THE

SUBANTARCTIC ISLANDS

OF

NEW ZEALAND.

REPORTS

ON THE

GEO-PHYSICS, GEOLOGY, ZOOLOGY, AND BOTANY OF THE ISLANDS LYING TO THE SOUTH OF NEW ZEALAND,

BASED MAINLY ON

OBSERVATIONS AND COLLECTIONS MADE DURING AN EXPEDITION IN THE GOVERNMENT STEAMER "HINEMOA" (CAPTAIN J. BOLLONS) IN NOVEMBER, 1907.

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ARTICLE XXVI.—THE CRUSTACEA OF THE SUBANTARCTIC ISLANDS OF NEW ZEALAND.

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INTRODUCTION.

THE collection of *Crustacea* actually made during the expedition was not very extensive, owing to the fact that very little dredging could be done, and that the Campbell Island station, where I spent most of my time, was not a favourable one for the littoral and marine forms. I have, however, been able to examine and incorporate in this report numerous species that were gathered at other times by Captain Bollons, Professor W. B. Benham, and Dr. L. Cockayne. To these gentlemen and to the various members of the expedition who so willingly collected *Crustacea* for me at places inaccessible to myself I wish to record here my best thanks.

No separate list of the *Crustacea* from these islands has, so far as I am aware, hitherto been published, though several species have been recorded from them at different times by the various scientific expeditions that have visited antarctic seas, by the late Captain Hutton,* and by the late Monsieur Henri Filhol.† In this report I record the occurrence at these islands of seventy-five species—viz., *Decapoda*, 12; *Stomatopoda*, 1; *Amphipoda*, 34; *Isopoda*, 20; *Tanaidacea*, 1; *Nebaliacea*, 1; *Entomostraca* (*Cirripedia*, *Copepoda*, and *Branchiopoda*), 6. It will be seen that the greater number belong to the *Amphipoda* and *Isopoda*. Doubtless many other *Decapoda* would be added as the result of systematic dredgings round the islands. No proper attempt has yet been made to collect the *Entomostraca*.

In the general classification I have followed that adopted by Dr. W. T. Calman in his recent work on the *Crustacea* for Ray Lankester's "Treatise on Zoology," while in the *Amphipoda* I have mainly followed the classification in Stebbing's "Das Tierreich Amphipoda," though with some slight modifications.

The forms not hitherto described are few in number. I describe only one new genus and nine new species; but, on the other hand, I have reduced a much greater number both of genera and of species to the rank of synonyms, for reasons that I hope will be considered satisfactory. This I have done chiefly in the *Amphipoda*, for which group I have fortunately been able to consult most of the reports on the

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* Trans. N.Z. Inst., xi, pp. 340, 341.

† "Mission de l'Île Campbell."

RABBITS.

These rodents have been freely introduced into the Auckland Group, and are said to be common on some of the islets at the present day. They bred so rapidly on a small detached area that they were in danger of extermination owing to lack of food; some of them were therefore removed to Rose Island, where they still exist.

Rabbits also live on Enderby Island, and traces of them were seen by members of our expedition.

RATS.

Captain Bollons informs me that rats are very numerous around the homestead on Campbell Island, and he thinks, judging from their size, that they are brown rats (*Mus decumanus*). Mr. G. R. Marriner tells me that he met with "grey rats" at North-west Bay. It is quite possible that these are black rats (*Mus rattus*), which I have elsewhere* described as living in the Australian bush, while the brown rat is seldom found far from the habitations of man.

HOUSE-MOUSE.

It is not surprising that the mouse is acclimatised on Campbell Island, seeing that it is properly inhabited, four shepherds living thereon the year through.

At the present day the Auckland Islands are visited normally but twice a year, and the chance of introducing mice is not great. Years ago, however, when whalers and sealers visited the islands, and doubtless lived thereon for considerable periods, the house-mouse was introduced, and has spread considerably. Traces were seen at the various depots established for the benefit of marooned sailors, while at the hut near our main camp kerosene-tins left by former visitors, and containing a little fat at the bottom, yielded numbers of remains. Returning from the bush on one occasion, Mr. F. R. Field told me that he had seen a piebald mouse run under a log, and he piloted me to the scene. We dug under the log for a considerable space, and at length secured a young mouse; it was, however, of normal coloration. An adult example was secured on Masked Island.

