

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

[FIFTH SERIES.]

No. 23. NOVEMBER 1879.

XXXVII.—*Additions to the Amphipodous Crustacea of New Zealand.* By GEORGE M. THOMSON, Dunedin.

[Plate XVI.]

A GREAT boon was conferred upon working naturalists in this colony by the publication, in 1876, of a Catalogue of the Stalk- and Sessile-eyed Crustacea of New Zealand, by Mr. E. J. Miers, of the British Museum, under the auspices of the Colonial Government. Information on the subject was there collected together which had previously been obtainable only by reference to expensive and difficultly obtainable works; and though the catalogue was necessarily imperfect, it gave a good starting-point to those engaged in working up this branch of the New-Zealand fauna. Naturally enough, chiefly the larger Crustacea belonging to the Brachyura and Macrura had been obtained by earlier collectors, and the list of them is tolerably complete. It is to the Isopoda and Amphipoda that additions will chiefly be made, these tribes being well represented in our seas.

Mr. Miers has enumerated fifteen species of Amphipoda in his catalogue, all of which, with the exception of *Phronima novæ-zealandiæ*, Powell, were previously described in Spence Bate's catalogue of Amphipodous Crustacea in the British Museum. Of these species, *Talitrus* (?) *novæ-zealandiæ*, Dana (*Orchestoidea* (?) *novi-zealandiæ*, Spence Bate), must be ex-

cluded, as I have already shown (in a paper published in the N.-Z.-Inst. Transactions) that it is only the female of *Talorchestia Quoyana*, Dana. In the same paper I have replaced *Paramœra tenuicornis*, Miers (*Mœra tenuicornis*, Spence Bate), in the genus in which it was originally placed by Dana, as *Melita tenuicornis*. At the same time I added fourteen species (belonging to eleven genera), of which twelve were new to science. These additions were **Nicea novæ-zealandicæ*, **N. fimbriata*, and **N. rubra*, *Lysianassa Krøyeri*, **Pherusa novæ-zealandicæ*, **Atylus Danai*†, **Dexamine pacifica*, **Calliope didactyla* and **C. fluviatilis*, **Gammarus barbimanus*, *Themisto antarcticus*, **Platyscelus intermedius* (which may prove to be the connecting-link between *P. Rissoina* and *P. serratus*, the extreme forms of one and the same species), **Caprella caudata* and **Caprellina novæ-zealandicæ*.

In the 'Annals' for December 1878, Mr. T. W. Kirk of Wellington made some additions to the local crustacean fauna, including the following Amphipods—*Caprella lobata* and **C. novæ-zealandicæ*.

I am now able to add four more species, of which three are new.

1. *Amphithonotus lævis*, sp. nov. (Pl. XVI. figs. 1-4.)

Animal quite smooth and not carinated on the back. Cephalon produced into a small falcate rostrum, which projects between the bases of the antennæ. Eyes large, subreniform. Superior antennæ slightly exceeding the inferior, about half as long as the animal; peduncle very short; flagellum long, slender, and multiarticulate. Peduncle of inferior antennæ longer than peduncle of superior. Appendage of the mandibles long, middle joint exceeding the other two. Maxillipeds having the appendages longer than their respective joints. Gnathopoda small, subequal, abundantly ciliated; propodos with a well-defined, nearly transverse palm, against which the dactylos impinges closely. Pereiopoda subequal, posterior pair the longest. Pleopoda subequal; rami lanceolate, those of the penultimate and antepenultimate pairs unequal in length. Telson tubular, notched at the apex. Length .3 inch.

Hab. Dredged in Dunedin Harbour in 4-5 fathoms.

Though agreeing closely in generic characters, this species is very distinct in appearance from *A. Edwardsii*, as figured in the British-Museum catalogue, and also apparently from *A. spiniventris*, Costa.

* Species not before described.

† Printed "*dania*" in Trans. N.-Z. Inst. vol. xi. p. 238.

2. *Aora typica*, Kröyer.

Of this species I got one specimen in the dredge, along with the preceding. This agreed well with the characters given in Brit.-Mus. Cat. p. 161, differing only slightly in the following respects:—The superior antennæ were about as long as the animal; the propodos of the first gnathopoda, as well as the last four joints of the second gnathopoda, were very hairy; telson quite smooth.

Colour yellowish, with small black spots chiefly on the lower parts of the body and on the limbs. Length $\cdot 3$ inch.

The species has evidently a wide range, having been originally described from specimens obtained at Valparaiso.

3. *Microdeutopus maculatus*, sp. nov. (Pl. XVI. figs. 5–8.)

Animal smooth, slender. Coxæ rather small. Superior antennæ considerably longer than inferior, two thirds as long as body; second joint of peduncle long and slender; third short and furnished with a 5–6-jointed appendage; flagellum very slender, many-jointed, sparingly ciliated. Inferior antennæ strong, subpediform, with a stout olfactory denticle, and furnished with numerous cilia; third joint of peduncle short, fourth and fifth very long; flagellum short, indistinctly 6–7-jointed. Mandibular appendage 2-jointed. Maxillipeds with strongly-toothed appendages. Gnathopoda moderate, covered with strong cilia: first pair rather the largest; carpus rounded on its inferior margin; propodos oblong, with a very oblique, curved palm defined by a strong spine; dactylos strong and curved, finely toothed on the inner margin: second pair similar, but with the palm transverse and without the defining spine. Third pereopoda shorter than preceding; posterior pair very long. Antepenultimate pleopoda reaching to extremity of ultimate pair; base of the rami with a stout spine. Telson with a broad apical notch, each side with a slender spinule. Length $\cdot 35$ inch.

