VIII. *Three Species of Harpactid Copepoda.*

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(Plates 28–30.)

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The following three species of Crustacea were found in 1888, in the Firth of Clyde, when I was with Sir John Murray in his yacht. The *Laophonte* was dredged in Lamlash Bay. *Ancorabolus* and *Arthropsyllus* were found under somewhat peculiar circumstances. It was blowing hard, and we ran for shelter under the north-east corner of the island of Little Cumbrae. The dredge was let down in about 20 fathoms, and came up full of broken and decaying seaweed, among which nothing could be seen. However, I worked a portion through sieves, but there was scarcely any product. Nevertheless, among the very few things were found the two species just mentioned and *Campylaspis costata*, G. O. Sars—all three additions to the British fauna.

The *Ancorabolus* surpasses all known Crustacea in its wonderful ornamental sculpture, with the exception of *Pontostratiotes abyssicola*, G. S. Brady, procured by the 'Challenger' Expedition at the great depth of 2200 fathoms in lat. 37° 29′ S., long. 27° 31′ W. When *Ancorabolus* was found it was almost smothered by fragments of filamentous algæ which clung to it.

The drawings here published were kindly made for me by Mr. Andrew Scott in 1890, but the pressure of various work has compelled me to defer publication.

Genus Laophonte, Philippi.

Laophonte bulbifera, sp. n. (Pl. 28. figs. 1–7.)

Animal with head rather broad, thence tapering gradually backwards to the caudal rami. Head as broad as long; rostrum well produced, obtuse, terminating in two minute cilia. 2nd and 3rd segments of urosome produced outwards and backwards, terminating in a minute spine. Whole animal densely pubescent.

Caudal rami remarkable on account of their bulbous form; they are as broad as long and scarcely equal in length to the preceding segment. Principal seta long, equal to the whole length of the animal; exterior to this is a second long seta, which, together with four small setæ, terminate the ramus.

Anterior antennæ 6-jointed and slender for the genus; their basal joint short, with two small projections on the outer margin; 2nd joint twice as long; 3rd rather shorter than the 2nd; 4th and 5th very short, last joint equal to the two preceding.

Posterior antennæ unusually slender for the genus; outer ramus well developed and slender; inner ramus slender, terminating in four setæ.

2nd maxillipeds with the hand narrow elongated ovate; claw long and very slender.

1st feet having the 2nd basal joint narrow and fully twice as long as broad. Inner ramus is slender throughout, 1st articulation has both margins setose; outer ramus is 2-jointed, the 1st with a single seta on the outer margin and the 2nd with five.

4th feet having inner ramus less than half the outer, scarcely exceeding the 1st joint of the outer in length; its 1st joint has one interior seta and the 2nd carries five setæ.

5th feet having an inner expansion of the 1st joint bearing two setæ, and nearer the attachment another seta. The outer lobe of the basal joint bears the usual seta. The 2nd joint is remarkable, as compared with other species of the genus, for its great length, being six times as long as broad, and is furnished with two setæ at its outer base, three setæ towards the termination, and terminates in a simple seta.

Size ·8 mm.

The specimen here described was dredged in Lamlash Bay, in the Firth of Clyde, in July 1885.

The species is characterized, first, by its 6-jointed antennæ; second, by the outer branch of the 1st feet consisting of only two joints; third, by the peculiar form of the bulbous caudal rami; fourth, by the structure of the 5th feet. This peculiar 5th foot finds its counterpart in *Laophonte elongata*, Boeck, and *Laophonte typhlops*, G. O. Sars.

Family Ancorabolidæ, G. O. Sars.