I am told by Captain Bollons that mice are very numerous at the Government depots on Campbell and Antipodes Islands

DOMESTIC POULTRY.

Whether owing to unsuitable conditions or inability to exist when removed from the fostering care of man, the fact remains that the fowls and ducks placed on the Auckland Islands, and the game and guinea fowls similarly turned loose on Campbell Island, have failed to establish themselves; while the domestic poultry under the care of the shepherds at Campbell Island, where they are properly fed and housed, thrive equally well with the farmyard birds of less rigorous climes.

* Waite, Proc. Zool. Soc., 1897, p. 857.

recent expeditions to southern seas; and, as many of the forms found at these islands are circumpolar in distribution, I have been in a position to correlate the various reports, and to decide in certain cases where the same form has been described under different names by different authors. In several groups of the *Amphipoda* the multiplication of genera has been carried to what appears to me an unnecessary degree, and characters have therefore been introduced into the generic diagnoses which, in some cases at any rate, are subject to individual variation. While the multiplication of species is bewildering enough, the unnecessary subdivision of genera creates still greater confusion.

As regards the geographical distribution of the species concerned, the results seem to be somewhat important. Naturally, the chief interest attaches to the terrestrial and fresh-water forms of the *Amphipoda* and *Isopoda*. Of these, there are in the islands three fresh-water and fourteen terrestrial species, including under the latter the sand-hoppers found on the shores. Of the fresh-water species,* two occur also in New Zealand; one of these (*Idotea lacustris*) is also found in Tierra del Fuego, the other (*Chiltonia mihiwaka*) is allied to species of the same genus found in Australia and Tasmania, and is represented in South America by the closely allied genus *Hyalella*. The third fresh-water species belongs to the genus *Atyloides*, of which two species have been described from the fresh waters of Victoria, but none as yet from the main islands of New Zealand. The genus as at present defined contains both marine and fresh-water species.

Of the fourteen terrestrial species, four belong to the genus *Parorchestia*, and three of these are peculiar to the islands, the fourth species being found on the Snares and in New Zealand (Stewart Island). Another closely allied species of this genus is very abundant in New Zealand, but has not yet been recorded with certainty from the subantarctic islands; but, as I have explained below, the identification of species in this genus is particularly difficult, and, in any case, we have here one terrestrial genus common to New Zealand and the islands, and represented by slightly different forms in the different islands. Of the remaining terrestrial species, four are endemic, but are represented in the main islands of New Zealand by closely allied species, and five others are identical with New Zealand species; consequently the connection between New Zealand and the islands lying to the south of it is very close, and the existence of so many similar forms in the two localities points, I think, undoubtedly to previous land connection. The remaining terrestrial species occurs also in South America, but has not been recorded from New Zealand.

These terrestrial species, like the fresh-water ones, also show connection with those of South America, Falkland Islands, and other subantarctic localities. One species, *Trichoniscus magellanicus*, found in both Auckland and Campbell Islands, is, I think, identical with one found in Tierra del Fuego and the Falkland Islands, and is very closely related to *T. verrucosus*, which has recently been described by Budde-Lund from the Crozets. Both these species, together with *T. thomsoni* (found in the Auckland Islands and also in New Zealand) and with some other New Zealand species, belong to a separate section of the genus *Trichoniscus*, confined in its distribution to

* I have not included *Parorchestia tenuis* (Dana) among the fresh-water species, as it can also live in brackish or even in salt water.

subantarctic regions. Another species, *Deto aucklandiae*, belongs to a genus of similar distribution, for species are known from New Zealand and the neighbouring islands, South America, Cape Colony, St. Paul (in the Indian Ocean), and Australia, and the genus is not known from any other locality. The Auckland Island species is peculiar to those islands, but is represented in New Zealand by *D. novae-zealandiae* (Filhol), which is very close to, if not identical with, a species described many years ago from Chili under the names *Oniscus bucculentus* (♂) and *O. tuberculatus* (♀), Nicolet.

The conclusions drawn from the above facts would be strengthened by a consideration of the distribution of the species of *Hyale* found on the subantarctic islands of New Zealand, for though, of course, marine, they are found only in shallow waters near the coast. Of the three species, one, *H. campbellica* (Filhol), is known only from Campbell Islands, and is a doubtful species; of the other two, one certainly extends to South America, South Georgia, and Kerguelen, and the other probably to South America.

