

Clavella iadda, N.Sp.

A PARASITIC COPEPOD OF *GADUS MORRHUA*.

Including some further remarks upon *C. sciatherica*, with a detailed account of the renal excretory system.

By

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With 9 text figures.

TOGETHER with the specimens of *C. sciatherica*, Leigh-Sharpe, presented to me by Michael G. L. Perkins, and taken by him from various *Gadus morrhua* at Lowestoft, in August, 1918 (vide *Parasitology*, XI, 118, and footnote), was another tube containing about a dozen further specimens taken by him at the same date, from the identical hosts. He first called my attention to the fact that we had two distinct species of *Clavella* from the same fish, and to him I am primarily indebted for most of the following observations. The claims of the other specimens to be considered as members of a distinct and new species are :—

- (1) Body less globose, longer than wide.
- (2) Ovisacs tapering.

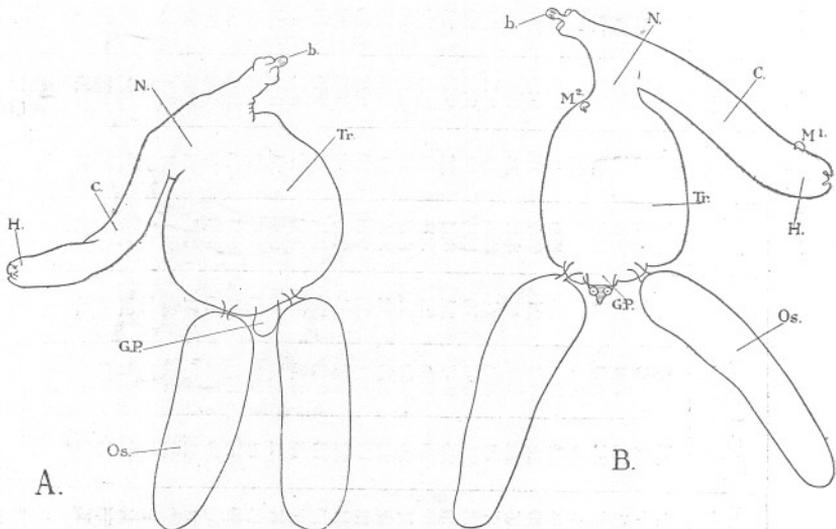


FIG. 1.—A. *Clavella sciatherica*. B. *Clavella iadda*. H., head; C., cephalothorax; N., neck; b., bulla; Tr., trunk; G.P., genital process; Os., ovisacs; M. 1. and M. 2., males. (Drawn by lantern projection from specimens mounted in Canada Balsam.)

- (3) Posterior terminal prominences (trilobate genital process as in *C. irina*, Wilson, but less pronounced).

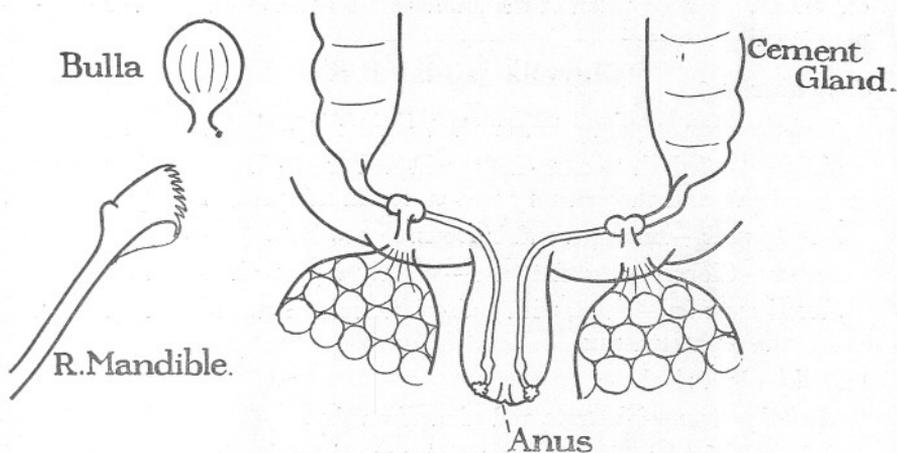


FIG. 2.—*Clavella sciatherica*. Bulla. Mandible. Posterior end of body showing genital process and ovisacs. (Drawn as Fig. 1.)

- (4) Cephalothorax comparatively short, little curved, and in line with the second maxillæ.