"Body slender, tapering behind, with no sharply marked boundary between the anterior and posterior divisions. All the segments very sharply defined and, excepting the last 2 or 3, produced to peculiar horn-like projections, either dorsal or lateral, or both dorsal and lateral; cephalic segment somewhat flattened in front, with the antero-lateral corners generally produced; rostral projection of varying shape in the different genera, in some cases wanting. Genital segment imperfectly subdivided in female. Caudal rami long and slender, with one of the apical setæ much elongated. Eye wholly absent. Anterior antennæ with the number of joints much reduced, terminal part (in female) uniarticulate. Posterior antennæ without any trace of an outer ramus. Oral parts poorly developed, but, on the whole, of normal structure. Natatory legs slender and projecting more or less laterally, 2nd basal joint obliquely produced; 1st pair generally differing in structure from the others, but never prehensile. Last pair of legs with the distal joint long and slender, proximal joint generally produced outside to a long narrow process tipped with a slender bristle. A single ovisac present in the female."

The above is Sars's description of the family which he has created. In it he has placed four genera, each of a single species. Of these I was previously acquainted with two—*Ancorabolus* and *Arthropsyllus*. It is this latter genus which in my description of *Ancorabolus* I mentioned as "a second species" of the same genus taken at the same time as *Ancorabolus mirabilis*.

The most remarkable character appears to consist in the form of the feet, which have the second basal joint produced outwards to a considerable extent, so that the attachments of the two branches are a considerable distance apart, and the inner branch

is much smaller than the outer. In this respect the family approaches *Laophontodes*, save that the 1st pair of that genus resembles that of *Laophonte*. Moreover, the form of the 1st and 2nd antennæ and of the 5th feet, as well as the transformed branch of the 3rd feet of the male, shows strong resemblances. As Sars remarks, the structure of the 1st feet more nearly resembles that of the genus *Cletodes*, which undoubtedly shows other alliances.

Genus Ancorabolus, Norman.

"Body armed with numerous horn-like, partly branched processes curving backwards, and forming several rows, dorsal, subdorsal, and lateral. Rostral projection well defined, narrow linear. Anterior antennæ in female composed of only 3 joints, in male 5-articulate and distinctly hinged. Posterior antennæ with the distal joint very slender, linear. Mandibular palp small, uniarticulate. Posterior maxillipeds very slender. 1st pair of legs differing conspicuously in structure from the succeeding ones; both rami biarticulate, the inner one being the longer. Inner ramus of the three succeeding pairs much smaller than the outer, but distinctly biarticulate. 1st joint very short, 2nd narrow linear; outer ramus slender, 3-articulate. Inner ramus of 2nd pairs of legs in male slightly transformed. Last pair of legs with a well-defined setiferous expansion inside the proximal joint, wanting, however, in male."

Such are the characters which Sars assigns to the genus as restricted. That author has changed my spelling of *Ancorabolus* to *Anchorabolus*. Why? The generic name is derived from ἄγκῦρα and βάλλω (an anchor-caster) and the Latin form is *Ancora* (more rarely *Anchora*).

Ancorabolus mirabilis, Norman. (Pl. 29. figs. 1–9.)

1903. *Ancorabolus mirabilis*, Norman, "Notes on the Nat. Hist. of East Finmark," Ann. & Mag. Nat. Hist. ser. 7, vol. xi. p. 2.

1909. *Anchorabolus mirabilis*, G. O. Sars, Crustacea of Norway, vol. v. Copepoda, Harpacticoida, p. 312, pl. 211.

Rostrum well developed, horizontally directed, cleft at the extremity, bearing one or two pairs of setæ on the sides, situated on little protuberances. Cephalon and four following segments ornamented with a wonderful series of simple furcate, and three-branched large horn-like processes, which are arranged as follows:—The cephalon bears two pairs of backward-directed horn-like processes on the back: the anterior pair are simple, the posterior trifid. The margin of the cephalon bears, first, a simple lancet-shaped spine followed by a larger trifid process, followed by a bifid, and posterior to this a trifid process. These are all of large size. The following four segments have a pair of simple dorsal processes, beneath which are subdorsal processes, which on the three earlier segments are bifid, but on the last of larger size and simple. On the lateral margin are very large falcate processes, curving backwards. The three earlier segments of the urosome are furnished with subdorsal simple and lateral processes. These lateral processes gradually increase in size backwards from the head to the 3rd segment of the

urosome, where they are subequal in length to the breadth of the body. All the processes described have the outer margin ciliated. Last segment of urosome is rather more than half the length of the preceding. The caudal rami are very long and slender, equal in length to two and a half preceding segments, bearing on the middle of the outer margin a spinule, and at the extremity four minute spines, and centrally a very long spine, so that the whole length of the ramus is as long as the whole of the rest of the body.

