sides, and with the infero-posterior angle subacute," and that the colour is "light brown, margins of segments yellowish;" "length nearly 1 in." Haswell only repeats the description given by Miers; and Studer thinks the *lanceolatum* of Fuegia is distinguished from the *S. gigas* of Kerguelen by its slenderer body and the shape of the caudal shield. Beddard notices *S. gigas* as a species without prominent sexual dimorphism. Thomson records under this name a small Tasmanian and New Zealand form, which, he says, "differs in a few details from a large form" found in the Auckland Islands. What the details are he has at present left untold, though, like Guérin-Méneville some fifty years earlier, bewailing the want of a monograph of the Sphæromidæ.

Guérin-Méneville himself adds nothing to the knowledge then available of the adult *S. gigas*, but makes the following statements in regard to the young. He has found, he says, "under the ventral plates (feuillets inférieurs) of a female a great number of eggs and some young individuals just hatched and still attached to the mother by a filament which issued from their anus, and he found that these individuals had seven segments [of the peræon] and seven pairs of feet. These young ones were scarcely a millimetre long, their body was narrow, elongate, with segments well marked and separated at the edges. The last pleon-segment was cordiform, rounded at the sides, pointed behind, and the lamellæ of the uropods were inserted far back on this tail-piece (fort en arrière de cette queue) and extended a little beyond it." He reminds us that the young of *Porcellio* have at first only six peræon-segments and six pairs of legs.[1] It is rather provoking that he did not give fuller details, since in his account so far as it goes there are many points calculated to excite some surprise. The small size, the linear form, the anal filament, the heart-shaped caudal segment with uropods projecting to the rear, were little to be expected in the young of *Sphæroma gigas*. The truth appears to me to be that Guérin-Méneville was misled by the minute size and semi-pellucid hue of *Iais pubescens* (Dana) into supposing it to be the young of the *Sphæroma*, of which it is, so far as known, the invariable companion.

We now pass to the description of the adult *Exosphæroma gigas*.

The short but broad vertex of the head is separated from the occiput by a nearly straight ridge, the front line of the vertex being indentured on either side of a short rostral point, its outer angles meeting the advanced points of the sides of the first peræon-segment a little in front of the eyes. All the segments of the peræon have the grooving described by Miers. The segments from the second to the seventh are almost parallel-sided, but the sixth and seventh slightly widen out. Again, the first division of the pleon is infinitesimally wider than the seventh segment of the peræon. This first part of the pleon is composite, a continuous line near the base, and for the most part usually concealed under the peræon, marking off the first segment, while from the broad second, the successively narrower third and fourth are marked off by lines which are interrupted at some distance from the middle. The second division probably consists of an obscure and concealed fifth segment, the sixth carrying the uropods and the telson. This division is so adjusted that in spirit-specimens the animal cannot be flattened out but has a crook in its back, which would appear to facilitate a doubling together of the body rather than the spherical form so readily assumed by *Sphæroma serratum*. The inflation of the caudal shield declines rather rapidly near the slightly sinuous sides and the rather narrow rounded apex.

The eyes are dark, small, irregularly oval, near the postero-lateral corners of the head.

First antennæ.—First joint large, broad, with basal fold, second much smaller, third longer but much narrower than second; flagellum shorter than peduncle, 17-jointed, each joint except first and last carrying two hyaline filaments.

Second antennæ.—Longer than first, with stouter flagellum of about 16 short and stout joints.

Epistome widening much downward. Upper lip with distal margin almost straight, except at the angles.

Mandibles.—Cutting-edge tridentate, accessory plate stronger

[1] M. Louis Roule, " Études sur le Développement des Crustacés," Ann. Sci. Nat. ser. 7, vol. xviii. pp. 46, 57, 64 (1895), contravenes this long-accepted statement, though admitting the small comparative size of the seventh segment and its pair of appendages.

on the left than on the right mandible; molar cylindrical, with spines above, as well as the usual spine-row; spines on the second and third joints of the palp pectinate.

First maxillæ.—Inner plate narrow, with four plumose setæ at the apex, outer plate with a lobe below the middle, and on the apex nine stout, and three slender, somewhat denticulate spines.

Maxillipeds.—Second joint wide at the base, then narrow, its plate narrow at the base, then wide, the apical margin broad, carrying numerous plumose spines; third joint short; fourth narrow at base, the lobed distal end wide; fifth much shorter but about as wide distally; sixth longer than fifth or seventh, much narrower than fifth, with a short lobe at its widened distal end; seventh narrow, not unguiform. The fifth and sixth joints are not without armature of the inner margin, but it is far less conspicuous than the long setæ which those joints display in *Sphæroma serratum*.

Here, as in *Sphæroma curtum*, the fifth joint is decidedly smaller than the fourth, but in *Sphæroma rugicauda* the fifth joint is larger than the fourth, as in *Sphæroma serratum*.

Limbs of the peræon.—In these there is a gradual increase of length, so that the seventh pair is considerably longer than the first. In all, the third joint is elongate, without the long setæ displayed in *Sphæroma serratum*; the fourth, fifth, and sixth joints are thickly furred along the forward margin, the fourth and fifth having a group of small spines on the backward apex; the sixth has at the apex, on the inner side, as in various other Sphæromidæ, and in Isopoda of other families, a rounded plate overlapping the base of the finger; the finger is of the kind called bidentate, one tooth being the short, curved, horny-looking nail, the other a small spine near the base of the nail.

The appendages of the male on the seventh peræon-segment are rather long, about four times as long as broad.

Pleopods.—The first pair are smaller than the second. The male appendage of the second is considerably longer than the rami, apart from their long fringes of plumose setæ, and ends almost acutely, not being roundly expanded at the apex as in *Sphæroma rugicauda*. The covering ramus in the last three pairs has a transverse suture near the end; the under ramus of the fourth and fifth pairs is much plicated.

Uropods.—The lower outer branch is a little broader and apically a little more broadly rounded than the inner, which is sometimes spoken of as a prolongation of the peduncle, there being, in fact, no articulation between them.

One of Mr. Vallentin's specimens is distinguished from the rest as follows:—It has the sides of the peræon-segments abruptly down-bent, so as to form a sharp angle with the middle of the back; on the fourth pleon-segment are a pair of little median humps, such as are barely indicated in the other specimens; the pleon-shield has the median line occupied by a longitudinal groove between two elevations, and then by a carina of which the first part is divided between two tubercles, the remainder running to the subacute apex; the uropods have their apices subacute, that of the outer ramus the sharper and turned slightly outward. It is light coloured, with two transverse narrow dark bands. This specimen ought perhaps to be called *Exosphæroma lanceolatum* (White); but one has to remark that Leach describes his species as having the "last segment of pleon narrowed to a point," so that the original *gigas* may have been the lanceolate form. Dana speaks of the lamellæ of the uropods in *lanceolatum* as "lanceolate, obtuse;" and if other distinctions are not more steadfast than those based on the apices of the telson and uropods appear to be, the two names *gigas* and *lanceolatum* may well stand in one synonymy.

Colour. In formol, the specimens are dark or light brown, the rows of whitish markings on the peræon being more conspicuous in dark than in light-coloured examples; the whole body is covered with minute blackish specks, the head and the peræon-segments, however, and parts of the pleon, having clear borders which are sometimes orange in hue.

Size. Length about 18 mm., breadth 11 mm.

Mr. Vallentin took this species in Stanley Harbour, where it abounds. He says: "This species is usually to be found during low water under stones; but during a calm, and especially if the sun is shining brightly, they come to the surface and swim about in an aimless manner, in an inverted position, the paired appendages of the telson standing out at right angles to the body. I frequently caught them swimming in this manner when in my boat, and when so captured they would immediately roll themselves up into a ball. On being replaced in the sea, an individual would sink a few inches, and mounting to the surface swim as vigorously as before. When swimming in this manner these crustaceans would always keep near the shore, where the water is not more than two fathoms in depth." Dr. Coppinger (*cf.* Miers, 1881) records small specimens from 9–10 fathoms at "Sandy Point."

Gen. CASSIDINA Milne-Edwards.

1840. *Cassidina*, Milne-Edwards, Hist. Nat. Crust. vol. iii. p. 223.

1843. *Cassidina*, Guérin-Méneville, Iconographie du Règne Animal, Crust., texte, p. 31.

1853. *Cassidina*, Dana, U. S. Expl. Exp. vol. xiii., Crust. p. 748.

1884. *Cassidina*, Studer, Isopoden Reise 'Gazelle,' p. 19.

1887. *Cassidina*, Pfeffer, Krebse von Süd-Georgien, p. 20.

1888. *Cassidina*, G. M. Thomson, Tr. New Zealand Inst. vol. xxi. p. 263.

1900. *Cassidena*, H. Richardson, The American Naturalist, vol. xxxiv. p. 222.

The origin of the name of this genus is indirectly explained by Milne-Edwards when he says that in the Sphæromidæ which compose it the general form of the body, prolonged on each side much over the feet, resembles that of the insects known as *Cassides*, or rather a regularly oval and very inflated buckler. The species that have been successively assigned to the genus are *Cassidina typa* M.-Edwards, 1840, *C. emarginata* Guérin-Méneville, 1843, *C. latistylis* Dana, 1853, *C. maculata* Studer, 1884, and *C. neo-zealanica* Thomson, 1888. Of these five, *typa* and *latistylis* are under the double disadvantage that their place of origin is unknown and their colour undescribed; *maculata*, from Betsy Cove, Kerguelen Island, is described as black-brown with whitish flecks on both sides of the middle line; *neo-zealanica*, from the Bay of Islands, New Zealand, has the colour brownish-grey, covered with black spots and star-like markings; *emarginata* is reported from the Falkland Islands by Guérin-Méneville, from the Strait of Magellan and the west coast of Patagonia by Cunningham, from the same Strait and Punta Arenas by Studer, from Kerguelen Island by Miers, and from South Georgia by Pfeffer, the last-named writer describing the colour as a quite clear brown mixed with a little green-grey, the whole dorsal surface overspread with minute close-set points, which on the side-plates are somewhat larger and closer together. This species attains a length of 35 mm., while for the other four the length recorded ranges from 8 to 14 mm. But Studer and Pfeffer are no doubt right in accepting the opinion of Miers that the largest of the four, *C. latistylis* Dana, is only a junior form of *C. emarginata*.

