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ser.6:v.16=no.91-96 (1895):

<https://www.biodiversitylibrary.org/item/81045>

Article/Chapter Title: On some new and rare British Copepoda

Author(s): Thomas Scott

Page(s): Page 353, Page 354, Page 355, Page 356, Page 357, Page 358, Page 359, Page 360, Page 361, Page 362, Text, Text, Text

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THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

[SIXTH SERIES.]

No. 95. NOVEMBER 1895.

XLVII.—*On some new and rare British Copepoda.* By THOMAS SCOTT, F.L.S., Naturalist to the Fishery Board for Scotland, and ANDREW SCOTT, Fisheries Assistant, University College, Liverpool.

[Plates XV.—XVII.]

Stenhelia Blanchardi, sp. n. (Pl. XV. figs. 1–10.)

Description.—*Female.* Length 1.15 millim. ($\frac{1}{22}$ of an inch). Body elongate, moderately stout; rostrum prominent and somewhat curved. Antennules long and slender, eight-jointed, the first and second joints much longer than any of the others; the fifth, sixth, and seventh joints subequal and very short; the first and second joints are very sparingly setiferous, but the others are provided with a number of moderately long setæ. The proportional lengths of the various joints are as follows:—

Proportional lengths of the joints..	27	.	26	.	10	.	9	.	5	.	5	.	5	.	9
Number of the joints	1		2		3		4		5		6		7		8

Antennæ moderately stout; secondary branch elongate; the first joint is nearly twice the length of the terminal one, but the middle joint is very short; there are several setæ on the secondary branches, as shown by the drawing (fig. 3). Mandibles large and furnished with a broad biting-part; the basal portion of the mandible-palp, which is about as large as the mandible, becomes gradually more dilated outwardly; the distal branch is larger than the other and one-jointed, but the

smaller branch is two-jointed (fig. 4). Posterior foot-jaws moderately stout; terminal joint very narrow and about three times as long as broad, and armed at the apex with a moderately long slender claw and two setæ; the proximal half of the inner margin of the second joint is fringed with hairs, and near the distal end of the margin is a moderately long plumose seta (fig. 6). The inner branches of the first pair of swimming-feet are long and slender; the first joint extends to the end of the outer branches; the second joint is short, while the third is very narrow and nearly three times the length of the second joint (fig. 7). Outer branches of the second, third, and fourth pairs elongate; inner branches much shorter (fig. 8). Fifth pair large; inner portion of the basal joint long and narrow and tapering towards the apex; the outer margin, which is nearly straight, is fringed with minute hairs, while four spiniform setæ spring from the distal half of the inner margin and apex; the two upper marginal setæ are stout and comparatively short and distinctly bifid at the end; the apical seta is also short, but the lower marginal seta is elongate and slender except towards the base, which is moderately stout; the secondary joint is elongate, narrow, and extends somewhat beyond the extremity of the basal joint; the distal end of the exterior margin is produced outwards into a triangular hook-like process; there are a few small setæ on the exterior margin and on the distal end of the inner margin and apex (fig. 9). Caudal stylets narrow and rather longer than the last abdominal segment (fig. 10).

Habitat. Off Arisaig, Argyllshire; a few specimens from dredged material collected in 1892.

Remarks. This species is at once distinguished by the form and armature of the fifth pair of thoracic feet; the hook-like process at the end of the secondary joints, as shown by the drawing, is characteristic of all the specimens examined, and the two upper setæ on the inner margin of the basal joint are distinctly bifid; the structure of the antennules, the form of the first pair of swimming-feet, and the elongate caudal stylets also form a combination of characters not observed in any other species known to us. We have much pleasure in giving to this species the name of our esteemed friend and correspondent, Dr. Raphael Blanchard, of Paris.

Thalestris peltata (Boeck).

(Pl. XV. figs. 11-15; Pl. XVI. figs. 1-8.)

Amenophia peltata, Boeck, Oversigt Norges Copepoder, p. 45 (1864).

Thalestris peltata, Brady, Mon. Brit. Copepoda, vol. ii. p. 138, pl. liii. figs. 11-19.

Description.—*Female.* Length .6 millim. ($\frac{1}{42}$ of an inch).

