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XXII.—*On some new or rare Crustacea from the Firth of Forth.* By THOMAS SCOTT, F.L.S., Naturalist to the Fishery Board for Scotland, and ANDREW SCOTT.

[Plates XV. & XVI.]

Lichomolgus agilis, sp. n. (provisional name).
(Pl. XV. figs. 1–14.)

Description.—Length, exclusive of caudal setæ, 1·38 millim. The cephalothorax, seen from above, is broadly ovate, composed of five segments, the first being longer than the combined length of the other four. Rostrum prominent, produced downwards at nearly right angles and ending in a sharp point. Anterior antennæ scarcely half the length of the first body-segment, seven-jointed, alike in both sexes, the proportional lengths of the joints being nearly as in the annexed formula—

$$\begin{array}{cccccccc} 12 & - & 23 & - & 11 & - & 14 & - & 12 & - & 13 & - & 8 \\ \hline 1 & - & 2 & - & 3 & - & 4 & - & 5 & - & 6 & - & 7 \end{array}$$

—sparingly setiferous; a small sensory filament springs from near the base of the fifth joint (Pl. XV. fig. 2). Posterior antennæ stout, four-jointed, the second joint fully twice the length of the next two together and having the lower margin produced forward into a digitiform process which extends beyond the middle of the third joint; the third and fourth joints are short, the penultimate one being the shortest, while the last joint is armed at the extremity with a moderately

short but stout and strongly hooked spine and four small setæ (fig. 3). A short trumpet-shaped siphon, capable of being extended or depressed, is situated nearly between the bases of the posterior antennæ, as shown in fig. 4 *c* (see also fig. 5). The other mouth-organs are nearly as in *Lichomolgus forficula*, Thorell, except that the mandible has no fringe of hairs on its upper margin and a prominent spiniform seta springs from the basal part of the anterior foot-jaw (figs. 6 and 7). The posterior foot-jaws differ considerably in the two sexes: those of the male are armed with extremely long and powerful falciform terminal claws, which are provided with a small spiniform seta at their base; the upper margin of the proximal half of the last joint is fringed with small teeth, and a spiniform seta springs from each side and near the middle of the same joint: the female foot-jaw, which gradually tapers towards the extremity, terminates in a short and stout claw, about half as long again as the joint from which it springs (fig. 9). The first four pairs of swimming-feet have both branches three-jointed; the last joint of the outer branch of the first pair is furnished with four dagger-shaped spines on the outer margin, the subterminal spine being longer than the others; the last joint of the outer branch of the fourth pair has one dagger-shaped terminal spine and two on the exterior margin; the last joint of the inner branches also bears dagger-shaped spines, and the inner margins of both branches are clothed with elongate plumose hairs; the spines and plumose hairs of the last joint of the inner branches of the four pairs are arranged in the following order:—in that of the first pair there are five hairs round the inner margin and end and one dagger-shaped spine on the exterior margin; that of the second pair has three hairs on the inner margin, two spines on the outer margin, and one terminal spine; that of the third pair has two hairs on the inner margin and three spines arranged as in the second pair; in that of the fourth pair there are no hairs on the inner margin, but there are two elongate spines, one terminal and one subterminal (figs. 10 and 11). The fifth pair in both sexes are small and provided with two terminal setæ, one being moderately long and slender and one stout and spiniform (fig. 12). Abdomen elongate, composed in the female of four, in the male of five segments: the first segment in both sexes is large and tumid, the greatest breadth of this segment in the female is near the middle, but in the male it is broadest at the distal end; the postero-lateral angles of this segment in the male are each furnished with two small setæ; the remaining segments are comparatively small and

subequal in length. Caudal stylets rather longer than the last two abdominal segments and provided with four setæ of very unequal length, the inner one of the two middle setæ being much longer than the others and more than twice the length of the stylet; a small seta also springs from the outer margin and near the middle of each stylet; the stylets of the male are rather longer than those of the female. Ovisacs two, large.

Hab. Within the siphons and between the branchial folds and body of the common cockle (*Cardium edule*), Firth of Forth and Morecambe Bay.

Remarks.—This species, though differing somewhat from the generic description of *Lichomolgus*, especially in having the inner branch of the fourth pair of swimming-feet three-jointed, agrees generally with the characters of that genus; it seems better therefore, for the present at least, to refer it to *Lichomolgus*.