The question next arises whether *C. emarginata* itself is distinct from all the other forms. *C. typa* is described as 4 lines long, thus very little exceeding in length the *C. neo-zealanica*, to which Thomson assigns "length 8 mm.; breadth 5 mm." It has been already stated that the colour of *C. typa* is not described; but in the Atlas to the 'Histoire Naturelle des Crustacés' there is a coloured figure of it, and the uniform light tint of this is out of agreement with any described colouring within the genus, except that of *C. emarginata*. It is rather curious, too, that the oval contour of this figure is very suggestive of a large, slightly bent specimen of *C. emarginata*. As opposed to any suspicions, however, that might arise of an identity between the two species, Guérin-Méneville points out that in his *C. emarginata* the body is moderately, not greatly, inflated; the head scarcely broader than long, while in Milne-Edwards's figure the head is very broad and very short with the eyes situated at a great distance one from the other; the last segment of the pleon triangular, truncate and a little emarginate at the apex, instead of having the apex narrowly rounded; the first antennæ reach a good deal, instead of scarcely at all, beyond the peduncle of the second; the fourth and fifth limbs of the peræon have the basal joint strongly bent, instead of straight; and the uropods have the inner lobe very broad, reaching clearly beyond the telson, with the distal margin obliquely truncate and a little emarginate, whereas in one of the figures given by Milne-Edwards this lobe does not reach beyond the telson, and though described as very large is represented as comparatively long and narrow.

Unless the type specimen of *C. typa* could be recovered and examined, it would be impossible without rashness to ignore the distinctions which Guérin-Méneville has drawn between it and *C. emarginata*. But they are not quite so formidable as at first sight they appear. It is not very easy to induce specimens of *C. emarginata* to lie flat, and when not flattened they have that much inflated ("très-bombé") appearance which Milne-Edwards describes. Their eyes are in fact very wide apart, and though the breadth of the head in comparison with the length will not answer Milne-Edwards's figure or description, in his figure there is foreshortening to be considered, and in his description we cannot be sure between what points he measured the head-length. He gives both a dorsal and ventral view of the animal, in the latter of which the last segment of the pleon has its apex protruding rather sharply beyond the uropods, whereas in the former the apex is more broadly rounded and enclosed by the uropods. It is obvious, therefore, that no particular stress can be laid on figures so variable relating to the same object. In regard to the extension of the first antennæ beyond the peduncle of the second, it should be noted that this is much less considerable in small specimens of *C. emarginata* than in large ones. Of the remarkable bend in the basal joints of the second and third peræopods (4th and 5th limbs of the peræon), the ventral view of *C. typa* shows indeed no trace; but neither does Pfeffer in his careful and elaborate account of *C. emarginata* take any notice of this peculiarity, although he explains that in all the limbs of the peræon the first and second joints are more or less firmly coalesced, but, except in the first pair, plainly distinguishable. The feature to which Guérin-Méneville called attention is in reality not an arching of the first joint of the limb, but rather a geniculate connexion between the coalesced first and second joints; a detail much less likely to attract attention in a ventral view of a small specimen than in a lateral view of a large one. Against identifying *C. typa* with *C. emarginata* there still, however, remains a stumbling-block in the shape of the uropods. Of these Milne-Edwards gives a separate figure, in which the inner lobe is much longer than broad, with a narrowly rounded apex; whereas in *C. emarginata* this lobe is little broader than long, and has an oblique, slightly emarginate apical border, of which the inner angle does not reach the end of the pleo-telson, but the rounded outer angle reaches well beyond it. It is at least possible that we have here the explanation of the discrepancy in the two figures of *C. typa*, the artist in the ventral view observing the inner angle of the uropods, and the outer angle in the dorsal view. It is further possible that in the separate figure he had the uropod angularly placed, so that the long distal margin appeared as part of the outer side. That all this argues more carelessness in the figures than ought to be imputed to a work so high in reputation and value as the 'Histoire Naturelle des Crustacés,' will be an obvious reflection. But there is no reason to suppose that the figures are by the distinguished author of that work, and it can easily be proved that their accuracy is not beyond impeachment. For example, in the figure of the maxillipeds of *C. typa* there is a joint missing; and if this corresponds with the reality, it would falsify the author's own statement that in this genus the mouth-organs correspond with those of the Sphæromidæ. It is most likely that Milne-Edwards had but one specimen, and that this one was dissected, and that the fragments, after they had been figured, were not thought worth preserving. In that case, the question here raised will perhaps never be answered with certainty.

C. maculata Studer, 11 mm. long, presents a different set of difficulties. Its colour has been already mentioned, together with the fact that it comes from Kerguelen, whence Miers records also *C. emarginata*. From this species, which was well known to Studer from South America, he distinguishes his Kerguelen species by the form of the pleo-telson, the narrowness of the inner branch of the uropods, and the length of the antennæ. Of these distinctions the last seems non-existent, but the other two make a rather close approach to what is shown in the ventral view of *C. typa*, the caudal shield being triangular, produced to a narrowly rounded point a little beyond the inner lobe of the uropods, this lobe being lanceolate with convex outer and concave inner margin, and prolonged much beyond the small outer ramus. A frontal view of the head shows a shape corresponding with that of *C. emarginata*, except that the rostrum (described in the text) is omitted in the drawing. But to this species Studer attributes "three free short pleon-segments" in front of the caudal shield, and figures them quite distinctly with unbroken lines running across the back, which cannot be reconciled with the statement of Milne-Edwards in his generic account, borne out by his dorsal view of *C. typa*, that "the pleon, as usual in this tribe, is composed of two portions, the anterior formed of several segments soldered together towards the middle of the body, but distant [? distinct] laterally, the other posterior portion being shield-shaped." The front part of the pleon in *C. emarginata* is accurately described by Pfeffer. It clearly consists of four segments; the first much narrower than the rest, so short that it is apt to be concealed, but having its distal margin dorsally uninterrupted; the second rather remarkable, not only for its width, but for the fact that its sides are longer than any side-plates of the peræon and enclose the two following segments, with both of which it is in coalescence at the middle of the back; the third segment having its acute lateral apices bent round so as to rest on the front margin of the caudal shield; the fourth ending similarly within the third, but projecting a point on to the front margin of the caudal shield on each side at a short distance within its own lateral apex. Of such details the figure of *C. typa* is to a large extent innocent, showing, however, the last-mentioned projecting points, and three segments coalesced in the middle of the back. But neither does Guérin-Méneville take any notice of the peculiar arrangement of the fore part of the pleon in his account of *C. emarginata*, and even Pfeffer's accurate description is very ill supported by the accompanying dorsal figure of that species.

It remains to consider the *C. neo-zealanica* Thomson, which agrees in its dimensions with *C. typa*, and is perhaps not particularly unlike in colouring—two characters, of which the second has but little importance, and the first, apart from other considerations, no importance at all. While quoting at length from Milne-Edwards's generic account of *Cassidina*, Mr. Thomson unfortunately does not call attention to any characters on which he relies for separating his own species from the typical one; and his specific description would, I think, justify an identification of one with the other, except for one peculiarity in *C. neo-zealanica*, namely, that the outer margin of the inner lobe of the uropods and the obtuse apex of the caudal shield are thickly ciliated. But the figure shows a pleon consisting of two broad, completely separated, segments, followed by the pleo-telson or caudal shield. By a comparison with the description, it appears as if the first of these segments had been regarded as the seventh of the peræon, the first peræon-segment being taken as a portion of the head, which is partially embedded in it. But the second pleon-segment is figured as quite simple, so that, if the figure is to be trusted, it is doubtful whether this species can stand in the genus *Cassidina*. The same doubt, for a similar reason, will apply to *C. maculata* Studer. But considering that the authors themselves have not attached any special importance to the characters discussed, there is still at least a possibility that, instead of needing new genera, all the named species of *Cassidina* may be one and the same. In that case, the ciliated apices in *C. neo-zealanica* would probably prove to be due to an adventitious growth. It would be very obliging on the part of the authors referred to, or any available representative, if they would re-examine their specimens and publish a decisive account of the required details.

CASSIDINA EMARGINATA Guérin-Méneville.

1843. *Cassidina emarginata*, Guérin-Méneville, Icon. Règne Animal, Crust., texte, p. 31.

1853. *Cassidina latistylis*, Dana, U.S. Expl. Exp. vol. xiii., Crust. p. 784, pl. 52. figs. 12 *a–e*.

1871. *Cassidina emarginata*, Cunningham, Tr. Linn. Soc. Lond. vol. xxvii. p. 499, pl. 59. fig. 4.

1879. *Cassidina emarginata*, Miers, Phil. Trans. vol. clxviii. p. 204.

1884. *Cassidina emarginata*, Studer, Isopoden Reise 'Gazelle,' p. 19.

1887. *Cassidina emarginata*, Pfeffer, Krebse von Süd-Georgien, pp. 63–69, pl. 2. figs. 9–10, pl. 5. figs. 23–30, pl. 6. figs. 1–10.

In the discussion of the genus many of the distinctive characters of this striking species have already been described. Moreover, a very full and satisfactory account of it has been given by Dr. Pfeffer, with a great number of excellent figures. In the earlier representations both Dana and Cunningham figure the fore part of the pleon as a simple solid segment. This is the more to be wondered at on Dana's part, as he, like Milne-Edwards, figures the corresponding and similar portion of *Amphoroidea typa* with all the requisite detail.

The specimens brought by Mr. Vallentin from the Falklands are preserved in formol and are all of a semi-pellucid orange colour, which under a lens shows a fine bordering to the segments and numerous dorsal markings of rather deeper tint, and is closely speckled about the dorso-lateral parts with minute greyish points.

