

Revision of the Amphipoda from South Georgia in the Hamburg Museum.

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IN 1882—83 the German Expedition to South Georgia for the observation of the Transit of Venus made a collection of the Crustacea of that island which was afterwards examined by Dr. GEORG PFEFFER and described in a series of valuable papers published in 1888. The collection was an important one as it was practically the first extensive collection to be fully reported upon from a region near the Antarctic Continent.

Of the Amphipoda, with which alone we are concerned at present, Dr. PFEFFER distinguished thirteen (13) species, all considered new, and with the exception of one, which was figured only, all of these were described and figured in considerable detail. At that time when the knowledge of the Amphipoda was not very far advanced it was natural enough to consider these forms from an entirely new locality to be all new species. Subsequent research however has shown that in a few cases the species had been already described from elsewhere; on the other hand several of the species have since been placed in other genera or have been redescribed and renamed by authors who overlooked or were ignorant of PFEFFER's work. Unfortunately PFEFFER's paper appeared only a very short time before the publication of STEBBING's report on the „Challenger“ Amphipoda — too late for Mr. STEBBING to make full use of it in that report.

In the examination of the Amphipoda collected by the Scottish National Antarctic Expedition, most of which are from the South Orkneys, it was necessary for me to compare them with those described by PFEFFER from South Georgia, and upon my expressing a desire to see co-types of his species, Dr. G. PFEFFER and Dr. O. STEINHAUS most generously placed freely at my disposition the whole South Georgia collection in the Hamburg Museum. I have thus been enabled to compare the South Georgia specimens with those from several parts of the Antarctic, for in addition to the „Scotia“ collections I have had an opportunity, through the kindness of Dr. W. T. CALMAN, of the British Museum, of seeing anything that I wished from the collections made by the „Southern Cross“ and the „Discovery“ Expeditions.

It seems desirable therefore to state the results of this examination by giving the names that, in my opinion, should now be assigned to PFEFFER'S species, indicating what species more recently described are synonymous with them and giving the geographical distribution as far as it is known.

In addition to the Amphipoda named by Dr. PFEFFER the collection of the Hamburg Museum contained a few unnamed Amphipoda from South Georgia obtained at other times. These are mostly duplicates of PFEFFER'S species, but among them was one additional species.

The following is a list of PFEFFER'S species with the names now assigned to them:

1. *Allorchestes georgianus* PFEFFER = *Hyale hirtipalma* (DANA).
2. *Metopa sarsi* PFEFFER = *Metopoides sarsi* (PFEFFER).
3. *Anonyx zschaui* PFEFFER . . . = *Waldeckia zschaui* (PFEFFER).
4. „ *femoratus* PFEFFER . . = *Cheirimedon femoratus* (PFEFFER).
5. *Bovallia gigantea* PFEFFER . . = *Bovallia monoculoides* (HASWELL).
6. *Eurymera monticulosa* PFEFFER = *Eurymera monticulosa* PFEFFER.
7. *Stebbingia gregaria* PFEFFER. = *Paramoera austrina* (BATE).
8. *Calliopius georgianus* PFEFFER = *Apherusa georgiana* (PFEFFER).
9. *Megamoera miersi* PFEFFER . . = *Paraceradocus miersi* (PFEFFER).
10. *Leucothoe antarctica* PFEFFER = *Leucothoe spinicarpa* (ABILDG.).
11. *Podocerus ingens* PFEFFER . . = *Jassa falcata* (MONTAGU).
12. *Caprellina mayeri* PFEFFER . . = *Cuprellinoides mayeri* (PFEFFER).
13. *Schraderia gracilis* PFEFFER . = ?*Atyloides serraticauda* (STEBBING).

Additional Species.

14. *Polycheria antarctica* (STEBBING).

It will be interesting to summarize the geographical distribution of these species—fuller details will be found under each species—:

Eight (8) species (*Hyale hirtipalma*, *Waldeckia zschaui*, *Bovallia monoculoides*, *Paramoera austrina*, *Leucothoe spinicarpa*, *Jassa falcata*, *Atyloides serraticauda* and *Polycheria antarctica*) are widely distributed in Antarctic and Subantarctic seas and may be described as circumaustral; four (*Metopoides sarsi*, *Cheirimedon femoratus*, *Eurymera monticulosa* and *Paraceradocus miersi*) are at present known only from the Subantarctic and Antarctic region to the south of South America, occurring at South

Georgia, South Orkneys and at Graham Land, the one last mentioned being also known to occur at the South Shetland Islands; the two remaining species (*Calliopius georgianus* and *Caprellinoides mayeri*) are known at present from South Georgia only.

