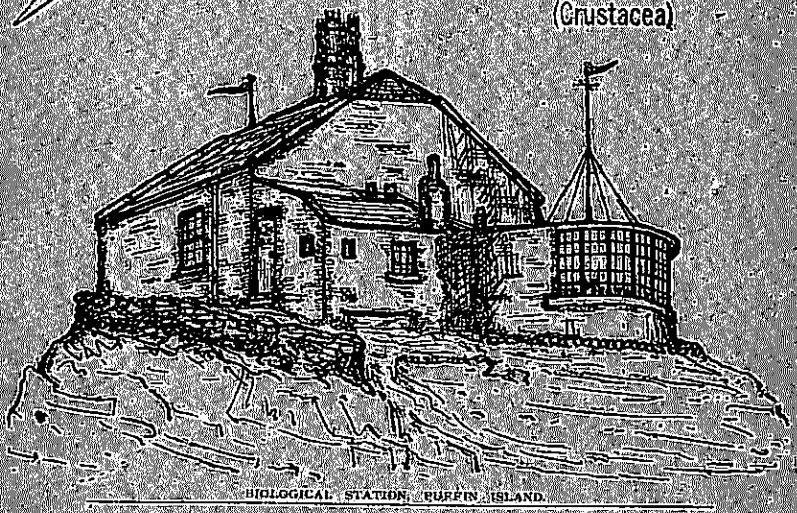
MONSTRILLA

AND THE

CYMBASOMATIDÆ.

WITH PLATE.



BIOLOGICAL STATION, PUFFIN ISLAND.

BY

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LIVERPOOL:

T. Dobb & Co., Printers, 229, Brownlow Hill.

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[From Trans. Biol. Soc., L'pool. Vol. IV.]

MONSTRILLA and the CYMBASOMATIDÆ.

By I. C. Thompson, F.L.S.

With Plate IV.

[Read April 11th, 1890.]

In a paper entitled "Notes on the Genus Monstrilla" by Mr. G. C. Bourne, in the current number of the "Quarterly Journal of Microscopical Science" (February 1890), the author refers to the various recorded species belonging to this genus, of which he considers my genus *Cymbasoma* to be a synonym.

As stated by Mr. Bourne, previous to the capture of the solitary specimen to which I gave the name *Cymbasoma rigidum** no similar animal had been recorded since that described by Claus as *Monstrilla helgolandica* in 1863. I subsequently found *Cymbasoma* in tow-nettings taken about Malta, and again in British waters on two occasions off Puffin Island as well as in Clyde gatherings. Mr. Sinel has also taken a number of specimens at Jersey, Mr. W. S. McMillan has found it at Torquay, and several specimens were taken by Canon Norman and Mr. Bourne at Plymouth. So that there has been no lack of material recently upon which to discuss the correctness of previous observations; and I may say at the outset that I concur in the general conclusion of Mr. Bourne that, under our existing knowledge, the various species seem to belong to one genus, and that the name *Cymbasoma* must be withdrawn in favour of *Monstrilla;* but, as I shall show further on,

* Linnean Journal, vol. xx., p. 145.

I cannot see that Mr. Bourne has sufficient grounds for merging the family Cymbasomatidæ in the Corycæidæ.

It was when engaged in examining a mass of material which I had collected about the Canary Islands that I came across the solitary specimen alluded to above, and I took the precaution of consulting with Dr. G. S. Brady before venturing to form for its reception the genus *Cymbasoma*. I did not overlook Dana's genus *Monstrilla* as Mr. Bourne supposes, but having the support of Dr. Brady's experienced opinion I was like him misled by the probably inaccurate figure (Ray Society Monograph, vol. III. p. 38) taken from Lubbock's solitary specimen, which has since been lost. This figure gives a large rostrum to the animal and omits one or more of the body segments; and being taken from a male bears little or no general resemblance to my specimen, a female, the sexes of this genus being very dissimilar in form and appearance. With male specimens now before us I think there is a considerable probability of the identity of Lubbock's *Monstrilla anglica* with my *Cymbasoma herdmani*.