It is only in large specimens that it is easy to make out the sinuous suture which marks off the side-plates of the second to the seventh segments of the peræon. The last of these segments is scarcely so wide as the second segment of the pleon.

In the fourth and fifth pleopods both rami are respiratory, consisting alike of plicated lamellæ, as contrasted with the corresponding appendages in some of the Sphæromidæ, in which the outer ramus or exopod is opercular. Mr. Beddard, in the 'Challenger' Isopoda, p. 147, calls attention to "a similar hypertrophy of the respiratory lamellæ" occurring in the two species of *Amphoroidea* and in his own *Cymodocea* [*Naesicopea*] *abyssorum*.

Two of Mr. Vallentin's specimens are of great size, the one measured being 36 mm. in length by 23 mm. in breadth, agreeing closely with the 3½ centimetres of Guérin-Méneville's description. With the large specimens were two others not more than 11 or 12 mm. long, and one 23 mm. in length.

Of his specimens Mr. Vallentin himself writes that the largest "was found holding on to a large drifting piece of *D'Urvillea harveyi* found in the harbour. The remaining specimens I secured on various occasions while collecting in my boat. During a calm I frequently observed specimens of this species mount to the surface of the sea, as if for a supply of air, and immediately return to the bottom. The depth of water where these crustacea were to be found was never less than two and half fathoms."

ONISCOIDEA.

1822. *Oniscoidea*, Sars, Christiania Vidensk. Forh. no. 18, p. 58.

1893. *Oniscoidea*, Stebbing, Hist. Crust., Internat. Sci. Ser. vol. lxxiv. p. 420.

1898. *Oniscoida*, Sars, Crustacea of Norway, vol. ii. pt. 9, p. 153.

1900. *Oniscoidea*, H. Richardson, The American Naturalist, vol. xxxiv. p. 301.

Fam. Trichoniscidæ.

1898. *Trichoniscidæ*, Sars, Crustacea of Norway, ii. p. 159.

1900. *Trichoniscidæ*, H. Richardson, Am. Nat. xxxiv. pp. 302, 306.

In separating this family from the Ligiidæ, Sars assigns to it the genera *Trichoniscus*, *Trichoniscoides*, *Haplophthalmus*, *Scyphacella*, and *Actoniscus*, while leaving to the Ligiidæ the genera *Ligia*, *Ligidium*, *Titanethes*, *Styloniscus*, and *Stymphalus*. In the latter family the first antennæ have the third joint minute, the second maxillæ have two plumose setæ on the inner margin, the maxillipeds have the terminal part distinctly five-jointed, and the uropods are described as freely projecting behind. In contradistinction to this, in the Trichoniscidæ the first antennæ have the third joint well developed, the second maxillæ are without plumose setæ on the inner margin, the maxillipeds have the terminal part generally imperfectly articulated, and the uropods have the peduncle broadly expanded inside and partly covered by the last caudal segment. There are other distinctions drawn by Sars, of more or less importance, to one of which it is specially needful to call attention. In the Ligiidæ the second antennæ have a "multiarticulate flagellum," whereas in the Trichoniscidæ they have a "flagellum composed of only a restricted number of articulations." The restricted number is not specified, but apparently it is not intended to exceed four or five, or seven at most. Now both species included by Dana in his genus *Styloniscus* at its institution have the multiarticulate flagellum, which is "seven to ten-jointed" in *magellanicus* and "about sixteen-jointed" in *longistylis*. But *magellanicus* by its maxillipeds and character in general clearly belongs to *Trichoniscus*. Therefore the distinction between the two families based on the number of joints in the flagellum of the second antennæ is no longer tenable. That *Styloniscus* may still belong to the Ligiidæ is possible. In the Californian species *gracilis*, added to the genus by Dana in 1856, the flagellum of the second antennæ has about fourteen joints and is nearly as long as the two preceding joints of the peduncle. The peduncle of the uropods is distinguished from that of *longistylis* by being scarcely twice as long as broad and on the outer side at the middle becoming suddenly narrower. This recalls the corresponding structure in *Ligidium hypnorum*. Unluckily Dana could not describe the rami because they were mutilated. He does not describe the mouth-organs either in this species or in *longistylis*, so that the genus remains obscure, covering two species which are very doubtfully congeneric. *Styloniscus gracilis* is mentioned by Stimpson in 1857, Budde-Lund in 1885, and Miss Harriet Richardson in 1899; but they neither quote nor supplement the meagre description given by Dana in the Pr. Ac. Philad. vol. vii. p. 176.

Sars makes the suggestion (Crustacea of Norway, vol. ii. p. 167) that the genus *Scyphacella* of S. I. Smith may perhaps turn out to be identical with *Haplophthalmus* of Schöbl. A distinguishing feature of *Haplophthalmus* is, however, as the name implies, that the eyes are simple. Professor Smith, in describing his *Scyphacella arenicola*, says "eyes prominent, round," and "eyes black," a twofold notice from which so important a character as "eyes simple" could scarcely have been omitted had it been applicable. The figure of the species by Harger (Rep. U.S. Comm. Fisheries for 1878, pt. 6, pl. 1. fig. 2) shows well-developed eyes with numerous components.

Gen. Trichoniscus J. F. Brandt.

1833. *Trichoniscus*, Brandt, Conspectus Crust. Oniscodorum, p. 12 (Bull. Soc. Moscou, vol. vi. p. 174).

1838. *Itea*, C. L. Koch, Deutschlands Crustaceen, 22 (162), no. 16.

1840. *Trichoniscus*, Milne-Edwards, Hist. Nat. Crust. vol. iii. p. 174.

1844. *Itea*, Zaddach, Synopseos Crust. Prussicorum Prodromus, p. 15.

1853. *Styloniscus* (part.), Dana, U.S. Expl. Exp. vol. xiii., Crust. p. 736.

1857. *Philougria*, Kinahan, Nat. Hist. Rev. vol. iv. p. 281.

1868. *Philougria*, Bate & Westwood, Brit. Sess.-eyed Crust. vol. ii. p. 454.

1870. *Trichoniscus*, Budde-Lund, Naturh. Tidsskr. ser. 3, vol. vii. p. 227.

1885. *Trichoniscus*, Budde-Lund, Crust. Isop. Terrestria, p. 243.

1886. *Philygria* (preocc. Diptera, 1844), Thomson & Chilton, Tr. New Zealand Inst. vol. xviii. p. 157.

1886. *Philygria*, Chilton, ibidem, p. 159.

1898. *Trichoniscus*, Sars, Crustacea of Norway, vol. ii. p. 160.

To this genus Budde-Lund in 1885 assigns nine species, one of them being *T. asper* Koch, found in amber, and another the *Scyphacella arenicola* of Smith, already referred to. He makes the *Trichoniscus leydigi* of Weber a synonym of his own *T. albidus*, but this decision is not admitted by Sars. Dollfus added to the genus the species *chavesi* in 1888, *insularis* in 1889, and with some doubt *murrayi* and *australis* in 1890. In 1898 Sars instituted a new genus, *Trichoniscoides*, to receive *Trichoniscus albidus* Budde-Lund, *T. leydigi* Weber, and perhaps *T. cavernicola* Budde-Lund. He does not mention *Trichoniscus vividus* Koch, but that species should probably be transferred, as it has simple eyes ; and the most prominent, though not of necessity the most important, distinction of the new genus is that the eyes are simple or wholly wanting, whereas in *Trichoniscus* they are "small, but distinct, consisting of only 3 visual elements imbedded in a dark pigment." In 1885 Chilton described a marine species from New South Wales as *Philougria marina*, but the eyes apparently have numerous visual elements, the mandibles show no molar, and the other mouth-organs are undescribed ; so that this species cannot be included in *Trichoniscus*. In 1886 the same author described *Philygria thomsoni* from New Zealand, and this appears to be a true *Trichoniscus*.

TRICHONISCUS MAGELLANICUS (Dana).

1853. *Styloniscus magellanicus*, Dana, U.S. Expl. Exp. vol. xiii., Crust. p. 736, pl. 48. figs. 7 *a–g*.

1881. *Styloniscus magellanicus*, Miers, Pr. Zool. Soc. Lond. p. 77.

1885. *Styloniscus magellanicus*, Budde-Lund, Crust. Isop. Terrestria, p. 271.

Body smooth, narrowly elliptical; front angles of first peræon-segment rounded, not greatly produced, hind angles of this and next segment rounded, of third subquadrate, of the rest successively a little more and more produced backwards and sharpened, but in none absolutely acute; first the longest, rather longer than the head, the others having the side-plates marked by a faint, obliquely sinuous suture. Pleon abruptly narrower than peræon, second segment very short. Telson with sides converging from insertion of uropods almost straight to broadly truncate apex.