Of the eight circumaustral species mentioned two (*Leucothoe spinicarpa* and *Jassa falcata*) are cosmopolitan and occur as commonly in northern seas as they do in the southern, *Polycheria antarctica* extends as far as Ceylon in the Indian Ocean and as Puget Sound in the Pacific, *Bovallia monoculoides* also extends into warm seas in the Indian and Atlantic Oceans and is closely allied to or perhaps identical with forms described from the North Atlantic and Mediterranean; the remaining species appear to be confined to Antarctic and Subantarctic waters. -

Critical list with notes on the distribution of the separate species.

Hyale hirtipalma (Dana)¹).

- Allorchestes hirtipalma* DANA 1853, p. 888.
 „ *georgianus* PFEFFER 1888, p. 77, pl. 1, fig. 1a—n, 4.
 „ „ STEBBING 1906, p. 572.
Hyale hirtipalma STEBBING 1906, p. 564.
 „ „ CHILTON 1909, p. 643.

This species, originally described by DANA from the west coast of South America (Valparaiso and the Island of San Lorenzo) is now known to be very widely distributed on the coasts of Subantarctic lands. It has been recorded (under various names) from New Zealand and the islands to the south as far south as Macquarie Island, from South Georgia and the Kerguelen Islands. It does not appear to exist on the Antarctic Continent itself, from which no species of *Hyale* has been recorded, and is not represented in the „Scotia“ collections from the South Orkneys.

Metopoides sarsi (Pfeffer).

- Metopa sarsi* PFEFFER 1888, p. 84, pl. 2, fig. 3, 8; pl. 3, fig. 2.
Probolooides sarsi STEBBING 1906, p. 190.
Metopoides walkeri CHEVREUX 1906, p. 28, fig. 15—17.
 „ *sarsi* CHILTON 1912, p. 479.

¹) The references are made by the year of publication to the works mentioned in the list at the end of this paper. Only those references are given that are required for the present purpose.

Of this species the South Georgia collections at Dr. PFEFFER's disposal contained originally only three specimens not well preserved. I was able to examine a specimen still in the collection and by Dr. STEINHAUS's permission to dissect it and mount the dissections permanently in Canada balsam. By doing so I was able to establish its identity with the form so fully described by CHEVREUX under the name *Metopoides walkeri*, of which I had specimens from the South Orkneys in the „Scotia“ collections.

This species is now known from South Georgia, South Orkneys and from Graham Land (Booth Wandell Island).

Waldeckia zschaui (Pfeffer).

Anonyx zschaui PFEFFER 1888, p. 87, pl. 2, fig. 1.

Orchomenopsis zschaui STEBBING 1906, p. 85 (in part).

„ „ CHILTON 1912, p. 471.

Waldeckia obesa CHEVREUX 1906, p. 15, fig. 8—10.

„ „ WALKER 1907, p. 10, pl. 2, fig. 4.

The specimens of this species examined and described by Dr. PFEFFER did not belong to the official collection and were not deposited in the Hamburg Museum. Fortunately in the „Scotia“ collections there were several specimens from the neighbourhood of Coat's Land, Lat. 74° 1' S., long. 22° W., which by the great dilatation of the body and especially by the character of the dorsal process on the first segment of the urus are without doubt the same as the species described by PFEFFER. The species is also identical with the form more recently described by Mr. CHEVREUX and Mr. A. O. WALKER under the name *Waldeckia obesa*.