The marine *Crustacea* from these islands, omitting the *Entomostraca*, number fifty. Of these, only one genus and four species are endemic, and two of these species are doubtful; of the remainder, thirty are found in one or more of the other subantarctic or antarctic localities, and about eight of the others extend to Australia and other places beyond New Zealand, while only twelve are confined to the New Zealand region, and some of these are represented by closely allied species in other subantarctic islands. Some five antarctic or subantarctic species are found in the islands, which do not appear to extend to the main islands of New Zealand.

It will thus be seen that the marine forms very considerably strengthen the evidence as to the large antarctic element in the crustacean fauna of these islands and to the close similarity of their *Crustacea* to those of the other subantarctic regions.

In connection with the species of the terrestrial genus *Parorchestia* there is one point that seems worthy of note. It is a curious fact that although the male of *P. sylvicola* (Dana) on the main islands of New Zealand is very rare, nearly all the specimens captured being females, yet in the three species found on the Auckland and Campbell Islands the males appear to be almost as abundant as the females —at least, so far as the collections before me enable me to judge. I have noticed that with species of *Orchestia* and *Talorchestia* on the sea-shore of New Zealand the males are usually fairly abundant, and approximate in number to that of the females. Whatever may be the conditions producing this result in littoral situations, it is probable that the same conditions obtain to a considerable extent over the whole of these subantarctic islands, for, owing to the damp climate and the abundance of undergrowth, the soil is always more or less wet, and the strong westerly winds carry the sea-spray over the greater part of the islands. In islands like these it is easy to see that the transition from life on the sea-shore within reach of the sea-spray to terrestrial life at higher altitudes may be quite gradual, and be easily accomplished.

I have not repeated all the references given in well-known works, such as Stebbing's "Das Tierreich Amphipoda," but have given only those that appeared necessary in each case.

LIST OF SPECIES.

Subclass MALACOSTRACA.

Order DECAPODA.

Suborder REPTANTIA.

Section BRACHYURA.

1. *Leptomithrax australis* (Jacq. et Luc.). Auckland Islands and New Zealand.*
2. *Prionorhynchus edwardsii*, Jacq. et Luc. Auckland and Campbell Islands, and New Zealand.
3. *Cancer novae-zealandiae* (Jacq. et Luc.). Auckland Islands and New Zealand. (A closely allied species in Chili.)
4. *Nectocarcinus antarcticus*, Jacq. et Luc. Auckland and Campbell Islands, and New Zealand.
5. *Hemiplax hirtipes*, Heller. Campbell Island and New Zealand.
6. *Halicarcinus planatus* (Fabr.). All subantarctic seas.
7. *Hymenosoma depressum*, Jacq. et Luc. Auckland Islands and New Zealand.

Section ANOMURA.

8. *Porcellanopagurus edwardsi*, Filhol. Campbell Island and Snares. (Allied species in Australia and Juan Fernandez.)
9. *Eupagurus campbelli*, Filhol. Campbell Island.
10. *Munida subrugosa* (White). All subantarctic seas.

Suborder NATANTIA.

11. *Nauticaris marionis*, Spence Bate. Auckland and Campbell Islands; New Zealand; Marion, Prince Edward, and Falkland Islands.
12. *Palaemon affinis* (H. Milne-Edwards). All subantarctic seas.

Order STOMATOPODA.

13. *Lysiosquilla spinosa* (Wood-Mason). Auckland Islands, New Zealand, and Indian Ocean.

Order AMPHIPODA.

Suborder GAMMARIDEA.

14. *Nannonyx kidderi* (S. I. Smith). Auckland and Campbell Islands, New Zealand, Tasmania, and Kerguelen.
15. *Tryphosa kergueleni* (Miers). Snares, New Zealand, Victoria Land, and Kerguelen.
16. *Tmetonyx stebbingi* (Walker). Auckland Islands and Cape Adare.
17. *Phoxocephalus kergueleni*, Stebbing. Snares and Kerguelen.

* By "New Zealand" in this list of localities the main islands only are included.