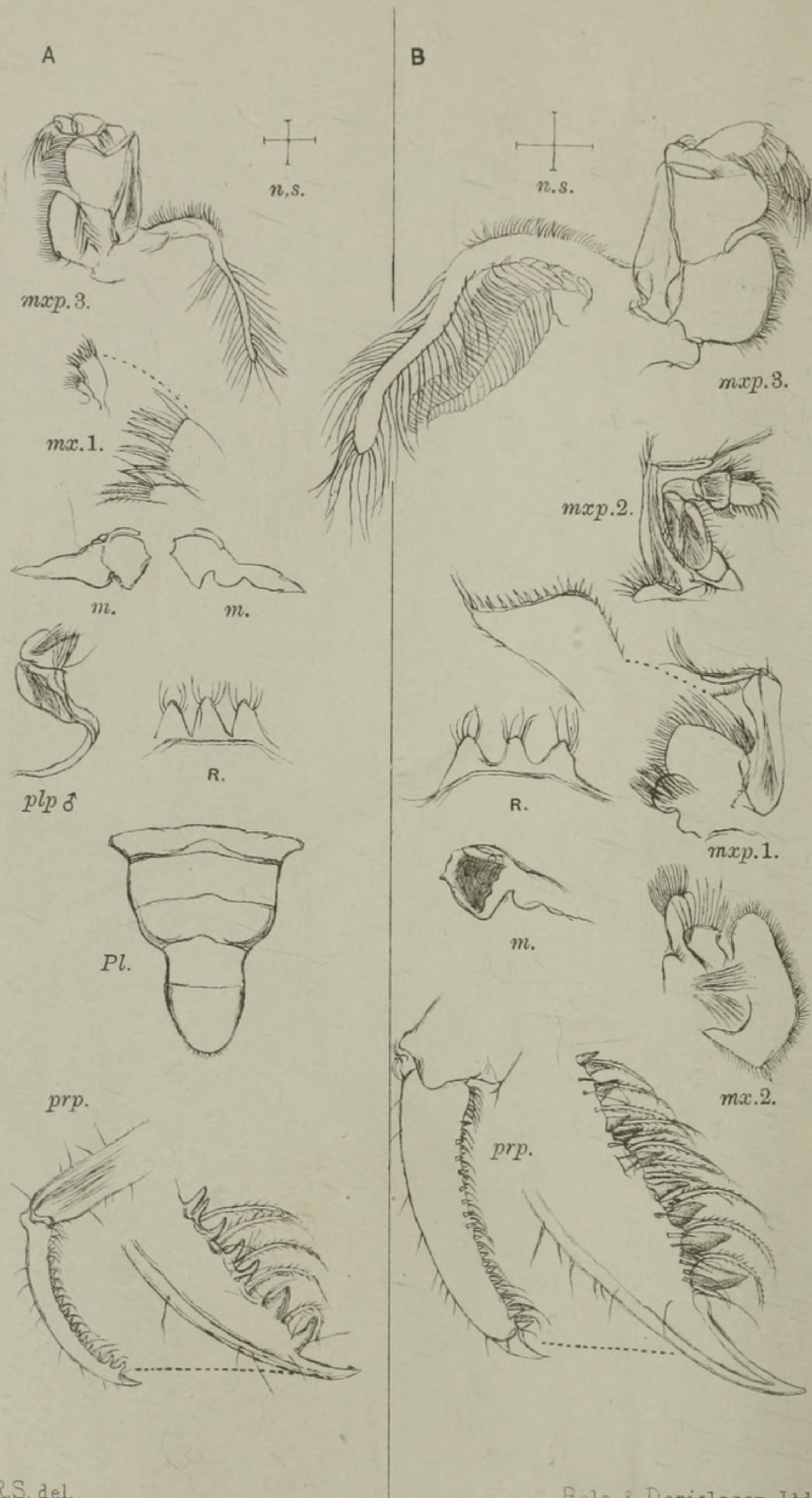
Eyes dark, with three visual elements. First antennæ with second joint shorter than first or third. Second antennæ spinulose, with joints of peduncle successively longer, the last a little shorter than the 7–10-jointed flagellum (7–8-jointed in specimens examined), last joint tipped with fascicle of setæ.

Upper lip apically rounded and furred. Mandibles with toothed cutting-edge narrow; a single seta on right mandible; molar cylindric, prominent. First maxillæ: inner plate with three plumose setæ, the inner the longest; outer plate strap-shaped, surmounted by eight unequal spines. Maxillipeds as partially figured by Dana, and in near agreement with those of *T. pusillus* as figured by Sars, but the epipod longer and distally furred with closely-set, very short setules or spinules.

Hind trunk-legs longer than those in front, all very similar in structure; the fifth joint carrying the strongest and longest spines; the sixth fringed on the outer margin with transparent spinules, with little spines at intervals, also on the inner and part of the apical margin showing, especially in the hinder pairs, thin membranous expansions, as well as several spines; the small seventh joint is beset with various setules, among them a long one with split apex, and others with smoothly widened extremity (compare Chilton on *Philygria*, 1886). In the second pleopods of the male the long distal joint of the inner ramus is, till near the end, much more widened than the stiliform joint figured by Sars for this part of *T. pygmæus*. The uropods are as Dana figures them, the inner ramus fully two-thirds as long as the outer, though in his description he says "longer branch nearly twice the length of the other."

Colour brown, mottled with yellowish white, especially a series of light patches just above the side-plates of the peræon. Length about a third of an inch, or 8 mm.

Mr. Vallentin's specimens were "found in a damp cave on the top of a hill 450 feet high, 2 miles distant from Stanley."



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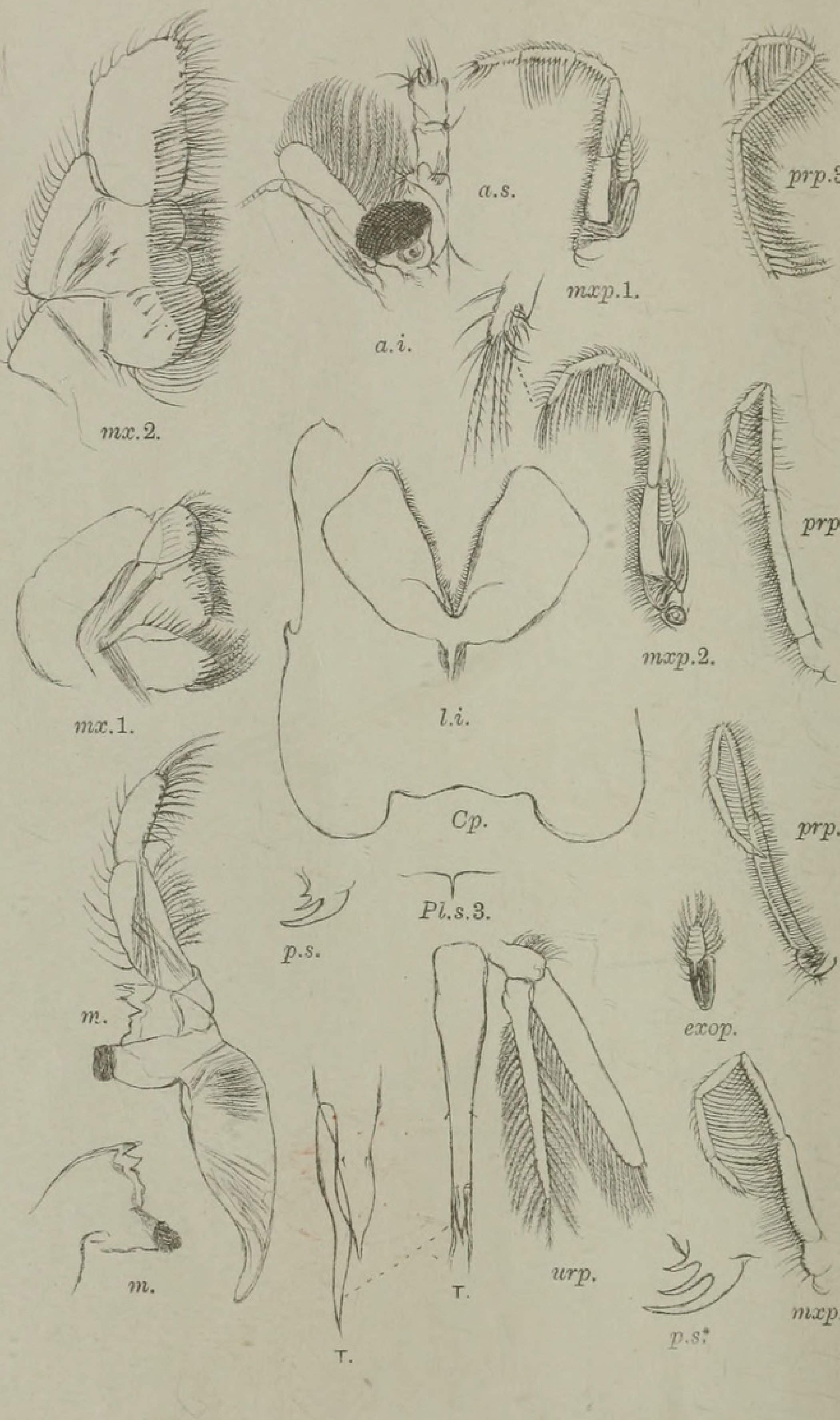
HALICARCINUS OVATUS.

HALICARCINUS PLANATUS.



