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CRUSTACEA

DECAPODA .

By W. T. Calman, D.Sc.



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I.—DECAPODA.

BY W. T. CALMAN, D.Sc.

Two species of Decapod Crustacea were obtained by the 'Discovery' within the Antarctic Circle. They have been identified with the two species collected by the German Polar Commission of 1882-1883 at South Georgia. By the courtesy of Dr. Georg Pfeffer, of the Hamburg Museum, who first described the species, I have been able to compare the 'Discovery' specimens with co-types from South Georgia, and to satisfy myself of their identity. With the circumpolar range implied by their occurrence at these two widely separated points, both species combine a remarkable range in depth, for, whereas at South Georgia they were found at 7-9 fathoms, the 'Discovery' dredged both species at depths reaching to 500 fathoms.* Dr. Pfeffer's descriptions, although very detailed and accurate, leave unnoticed certain characters which are now regarded as of systematic importance. I have, therefore, found it necessary to supplement his account on some points. One of the species, *Crangon antarcticus*, has received some attention in recent discussions on the subject of "bipolarity," and I have therefore attempted to define a little more precisely its affinities with related forms.

FAMILY HIPPOLYTIDÆ.

CHORISMUS ANTARCTICUS.

Hippolyte antarctica Pfeffer, Jahrb. Hamburg. Wiss. Anst. IV. (1887), p. 51, pl. i. figs. 22-27.

Description of ovigerous females.—Total length 87 to 101 mm. Length of carapace (including rostrum) about two-fifths of total length of body. Rostrum equal to or a little longer than the distance from the orbital notch to posterior margin of carapace in the middle line, curved upwards, moderately expanded below; upper margin with eight or nine teeth, of which the second is placed over, or a little in front of, or

* *Crangon antarcticus* was also dredged by the 'Belgica' at a depth of 400-500 fathoms in Lat. 71° S., Long. 88° W.

in one case a very little behind the orbital notch, and the last two are close to the apex of the rostrum; lower margin with six to nine teeth (usually seven.) No supra-orbital teeth, antennal tooth distinct from the lower orbital angle, anterolateral corner of carapace with a minute (pterygostomial) tooth.

Third abdominal somite with dorsal surface strongly elevated or "humped," but without a definite tubercle as in *Chorismus tuberculatus*. Sixth abdominal somite without movable lateral spines.

Peduncle of antennules reaching to or nearly to two-thirds the length of rostrum, third segment one-half the length of second, spine of first segment ("stylocerite") narrow and acute, reaching to middle or quite to end of second segment; flagella subequal, or inner slightly longer than outer, extending beyond tip of rostrum by one-third to nearly half their length. Antennal scale broad, about equal in length to rostrum, outer edge distinctly and evenly convex, apex broadly rounded, outer spine short.

Mandible with small incisor process and palp of three segments, the first broader than, and as long as the second. Third maxilliped extending nearly to tip of antennal scale, terminal segment twice the length of preceding. Exopod well developed.

First leg extending beyond penultimate segment of third maxilliped, carpus slightly excavate distally, about equal in length to the hand. Second leg extending beyond tip of antennal scale, carpus of eleven, merus of three, and ischium of two segments. Remaining legs moderately stout, fifth leg extending forwards nearly to tip of antennal scale.

Telson not greatly narrowed distally, tip rounded, with seven spines. Inner plate of uropods subequal to the telson and very little shorter than the outer plate, which is broadly rounded at the tip.

The branchial system comprises five pleurobranchiæ on each side on the last five thoracic somites, an arthrobranchia on the third, and a podobranchia on the second maxilliped. There are epipods on the third maxillipeds and on the first two pairs of legs.

Young males (55–59 mm. in length) and *females* (42 mm.) Body a little more slender and the rostrum relatively longer, distinctly exceeding the length from orbit to back of carapace. Flagella of antennule little longer than rostrum. Outer edge of antennal scale straight. In two specimens (♂ and ♀) there are twelve segments in carpus of second leg.