Lichomolgus agilis was first observed in specimens of *Cardium edule* from Morecambe, Lancashire, and more recently in specimens of the same species of cockle from the vicinity of Cramond, Firth of Forth. The Copepod was obtained in at least 90 per cent. of the cockles examined, and appears to be moderately common—as many as sixteen specimens were taken from a single cockle. They are very active in their movements: if the shell of a living mollusk be opened, so that some of the contained water remains in the hollow of the opened shell-valves, the Entomostracan may be observed darting hither and thither in the water; not unfrequently their presence is indicated only by the dark-coloured line of the alimentary canal, their body being otherwise so transparent as to be scarcely visible in the water. When the Copepod is removed from the water the ovisacs, when present, are very conspicuous; they are about half as long as the animal, nearly straight along the inner edge, while the outer margin is a flattened but evenly rounded curve.

The presence of this Crustacean does not seem to be due to or to indicate an unhealthy condition of the mollusk which forms its host.

? *Enterocola eruca*, Norman. (Pl. XVI. figs. 1–11.)

Enterocola eruca, Brady, Mon. Brit. Copep. vol. i. p. 147 (1878).

Description.—Length, exclusive of ovisacs, 4·5 millim. (nearly $\frac{1}{5}$ of an inch), and including ovisacs 13 millim. (fully $\frac{1}{2}$ an inch). Body seen from above somewhat cylindrical, but rather narrower towards the anterior end, and composed of four distinct and subequal segments; there is a constriction

between the head and first thoracic somite, which in some positions has the appearance of a true joint, especially if the specimen has been a considerable time in spirit; the forehead is rounded and furnished with a very small rostrum. The last body-segment is produced laterally near the distal end and on the dorsal aspect into two digitiform processes, as shown in Pl. XVI. figs. 2 and 3. Anterior antennæ very short, stout, three-jointed, truncate at the end, and armed with several terminal, somewhat conical teeth, the two upper being considerably larger than the others; the first joint is proportionally large, the second and third very short (fig. 4). Posterior antennæ two-jointed; the end of the last joint bears four conical teeth, one terminal and three marginal (fig. 5). ? Mandibles rudimentary, composed of three nearly equal and rounded lobes (fig. 6). Anterior foot-jaw small, one-jointed, and bearing two terminal spines (fig. 7). Posterior foot-jaw large, three-jointed, considerably dilated at the base, but gradually decreasing in breadth towards the extremity and armed with a short but stout terminal claw, which has a broadly rounded lobe on the inner edge (fig. 8). The first four pairs of feet are nearly alike, and resemble the posterior antennæ in general appearance: the inner branch of all the four pairs is a short and broad rudimentary appendage apparently unfurnished with spines or setæ of any kind; the outer branch is comparatively narrow and elongate; in the first pair this branch is furnished with four small spiniform teeth, one being terminal and three marginal (fig. 9); that of the second pair has one terminal and two marginal, and that of the third and fourth pairs is furnished with one terminal and one marginal tooth (fig. 10). Abdomen very short and rudimentary, composed of three joints, the middle one being smaller than the other two; the end of the last joint is somewhat bifid, and each of the postero-lateral angles terminates in a small tooth-like spine (fig. 11). Ovisacs two, cylindrical, and about twice the length of the animal (fig. 1); they are attached at the base and towards the dorsal aspect of the last thoracic segment. Colour opaque white.

Hab. In the intestine, *not the branchial cavity*, of *Ascidia ? intestinalis*, dredged near Inchkeith, Firth of Forth.

Remarks.—Four specimens of this parasite were obtained in the intestine of four Ascidians (one in each Ascidian) during March 1891, and are recorded in the 'Ninth Annual Report of the Fishery Board for Scotland,' part iii. p. 301; one of these possessed a small portion of the basal part of two ovisacs. A short time ago another specimen of the same parasite was obtained in the intestine of the same species of

Ascidian in which the others occurred, and this one carried two long and slender ovisacs. Considerable difficulty was experienced in dissecting out the parasite from the intestine of the Ascidian, owing to the ovisacs being so slender and fragile; this character of the ovisacs possibly explains why they have been so rarely observed.

These Forth specimens appear to be identical with *Enterocola eruca*, Norman, a species obtained by the Rev. A. M. Norman while dredging among the Shetland Islands, and described in the Report of the Meeting of the British Association for 1868. One of the Forth specimens obtained last year was submitted to Prof. G. S. Brady, and he considered it to be identical with the species described by Dr. Norman.