Body stout, depressed, somewhat like *Zaus spinatus* in general appearance; rostrum short, truncate. Antennules moderately stout, nine-jointed, setiferous and gradually tapering from the base; the fifth, seventh, and eighth joints much shorter than any of the others. The annexed formula shows the proportional lengths of the various joints:—

Proportional lengths of the joints..	14	18	13	11	5	8	4	3	8
Number of the joints	1	2	3	4	5	6	7	8	9

Secondary branches of the antennæ two-jointed, stout, and furnished with several plumose setæ, the first joint rather shorter than the other (Pl. XV. fig. 13). Mandible-palp narrow-elongate, sinuate, provided with two small marginal and one-jointed branches (Pl. XV. fig. 14). Anterior foot-jaws short, dilated, and armed with a strong terminal claw, and with three short setiferous marginal processes (Pl. XV. fig. 15). Posterior foot-jaws stout, of moderate length, and furnished with a strong slightly hooked terminal claw (Pl. XVI. fig. 2). First pair of swimming-feet robust; the second basal joint is provided interiorly and near the distal end with a short hook-like spine; the first joint of the outer branches is equal to nearly half the length of the second, while the end-joint is very short; the marginal spines of the first and second joints are long and slender; the end-joint, which bears two small setæ on the exterior margin, is armed at the apex with two stout claw-like spines, fringed on the outer edge with minute hairs, and with an elongate and moderately stout seta; a small seta also springs from the distal end of the inner margin of the second joint; the first joint of the inner branches, which are elongate and fringed with small hairs on both margins, bears a moderately long plumose seta on the middle of the inner aspect; the second and third joints are very small; each of the inner branches is armed with an elongate and powerful terminal claw, fringed with minute hairs on the outer edge, and with also a terminal spiniform seta; both branches are of nearly the same length (Pl. XVI. fig. 3). In the fourth pair, which are comparatively slender, the inner branches extend only to about the end of the second joint of the outer branches (Pl. XVI. fig. 5). The fifth pair are foliaceous; the basal joint, which is broadly subtriangular (its greatest length being equal to only about two thirds of the breadth), is provided with five setæ—one on the lower half of the inner margin and four at the apex; the two middle apical setæ are long and plumose, but all the others are short; the secondary joint is moderately long and subovate, the inner

edge is nearly straight and provided with a few small and equidistant fascicles of minute hairs; the outer margin is gently curved, densely setose on the upper half and with several setæ on the lower half and apex (Pl. XVI. fig. 6). Caudal stylets short, scarcely equal in length to the last abdominal segment.

Male. The male is similar to the female except in the following particulars:—The antennules, which are moderately stout, are modified for grasping (Pl. XV. fig. 12). The second pair of swimming-feet are very similar to those of the male of *Thalestris harpactoides*, Claus, except that the second and third joints of the inner branches are coalescent (Pl. XVI. fig. 5). In the fifth pair the basal joint is much shorter than in the female, being scarcely produced interiorly; it bears three moderately stout apical setæ, the middle one of which is about twice the length of the others; the secondary joint is somewhat similar to that of the female fifth pair, and is furnished with six stout spiniform setæ, three on the outer margin and three at the apex (Pl. XVI. fig. 7).

Habitat. Firth of Forth; collected April 1895.

Remarks. *Thalestris peltata* (Boeck) is not very unlike *Zaus spinatus* in general appearance; moreover, in the structure of some of its appendages, and especially of the first pair of swimming-feet, it resembles certain species of *Dactylopus*. The chief points of difference between *Thalestris* and *Dactylopus* seem to be these—in *Thalestris* the outer and inner branches of the first pair of swimming-feet are usually of equal length, or the outer may be slightly longer than the inner, and the middle joint of the outer branches is usually considerably longer than the first or third joints, whereas in *Dactylopus* the outer branches are usually shorter than the inner branches, and the middle joint of the outer branches usually equal in length to, or only slightly longer than, the first or third joints. But in *Thalestris peltata* and *Dactylopus tisboides* the two genera approach somewhat closely to each other. The description and figures of this species in Dr. Brady's 'Monograph of British Copepoda' agree very well with our observations, except that he describes the secondary branch of the antennæ as three-jointed. He had only one specimen to describe from; and as we have obtained both males and females, we thought that a set of drawings showing their sexual differences might be of interest. We did not observe the eyes mentioned by Boeck.

Dermatomyzon gibberum, T. & A. Scott.
(Pl. XVII. fig 14.)