Mr. CHEVREUX established for this species the genus *Waldeckia* (= *Charcotia* CHEVREUX 1906) which he considered as coming near to *Menigrates* A. BOECK; Mr. WALKER who had obtained the species in the collections made by the „Discovery“ had at first placed it under *Socarnes*. In my opinion it comes so near to *Orchomenopsis chilensis* (HELLER) (= *O. rossi* WALKER) that it might almost be placed in the same genus. STEBBING had identified his *Orchomene cavimanus* with it and placed it under *Orchomenopsis*. The only points in which it appears to differ from the typical species of *Orchomenopsis* are that the first gnathopoda are said to be not subcheliform and that the peraeopoda bear one or two accessory branchial lobes. The propod of the first gnathopod does certainly narrow very considerably distally but in my specimens there is still a fairly distinct though very short palm and Dr. PFEFFER's and Mr. WALKER's figures also show a short palm. In any case however the first gnathopod in the species has not the distinctly simple character that it has in *Socarnes* and a tendency to the same distal narrowing of the propod is found in

some specimens of an *Orchomenopsis* from South Africa that seem to me to be hardly distinguishable from the variable and wide-spread species *Orchomenopsis chilensis* (HELLER). The other point, the possession of accessory branchial lobes seems hardly sufficient to form a generic character by itself, for accessory branchiae are developed independently in several genera of the Amphipoda belonging to quite different families and they occur, for example, in some species of *Hyalella* but not in others. Moreover accessory branchiae are also found in *Orchomenopsis chilensis* (HELLER).

Unfortunately all the specimens in the „Scotia“ collection are of nearly the same size and I therefore have had no opportunity of ascertaining what changes take place during the growth of the animal; but judging from the analogy of nearly allied forms I have little doubt that the great dilatation of the body with the accompanying expansion posteriorly of the fourth side-plate and consequent absence of margination on the inferior margin of the fifth side-plate is less marked in young specimens, and probably in a similar way the distal narrowing of the propod of the first gnathopod is best marked in large and fully grown specimens.

The species is now known from South Georgia, Graham Land, South Victoria Land and Coat's Land.

Cheirimedon femoratus (Pfeffer).

Anonyx femoratus PFEFFER 1888, p. 93, pl. 2, fig. 2.

„ „ STEBBING 1906, p. 86.

Cheirimedon dentimanus CHEVREUX 1906, p. 2, fig. 1—4.

„ *femoratus* CHILTON 1912, p. 467.

A comparison of a specimen of PFEFFER's species with a co-type of Mr. CHEVREUX's species kindly placed at my disposal has shown that the latter is a synonym of the former. The species has been very fully described and figured by M. CHEVREUX.

It is known from South Georgia, the South Orkneys and from Graham Land (Port Charcot, Booth Wandel and Wincke Islands).

Bovallia monoculoides (Haswell).

Atylus monoculoides HASWELL 1880, p. 327, pl. 18, fig. 4.

Bovallia gigantea PFEFFER 1888, p. 96, pl. 1, fig. 5.

Eusiroides monoculoides and *E. crassi* STEBBING 1906, pp. 345, 346.

Bovallia monoculoides CHILTON 1909, p. 622, and 1912, p. 494.

This species appears to be a variable one and to be very widely distributed in Subantarctic seas though extending further north both in the Atlantic and in the Indian Ocean. Usually the last segment of the

peraeon and pleon segments are dorsally carinate and produced to a more or less acute tooth but these teeth are sometimes obsolete. In the form described by PFEFFER under the name *Bovallia gigantea* these segments are carinate but the teeth only subacute and in them the posterior margin of the pleural plate of the third segment of the pleon is slightly convex and entire while in other forms this margin may be partly or wholly serrate. While the intermediate forms appear to be too numerous and the transitions too gradual to justify the continued recognition of different species it is possible that the forms may develop either in the direction of *Bovallia gigantea* as described above or of the form originally described by Mr. STEBBING under the name *Eusiroides caesaris* in which the dorsal teeth are more acute and the posterior margin of the third segment of the pleon is serrate. I have discussed the species in some detail in the two papers quoted above.

Eurymera monticulosa Pfeffer.

- Eurymera monticulosa* PFEFFER 1888, p. 103, pl. 1, fig. 3.
 CHEVREUX 1906, p. 59, fig. 34—36.
 CHILTON 1912, p. 493.

This species, originally described by PFEFFER from South Georgia, has more recently been fully redescribed and figured by CHEVREUX from specimens from Graham Land (Booth Wandel Island). A single specimen from South Orkneys was in the collections of the „Scotia“.

In most respects it appears to correspond with those forms of the family Pontogeneiidae in which some of the joints of the flagellum of the upper antenna are enlarged on the under side but it differs from them in the transverse dorsal ridges and the longitudinal lateral elevations of the peraeon.

Paramoera austrina (Bate).