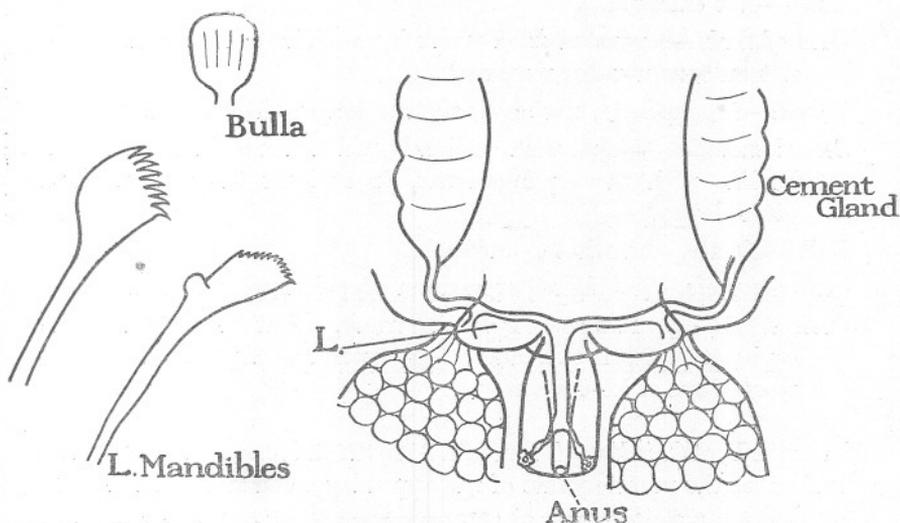


FIG. 3.—*Clavella iadda*. Bulla. Mandibles. Posterior end of body showing genital process and ovisacs. L. lateral lobes. (Drawn as Fig. 1.)

- (5) Bulla widest at apex of the sphere (not at the base] as in *C. sciatherica*).
- (6) A slight difference in the mandibles.

The outline, in semi-profile, of *C. iadda*, is shown in Fig. 1, B. where, it is compared with *C. sciatherica*. The genital process is here shrunk by exosmosis. A description of the animals is best followed by the accompanying diagnoses:—

C. sciatherica ♀

Cephalothorax.—Plainly longer than trunk: $1\frac{1}{4}$ – $1\frac{1}{2}$ times.

Head.—Cephalothorax gradually widened up to head. (This is very slight, and the contrary was stated in my previous paper.)

Base of neck.—Enlarged and bulbous.

Trunk.—Globose—not flattened—slightly longer than wide.

Second maxillæ.—Short, with a discoid termination. Not in line with the cephalothorax.

Bulla.—Spherical.

Genital process.—Elongate and of medium size.

Ovisacs.—Not tapering, 8–10 rows of approximately 20 ova in a row.

C. iadda ♀

Cephalothorax.—But little longer than trunk: $1\frac{1}{4}$ times at most. Dorsiventral curve only slight.

Head.—Not enlarged.

Base of neck.—Separated from trunk by a slight constriction. Base not bulbous nor differentiated.

Trunk.—Subquadrate, flattened, slightly longer than broad.

Second maxillæ.—Short, with a slightly widened discoid termination.

In line with the cephalothorax, or at least the central third of the latter.

Bulla.—Ovate, somewhat cylindrical.

Genital process.—(See figure) of medium size, elongate, trilobed.

Ovisacs.— $1\frac{1}{3}$ – $1\frac{1}{2}$ times as long as the trunk, about the length of the cephalothorax, not slender, but tapering. Approximately 28 rows of ova of 12–6 in a row.

In Fig. 1 B, of *C. iadda*, *M. 1* and *M. 2* are the shrivelled empty “skins” of males, for the minute joints of the appendages can still be made out. They indicate a flatter form of carapace than the males I described in *C. sciatherica*. I am not aware of any record of defunct males remaining attached to so old a female for such a length of time in any Lernæopod:

In *C. iadda* there appear to be two forms of mandible, one of which resembles that of *C. sciatherica*, but has sufficient differences from it to be noticeable. Age may have to be considered as the factor for this

(cf. *Parasitology*, XI, 120, Fig. 4, of a mandible drawn from an immature specimen).