This species was described in the Ann. & Mag. Nat. Hist. for February 1894; at that time only a single specimen had been obtained from a tow-net gathering collected near the mouth of the Firth of Forth. This year (1895) we have taken a considerable number of specimens of the same species, not only in the Firth of Forth, but also in Liverpool Bay; they were obtained by washing a number of specimens of the common starfish (*Asterias rubens*) in a bottle containing methylated spirit mixed with water, and afterwards examining the sediment. Several of the specimens from both localities were apparently mature, and a few of them carried ovisacs; these apparently adult forms differed in general appearance from the one figured in the Ann. & Mag. Nat. Hist. in being more globose in outline; but a careful dissection and examination of one or two of these adult specimens showed that this was the only difference of importance; the structure of their various appendages was apparently identical with the structure of the appendages of the specimen first described and figured in February 1894. We, therefore, at the present time do not think it is necessary to repeat these structural drawings, but, instead, we give here a full-size drawing of one of the adult forms from Liverpool Bay (see fig. 14), as the full-size figure in the Ann. & Mag. Nat. Hist. for February 1894 is evidently that of a somewhat immature specimen.

Alcyoncola fusiformis, gen. et sp. n.
(Pl. XVI. figs. 10-14; Pl. XVII. fig. 13.)

Description. Body elongate-fusiform; the last two abdominal segments distinct, all the others coalescent. Head somewhat produced and furnished with both antennules and antennæ. The abdominal segments are unequal in length, the penultimate one being nearly four times longer than the other, which is very short. Caudal stylets well developed and equal to about three fourths the length of the penultimate abdominal segment; they diverge considerably, and each stylet is provided with three stout spiniform setæ, which are at least three times the length of the stylet; the middle one is straight, but the one on each side diverges at the base and then curves round towards the end of the middle seta; each stylet has also one or two small hairs on the lateral aspect. Fig. 13, Pl. XVII., is a full-size drawing representing a dorsal view of one of the more perfect specimens of this Copepod.

Length of this specimen 1.23 millim. ($\frac{1}{20}$ of an inch). The antennules are four-jointed and sparingly setiferous; a filament much longer than the antennule springs from the end of the second last joint, and possesses what looks like an articulation at about a third of its length from the proximal end, where also are two setæ-like appendages; the basal joint is larger than the others and somewhat dilated, the other three are of nearly equal length, but the last is much narrower than the two preceding ones (Pl. XVI. fig. 10). The antennæ are long and slender and three-jointed; the middle joint is longer than either the first or the third, and the third is armed with a stout and claw-like terminal spine (Pl. XVI. fig. 11). We have been unable to make out the mouth-appendages. The first and second pairs of feet are fairly well developed; they each consist of a stout one-jointed basal part, which bears a short and robust two-jointed branch, and, in the second pair at least, what looks like a rudimentary second branch; in both pairs the outer two-jointed branches are each armed with two powerful terminal claws, while a stylet-like spine springs at nearly right angles from the distal half of the outer margin of the first joint. In the first pair the lower part of the basal joint is considerably gibbous and produced into a stout tuberculiform process; in the second pair the basal joint is not so much dilated as in the first pair, but is furnished with a stout stylet-shaped spine on its inferior aspect (Pl. XVI. figs. 12 and 13). This spine may represent a rudimentary second branch, as already stated. The third, fourth, and fifth pairs of feet appeared to be entirely absent, and no ova were observed upon or within any of the specimens examined.

Habitat. On *Alcyonium digitatum*. Firth of Forth, and also in the Moray Firth.

Remarks. Though this organism has been known to us for several years, we have not hitherto observed any description of it in any of the works on natural history within our reach. It seems to be a true though a somewhat abnormal Copepod, and also we think there can be no doubt that it is parasitic on *Alcyonium digitatum*. The method usually adopted by us for obtaining specimens is to immerse fragments or whole specimens of the zoophyte in diluted methylated spirit, and, after washing them thoroughly, the residue is examined; by adopting this method we seldom fail in obtaining one or two specimens. The parasite does not, however, appear to be very common, and may not be generally distributed.

? *Enterocola Beaumonti*, sp. n.
(Pl. XVI. fig. 9; Pl. XVII. figs. 9-12.)