The 1st antennæ are 3-jointed and slender. The 1st joint has at the extremity of the lower margin a small denticulation, and in some specimens there is also a small curved process near the commencement on the outer side of the 2nd joint. *The posterior antennæ* are 2-jointed, devoid of a secondary branch, slender, and 2nd joint longer than the 1st. *Hinder maxillipeds* very slender and long, nearly parallel-sided; nail very long and slender. *The legs* are all remarkable from the 2nd basal joint being produced outwards to a considerable extent, so that the attachment of the inner branch is far removed from that of the outer. *1st pair* has the inner branch twice the length of the outer; its basal joint is without setæ, 2nd joint terminates in three setæ. The outer branch has the 1st joint rather more than half the length of the 2nd, and bears one seta on the outer margin; the 2nd joint has two setæ on the outer side and three terminal. In the *2nd*, *3rd*, and *4th pairs* the inner ramus is very much shorter than the outer and terminates in two or three setæ. Its 1st joint is not more than one-third or one-fourth the length of the 2nd. *The 5th pair* has the outer limb very long and linear, more than six times as long as broad, and carries two setæ on the outer margin, one on the inner and two terminal. The simple seta of the exterior margin of the basal joint is of great size. The inner lobe of the basal joint is long and slender, about equal to half of the outer joint; it is furnished with two setæ on the inner margin and two apical.

Length of female ·8 mm.

The male I have not seen. Sars describes it as "smaller than female, and with the anterior antennæ distinctly hinged, 5-articulate, 3rd joint slightly dilated, last joint claw-like. Inner ramus of 2nd pair of legs armed at the tip with a somewhat flexuous claw-like spine in addition to the setæ. Last pair of legs much smaller than in female, one of the setæ wanting on the outer side of distal joint, proximal joint without any expansion inside."

This species was first dredged by me in the Firth of Clyde, in 1888, among a mass of decaying weeds on the east side of Little Cumbrae. In 1890 I again met with it in the Varanger Fiord in East Finmark, and Sars has met with it in several places on the Norwegian coast.

Genus Arthropsyllus, G. O. Sars.

Body flanked each side with a series of acutely produced lappets arising from the lateral parts of all segments except the last two. Cephalic segment with a broadly triangular rostral projection, antero-lateral corners rounded off. Antennules in female 3-jointed, those of male strongly hinged. Antennæ somewhat robust. Legs with

2nd basal joint less produced outwards than in *Ancorabolus*. 1st pair with both rami 2-jointed and subequal in size. Inner ramus of three following pairs well developed, 2-jointed, shorter than the outer. Last pair of legs very similar in character to those of *Ancorabolus*. 2nd pair of legs in male armed at the tip of the inner branch with a curved spine of considerable size.

ARTHROPSYLLUS SERRATUS, G. O. Sars, var. SPINIFERA, Norman. (Pl. 30. figs. 1–14.)

1909. *Arthropsyllus serratus*, G. O. Sars, Crustacea of Norway, vol. v. Copepoda, Harpacticoida, p. 318, pl. 214.

Body depressed; head broadest, thence gradually tapering backwards; segments well marked. Cephalon broad, about as broad as long; rostrum widely rounded and slightly prominent; lateral margins of cephalon slightly notched behind the rostrum, followed by three lateral lobes, of which the middle one is the shortest and the posterior armed with a spine. Segments of the body and first three of the urosome armed with large, falcate, sharply-pointed lateral processes. The body-segments and two earlier segments of the urosome furnished posteriorly with four small spines. The 3rd segment of the urosome bears only two such spines. The last two segments of the urosome subequal, the terminal being rather shorter. Caudal rami subequal in length to three segments of the urosome, bearing two spines on the outer margin, three small terminal, and the long final seta which, together with the rami, equals the length of the entire animal except the head.