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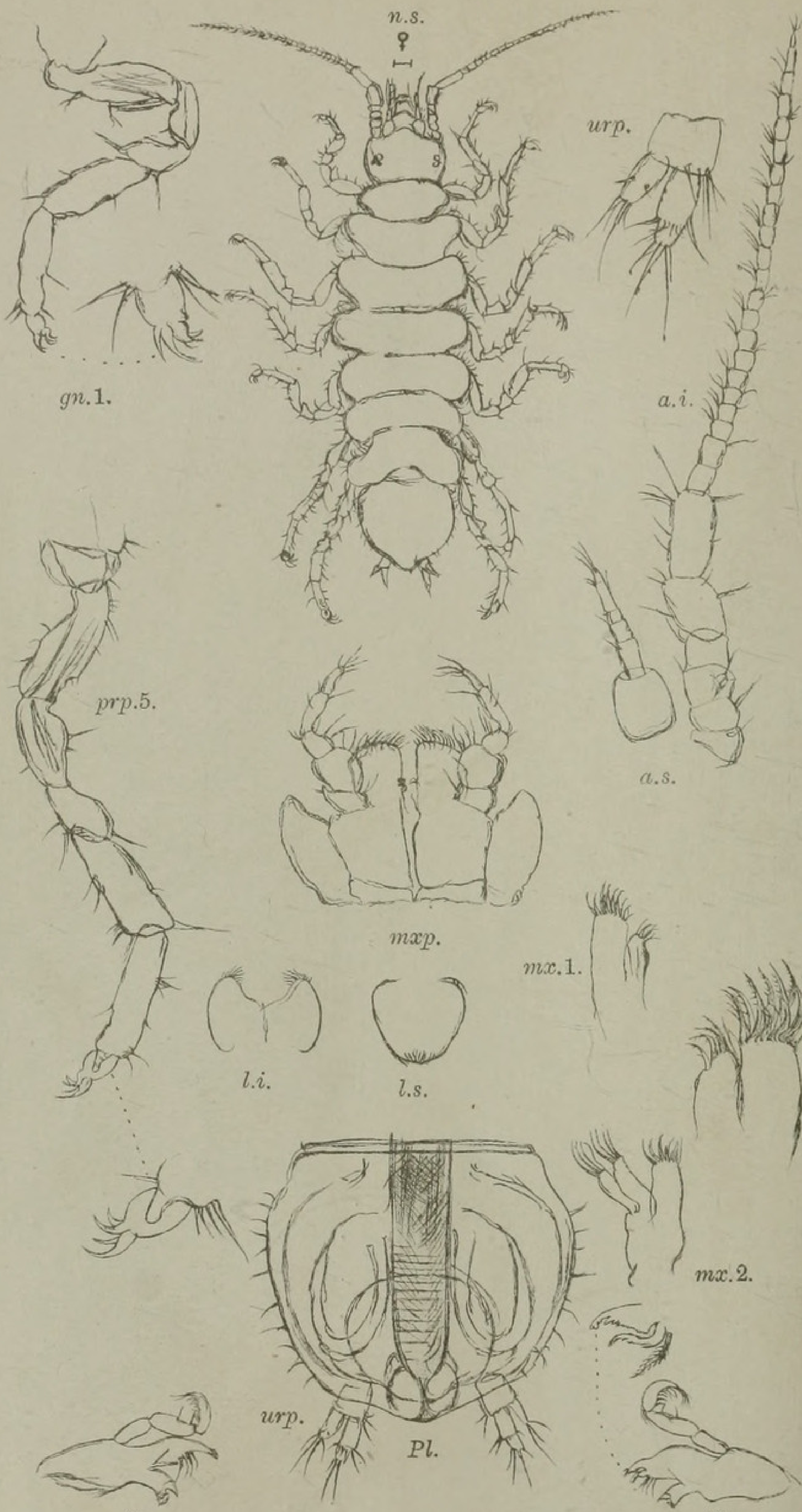
EUPHAUSIA VALLENTINI.



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IAIS PUBESCENS.

EXPLANATION OF THE PLATES.

Plate XXXVI.

A. *Halicarcinus ovatus*, p. 523.

n.s. Natural size of carapace, breadth measured at widest part of rim, length from middle rostral tooth to posterior margin.
R. Rostral teeth.
Pl. Pleon of male.
m., m. Mandibles, outer surface.
mx. 1. First maxilla, with spine-margins more highly magnified.
mxp. 3. Third or external maxilliped, inner surface.
prp. Terminal joint of a trunk-leg or peræopod, with apical part more highly magnified.
plp. ♂. Pleopod of male.

B. *Halicarcinus planatus*, p. 524.

n.s. Natural size of carapace, measured as in preceding species.
R. Rostral teeth.
m. Mandible, inner surface.
mx. 2. Second maxilla.
mxp. 1. First maxilliped, with apex of endopod more highly magnified.
mxp. 2. Second maxilliped.
mxp. 3. Third or external maxilliped, inner surface.
prp. Terminal joint of a trunk-leg or peræopod, with apical part more highly magnified.

Plate XXXVII.

Euphausia vallentini, p. 545.

Cp. Lateral and hind margins of carapace.
Pl.s. 3. Postero-dorsal tooth of third pleon-segment.
p.s. Preanal spine. *p.s.** The same, from another specimen.
a.s., a.i. Eye, together with first antenna, second antenna, and rostral point.
m., m. Mandibles.
l.i. Lower lip.
mx. 1, *mx.* 2. First and second maxillæ.
mxp. 1, 2, 3. First, second, and third maxillipeds, without branchial appendages, the third also without exopod. Apex of second maxilliped more highly magnified.
prp. 1, 2, 3. First, second, and third peræopods, without exopods or branchiæ.
exop. A detached exopod.
urp. Uropod.
T. Telson. Apical portion and one subapical process more highly magnified.

The mandibles, lower lip, first and second maxillæ, preanal spines, apex of second maxilliped, and apex of telson are more highly magnified than the other figures, but the figures in each group are all to the same scale.

Plate XXXVIII.

Iais pubescens, p. 549.

n.s. Line showing length of specimen figured.
a.s., a.i. First and second antennæ.
l.s. Upper lip.
m., m. Mandibles.
l.i. Lower lip.
mx. 1, *mx.* 2. First and second maxillæ.
mxp. Maxillipeds.
gn. 1, *prp.* 5. First gnathopod and fifth peræopod (first and seventh trunk-legs).
Pl. The semipellucid pleon.
urp. Uropod.

The mouth-parts, fingers of trunk-legs, and one uropod are magnified to the same scale, except the apices of *mx.* 1; the other details are less enlarged.

PLATE XXXIX.

Exosphæroma gigas, p. 553.

n.s. Lines showing actual length and breadth of specimen figured.
a.s., *a.i.* First and second antennæ.
e.p., *l.s.* Epistome and upper lip.
m., *m.* Mandibles. The right mandible from the outer side; the left mandible from the inner side, without its palp.
l.i. Lower lip.
mx. 1, *mx.* 2. First and second maxillæ.
mxp. Maxillipeds.
prp. First peræopod (third trunk-leg).
Per.s. 7 ♂. Appendages of male on ventral margin of seventh peræon-segment.
plp. 2 ♂. Appendage of male on inner side of second pleopod.

The mouth-organs are all drawn to the same scale, but with higher magnification of the apical spines and setæ of the first maxilla, and of one setiform spine of the second maxilla. A uniform but lower scale applies to the two antennæ, the peræopod, and the male appendages.

2. On some Crustaceans from the South Pacific.—Part IV. *The Crabs*. By L. A. BORRADAILE, M.A., F.Z.S., Lecturer in Natural Sciences of Selwyn College, Cambridge.

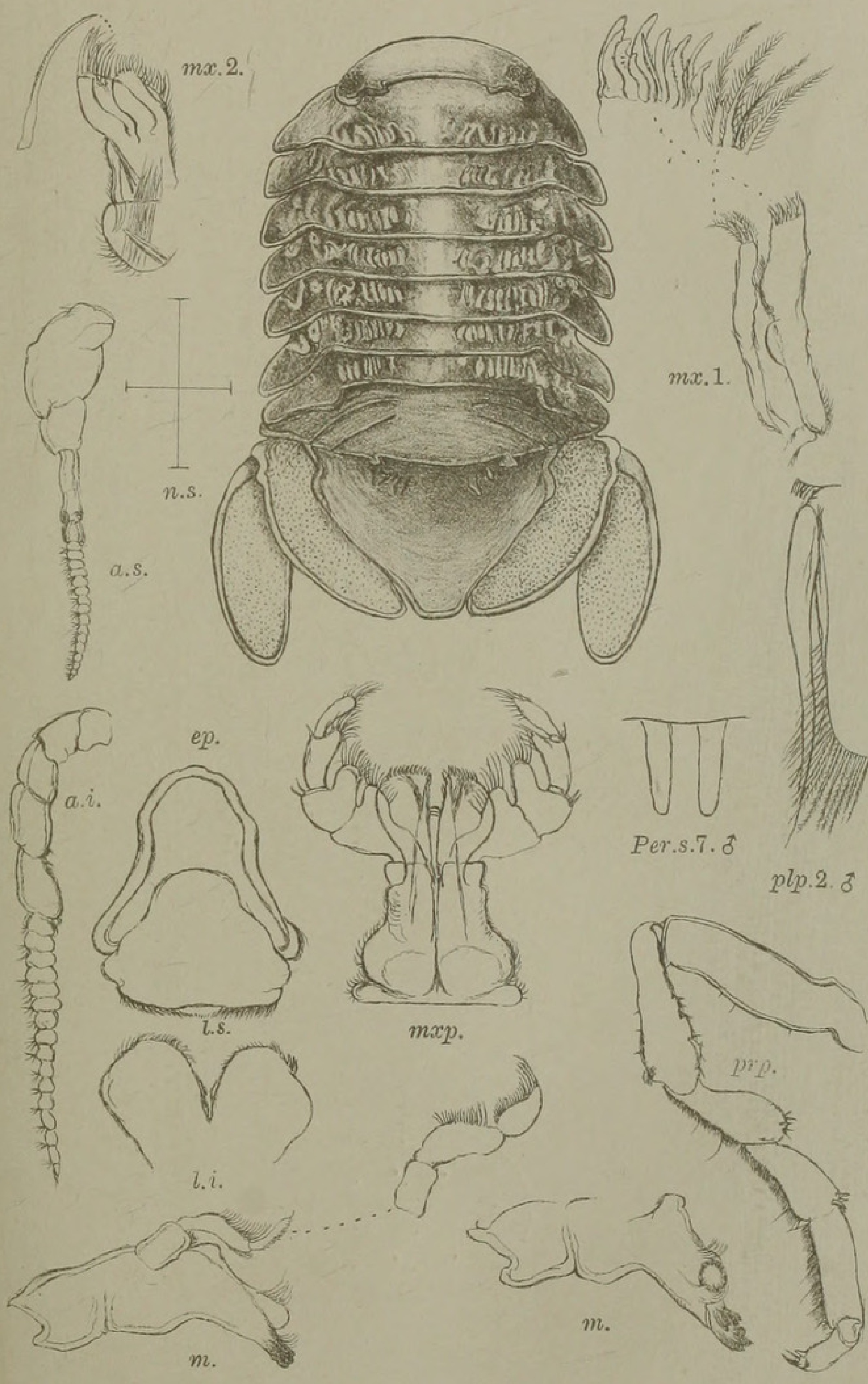
[Received March 31, 1900.]

(Plates XL.–XLII.)

The collections described in the following report were made in the islands of Funafuti (Ellice group), Rotuma, and Fiji by Mr. J. Stanley Gardiner, to whose kindness I am indebted for permission to examine them. They contain altogether examples of 77 species, of which seven appear to be new to science. All the known species have been already recorded from the Indo-Pacific region, and the new ones present no particularly remarkable features, although it has proved impossible to place one of them in any known genus, and a new division of that rank has been established for it.