- Atylus austrinus* SPENCE BATE, Cat. Amphipoda, Brit. Mus., p. 137, pl. 26, fig. 4.
Paramoera austrina STEBBING 1906, p. 363.
 CHILTON 1909, p. 625 and 1912, p. 498.
Stebbingia gregaria PFEFFER 1888, p. 110, pl. 2, fig. 7.

This is an exceedingly common species in Subantarctic seas and being dominant and widely spread it presents in some localities local variations and in some cases it is very difficult to decide whether these should receive separate names or not. With *Stebbingia gregaria* PFEFFER, however, there is no difficulty, for the examination of the specimens in the Hamburg Museum shows that they are quite the same as those

described by MIERS under the name *Paramoera australis*, a form now considered by STEBBING identical with *Atylus austrinus* BATE.

The species occurs between tide marks on practically all Subantarctic shores and in some cases in New Zealand it may extend into brackish waters. It varies much in size, in the stoutness of the body, the presence or absence of the accessory flagellum, the shape of the gnathopoda and in the telson — some of these variations are discussed in the works quoted above, but a full comparison of forms from different localities and a fuller knowledge of the sexual differences and of the life history is required and a research into these matters would probably lead to interesting and important results in connection with the distribution of the species.

Apherusa georgiana (Pfeffer).

Calliopius georgianus PFEFFER 1888, p. 116, pl. 2, fig. 6.

Apherusa georgiana STEBBING 1906, p. 308.

I have dissected and examined one of the specimens from the collection in the Hamburg Museum and it agrees well with PFEFFER's description. I am not quite clear about the structure of the telson in this species. The telson of the specimen examined was somewhat damaged in dissection and could not be completely made out, but it appears to be notched posteriorly, the posterior margin on each side of the notch being rounded and bearing a minute setule near the outer side.

In a tube labelled „*Calliopius georgianus*“ there was also one specimen of another species that seems to belong to *Paramoera* though apparently differing in several points from *P. austrina* BATE, and in the telson and third uropoda more resembling a *Pontogeneia*. I have not yet been able to satisfactorily identify this second species.

Paraceradocus miersi (Pfeffer).

Megamoera miersi PFEFFER 1888, p. 121, pl. 3, fig. 3.

Paraceradocus miersi STEBBING 1906, p. 429.

„ „ CHEVREUX 1906, p. 93.

„ „ CHILTON 1912, p. 500.

This is a particularly large species, the males attaining a length of 49 mm, and having very large third uropoda.

It is known from South Georgia, South Orkneys and Graham Land (Port Charcot, Booth Wandel and Hovgaard Island and also from the South Shetland Islands). It seems to be abundant in these places for it occurs in all the collections made there but so far as our present knowledge goes it is confined to this portion of the Antarctic Region.

Leucothoe spinicarpa (Abildgaard).

- L. antarctica* PFEFFER 1888, p. 128, pl. 2, fig. 4.
 „ *spinicarpa* STEBBING 1906, p. 165.
 „ „ WALKER 1907, p. 18.
 „ „ STEBBING 1910, p. 580 and 630.
 „ „ CHILTON 1912, p. 478.

I agree with WALKER in considering the Antarctic specimens specifically identical with those from northern and other seas, so that this species is to be looked upon as another of the Amphipoda of cosmopolitan distribution. I have carefully compared a specimen of PFEFFER'S species with some from South Victoria Land and with European specimens and have failed to find any differences of specific importance. PFEFFER had himself drawn attention to the close resemblance of his species to the northern *L. articulosa* MONTAGU, a form now considered the same as *L. spinicarpa* (ABILDG.). It is probable that some of the species now known under different names from Australia and New Zealand will prove also to belong to *L. spinicarpa*. References to these will be found in the works quoted. The species appears to be abundant both in Arctic and in Antarctic seas.

Jassa falcata (Montagu).

- Podocerus ingens* PFEFFER 1888, p. 131, pl. 3, fig. 1.
Jassa pulchella STEBBING 1906, p. 654.
 „ *wandeli* CHEVREUX 1906, p. 94, fig. 54—56.
Hemijassa goniamera WALKER 1907, p. 61, pl. 11, figs. 98—106 A.
Jassa falcata E. W. SEXTON 1911, p. 212.
 „ „ CHILTON 1912, p. 511.