Hab. A single specimen dredged in Dunedin Harbour in 4–5 fathoms.

Apparently a very distinct species.

4. *Cyrtophium cristatum*, sp. nov. (Pl. XVI. figs. 9–15.)

Male. Eyes prominent. Pereion wider than deep, transversely ribbed and tuberculate. Last segment of pereion and three anterior segments of pleon elevated into prominent crests. Antennæ with long cilia on their inferior margins: superior pair shorter than inferior; peduncle reaching the extremity of penultimate joint of peduncle of inferior, bearing a one-jointed

appendage; flagellum very indistinctly 7-8-jointed: inferior pair very strong, about as long as body; second and third joints with spines on their anterior margins; fourth and fifth joints long; flagellum indistinctly three-jointed, the first joint being equal to the two succeeding. Mandibles with an appendage, the basal joint of which is much the shortest. Maxillipeds with appendages to the basos and ischium; dactylos spatulate. First gnathopoda with simple cilia on their inferior margins; carpus produced inferiorly into a rounded lobe; propodos narrowing anteriorly, palm very oblique, defined by three or four stout spines; dactylos strong, curved and acutely toothed on its inner margin. Second gnathopoda large and powerful, furnished with numerous plumose hairs, which are particularly abundant in two rows on each side of the palm; basos hollowed out in front so as to receive the upperside of the propodos; meros acutely produced on its infero-posterior margin; propodos articulating on the upper margin of the carpus, oblong, that of the left side slightly the larger and having the teeth more prominent on its upper margin; palm extending along the whole under surface, with two or three denticulations; dactylos long, curved, and smooth. Pereiopoda subequal, fifth pair rather the longest; setæ numerous and strong, not exceeding the diameter of the articulations to which they are attached. Telson conical, tipped with a few slender setæ.

Female differs from the above only in the greater width of the pereion, and in having the second gnathopoda relatively smaller, rounder, and wanting the plumose cilia. Length .25 inch.

Hab. Dredged along with the preceding species in Dunedin Harbour in 4-5 fathoms, among *Sertulariæ* and seaweeds.

This species differs from the generic characters of *Cyrtophium* in possessing an appendage on the superior antennæ; but as it agrees in every other respect, I do not feel justified in placing it in a new genus. It comes nearest to *C. brasiliense*, obtained by Dana in the harbour of Rio Janeiro.

EXPLANATION OF PLATE XVI.

- Fig. 1.* *Amphithonotus lævis* ♀, magnified.
Fig. 2. The same: cephalon, showing the rostrum, ×14.
Fig. 3. The same: mandible, with its appendage, ×56.
Fig. 4. The same: telson, seen from above, ×14.
Fig. 5. *Microdeutopus maculatus* ♀, magnified.
Fig. 6. The same: telson and posterior pleopoda. ×28.
Fig. 7. The same: mandible and appendage, ×28.
Fig. 8. The same: maxillipeds, ×28.

Fig. 9. *Cyrtophium cristatum* ♂, magnified.

Fig. 10. The same: mandible, × 28.

Fig. 11. The same: left maxilliped, × 28.

Fig. 12. The same: first gnathopod, × 28.

Fig. 13. The same: second gnathopod, × 25.

Fig. 14. The same: single hair from palm of same, × 115.

Fig. 15. The same: telson and posterior pleopoda, three pairs, × 28.

XXXVIII.—*On the Geological Distribution of the Rhabdophora*. By CHARLES LAPWORTH, F.G.S. &c.

[Continued from vol. iii. p. 455.]

Part II. DATA.

CAMBRIAN SYSTEM.—Although the fact of the existence of *Cladophora* in the Upper Cambrian rocks has been admitted by palæontologists since Salter's discovery of *Dictyonema sociale* in such abundance in strata of this age in Merionethshire, it is only within the last few years that the presence of *Rhabdophora* or true Graptolites in these ancient deposits has been placed absolutely beyond question. Kjerulf, indeed, figured a well-marked *Dichograptus* (*Bryograptus*) from the Alum-shales of Christiania in his 'Veiviser,' as early as 1865; but its exact horizon is even yet doubtful. Its true Cambrian age, however, is rendered highly probable by Linnarsson's more recent discovery of *Dichograptus tenellus* &c. in the highest Olenus-beds of Westrogothia*, and an allied form in the *Dictyonema*-schists of Scania. These strata correspond to the highest portions of the *Lingula*-flags of Wales, and are unequivocally of true Cambrian age.

The question of the existence of *Rhabdophora* in the Upper Cambrian of Britain has also been satisfactorily set at rest by the interesting researches of Dr. C. Callaway. This careful observer detected Graptolites in the Shineton (Upper Cambrian) shales of Salop as early as 1873; and in the following year examples of *Bryograptus* and *Clonograptus* from these rocks were forwarded by him to me for identification; and I recognized at once their striking similarity to the forms figured from the Swedish Cambrian by Kjerulf and Linnarsson. Within the last few months Dr. Callaway has discovered fragments of the first of these genera in the Cambrian rocks of the Malvern Hills.

* Linnarsson, 'Öfversigt af Vetenskaps-Ak. Förhandlingar,' 1871, p. 794; and Geol. Mag., June 1876.



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Thomson, George Malcolm. 1879. "Additions to the amphipodous Crustacea of New Zealand." *The Annals and magazine of natural history; zoology, botany, and geology* 4, 329–333. <https://doi.org/10.1080/00222937908679843>.

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