The Funafuti collection contained examples of the following species:—

1. *Cryptodromia hilgendorfi* de Man.
2. *Ebalia erosa* (A. M.-Edw.).
3. *Calappa hepatica* (Linn.).
4. *Xenocarcinoides rostratus*, n. sp.
5. *Menœthius monoceros* (Latr.).
6. *Goniocaphyra truncatifrons* de Man.
7. *Carupa læviuscula* Heller.
8. *Neptunus* (*Achelous*) *granulatus* (H. M.-Edw.).
9. *Thalamita admete* (Herbst), var. *edwardsi*, n. nom.
10. *Thalamita integra* Dana.
11. *Pseudozius inornatus* Dana.
12. *Pseudozius caystrus* (Ad. & Wh.).
13. *Pilumnus prunosus* Whitelegge.
14. *Cymo andreossyi* (Aud.), var. *melanodactylus* Dana.
15. *Xanthias lamarcki* (H. M.-Edw.).



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EXOSPHÆROMA GIGAS.

16. *Daira perlata* (Herbst).
17. *Atergatis floridus* (Rumph.).
18. *Chlorodius niger* (Forskål).
19. *Chlorodopsis spinipes* (Heller).
20. *Chlorodopsis* (*Cyclodius*) *ornata* Dana.
21. *Etisodes frontalis* Dana.
22. *Eriphia lævimana* Latr.
23. *Eriphia scabricula* Dana.
24. *Trapezia ferruginea* Latr.
    Var. *dentata* (Macleay).
    Var. *areolata* Dana.
    Var. *guttata* Rüppell.
25. *Trapezia digitalis* Latr.
    Var. *speciosa* Dana.
26. *Trapezia cymodoce* Herbst.
27. *Tetralia glaberrina* (Herbst).
28. *Plagusia speciosa* Dana.
29. *Leiolophus planissimus* (Herbst).
30. *Grapsus maculatus* (Catesby).
31. *Pachygrapsus lævis*, n. sp.
32. *Geograpsus grayi* (H. M.-Edw.).
33. *Sesarma gardineri*, n. sp.
34. *Cardiosoma hirtipes* Dana.
35. *Uca cultrimana* (White).
36. *Ocypode urvillei* Guérin.

The Rotuma collection contained :—

1. *Dromidiopsis australiensis* (Hasw.).
2. *Dromidia globosa* (Lam.).
3. *Calappa hepatica* (Linn.).
4. *Camposcia retusa* Latr.
5. *Hyastenus elegans* Miers, var. *tenuicornis*, nov.
6. *Tylocarcinus styx* (Herbst).
7. *Cyclax* (*Cyclomaia*) *suborbicularis* (Stimps.).
8. *Elamene truncata* A. M.-Edw.
9. *Kraussia rastripes* Müller.
10. *Thalamita admete* Herbst.
11. *Thalamita prymna* Herbst, var. *spinimana* Dana.
    Var. *picta* Stimps.
    Var. *stimpsoni* A. M.-Edw.
12. *Caphyra rotundifrons* A. M.-Edw.
13. *Pseudozius caystrus* (Ad. & Wh.).
14. *Melia tesselata* (Latr.).
15. *Pilumnus rotumanus*, n. sp.
16. *Cymo andreossyi* (Aud.).
    Var. *melanodactylus* Dana.
17. *Xanthias notatus* (Dana).
18. *Xanthias lamarcki* (H. M.-Edw.).
19. *Xanthias parvus*, n. sp.
20. *Liomera richtersi* (de Man).
21. *Liomera lævis* (Dana).

22. *Actæa tomentosa* (H. M.-Edw.).
23. *Actæa affinis* (Dana).
24. *Actæa hirtissima* (Rüppell).
25. *Actæa rufopunctata* (H. M.-Edw.).
26. *Actæa speciosa* (Dana).
27. *Actæa fossulata* (Girard).
28. *Zozimus æneus* (Linn.).
29. *Atergatus floridus* (Rumph.).
30. *Carpilius maculatus* (Linn.).
31. *Carpilius convexus* (Forskål).
32. *Carpiliodes tristis* Dana.
33. *Carpiliodes vailliantianus* (A. M.-Edw.).
34. *Carpiliodes monticulosus* A. M.-Edw.
35. *Carpiliodes pallidus*, n. sp.
36. *Euxanthus melissa* (Herbst).
37. *Chlorodius niger* (Forskål).
38. *Chlorodius barbatus*, n. sp.
39. *Phymodius ungulatus* (H. M.-Edw.).
40. *Etisus lævimanus* Randall.
41. *Etisodes anaglyptus* (H. M.-Edw.).
42. *Etisodes frontalis* Dana.
43. *Chlorodopsis* (*Cyclodius*) *ornata* Dana.
44. *Euruppellia annulipes* (H. M.-Edw.).
45. *Eriphia lævimana* Latr.
46. *Eriphia scabricula* Dana.
47. *Trapezia ferruginea* Latr.
    Var. *dentata* (Macleay).
    Var. *areolata* Dana.
    Var. *guttata* Rüppell.
    Var. *maculata* (Macleay).
48. *Trapezia digitalis* Latr., var. *speciosa* Dana.
49. *Trapezia cymodoce* (Herbst).
50. *Tetralia glaberrima* (Herbst).
51. *Plagusia speciosa* Dana.
52. *Leiolophus planissimus* (Herbst).
53. *Grapsus maculatus* (Catesby).
54. *Geograpsus grayi* (H. M.-Edw.).
55. *Sesarma aubryi* A. M.-Edw.
56. *Sesarma gardineri*, n. sp.
57. *Cardiosoma hirtipes* Dana.
58. *Cardiosoma carnifex* (Herbst).
59. *Uca cultrimana* (White).
60. *Ocypode ceratophthalma* (Pallas).

The Fiji collection :—

1. *Dromidiopsis australiensis* (Hasw.).
2. *Pilumnus hirsutus* Stimps.
3. *Actumnus setifer* de Haan.
4. *Actæa tomentosa* (H. M.-Edw.).
5. *Pachygrapsus minutus* A. M.-Edw.

The classification followed is that of Ortmann, in Bronn's 'Thier-reich.' In one or two points, however, slight deviations from this scheme will be found. The three tribes of Crabs seem still to have enough in common to justify us in keeping the old name of Brachyura in its full extent; and I have accordingly adopted de Haan's term Brachygnatha for the groups included by Ortmann in his restricted Brachyura. Following the latter writer's suggestion as to the inclusion of *Thia* Leach in the Atelecyclidæ, it is proposed to transfer Alcock's Thiinæ [1] bodily to that family, and *Kraussia* Dana is accordingly classed here. Lastly, under the heading Portunidæ, there will be found certain suggestions for an amplification of Ortmann's classification, notably the establishment of a new subfamily for the genus *Goniocaphyra* de Man.

Major Alcock's admirable series of papers on the Indian Crabs [2], containing as they do diagnoses and bibliographies for a large number of the species included in the present collection, make it unnecessary to give more than a very short list of references for these species. For the sake of convenience, however, a reference to the original description and, when possible, to a figure, is given, together with one to Major Alcock's work. In the case of species mentioned also in Whitelegge's report on the Funafuti Crustacea, I have included a reference to that writer's paper.

Suborder **BRACHYURA.**

Tribe DROMIIDEA.

Family Dromiidæ.

Genus Cryptodromia Stimps., 1858.

1. Cryptodromia hilgendorfi de Man, 1887.

Cryptodromia hilgendorfi, de Man, Arch. Naturg. liii. 1, iii. p. 406, pl. xviii. fig. 4 (1887).

Three males from Funafuti, one dredged in the lagoon at a depth of 23 fathoms. This latter specimen carries a big sponge.

Genus Dromidia Stimps., 1858.

2. Dromidia globosa (Lam.), 1818.

Dromia globosa, Lamarck, Hist. An. sans vert. v. p. 264 (1818); H. M.-Edwards, H. N. Crust. ii. p. 177 (1837).

Dromidia globosa, de Man, Arch. Naturg. liii. 1, iii. p. 396 (footnote), pl. xviii. fig. 1 (1887).

One male from Rotuma, bearing an ascidian. The tooth at the side of the carapace is rather farther back than is indicated in de Man's figure. The locality of this species has hitherto been unknown.

[1] Journ. As. Soc. Bengal, lxviii. 2, i. p. 96 (1899).
[2] *Ibid.* lxiv., lxv., lxvii., lxviii.

Genus DROMIDIOPSIS, nov.

According to Ortmann (Bronn's 'Thier-reich,' v. 2, p. 1155) *Dromidia* has no epipodite on the first leg (cheliped). Examination of the specimens of *D. australiensis* Haswell shows that in this species the epipodite is present. It seems necessary, therefore, to make a new genus for this species, and such others as may agree with it in this particular. The name proposed is *Dromidiopsis*.

Characters of *Dromidiopsis*, n. gen. :—

1. Rostrum triangular, with the sides not distinctly lobed.
2. Carapace slightly longer than broad.
3. Sternal furrows in the female reach the chelipeds, converge, but do not join, and end in a single ill-marked tubercle.
4. Gills phyllobranchiate.
5. Cheliped with epipodite.
6. 4th and 5th legs (last two walking-legs) subchelate.
7. Uropods present and visible in dorsal view in the angle between the 6th segment and the telson.

3. DROMIDIOPSIS AUSTRALIENSIS (Hasw.), 1882.

Dromia australiensis, Haswell, Proc. Linn. Soc. N. S. W. vi. 4, p. 755 (1882); id. Cat. Austral. Crust. p. 139 (1882).

Dromidia australiensis, de Man, Arch. Naturg. liii. 1, iii. p. 396, pl. xvii. fig. 6 (1887).

Rotuma; one male bearing an ascidian.

Fiji; one male, one female.

Tribe OXYSTOMATA.

Family LEUCOSIIDÆ.

Subfamily LEUCOSIINÆ.

Genus EBALIA Leach, 1817.