It is somewhat unaccountable that previous to my capture of the specimen off Teneriffe in 1887 not a single specimen of *Monstrilla* should have been recorded as taken anywhere for a quarter of a century, especially as Claparède reports that it was not at all rare on the Normandy coast when he described *Monstrilla danæ* in 1863* and as it has been so frequently met with during the last two years. My experience is that the striking appearance of the animals of this genus render them readily conspicuous whenever they are in material under examination. The fact that they are destitute of posterior antennæ, mandibles, and maxillæ, as well as foot jaws, at once distinguishes

* Beobach. Anat. Entwick. Wirbellos. Thiere, Leipzig, p. 95.

them, and must lead any observer to almost mistrust his eyes as did Claparède—for how can it live with apparently no means of obtaining nutriment? Its internal anatomy further bears out the supposition that its digestive powers must be very limited, for it is quite destitute of any alimentary canal; the small mouth discernable in some specimens opening directly into the body cavity.

From the entire absence of mouth organs one would naturally surmise that the animal was a sucking parasite dependant for nutriment upon its host, and the cylindrical proboscis ending in a mouth possessed by some species lends countenance to this view. But against this it must be noted that this mouth is very rudimentary or entirely absent in the males of most of the species (they also being devoid of eyes); and further, as noted by Claparède and by Bourne, all the specimens of *Monstrilla* hitherto recorded have been free swimmers near the surface. So there is no sufficient justification for the parasite theory, and for the present I am inclined to think with Bourne that "possibly this creature may present an analogy with the Ephemeridæ, and the adult may be preceded by a predaceous larva supplied with mouth parts and an alimentary tract, which, after a succession of rapid ecdyses, developes into the mature sexual form, whose only function is that of reproduction."

Bourne classifies the known forms of *Monstrilla* into six species:

1. *Monstrilla rigida*, I. C. Thompson.
2. *Monstrilla longispinosa*, Bourne.
3. *Monstrilla danæ*, Claparède.
4. *Monstrilla viridis*, Dana.
5. *Monstrilla heligolandica*, Claus.
6. *Monstrilla anglica*, Lubbock.

To this list I have now to add—

7. *Monstrilla longicornis*, n. sp.,

a form of which I recently took one specimen near Puffin Island, and which differs specifically from the six previously enumerated. Considering our still very limited knowledge of the genus it is by no means improbable that further investigation may reveal the necessity of dividing *Monstrilla* into two genera. Indeed Claparède says*: "One can still be doubtful whether the Chinese *M. viridis* and the European species really belong to the same genus."

Bourne ingeniously founds a system of classification of the species of *Monstrilla* upon the number of setæ occurring on each division of the caudal segment,

viz., A, Three setæ on each furcal member.

B, Six setæ ,, ,, ,,

Claparède, however, in his exceedingly beautiful plates, figures (l. c. fig. 2) the male of *Monstrilla danæ* with four setæ on each furcal member, Mr. Bourne's supposition being that "he has omitted to count them carefully." I think it is probable that Claparède is quite correct on this point both from the fact of his generally careful description and because my specimen of *M. longicornis* has undoubtedly four setæ, and only four, on each furcal member. If, therefore, the number of caudal setæ is found to be sufficiently constant for this basis of classification to be retained, it will be necessary to add a further division:—

C, Four setæ on each furcal member,

containing *M. danæ* of Claparède and my new species *M. longicornis*. I suspect, however, that it will be found necessary to discover some more stable basis for the classification of the various species composing this most remarkable and altogether puzzling genus.

* loc. cit. p. 96.

Of specimens of the various species of *Monstrilla* I have had no experience beyond some half-dozen which I have in all collected. Three of these, all females, are clearly *M. rigida*, I. C. Thompson. Two others, both males, though very unlike in general appearance, agree structurally for the most part with and are probably different stages of *M. anglica*, Lubbock. Examined with a high form ($\frac{1}{16}$ Obj. Gundlach) these reveal some points apparently overlooked by other observers. The spines situated on the 2nd and 3rd joints of the antennæ of the specimen which I take to be the more mature of the two have finely serrated edges (Pl. IV. fig. 5.) The fifth and apical segments have one feathery plume on the inner side of each (fig. 3). The setæ of the swimming feet and caudal segment are all finely plumose. The first abdominal segment bears a symmetrical genital appendage curiously like the tail fin of a fish, (see fig. 6). It is a good deal different in form from Bourne's fig. 9, though doubtless of the same nature and function—whatever that may be.

The last specimen of *Monstrilla* which I have found differs entirely in several points from any hitherto described species. From its very long antennæ I propose to name it *Monstrilla longicornis*, and describe it as follows:

Monstrilla longicornis, n. sp. (Plate IV., figs. 1, 2, and 4).