Description.—*Female.* Length 2·2 millim. ($\frac{1}{11}$ of an inch). Body composed of five segments, seen from above stout and subcylindrical, the anterior half tapering slightly towards the broadly rounded forehead; the last body-segment with two stout tubercles at the distal end, one on each side of the dorsal aspect; abdomen short, subtriangular, three-jointed; caudal stylets in the form of two short, divergent, and pointed tooth-like processes (Pl. XVII. fig. 9). Seen from the side the last body-segment is strongly gibbous on the posterior dorsal aspect (Pl. XVII. fig. 10). Antennules short and stout, four-jointed; the first is about twice the entire length of the other three; the last is very short (Pl. XVII. fig. 11). Antennæ three-jointed; the first joint, which bears two tooth-like spines near the middle of the inner edge, has the base dilated, but tapers rapidly towards the distal end; the second joint is about three times longer than broad, and has the inner margin obscurely three-toothed; the last joint, which is small, forms a stout tooth-like claw (Pl. XVII. fig. 12). Posterior foot-jaws strong; first joint stout and rather longer than broad, the second and third short; the third joint is armed with a short but strong terminal claw (Pl. XVI. fig. 9). There are four pairs of thoracic feet, all of which are somewhat similar in structure, and resemble those of the next species; they each consist of a short and dilated basal joint, to the upper part of which is attached a single two-jointed branch; the first joint of the branch is moderately stout and elongate, the second joint is short and has two claw-like processes on the outer aspect, as shown by fig. 8 (Pl. XVII.), which represents one of the fourth pair of *Enterocola hibernica*.

Habitat. Taken from an Ascidian, obtained at Valentia, Ireland.

Remarks. This Ascidian parasite somewhat resembles a form obtained by us in the Firth of Forth in 1891, and described and figured in the Ann. & Mag. Nat. Hist. for September 1892; it differs, however, very distinctly in the structure of the antennules, and the dorsal processes on the last body-segment are much less developed; it also differs in the structure of the thoracic feet, and is likewise a smaller species.

This and the following parasites were discovered by Messrs. W. I. Beaumont, B.A., of Cambridge, and F. W. Gamble, M.Sc., of Owens College, Manchester, whilst

carrying out some scientific researches at Valentia, Ireland, from whom we received them for examination. We have much pleasure in attaching Mr. Beaumont's name to this species.

(?) *Enterocola hibernica*, sp. n.
(Pl. XVII. figs. 3-8.)

Description. In general outline somewhat like the preceding species, but considerably larger, being about 4.5 millim. in length ($\frac{2}{11}$ of an inch). Head separated from the body by a distinct joint; body indistinctly segmented; the abdomen, which is coalescent with the last body-segment, terminates in a short and somewhat pyriform caudal process (figs. 3 and 4). Antennules stout, four-jointed, shorter than those of *Enterocola Beaumonti*; basal joint scarcely longer than the combined lengths of the next three; third joint rather longer than the second, end-joint very short (fig. 5). Antennæ short and stout; basal joint without marginal teeth; second joint shorter than the second joint of the antennæ in *Enterocola Beaumonti*, and with a single small tooth near the distal end of the inner margin (fig. 6). Posterior foot-jaws robust; first and second joints of nearly equal length, but the first is more dilated; third joint much smaller, and armed with a short but powerful hooked claw (fig. 7). Thoracic feet similar to those of *Enterocola Beaumonti*. Ovisacs narrow, cylindrical, and elongate.

Habitat. The same as *Enterocola Beaumonti*.

Remarks. *Enterocola hibernica*, though somewhat similar to the species previously described, is quite distinct: not only is it a much larger species, but the structural differences are very marked. The body is indistinctly segmented and the abdomen is coalescent with the last body-segment; whereas in *Enterocola Beaumonti* both body and abdomen are distinctly segmented, and the abdomen is not so rudimentary; the cephalic appendages also show distinct differences.

Though we have ascribed these Ascidian parasites to the genus *Enterocola* of van Beneden, we are not satisfied that this is their true position; but whether a new genus should be established for them, we are not prepared to say.

Lomanoticola insolens, gen. et sp. n.
(Pl. XVII. figs. 1, 2.)

Description.—*Female.* Length about 2 millim. ($\frac{1}{12}$ of an inch). Body broadly subovate; head narrow, subconical, with the apex somewhat truncate; between the head and

thorax there is on each side a deep lateral sinus, and the body is furnished on each side with four large elongate tooth-like processes that overlap each other on the ventral aspect; the abdomen is short and narrow, two-jointed; the terminal joint, which is about three times the length of the first, has the end somewhat trilobed and is furnished with three very small terminal hairs. Ovisacs large, broadly oblong, divergent, each ovisac extending laterally beyond the body of the animal.