In the 'Monograph of the British Copepoda,' by Prof. G. S. Brady, that author, while including *Enterocola*, M. van Beneden, in the family Buproridæ, did so in deference to Dr. Claus's opinion, but at the same time expressed himself as doubtful of this being its proper position.

Though the *Enterocola* from the Firth of Forth agrees to some extent with the characters of the family Buproridæ as described in the 'Monograph of the British Copepoda,' it differs in one important character: the Buproridæ are described as having "no external ovisac," but the Forth *Enterocola* possesses two ovisacs which are well developed. The *Enterocola* described and figured by M. van Beneden in the 'Bulletins de l'Académie Royale de Bruxelles,' 2^e série, tome ix. (1860), p. 155, as *Enterocola fulgens*, though certainly quite distinct from the Forth species, agrees with it in also possessing two external ovisacs; these ovisacs, if not so large as those of our specimen, are yet of considerable size; M. van Beneden's figure shows them to be nearly as long as the animal.

This marked difference between *Enterocola* and the Buproridæ shows the correctness of Prof. Brady's doubt as to the position of *Enterocola*. If one of the characters that distinguish the Buproridæ be the absence of external ovisacs, the position of *Enterocola* in that family becomes untenable.

Bathyporeia norvegica, G. O. Sars.

This Amphipod has recently been obtained in the Firth of Forth, where it appears to be a rare species.

Cerapis crassicornis (Spence Bate), = *Siphonæcetus crassicornis*, Spence Bate, has also been recently obtained in the Forth. It was observed in some material collected by means of a tow-net worked near the bottom. One specimen only

was taken; it inhabited a tube a little longer than itself, formed of fine black mud bound together with some kind of glutinous substance.

Petalomera declivis, G. O. Sars.

This little Cumacean was taken in the Firth of Forth some time ago, but not identified at the time. The Rev. T. R. R. Stebbing, M.A., to whom we are indebted for the names of these three species, states that *Petalomera declivis* "has probably not yet been recorded as British."

EXPLANATION OF THE PLATES.

PLATE XV.

Lichomolgus agilis, sp. n.

- Fig.* 1. Adult female, seen from above. Magn. 46·7 diam.
Fig. 2. Anterior antennæ. Magn. 190 diam.
Fig. 3. Posterior antennæ. Magn. 127 diam.
Fig. 4. First segment of body. Magn. 80 diam. *a*, rostrum; *b*, anterior antennæ; *c*, siphon; *d*, posterior antennæ; *e*, mandible; *f*, maxilla; *g*, first foot-jaw; *h*, second foot-jaw; *i*, first feet.
Fig. 5. Rostrum (*r*); siphon (*s*). Magn. 95 diam.
Fig. 6. Mandible; maxilla (*a*). Magn. 460 diam.
Fig. 7. Anterior foot-jaw. Magn. 460 diam.
Fig. 8. Posterior foot-jaw of male. Magn. 253 diam.
Fig. 9. Posterior foot-jaw of female. Magn. 253 diam.
Fig. 10. Foot of first pair. Magn. 190 diam.
Fig. 11. Foot of fourth pair. Magn. 190 diam.
Fig. 12. Foot of fifth pair. Magn. 380 diam.
Fig. 13. Abdomen of female. Magn. 80 diam.
Fig. 14. Abdomen of male. Magn. 80 diam.

PLATE XVI.

? *Enterocola eruca*, Norman.

- Fig.* 1. Adult female, seen from below. Magn. 16·6 diam.
Fig. 2. Adult female, seen from right side. Magn. 16·6 diam.
Fig. 3. Adult female, seen from above. Magn. 345 diam.
Fig. 4. Anterior antennæ. Magn. 345 diam.
Fig. 5. Posterior antennæ. Magn. 247 diam.
Fig. 6. Mandibles. Magn. 247 diam.
Fig. 7. Anterior foot-jaw. Magn. 690 diam.
Fig. 8. Posterior foot-jaw. Magn. 345 diam.
Fig. 9. Foot of first pair. Magn. 190 diam.
Fig. 10. Foot of fourth pair. Magn. 190 diam.
Fig. 11. Abdomen of female. Magn. 40 diam.



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