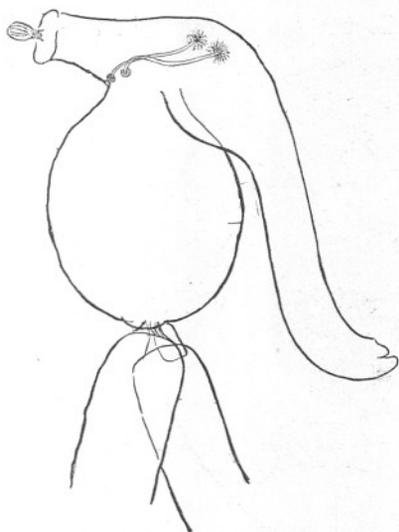


FIG. 4.—*Clavella sciatherica*, in lateral aspect, showing excretory organs. $\times 13$.

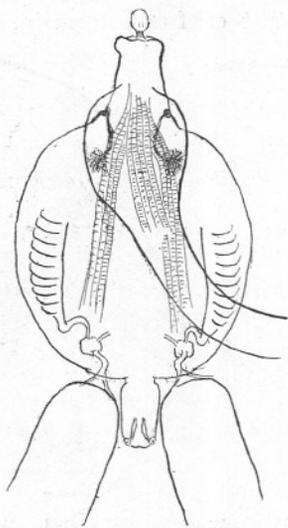


FIG. 5.—*Clavella sciatherica*, from above, showing excretory organs. $\times 13$.

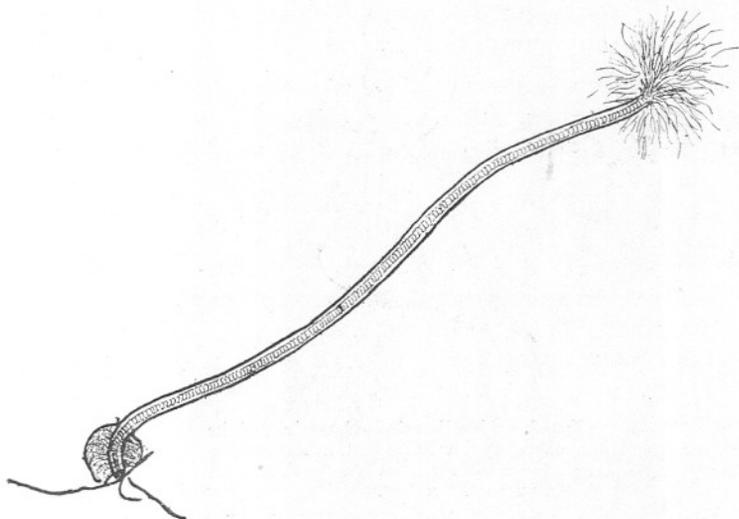


FIG. 6.—*Clavella sciatherica*, excretory organ. $\times 100$.

The terminal claw of the maxillipedes is longer and more formidable than that previously observed in *C. sciatherica* (cf. *op. cit.*, XI, 119, Fig. 3), though I am bound to state the adults of the last-named species

have a longer and stouter claw than I have figured for the immature female, so that in this particular there is hardly any difference between the two species.

I must confess I cannot reconcile the genital ducts in the genital

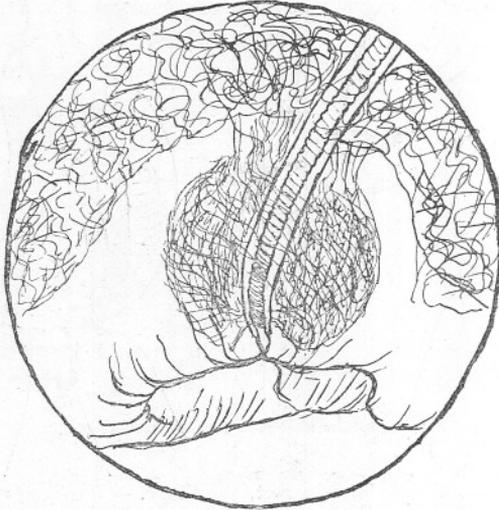


FIG 7.—*Clavella sciatherica*, external aperture of excretory duct. $\times 350$.