Habitat. Parasitic on the nudibranch mollusc *Lomanotus Genei*, Ver., obtained at a depth of 8 fathoms in Valentia Harbour, Ireland.

Remarks. In this remarkable parasite there is no apparent segmentation of the body, and the head is distinguished from the body only by the lateral sinuses already described; on the other hand, the abdomen is distinctly jointed, and consists of two segments, as shown in the drawing. The parasite was entirely buried in the body of the mollusc with the exception of the last abdominal segment and the ovisacs. Figure 2 represents the mollusc with the parasite *in situ*. No antennules, antennæ, or mouth-organs could be observed. The parasite was slightly injured during its removal from the body of the mollusk, and the appendages on one side somewhat displaced; but the drawing shows them in what we believe to be their natural position. We have been unable to identify this parasite with any described genus or species.

Additional Note.—In the 'Journal of the Marine Biological Association,' vol. i., n. s., p. 426, Mr. Garstang, in an article on "The Opisthobranchiate Mollusca of Plymouth," refers to "a remarkable parasitic Copepod" which he had observed on a specimen of *Lomanotus Genei*, and which he at first supposed to be the eggs of the mollusc; probably this parasite may be similar to the form now described.

EXPLANATION OF THE PLATES.

PLATE XV.

Stenhelia Blanchardi, sp. n.

Fig. 1. Female, seen from the side, $\times 53$. 2. Antennule, $\times 126$. 3. Antenna, $\times 168$. 4. Mandible, $\times 190$. 5. Anterior foot-jaw, $\times 380$. 6. Posterior foot-jaw, $\times 380$. 7. Foot of first pair of swimming-feet, $\times 190$. 8. Foot of fourth pair, $\times 126$. 9. Foot of fifth pair, $\times 168$. 10. Abdomen and caudal stylets, $\times 80$.

Thalestris peltata (Boeck).

Fig. 11. Female, seen from above, $\times 80$. 12. Antennule of male, $\times 253$.
13. Antenna (female), $\times 380$. 14. Mandible, $\times 253$. 15. Anterior foot-jaw, $\times 380$.

PLATE XVI.

Thalestris peltata (Boeck).

Fig. 1. Antennule of female, $\times 253$. 2. Posterior foot-jaw, $\times 253$.
3. Foot of first pair of swimming-feet, $\times 380$. 4. Foot of fourth pair, $\times 126$. 5. Foot of second pair (male), $\times 168$. 6. Foot of fifth pair (female), $\times 380$. 7. Foot of fifth pair (male), $\times 253$. 8. Abdomen and caudal stylets, $\times 168$.

(?) *Enterocola Beaumonti*, sp. n.

Fig. 9. Posterior foot-jaw, $\times 380$.

Alcyonicola fusiformis, gen. et sp. n.

Fig. 10. Antennule, $\times 760$. 11. Antenna, $\times 380$. 12. Foot of first pair, $\times 380$. 13. Foot of second pair, $\times 380$. 14. Mouth.

PLATE XVII.

Lomanotocola insolens, gen. et sp. n.

Fig. 1. Female, seen from below, $\times 250$. 2. *Lomanotus*, with parasite *in situ*, $\times 10$.

(?) *Enterocola hibernica*, sp. n.

Fig. 3. Female, dorsal view, $\times 10$. 4. Ditto, side view, $\times 12$. 5. Antennule, $\times 380$. 6. Antenna, $\times 380$. 7. Posterior foot-jaw, $\times 380$. 8. Foot of fourth pair of swimming-feet, $\times 380$.

(?) *Enterocola Beaumonti*, sp. n.

Fig. 9. Female, dorsal view, $\times 26$. 10. Ditto, seen from the side, $\times 26$. 11. Antennule, $\times 380$. 12. Antenna, $\times 380$.

Alcyonicola fusiformis, gen. et sp. n.

Fig. 13. Dorsal view, $\times 40$.

Dermatomyzon gibberum, T. & A. Scott.

Fig. 14. Female, dorsal view, $\times 70$.

XLVIII.—*Descriptions of Five new Species of Land-Shells from New Guinea.* By EDGAR A. SMITH.

[Plate XX.]

THE species described in this paper were collected in German New Guinea in the neighbourhood of Constantin Hafen, on