Length from apex of antennæ to caudal segment 1-15th of an inch. Antennæ almost the same length as the entire cephalothorax, having six segments; the first and basal segment as broad as long; the length of the second about four times as long as the width, bearing a spine about the centre on inner side and several spines near its apex; the third segment about twice as long as broad, bearing several spines; the fourth about the same length as the second, with an enlargement about the centre bearing spines. Between the fourth and the penultimate there is

a decided hinge which leads me to conclude that the specimen is a male; the fifth segment rather longer than the third and terminated by several setæ; the sixth is rather shorter than the fifth and much narrower, bearing at the apex one long and one short spine and one or possibly more setæ. Cephalothorax composed of five segments covered all over with very fine black dots. No appearance of any eye; mouth subcentral, ventral, near the middle of first body segment; mouth organs entirely absent. Setæ of swimming feet apparently non-plumose, the edges being wavered or uneven (fig. 2). Fifth pair of appendages in the form of two long setæ springing from short protuberances. Abdomen composed of four segments, the first bearing a genital appendage terminating in two short lateral spines. Furcal members each terminated by four apparently non-plumose setæ, the edges of which are marked with regular dots which may possibly be the scars of lost hairs (fig. 4).

A single specimen of this striking species was taken by tow-net off Puffin Island in November 1888. The length of the antennæ and the finely dotted surface readily distinguished it from any other species.

The systematic position of the genus *Monstrilla* is not at all an easy matter to decide upon, but I fail to see that Bourne has given any good grounds for placing it among the Corycæidæ, where it was originally placed by Claus.

A comparison of the two families, Corycæidæ and Cymbasomatidæ, will show that they have indeed very few points in common.

CORYCÆIDÆ. (Thorell, G. S. Brady.)	CYMBASOMATIDÆ. (I. C. Thompson.)
Body subpyriform.	Body elongated, boat-shaped.
Abdomen elongated, much narrower than the cephalothorax.	Abdomen scarcely narrower than cephalothorax.
Anterior antennæ 5 — 7 jointed; alike in both sexes, short.	Anterior antennæ 4 — 6 jointed; different in the sexes, the male on both sides being thickened and geniculated.
Posterior antennæ simple, 3—4 jointed, forming a strongly clawed prehensile hand.	Posterior antennæ and gnathites entirely absent. Rudiments of gnathites present in larval specimens.
Mandibles, maxillæ, and first pair of foot jaws present, but destitute (or nearly so) of palps.	Mouth circular, at end of cylindrical process on ventral surface of cephalon, and leading into a short pharynx; remainder of digestive tract aborted.
Posterior foot jaws prehensile, and in the male powerfully clawed.	
First four pairs of feet adapted for swimming, 2 branched.	First four pairs of feet adapted for swimming, 2 branched.
Fifth pair of feet rudimentary alike in both sexes, rarely absent.	Fifth pair of feet rudimentary in both sexes.

Corycæidæ.—*Cont.* (Thorell, G. S. Brady.)	Cymbasomatidæ.—*Cont.* (I. C. Thompson.)
Small median eyes and usually two large lateral eyes.	Females have usually a single median eye with two lenses on dorsal side of head, and a third median lens on ventral side. Males of most species have no eyes.
Ovisacs usually two.	No ovisacs. Ova are deposited upon strong double genital setæ.

Bourne lays stress upon the eyes "the character of the antennæ, the reduction of the mouth parts, and the habit of the animals." But in the matter of antennæ *Monstrilla* certainly more nearly resembles the Harpacticidæ than the Corycæidæ, while in the condition of the mouth parts it is difficult to see the similarity, and as to the habit of the animals and the appearance of the eyes they are entirely different in the two cases.

There is but little similarity between the families Pontellidæ and Corycæidæ, and yet Claparède was inclined to place *Monstrilla* in the former. His remarks on this point may be thus translated:—

"Especially with the Pontellæ and perhaps also with the Setellæ as stated already by Dana, the relationship cannot be denied. *Monstrilla* is, so to speak, a *Pontella* provided with a proboscis and therefore degraded to the Cormostomata. This comparison is so natural that as soon as a *Pontella* rushed through the field of my microscope I thought I saw a *Monstrilla* and groped after it. I cannot help regarding this circumstance as a fresh support

for the view so ingeniously supported by Steenstrup and Lütken, according to which view the parasitic Crustaceans do not form a special order, but only represent the parasitic Lophyropoda. Every type of Lophyropod would, according to this theory, furnish a sucking sub-species. That is to say, it might appear here as a form of Gnathostoma, and there as a form of Cormostoma. . . . I now find in the example before us a new warranty for the correctness of the above mentioned theory. Namely, *Monstrilla* appears as the Cormostoma or Siphonostoma form of a type, the Gnathostoma form of which is to be looked for in the genus *Pontella*."