18. *Harpinia obtusifrons*, Stebbing. Campbell Island, New Zealand, Victoria Land, Kerguelen.
19. *Liljeborgia dubia* (Haswell). Auckland Islands, New Zealand, Australia, &c.
20. *Carolobatea novae-zealandiae* (Dana). Auckland Islands, New Zealand, and Kerguelen.
21. *Leptamphopus novae-zealandiae* (G. M. Thomson). Auckland Islands, New Zealand, Victoria Land, and Graham Land.
22. *Bovallia monoculoides* (Haswell). Auckland Islands, South Georgia, Graham Land, South Atlantic and Indian Oceans.
23. *Pontogeneia antarctica*, Chevreux. Auckland Islands, Campbell Island, and Graham Land. (Closely allied species in New Zealand.)
24. *Paramoera austrina* (Spence Bate). All subantarctic seas.
25. *Atyloides serraticauda*, Stebbing. Auckland Islands, Australia, Victoria Land, and Graham Land (Flanders Bay).
26. *Atyloides magellanica* (Stebbing). Auckland Islands, Victoria Land, Tierra del Fuego, and Graham Land.
27. *Atyloides aucklandicus*, Walker. Auckland Islands. (Allied species in Victoria, Australia.)
28. *Parapherusa crassipes* (Haswell). Antipodes Island, New Zealand, and Australia.
29. *Melita inaequistylis* (Dana). Auckland Islands, New Zealand, and Indian Ocean.
30. *Paradexamine pacifica* (G. M. Thomson). Auckland Islands and New Zealand. (A closely allied species in Graham Land.)
31. *Orchestia serrulata*, Dana. Auckland and Campbell Islands, and New Zealand.
32. *Orchestia aucklandiae*, Spence Bate. Auckland Islands (? New Zealand).
33. *Orchestia bollonsi*, sp. nov. Bounty Island, Snares, Auckland Islands, and New Zealand.
34. *Parorchestia maynei*, sp. nov. Auckland Islands.
35. *Parorchestia insularis*, sp. nov. Campbell Island.
36. *Parorchestia parva*, sp. nov. Auckland Islands.
37. *Parorchestia improvisa*, sp. nov. Snares, New Zealand (Stewart Island).
38. *Parorchestia tenuis* (Dana). Campbell Island and New Zealand.
39. *Hyale hirtipalma* (Dana). Auckland Island, Macquarie Island, New Zealand, South Georgia, and Kerguelen.
40. *Hyale novae-zealandiae* (G. M. Thomson). Snares, Macquarie Island, and New Zealand.
41. *Hyale campbellica* (Filhol). Campbell Island.
42. *Chiltonia mihiwaka* (Chilton). Auckland Islands, Campbell Island, and New Zealand. (Allied species in Victoria and Tasmania.)
43. *Allorchestes novae-zealandiae*, Dana. Auckland Islands, New Zealand (? South America).
44. *Aora typica*, Kröyer. Atlantic, Pacific, and Southern Oceans.
45. *Lembos kergueleni* (Stebbing). Campbell Island, Snares, Macquarie Island, New Zealand, Kerguelen, and Indian Ocean.
46. *Jassa pulchella*, Leach. Cosmopolitan.

Suborder CAPRELLIDEA.

47. *Caprellinopsis longicollis* (Nicolet). Snares, New Zealand and South America.

Genus **Eupagurus**, Brandt, 1851.

Distribution.—Widely distributed.

Eupagurus campbelli, Filhol.

Eupagurus campbelli, Filhol, "Mission de l'Île Campbell," p. 421, pl. lii, fig. 3, 1885; G. M. Thomson, Trans. N.Z. Inst., xxxi, p. 183, 1899.

Taken by Filhol in Perseverance Harbour, Campbell Island, at a depth of 5 to 6 metres. I have not seen any specimens of this species.

Genus **Munida**, Leach, 1820.

Distribution.—In all seas.

Munida subrugosa (White).

Galathea subrugosa, White, List Crust. Brit. Mus., 1847. *Munida subrugosa*, Miers, Zool. "Erebus" and "Terror," Crust., p. 3, pl. iii, fig. 2, 1874; Hutton, Trans. N.Z. Inst., xi, p. 340, 1879; Henderson, Rep. "Challenger" Anomura, p. 124, 1888; G. M. Thomson, Trans. N.Z. Inst., xxxi, p. 194, 1899; Hodgson, "Southern Cross" Crust., p. 232, 1902; Chilton, Trans. N.Z. Inst., xxxvii, p. 320, 1905. ? *Galathea gregaria*, Fabricius, Ent. Syst., ii, p. 473, 1793. ? *Grimothea gregaria*, Henderson, Rep. "Challenger" Anomura, p. 124, 1888. *G. novae-zealandiae*, Filhol, "Mission de l'Île Campbell," p. 426.