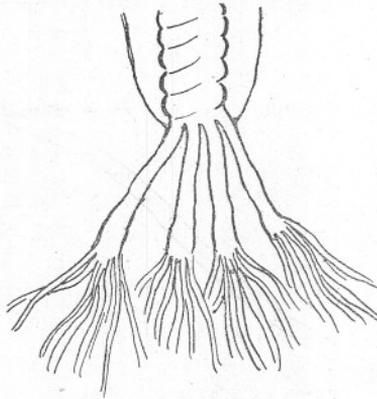


FIG. 8.—*Clavella sciatherica*, origin of the excretory duct at the gland. The tubules and ductules are each very much reduced in number. $\times 800$.

process of the adults (Figs. 2 and 3) with the condition in the immature female (*op. cit.*, XI, 122, Fig. 6). Here they appear much more like the condition that obtains in *Lernæopoda* (*Parasitology*, VIII, 272, Fig. 6), although my former interpretation agreed with the remarks of Dr. C. B. Wilson. In Fig. 6 of *Clavella sciatherica*, *Os.* are evidently not, as stated,

the apertures through which the ovisacs emerge, since here we have these crenated apertures, but the eggstrings pendant elsewhere. If they should prove to be the vulvæ than both Wilson and I have been previously wrong as to the existence of a single median vulva. On this view what I previously called spermatophores is faecal matter in the intestine, the median vulva is the anus, and what I called anus (very indistinct) an accidental perforation: but none of this I am prepared to admit. To make matters more complicated Dr. Wilson denies that in *Clavella* the anus is in the genital process at all, that being the reason he prefers that name for the protuberance rather than abdomen.

The Renal Excretory Organs.—Their ducts and apertures on the base of the second maxillæ can be made out with great clearness in both species, and the following is, I believe, the first detailed account to be published for any of the Lernæopodidæ.

Fundamental Structure.—A number of excretory tubules join together to form a ductule (Fig. 8). From ten to twenty ductules unite to form

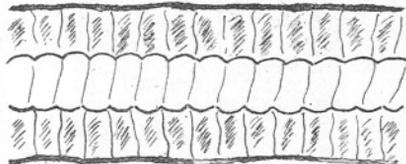


FIG. 9.—*Clavella sciatherica*, a portion of the excretory duct. $\times 800$.

the main duct. The tubules are so numerous that it is impossible to count them.

There is thus formed a spherical "gland" composed of an intimate convolution of tubules at the origin of an excretory duct.

Two such glands are present, one on each side (Figs. 4 and 5), in the supero-lateral region of the proximal (enlarged in *C. sciatherica*) end of the cephalothorax. Each gland is separately provided with a duct.

The Excretory Ducts.—These are about 1.5 mm. in length and run down to open on the ventral surface at the junction of the trunk and the second maxillæ (Figs. 4 and 5).

Their walls are thick and highly refractile. They appear to be composed of a single layer of cells arranged spirally around a basement membrane which is spirally twisted, thus giving a peculiar appearance to the lumen, as though it had been moulded round a piece of thread (Figs. 6 and 9).

Termination of the Ducts.—The ducts debouch at introversions of the cuticle on either side of the ventral surface, at the bases of the second maxillæ, at their junction with the trunk.

At the termination the spirals of the lumen become closer, the lumen

gradually narrowing. Then the spirals cease and the lumen widens out again, finally, however, forming a very much narrower duct.

Around this final portion of the duct is a spherical mass, which possibly is glandular, but in all probability serves as a sphincter muscle. It is connected with the duct and with the body substance by connective tissue (Fig. 7).

Dimensions :—

Average diameter of renal organ	=	150 μ .
" " of tubules	=	0.2 μ .
" " of ductules	=	1-2 μ .
" " of excretory duct over all	=	20 μ .
" " " " " lumen	=	8 μ .
Length of duct	=	1-1.5 mm.
Diameter of sphincter muscle	=	75 μ .

In the opinion of Perkins and myself *C. iadda* is a fairly common central type from which the other three have been derived. An attempt to show this has been drawn up in the following tables :—

- A. Bulla clavate **C. irina.**
- B. Bulla spherical or ovate :—
 - (a) Base of neck not differentiated. Ovisacs tapering :
 - (a) Trunk transverse **C. uncinata.**
 - (β) Trunk not transverse, longer than wide **C. iadda.**
 - (b) Base of neck differentiated. Ovisacs not tapering. Trunk a trifle longer than wide **C. sciatherica.**
- A. Genital process trilobate :—
 - (a) Bulla clavate. **C. irina.**
 - (b) Bulla ovate **C. iadda.**
- B. Genital process simple :—
 - (a) Base of neck not differentiated. Trunk transverse. Ovisacs tapering . **C. uncinata.**
 - (b) Base of neck differentiated. Trunk suborbicular, longer than wide. Ovisacs linear **C. sciatherica.**