4. EBALIA EROSA (A. M.-Edw.), 1873.

Phlyxia erosa, A. M.-Edwards, Journ. Mus. Godeffr. i. 4, p. 262 (1873); id. Nouv. Arch. Mus. x. p. 47, pl. iii. fig. 2 (1874).

Ebalia erosa, Miers, 'Challenger' Brachyura, p. 305 (1886); Alcock, J. As. Soc. Beng. lxv. 2, p. 189 (1896).

Funafuti; one male.

Family CALAPPIDÆ.

Subfamily CALAPPINÆ.

Genus CALAPPA Fabr., 1798.

5. CALAPPA HEPATICA (Linn.), 1764.

Cancer hepaticus, Linnæus, Mus. Lud. Ulr. p. 448 (1764).

Calappa tuberculosa, Guérin, Icon. R. A., Crust. pl. xii. fig. 2.

Calappa hepatica, de Haan, Faun. Japon., Crust. p. 70 (1833); Alcock, J. As. Soc. Beng. lxv. 2, p. 142 (1896); Whitelegge, Mem. Austral. Mus. iii. 2, p. 139 (1897).

Funafuti; one male, one female.
Rotuma; one male, four females.

Tribe BRACHYGNATHA.

Subtribe OXYRHYNCHA.

Family MAIIDÆ.

Subfamily INACHINÆ.

Genus CAMPOSCIA Latr., 1829.

6. CAMPOSCIA RETUSA Latr., 1829.

Camposcia retusa, Latreille, Cuvier's R. An. (2) p. 60 (1829); A. M.-Edwards, H. N. Crust. i. p. 283, pl. xv. figs. 15, 16 (1834); Alcock, J. As. Soc. Beng. lxiv. 2, p. 184 (1895).

Rotuma; one male.

Subfamily ACANTHONYCHINÆ.

Genus XENOCARCINOIDES, nov.

Characters of *Xenocarcinoides*, n. gen.:—

Rostrum long, compressed, above faintly grooved and notched at the tip, below hollowed and bearing on each side a thin wing.

Carapace elongate-triangular, bearing large tubercles.

Eyes moveable but not retractile, sunken in a pit formed by the side of the rostrum and the immoveable second joint of the second antenna. No pre- or postocular spines.

Antenna with 1st and 2nd joints fused, subtriangular. Flagellum hidden under rostrum.

Third maxilliped with the meropodite subquadrate, as broad as the ischiopodite, and bearing the carpopodite at its inner angle.

Chelipeds large; longer than either of the last three pairs of legs. (The second pair of legs are unfortunately wanting in the specimen.) The last three legs diminish gradually from before backwards. The dactyles are somewhat sickle-shaped, toothed below, and as long as the preceding joint.

The abdomen of the male is six-jointed, owing to fusion of joints 5 and 6, between which, however, a furrow can still be seen.

The genus differs from *Xenocarcinus* White in the shape of the carapace and rostrum, and in the larger size of the chelipeds.

7. XENOCARCINOIDES ROSTRATUS, n. sp. (Plate XL. fig. 1.)

Diagnosis: "A *Xenocarcinoides* with the carapace provided with ten tubercles arranged in an anterior and a posterior group of five each, those of the hinder group being larger and more acute than those of the anterior; chelipeds much larger than the last three legs, nearly as long as the rostrum; fingers shorter than the palm, fairly stout, enclosing a space at the base, with interlocking teeth at the tip; moveable finger with an isolated blunt tooth near the proximal end; walking-legs with the joints irregularly swollen; dactyles somewhat sickle-shaped, bearing spines and a few hairs below."

The third maxilliped and the abdomen of the male are shown in figs. 1 *a* and 1 *b*.

Colour in spirit, white.

Total length 13·5 mm. Length of carapace to base of rostrum 8·5 mm. Greatest breadth 7 mm.

Funafuti; one male.

Genus Menæthius H. M.-Edw., 1834.

8. Menæthius monoceros (Latr.), 1825.

Pisa monoceros, Latr. Encycl. x. p. 139 (1825).

Menæthius monoceros, H. M.-Edwards, H. N. Crust. i. p. 339 (1834); Alcock, J. As. Soc. Beng. lxiv. 2, p. 197 (1895).

Menæthius angustus, *depressus*, *subserratus*, *tuberculatus*, *areolatus*, and *inornatus*, Dana, U.S. Expl. Exped., Crust. i. pp. 121–125, pl. iv. figs. 5–7 & pl. v. figs. 1–3 (1852).

Funafuti; two males.

The carapace in both specimens has the tubercles low and rounded but fairly numerous.

Subfamily Pisinæ.

Genus Hyastenus White, 1847.

9. Hyastenus elegans Miers, 1886, var. (Plate XL. fig. 2.)

Hyastenus elegans, Miers, 'Challenger' Brachyura, p. 58, pl. vi. fig. 3 (1886).

The specimens differ from the type in the following particulars:—

1. The horns are more slender and set wider apart at the base.
2. The larger tubercles of the carapace are more rounded; not so sharp.
3. The arrangement of tubercles in the fore part of the carapace is somewhat different (see figure).

Should it be thought advisable to give this variety a name, that of *tenuicornis* would be suitable.

Rotuma; two males, one female.

Genus Tylocarcinus Miers, 1879.

10. Tylocarcinus styx (Herbst), 1803.

Cancer styx, Herbst, Naturges. Krabb. u. Krebse, iii. 3, p. 53, pl. lviii. fig. 6 (1803).

Microphrys styx, A. M.-Edwards, Nouv. Arch. Mus. (1) viii. p. 247, pl. xi. fig. 4 (1872).

Tylocarcinus styx, Miers, Ann. Mag. Nat. Hist. (5) iv. p. 14 (1879); Alcock, Journ. As. Soc. Beng. lxiv. 2, p. 235 (1895).

Rotuma; eight males and eight females.

Two of the males have adult chelæ as in Milne-Edwards's figure. The length of these two is 20 and 18 mm. respectively, measured from the hinder end of the carapace to the tip of the rostral spines. Of the remaining six males, the two biggest were both exactly 16 mm. long; in one of these the two chelæ were both like those of the female and young male, in the other the left claw was that of the female and the right that of the grown male. All the other specimens had the chelæ of the female.

Subfamily Maiinæ.

Genus Cyclax Dana, 1852.

11. Cyclax (Cyclomaia) suborbicularis (Stimps.), 1857.

Mithrax suborbicularis, Stimpson, Proc. Ac. Nat. Sci. Philad. 1857, p. 218.

Cyclomaia margaritata, A. M.-Edwards, Nouv. Arch. Mus. (1) viii. p. 236, pl. x. figs. 2, 3 (1872).

Cyclax (Cyclomaia) suborbicularis, Alcock, Journ. As. Soc. Beng. lxiv. 2, p. 245 (1895).

Rotuma; three males and three females.

Of the females one, 19 mm. long, had the sterna completely covered by the abdomen. The others, 17 and 18 mm. long respectively, showed a considerable stretch of the sterna bare on each side of the abdomen.

Family Hymenosomidæ.

Genus Elamene H. M.-Edw., 1837.

12. Elamene truncata A. M.-Edw., 1874.

Elamene truncata, A. M.-Edwards, Nouv. Arch. Mus. (1) x. p. 323 (1874).

Rotuma; one female.

Subtribe CYCLOMETOPA.

Family Atelecyclidæ.

It seems best to follow Ortmann in keeping this family distinct from the Cancridæ, and to place in it the subfamilies Atelecyclinæ, Acanthocyclinæ, and Thiinæ.

Subfamily THIINÆ.

Genus KRAUSSIA Dana, 1852.

13. KRAUSSIA RASTRIPES Müller, 1887.

Kraussia rastripes, Müller, Verh. Nat. Ges. Basel, viii. 2, p. 480, pl. iv. fig. 5 (1887).

The ridges on the moveable finger of the specimen are not so distinctly tuberculated as in Müller's figure.

Rotuma; one female.

Family CANCRIDÆ.

By the removal of the subfamilies of the Atelecyclidæ, the family Cancridæ becomes restricted to the Cancrinæ and Pirimelinæ, with perhaps also the Carcinidinæ (= Carcininæ). Thus narrowed it is essentially a circumpolar group, and it is not surprising that it is unrepresented in the present collection.

Family PORTUNIDÆ.

The following tables, showing the schemes of classification adopted by Ortmann[1] and Alcock[2] respectively, make it clear that there is a considerable difference of opinion between the authors in question, though in the main they may be said to be in accord.

Alcock.		Ortmann.
Subfamilies.	*Alliances.*	*Subfamilies.*
Portumninæ.	Carcinoida. Portumnoida.	Portumninæ.
Portuninæ.	Portunoida. Cœnophthalmoida.	Portuninæ.
Caphyrinæ.	———	
Lupinæ.	Lupocycloida. Lupoida. Podophthalmoida.	Carupinæ. Thalamitinæ. Podophthalminæ.

Roughly speaking Ortmann's subfamilies correspond to alliances in Alcock's classification, but there is considerable divergence in detail.

Neither author refers to the somewhat remarkable genus *Goniocaphyra* de Man, which is not only impossible to place in any subfamily of either author as defined, but appears to have a distinct standing of its own, and to deserve a separate subfamily for its reception.

[1] Ortmann, Bronn's 'Thier-reich,' v. 2, p. 1170 (1899).
[2] Alcock, Journ. Soc. As. Beng. lxviii. 2, i. p. 6 (1899).

Under the circumstances it is perhaps best to retain the whole of Ortmann's subfamilies with the addition of two, or three, others —the *Caphyrinæ* for the genera *Caphyra* Guérin 1832, and *Sphærocarcinus* Zehnter 1894; a new subfamily *Goniocaphyrinæ*, for the single genus *Goniocaphyra* de Man 1837; and the *Carcinidinæ*, if it be thought needful to retain this group in the Portunidæ.