This species is very abundant at the Auckland and Campbell Islands, and is widely distributed in subantarctic seas.

The relationship of *Munida subrugosa* and *Grimothea gregaria* has been the subject of much dispute. Miers suggested that *Grimothea gregaria* is the immature form of *Munida subrugosa*, and the question has been since discussed by Hutton, Henderson, Thomson, Hodgson, and others, without any definite conclusion being arrived at. Hutton was, I believe, the first to point out that the two forms are different in habit, *Grimothea gregaria* being pelagic, while *Munida subrugosa* lives at the bottom of the sea; and he argued from this, and from the fact that small forms are found with the maxillipedes shortened, as in *Munida subrugosa*, that the two species were distinct. Henderson and others have since likewise pointed out that small forms with the characters of *Munida subrugosa* are found, and have similarly upheld the distinction of the two species. The fullest discussion of the question has been given by Thomson, who gives measurements of various individuals, and shows that the difference in the length and development of the external maxillipedes is a comparative one, and that these appendages do not, after all, differ very greatly in the two forms—thus, in *Munida subrugosa* the relative length of the body to that of the external maxillipedes is about 5 to 2, while in *Grimothea gregaria* it is 5 to less than 3. He is therefore inclined to treat *Grimothea gregaria* as merely a stage in the development of *Munida subrugosa*.

My own observations certainly lead me to confirm the measurements made by Mr. Thomson. The difference in the appearance of the external maxillipedes in the two forms is largely due, not so much to their actual size, as to the way in which

they are folded back in *Munida subrugosa*, while they are kept extended in *Grimothea gregaria;* and these positions are naturally associated with the difference in habit of the two forms.

It is true that specimens with the external maxillipedes proportionally short and in-folded as in *Munida subrugosa* are sometimes found which are no larger than some of the specimens of *Grimothea gregaria;* and, on the other hand, large specimens which from their size should belong to *Munida subrugosa* are also met with which have the external maxillipedes elongated and showing the flattened and foliaceous form characteristic of *Grimothea gregaria*. This has already been recorded by Mr. Thomson when he says, "In several large males of *Munida* the joints all show the flattened and foliaceous form characteristic of *Grimothea*, as well as the densely fringing setae, while in one large female the joints are completely foliaceous." Mr. Thomson speaks of these large forms as belonging to *Munida*, and in another place, speaking of the small *Grimothea* form, he says, "Though I have examined hundreds of individuals, I have always found the sexual appendages in a more or less undeveloped condition." From the "Nora Niven" collections I have a number of specimens varying from about 25 mm. in length to 54 mm.; all of these have the external maxillipedes more or less flattened and foliaceous, though their length as compared with the length of the body seems to decrease a little in the larger forms; many of these large forms, however, varying from 35 mm. to 40 mm. in length, are mature females bearing eggs, and would undoubtedly be considered as belonging to *Munida subrugosa* but for the character of their foliaceous maxillipedes, and it is doubtless large specimens of this kind which Mr. Thomson had before him when he made the statement in the first sentence quoted above.

Considering these facts, it would no doubt be the simplest plan to say that there are two species, differing in the form and size of the external maxillipedes, and this is what has been done by Filhol and others. The general resemblance, however, between the forms is so great, and the length of the external maxillipedes varies so much in each form, that I cannot bring myself to agree with this view, but consider we are dealing, after all, only with two forms of one species; and this view seems to be confirmed by the fact that where one form is met with in any particular locality the other is also found somewhere in the neighbourhood. It is, of course, only natural that the immature form should be pelagic in habit, while the mature form inhabits the bottom of the sea; and it seems likely that in this case, just as in some other well-known animals, the immature stage may under certain circumstances be prolonged, and even become sexually mature without completely losing its immature characters. I consider, then, that the foliaceous maxillipedes of *Grimothea gregaria* are associated with its pelagic habit, and that in the absence of favourable circumstances (*e.g.*, a suitable sea-bottom at moderate depth) it may continue pelagic, increase in size, and even become sexually mature without losing its foliaceous maxillipedes; but if it reaches a suitable locality it adopts a more sedentary life at the bottom of the sea, and in subsequent moults the external maxillipedes tend to become shorter and less foliaceous and are in-folded instead of being kept extended as in the pelagic form.