I am not aware that the further knowledge during the past quarter of a century since these words were written has in any way gone to substantiate the theory here indicated, and there certainly seems no better grounds for placing *Monstrilla* among the Pontellidæ than among the Corycæidæ. Finally Lubbock's *Baculus elongatus** which has been compared with *Monstrilla* by more than one author is probably a young stage of *Lernæa branchialis*.†

For the present therefore I think that while *Cymbasoma* must be merged in *Monstrilla*, we are justified in separating (as I did in my paper in the Linnean Journal for 1887) this remarkable group of species from the other Copepoda as a distinct family, the Cymbasomatidæ, having the characters given above on p. 121; and the natural position of this family seems to be close to the Artotrogidæ, the proboscis of *Monstrilla* corresponding to the siphon of the Siphonostoma.

*Trans. Linn. Soc., vol. XXIII, 1860.

†Compare Proc. Biol. Soc., L'pool. vol. III. pl. VIII. fig. 6.

Explanation of Plate IV.

Fig. 1. *Monstrilla longicornis*, n. sp., male, × 250
Fig. 2. Do. seta of swimming feet, × 750
Fig. 3. Feathery plume on inner side of apical segment of antennæ of male *Monstrilla anglica*, Lubbock. × 750
Fig. 4. Seta of furcal members of *M. longicornis*, × 750
Fig. 5. Spines on second and third segments of antennæ of *M. anglica*, male, × 750
Fig. 6. Genital appendage on first abdominal segment of *M. anglica*, male, × 750

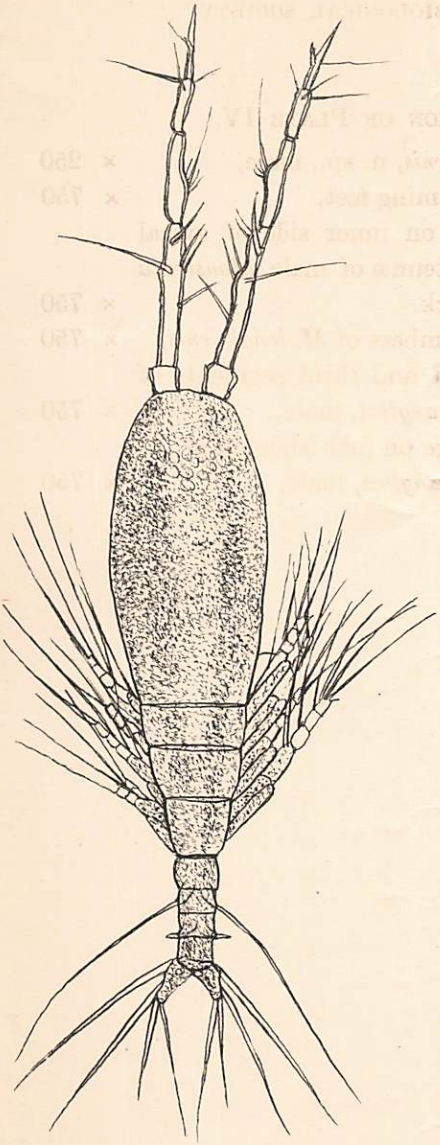

Fig. 1.

Fig. 3.

Fig. 4.

Fig. 5.

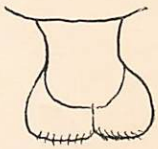

Fig. 6.

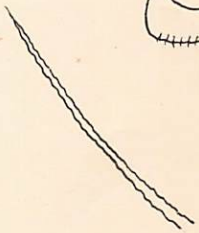

Fig. 2.

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MONSTRILLA LONGICORNIS, N. SP. ♂ FIGS. 1, 2 & 4.
MONSTRILLA ANGLICA (LUBBOCK), ♂ FIGS. 3, 5. ♀ ?