The co-typical specimen of *Hippolyte antarctica* used for comparison is an ovigerous female, about 60 mm. in total length. It agrees perfectly with the 'Discovery' specimens except in the following points:—Of the seven teeth on the upper edge of the rostrum only one is close to the point, not two, as in our specimens; the antennal scale is slightly longer than the rostrum, and its outer edge (as in our specimens of similar size) is nearly straight; the third maxillipeds are a

little shorter, and their terminal segment is hardly twice the length of the preceding; the carpus of the first legs is a little shorter than the hand.

Remarks.—This species agrees with the type of the genus *Chorismus* (*C. tuberculatus*, Sp. Bate.) in the characters given in my recently published synopsis of the *Hippolytidæ* ('Ann. Mag. Nat. Hist.,' xvii., 1906, p. 30), and further in having no supra-orbital spines, in the mandible-palp being composed of three segments,* the gills seven in number on each side, and the last three pairs of legs without epipods. It differs in having eleven or twelve segments in the carpus of the second legs while *C. tuberculatus* has only nine, in having an exopod on the third maxilliped, and in the fact that the first segment of the mandibular palp is not shorter than the second.

Occurrences.—January 22, 1902. 500 fathoms, 1 ♂.

W.Q., February 28, 1902. Less than 20 fathoms, 1 ♂, 1 ♀.

W.Q., January 10, 1903. 130 fathoms, 2 ♀.

W.Q., May 14, 1903. 127 fathoms, 1 ♂, 1 ♀.

W.Q., June 18, 1903. 130 fathoms, 2 ♀.

Fragments of this species were taken from the stomachs of seals on several occasions.

FAMILY CRANGONIDÆ.

CRANGON † ANTARCTICUS.

C. antarcticus Pfeffer, Jahrb. Hamburg. Wiss. Anst. iv. (1887), p. 45, pl. i., figs. 1-21; Coutière, C. R. Acad. Sci. Paris, cxxx. (1900), p. 1640; and Bull. Mus. Paris, vi. (1900), p. 240.

Description of females (not ovigerous).—Total length, 37·5-77 mm. General form slender. Surface of the carapace very uneven, with strongly marked ridges and hollows; in particular, a more or less sharply defined ridge runs backwards from the median dorsal spine for a distance equal to one-half the length of the carapace. The ridge running backwards from the antennal spine is continuous with that running forwards from the hepatic spine. Rostrum long, slender, compressed and acute, in one case nearly one and a half times as long as the eye-stalks. Abdomen long and slender, sixth somite generally more than one-sixth of total length of body. A pair of slender acute spines on hind margin of fifth somite dorso-laterally. Sixth somite with a strongly-marked double dorsal keel. Telson rounded at the tip, with a median spiniform point. Antennular peduncle slender, the distal end of first segment narrower than one-half the greatest diameter of the eye; outer lobe of first segment nearly flat, broadly ovate, produced anteriorly into a rather feeble spiniform point which does not reach distal

* Spence Bate defines the genus *Chorismus* as having a "biarticulate synnaphipod" ('Challenger Rep.' Macrura, p. 616), but he elsewhere correctly states that there are three segments (t.c. pp. 577 and 618).

† Recent reforms in nomenclature having rendered most of the well-known generic names of Crustacea unintelligible without an explanatory footnote, it is necessary to state that I use the name *Crangon* for the genus of which the common shrimp is the type.

end of segment. Antennal scale with outer margin straight, or, in smaller specimens, concave. Third maxillipeds extending to or slightly beyond end of scale. First legs extending a little beyond middle of terminal segment of third maxillipeds; hand from nearly four to nearly five times as long as broad, terminal tooth of palmar edge at about one-fourth of the length of the hand from distal end. Last pair of legs extending forward to the tip of the antennal scale. Endopod of first pleopod articulating with distal inner angle of peduncle.

Branchial system.—Five pleurobranchiæ on each side, on the last five thoracic somites; no arthro- or podo-branchiæ.

Remarks.—The ‘Discovery’ specimens differ from Dr. Pfeffer’s description, and from a co-typical specimen with which I have compared them, in the more slender form of the body, due especially to the greater length of the sixth abdominal somite; in the greater length of the rostrum; in the shorter lobe on the basal segment of the antennule, reaching only to about the distal third of the segment, while in the typical form it reaches nearly to the end; and in the narrower “hand” of the first legs. But while each of the three well-preserved specimens in this collection differs from the co-type in all these points, they do so in varying degree. The differences are at least as important as some of those which have been regarded as of specific value by recent writers on the Crangonidæ, but I do not think that they would justify us, at present, in separating the form inhabiting the area explored by the ‘Discovery’ from that found in the very distant region of South Georgia.