Anterior antennæ 3-jointed, moderately stout and long; joints nearly equal, bearing numerous spines.

Posterior antennæ consisting of two equal joints and entirely devoid of a secondary branch; the 1st joint with two setæ on the outer margin, the 2nd with two spines on the inner margin, and terminating with five setæ.

Posterior maxillipeds with the hand elongately ovate, terminal claw unusually long and slender.

1st feet with two branches subequal in length and 2-jointed; inner ramus terminating in two long setæ, outer with one seta on the 1st joint, two on the 2nd, and three at the extremity. *Succeeding feet* with the outer ramus 3-jointed, and the inner is much shorter than the outer, 2-jointed, the 1st joint very short. The setose armature is nearly similar to that of the 1st pair, except that the 2nd joint of the exterior branch carries a long seta on its inner face.

The 5th feet have the outer branch long and narrow, five or six times as long as broad, with two setæ on the outer margin and three terminal, of which the central is much the longest. The basal joint has the interior produced lobe with four setæ, and is about half the length of the terminal joint.

Length ·7 mm.

Male with antennules very stout, 6- or 7-jointed; 3rd joint greatly swollen, terminal strong, nail-like.

2nd foot with the inner branch bearing a strong, curved spine-process and two long setæ.

5th feet of nearly the same structure as those of the female, but very much shorter.

This species was dredged, in company with *Ancorabolus mirabilis*, on the east side of Little Cumbrae, in the Firth of Clyde, in 1888. Sars has found it in the outer part of the Trondhjem Fiord and other places in Norway, and records a specimen taken by Mr. Nordgaard at Repvaag in East Finmark.

In my description of *Ancorabolus* I referred to this form as a second species of that genus. I feel considerable difficulty with respect to the description I have given. In its structural details it seems to agree closely with Sars's species, but in the drawing which I publish it will be seen that the segments are armed with spines. These are not noted by Sars. The drawing was made for me by Mr. A. Scott in 1890, who is extremely accurate. In my specimens now mounted I am unable to see, in consequence of the opacity of the animal, the spines referred to. I thought it was better, therefore, to give it a varietal name, which can hereafter be used as specific if the form should prove to be distinct from that described by Sars.

EXPLANATION OF THE PLATES.

Plate 28.

Fig. 1. *Laophonte bulbifera*, sp. n.
2. „ „ „ Antennule.
3. „ „ „ Antenna.
4. „ „ „ 2nd maxilliped.
5. „ „ „ 1st foot.
6. „ „ „ 4th foot.
7. „ „ „ 5th foot.

Plate 29.

Fig. 1. *Ancorabolus mirabilis*, Norman.
2. „ „ „ Antennule.
3. „ „ „ Rostrum and base of antennule of a variety.
4. „ „ „ Antenna.
5. „ „ „ 2nd maxilliped.
6. „ „ „ 1st foot.
7. „ „ „ 2nd foot.
8. „ „ „ 3rd foot.
9. „ „ „ Last foot.

Plate 30.

Fig. 1. *Arthropsyllus serratus*, G. O. Sars, var. *spinifera*, Norman.

2. " " " " Antennule (female).
3. " " " " Antennule (male).
4. " " " " Antenna.
5. " " " " Mandible.
6. " " " " Maxilla.
7. " " " " 1st maxilliped.
8. " " " " 2nd maxilliped.
9. " " " " 1st foot.
10. " " " " 2nd foot.
11. " " " " 3rd foot (female).
12. " " " " 3rd foot (male).
13. " " " " 5th foot (female).
14. " " " " 5th foot (male).