This is another Amphipod of cosmopolitan distribution and owing to the fact that there are at least two forms of the adult male both differing from the female the number of names given by the different authors to the species is very great; the most important of them can be traced from the references given above. Much work at the elucidation of the life history of this species has already been done by Mrs. E. W. SEXTON and her researches are being continued at the Marine Laboratory, Plymouth. She has been good enough to examine PFEFFER'S specimens from South Georgia and those obtained by the „Scotia“ Expedition from South Orkneys and agrees with me that the majority of them are specifically the same as the European specimens. PFEFFER'S actual type is a male of large size, 26 mm in length, and in the second gnathopod shows some points that do not appear to be represented in any of the smaller specimens so that it is doubtful whether this is the same species as the smaller specimens, Mrs. SEXTON being inclined to

think it may be different. Personally, however, I consider it only a particularly large form of *Jassa falcata*, the differences in the gnathopod being, as it were, mechanical adaptations associated with its exceptional size. Numerous instances are now known among the Amphipoda where large and old males develop in those appendages which differ in the two sexes characters which differ considerably not only from the female form but also from the ordinary male form; this appears to be the case, for instance, in *Cerapus abditus* R. TEMPLETON (= *C. flindersi* STEBBING).

In the South Georgia specimens and also in those collected by the „Scotia“ from South Orkneys both forms of the male occur and while this tends to confirm the fact that the Subantarctic forms really belong to *Jassa falcata* it also goes to show that Mrs. SEXTON is right in considering it a species with dimorphic males and that it is not a question of two separate species being confused under one name.

? *Atyloides serraticauda* (Stebbing).

A. serraticauda STEBBING 1906, p. 362.

„ „ CHEVREUX 1906, p. 87.

„ „ CHILTON 1912, p. 497.

? *Schraderia gracilis* PFEFFER 1888, p. 141, pl. 2, fig. 5 (no description, only one figure).

This species was mentioned but not described by PFEFFER, who gave only a figure of the whole animal. From this figure alone it is impossible to recognise the species in a family where there are so many almost identical in general appearance and distinguishable only by a detailed examination of the separate appendages. The actual specimen from which PFEFFER's figure was made cannot now be ascertained but specimens in the collections of the Hamburg Museum labelled „*Schraderia gracilis*“ prove to be the same as *Atyloides serraticauda* STEBBING.

This species is very widely distributed in Antarctic and Subantarctic seas.

Caprellinoides mayeri (Pfeffer).

Caprellina mayeri PFEFFER 1888, p. 137, pl. 3, fig. 4.

Caprellinoides mayeri MAYER 1890, p. 88, pl. 5, fig. 57—58, pl. 6, fig. 15 and 26, pl. 7, fig. 48.

In 1890 MAYER placed this species under the genus *Caprellinoides* pointing out that it cannot come under *Caprellina* as it has no branchiae on the second segment. In many respects it seems close to *C. tristanensis* STEBBING from „off Nightingale Island, Tristan da Cunha“, but as only the female of that species is known MAYER was unable to decide definitely whether the two were identical or not. No specimens of this species were taken by the „Scotia“.

The *Cuprellidae* seem to be altogether absent from the shores of the Antarctic continent and only very scantily represented on those of Subantarctic Lands.

***Polycheria antarctica* (Stebbing).**

Dexamine antarctica STEBBING 1875, p. 184, pl. 15A, fig. 1.

Tritaeta antarctica and *T. kergueleni* STEBBING 1888, p. 941, pl. 83.

Polycheria antarctica and *P. tenuipes* STEBBING 1906, p. 520.

.. *atolli* WALKER 1905, p. 926, pl. 88, fig. 1—5.

.. *antarctica* CHILTON 1912, p. 502.

A small specimen of this species from South Georgia was in the collections of the Hamburg Museum but had not been identified.

I have discussed this species at considerable length in my report on the „Scotia“ Amphipoda and after an examination of types or named specimens of most of the species described have come to the conclusion that they must all be considered as belonging to the one species originally described by STEBBING as *Dexamine antarctica* though there is much variation in the dorsal processes on the pleon, in the shape of the side plates, of the gnathopoda and in the size of the eyes.

The species appears to be primarily an Antarctic species, being found at South Victoria Land, Kerguelen Island, South Georgia, and South Orkneys, but it also extends far to the north, occurring in Australia, New Zealand, and South Africa, while in the Indian Ocean it is found in several places and reaches to Ceylon and in the Pacific it occurs as far north as Puget Sound.

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