The following table gives some measurements, in millimetres, of the co-type of *C. antarcticus* as compared with the three most perfect specimens in the ‘Discovery’ collection. All the specimens appear to be females or immature males.

	Total Length.	Length of Carapace from back of Orbit.	Length of Rostrum from back of Orbit.	Length of Sixth Abdominal Somite.	Length of Telson.	Ratio Length to Breadth of “Hand.”
<i>C. antarcticus</i> , co-type	46·0	9·75	2·5	7·5	9·0	3·9
‘Discovery,’ January 27, 1902	58·0	11·75	4·75	10·0	12·5	4·9
„ March 4, 1904	77·0	17·0	—	13·0	15·0	—
„ January 22, 1902	37·5	8·0	2·3	7·5	8·0	—

Dr. Pfeffer* was the first to draw attention to the apparent “bipolarity” in the distribution of the genus *Crangon*. With the exception of the very imperfectly known *C. capensis*, Stimpson, from the Cape of Good Hope, *C. antarcticus* is the only species of the genus inhabiting the Southern Hemisphere, and is widely separated from all the other species, which are confined to the temperate and (if *Sclerocrangon* be

* Die niedere Thierwelt des antarctischen Ufergebietes. Internat. Polarf. Deutsch. Exped., ii. (1890), pp. 520–572.

included) the Arctic regions of the Atlantic and Pacific. The question has been discussed by Dr. Ortmann,* who concludes that *C. antarcticus* is specially and closely related to the Californian *C. franciscorum*, Stimpson, and that its presence in the Southern Hemisphere is to be explained by migration from the North along the West coast of America, where the hydrographical conditions are such as to favour an intermixture of northern and southern faunas across the tropic zone.

With a view to testing this conclusion of Dr. Ortmann's, I have carefully compared the specimens of *C. antarcticus* with specimens of *C. franciscorum* in the Museum collection.† The chief character on which Dr. Ortmann relies for linking the two species together is the presence of a pair of dorso-lateral spines on the hind margin of the fifth abdominal somite. This character is conspicuous and definite, but it may be doubted whether it is of great morphological importance. Prof. Sars figures a pair of spines of varying length in nearly the same position in all the larvæ of *Crangonidæ* examined by him,‡ and it seems likely that this larval character may have been retained independently in species not closely related. In other respects *C. franciscorum* differs considerably from the Antarctic species. The surface of the carapace is much less uneven, the various ridges and hollows being much less strongly marked. There is no ridge running backward from the median dorsal spine, and the ridge connecting the antennal and hepatic spines is interrupted by a groove. The pterygostomial spine is not compressed and expanded laterally as it is in *C. antarcticus*. The rostrum is shorter than the eye-stalks, depressed and hollowed on the dorsal surface and bluntly pointed. The sixth abdominal somite is about one-seventh of the total length, and has only a faintly-marked indication of a double keel on its dorsal surface. The telson narrows gradually to an acute tip. The antennular peduncle is stout, the distal end of the first segment broader than three-fourths of the greatest diameter of the eye; the outer lobe of the first segment has its external margin strongly bent upwards, thickened and produced forwards into a strong spine which reaches the distal end of the segment. The outer edge of the antennal scale is slightly convex. Miss Rathbun states (Harriman Alaska Exp., Crustacea, p. 120) that the third maxillipeds do not reach the end of the antennal scale, but in two out of three specimens examined by me they certainly do so. The first legs reach the tip of the third maxillipeds; the palmar edge of the hand is very oblique, its terminal tooth being more than one-third of the length of the hand from the distal end. The last pair of legs reach to about the middle of the antennal scale. The first pleopod differs considerably in shape from that of *C. antarcticus*, the endopod being attached nearly half-way down the inner margin of the peduncle.

* Jenaische Denkschr., VIII. (Semon's Zool. Forschungsreise V.), (1) (1894), p. 77; Proc. Acad. Nat. Sci., Philad., 1895, p. 190; Zool. Jahrb., Syst., IX. (1897), p. 582.