The following key embodies the leading characters of the subfamilies as it is here proposed to limit them :—

I. Eyestalks and orbits normal.
- A. Basal joint of 2nd or outer antenna narrow. [Flagellum of 2nd antenna not shut out from orbit.]
  - i. Inner antennæ sloping. Front with a median tooth. Generally at least one pair of walking-legs as long as chelipeds.
    1. Last pair of legs not distinctly natatorial ...... *Carcinidinæ*.
    2. Last pair of legs distinctly natatorial .... *Portumninæ*.
  - ii. Inner antennæ transverse. Front with a median notch. Chelipeds longer than walking-legs.
    1. 5th dactyles lanceolate .... *Goniocaphyrinæ*.
    2. 5th dactyles rounded .... *Carupinæ*.
- B. Basal joint of antenna broad. [Chelipeds larger than walking-legs.]
  - i. Flagellum of 2nd antenna not shut out from the orbit by a process of the basal joint .... *Portuninæ*.
  - ii. Flagellum of 2nd antenna shut out from the orbit by a process of the basal joint. [5th legs natatorial.]
    1. Last joint of 5th legs sickle-shaped .... *Caphyrinæ*.
    2. Last joint of 5th legs flattened .... *Thalamitinæ*.

II. Eyestalks enormously long, orbits extend across the whole fore edge of the carapace. [5th legs natatory. Chelipeds longer than legs. Antennæ free; basal joint short; flagellum not shut out from orbit.] .... *Podophthalminæ*.

Subfamily Goniocaphyrinæ.

Characters of *Goniocaphyrinæ*, n. subfam. :—

1. Carapace broad.
2. Antero-lateral edge with 5 teeth.
3. Front truncate, slightly notched in the middle.
4. Legs slender; chelipeds somewhat longer than walking-legs.
5. Last pair of legs with lanceolate dactyles.
6. Basal joint of antenna enters the orbital gap but does not wholly fill it. Flagellum not shut out from orbit by a process of the basal joint.
7. Antennules transverse.

Genus Goniocaphyra de Man, 1887.

14. Goniocaphyra truncatifrons de Man, 1887.

Goniocaphyra truncatifrons, de Man, Arch. Naturg. liii. 1, iii. p. 339, pl. xiv. fig. 1 (1887).

Funafuti; one male.

Subfamily Carupinæ.

Genus Carupa Dana, 1850.

15. Carupa læviuscula Heller, 1862.

Carupa læviuscula, Heller, Verh. zool.-bot. Ges. Wien, xii. p. 520 (1862); id. 'Novara' Crust. p. 27, pl. iii. fig. 2 (1868); Alcock, Journ. As. Soc. Beng. lxviii. 2, i. p. 26 (1899).

Funafuti; one male.

Subfamily Portuninæ.

Genus Neptunus de Haan, 1833.

Neptunus, de Haan, Faun. Japon., Crust. p. 7 (1833); Alcock, Journ. As. Soc. Beng. lxviii. 2, i. p. 28 (1899); Ortmann, Bronn's 'Thier-reich,' v. 2, p. 1171 (1899).

Portunus, Rathbun, Proc. Biol. Soc. Wash. xi. pp. 155 & 160 (1897); id. Proc. U.S. Nat. Mus. xxii. p. 289 (1900).

I am unable to agree with the alteration of the name of this genus proposed by Miss Rathbun. On the subject of Latreille's "types" I am in full agreement with the position taken up by Stebbing (Nat. Sci. xii. p. 239).

16. Neptunus (Achelous) granulatus (H. M.-Edw.), 1834.

Lupea granulata, H. M.-Edwards, H. N. Crust. i. p. 454 (1834).

Amphitrite speciosa, Dana, Proc. Ac. Nat. Sci. Philad. 1852, p. 84; id. U.S. Expl. Exped., Crust. i. p. 276, pl. xvii. fig. 1 (1852).

Achelous granulatus, A. M.-Edwards, Arch. Mus. x. p. 344 (1861).

Neptunus (Achelous) granulatus, Miers, 'Challenger' Brachyura, p. 180 (1886); Alcock, Journ. As. Soc. Beng. lxviii. 2, i. p. 45 (1899).

Funafuti; four males.

Subfamily Thalamitinæ.

Genus Thalamita Latr., 1829.

17. Thalamita prymna (Herbst), 1803.

Cancer prymna, Herbst, Naturges. Krabb. u. Krebse, iii. 3, p. 41, pl. lvii. fig. 2 (1803).

Thalamita prymna, H. M.-Edwards, H. N. Crust. i. p. 461 (1834); Alcock, Journ. As. Soc. Beng. lxviii. 2, i. pp. 76, 78.

Alcock supports Kossman's view that all the forms of *Thalamita* with an eight-lobed front and a very broad basal joint to the antenna are but varieties of one species (*T. prymna*). The present collection contains no examples of the type, but three varieties are represented.

Var. PICTA Stimps., 1858.

Thalamita picta, Stimpson, Proc. Ac. N. Sci. Philad. 1858, p. 39; A. M.-Edwards, Nouv. Arch. Mus. (1) ix. p. 164, pl. iv. fig. 4 (1873); Alcock, Journ. As. Soc. Beng. lxviii. 2, i. p. 79 (1899).

Rotuma; one male.

Var. STIMPSONI A. M.-Edw., 1861.

Thalamita stimpsoni, A. M.-Edwards, Arch. Mus. x. p. 362, pl. xxxv. fig. 4 (1861); Alcock, Journ. As. Soc. Beng. lxviii. p. 79 (1899).

Var. SPINIMANA Dana, 1852.

Thalamita spinimana, Dana, U.S. Expl. Exped., Crust. i. p. 283, pl. xvii. fig. 8 (1852); A. M.-Edw. Arch. Mus. x. p. 364 (1861); id. Nouv. Arch. Mus. (1) ix. p. 165, pl. iv. fig. 5 (1873).

Rotuma; five males.

18. THALAMITA ADMETE (Herbst), 1803.

Cancer admete, Herbst, Naturges. Krabb. u. Krebse, iii. 3, p. 40, pl. lvii. fig. 1 (1803).

Thalamita admete, H. M.-Edw. H. N. Crust. i. p. 459 (1834); id. Cuvier's R. An. 2nd ed., Atlas Crust. pl. ix. fig. 2 (no date); Whitelegge, Mem. Austral. Mus. iii. 2, p. 138 (1897).

Thalamita admeta, Alcock, Journ. As. Soc. Beng. lxviii. 2, i. p. 32 (1899).

Rotuma; three males.

Var. EDWARDSI, n. nom.

Thalamita admete, A. M.-Edwards, Arch. Mus. Paris, x. p. 356 (1861).

Alcock (J. As. Soc. Beng. lxviii. p. 84) points out the existence of three varieties of this species. It is at present convenient to have a name for such forms, and accordingly it is here proposed to call Alcock's var. (2) *edwardsi*, after Prof. A. Milne-Edwards, who described it.

Funafuti; one male.

19. THALAMITA INTEGRA Dana, 1852.

Thalamita integra, Dana, Proc. Ac. N. Sci. Philad. 1852, p. 85; id. U.S. Expl. Exped., Crust. i. p. 281, pl. xvii. fig. 6 (1852); Whitelegge, Mem. Austral. Mus. iii. 2, p. 138 (1897); Alcock, Journ. As. Soc. Beng. lxviii. 2, i. p. 85 (1899).

Funafuti; seven males, six females.

Subfamily CAPHYRINÆ.

Genus CAPHYRA Guérin, 1832.

20. CAPHYRA ROTUNDIFRONS (A. M.-Edw.), 1869.

Camptonyx rotundifrons, A. M.-Edwards, Nouv. Arch. Mus. (1) v. p. 156, pl. vii. figs 11 & 12 (1869).

Caphyra rotundifrons, A. M.-Edwards, Nouv. Arch. Mus. (1) ix. p. 174 (1873).

Rotuma; fourteen males, five females.

Family XANTHIDÆ.

Subfamily MENIPPINÆ.

Genus PSEUDOZIUS Dana, 1851.

21. PSEUDOZIUS INORNATUS Dana, 1852.

Pseudozius inornatus, Dana, U.S. Expl. Exped., Crust. i. p. 234, pl. xiii. fig. 7 (1852).

The colour of this species as preserved in spirit is brown of varying shades with three pale longitudinal stripes on the carapace, indicated in Dana's figure. It is, I think, quite distinct from *P. caystrus* (Ad. & Wh.).

Funafuti; eight males, six females.

22. PSEUDOZIUS CAYSTRUS (Ad. & Wh.), 1848.

Panopœus caystrus, Adams & White, 'Samarang,' Crust. p. 42, pl. ix. fig. 2 (1848).

Pseudozius caystrus, Miers, 'Challenger' Brachyura, p. 142 (1886); Alcock, Journ. As. Soc. Beng. lxvii. 2, i. p. 181 (1898).

Rotuma; twenty-six males, thirty-eight females.

Funafuti; two males, six females.

Genus MELIA Latr., 1825.

23. MELIA TESSELATA (Latr.).

Grapsus tesselatus, Latreille, Encycl. Méth. pl. cccv. fig. 2.

Melia tesselata, Latreille, Encycl. x. p. 705 (1825); H. M.-Edwards, Cuvier's R. An. ed. 3, Atlas Crust. pl. xv. fig. 5 (no date); Dana, U.S. Expl. Exped., Crust. i. p. 242, pl. xiv. fig. 1 (1852).

Melia tresselata, H. M.-Edw. Coll. Mus. pl. xviii. fig. 8; id. H. N. Crust. i. p. 431, pl. xviii. figs. 8, 9 (1834).

Rotuma; two males, five females.

Genus ACTUMNUS Dana, 1851.

24. ACTUMNUS SETIFER (de Haan), 1835.

Cancer (Pilumnus) setifer, de Haan, Faun. Japon., Crust. p. 50, pl. iii. fig. 3 (1835).

Actumnus setifer, A. M.-Edwards, Nouv. Arch. Mus. (1) i. p. 287, pl. xv. fig. 5 (1865); Alcock, Journ. As. Soc. Beng. lxvii. 2, i. p. 202 (1898).

Fiji; one male.