† These specimens, received from the Smithsonian Institute, are labelled as having been collected in California by Stimpson himself, in the course of the North Pacific Exploring Expedition, and may therefore be regarded as co-types.

‡ Bidrag til Kundskaben om Decapodernes Forvandlingar, iii. Fam. Crangonidæ. Arch. Math. Naturvid. xiv. (1890), pp. 132-195, pls. i.-vi.

A difference which may possibly be of greater importance than any of those mentioned above exists, as Prof. Coutière has pointed out, in the branchial system. In addition to the five pleurobranchiæ possessed by *C. antarcticus*, *C. franciscorum* has on each side a well-developed arthrobranchia at the base of the third maxilliped. The statements made by various writers as to the gill-formula of the common shrimp, and of the genus of which it is the type, are curiously conflicting. Although Huxley, in 1878, Boas, in 1880, and Claus, in 1886, gave the number of gills in *C. vulgaris* correctly as six, more recent authors seem to have overlooked the arthrobranchia of the third maxilliped, which, although small, is not at all difficult to see. Sars, in 1890,* gives among the characters distinguishing *Crangon* from *Pontophilus*, the presence of five gills in the former and six in the latter genus, and this statement is copied by Mr. Stebbing.† Ortmann, in his revision of the *Crangonidæ* in 1895,‡ names a number of species of *Crangon* which he has examined and found to have only five gills. One of the names mentioned, "typicus," does not appear elsewhere in the paper, but it may be conjectured that it refers to the typical form of the species *C. vulgaris*. Two other species on the list are *C. affinis* and *C. franciscorum*. In these three species, and also in *C. allmanni* and *C. nigricauda*, I find, on the contrary, that the arthrobranchia is well developed. In the absence of trustworthy data as to the occurrence of this gill in the other species from the northern hemisphere, it is not possible to estimate the importance to be attached to its absence in *C. antarcticus*. It may be noted, however, that it is absent in the characteristically Arctic genus (or subgenus) *Sclerocrangon*, which is otherwise not very sharply defined from *Crangon*, and to which, in its strongly sculptured carapace, the present species has some resemblance. Prof. Coutière, in his preliminary notes on the Decapoda of the 'Belgica,' has called attention to this resemblance to *Sclerocrangon*; but he suggests, with some hesitation, the establishment of a new subgenus, *Notocrangon*, for the Antarctic species. I have not been able to examine the structure of the male pleopods, to which he attaches some importance, but the other characters which he mentions do not seem to me to justify this step.

Larvæ.—A number of larvæ of this species were collected, all in a stage of development corresponding to the "last larval stage" of Prof. Sars. The rostrum is very long and slender, extending well beyond the eyes. There is a small median dorsal tooth on the carapace, about midway between the back of the orbit and the "cervical" groove, and a little in front of it is a rounded papilla (represented in some of Sars's figures) probably representing the problematical "dorsal organ" of some Euphausiid larvæ. The abdomen is unarmed, except for the paired spines at the posterior end of the fifth somite, which are long and slender, almost as in Sars's figures of the larvæ of *Pontophilus*, and, as in that genus also, the sixth somite is very long. The telson is very large, in the form of an almost equilateral triangle, with the posterior margin

* Arch. Math. Naturvid, xiv. (1890), p. 153.

† Hist. Crustacea (1893), p. 227.

‡ Proc. Acad. Nat. Sci., Philad. (1895), p. 175.

concave, but not deeply notched. All the appendages are present. The first legs are subchelate. The second legs are (as in the other species of the genus *Crangon*) devoid of exopods. The pleopods are large but uniramous. There are only four gills on each side, corresponding to the first four legs.

Occurrences.—January 13, 1902. 100 fathoms, off Coulman Island, 1 ♀.

January 22, 1902. 500 fathoms, 1 ♂ (juv.) (?).

January 27, 1902. 300 fathoms, off Barrier, 1 ♀.

March 4, 1904. 254 fathoms, 1 ♀.

Larvæ of this species were taken in Winter Quarters on September 13, 1902, February 8, 1903, March 10, 1903, and March 23, 1903.

Fragments were taken from the stomachs of seals on several occasions.

