LERNAEOPODA GLOBOSA N. SP., A PARASITIC COPEPOD OF *SCYLLIUM CANICULA*.

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Part I.

(With 3 Text-figures.)

(The figures are all drawn from preparations mounted in Farrant's medium.)

Habitat and Record. On 10. iv. 1918 my attention was called to five specimens of *Lernaeopoda* occurring on *Scyllium canicula* obtained at Plymouth. The largest copepod was attached outside and about one inch ventral to the left spiracle. The other four were deeply concealed within the left nasal groove, so that the nasal flap had to be cut away in order to detach the parasites. These specimens exhibit characters of their own which seem to combine those of other established species. The most striking modification is that the ends of the attaching "arms" (2nd maxillae) are expanded into large discs on either side of a vestigial bulla, thus recalling *L. bidiscalis* Kane, 1892, though that species is described as possessing discs of a different conformation, and as having no bulla. In other respects they agree more with *L. musteli* Thomson, 1899, notably as to their small size, and the proportion of the arms to their trunk. But to these points I do not attach much importance, since both may be due to the confined space in which the parasites are domiciled. Indeed I would not have mentioned them at all but that no recorded *Lernaeopoda* of the well-established species obtains such small dimensions. *L. musteli* Thomson, however, was diagnosed from a single specimen, and has never been met with again. No details of appendages etc. were given, so that the species remains practically a nominal one. Since it was (1) taken from the cloaca, (2) of *Mustelus antarcticus*, (3) near New Zealand, it is most improbable that my specimens should be of that species. I therefore hold that this is a species new to science, and for it I propose the name *Lernaeopoda globosa*[1].

Only the females are dealt with in this paper. A common or central type (*L. scyllicola*) was described by me in 1915, and may be referred to for purposes of comparison.

[1] Later, a single specimen of *L. globosa* was taken from the right nasal groove of *S. canicula*, one of a batch of six landed at Plymouth on May 21st, 1918. The specimen was perfect, and possessed two ovisacs. The new species therefore does not appear to be uncommon.

Body. The outline of the animal is best seen from Fig. 1, which is drawn to scale. The total length of the type specimen from the "top" (dorsal side) of the cephalothorax to the end of the egg-sacs is but 5–6 mm., of which the cephalothorax occupies 1 mm., the trunk a little over 2 mm., and the egg-sacs also a little over 2 mm. The arms are much curved, and, though almost as long as the entire animal, the bulla is inserted but 1 mm. above the "top" of the cephalothorax.

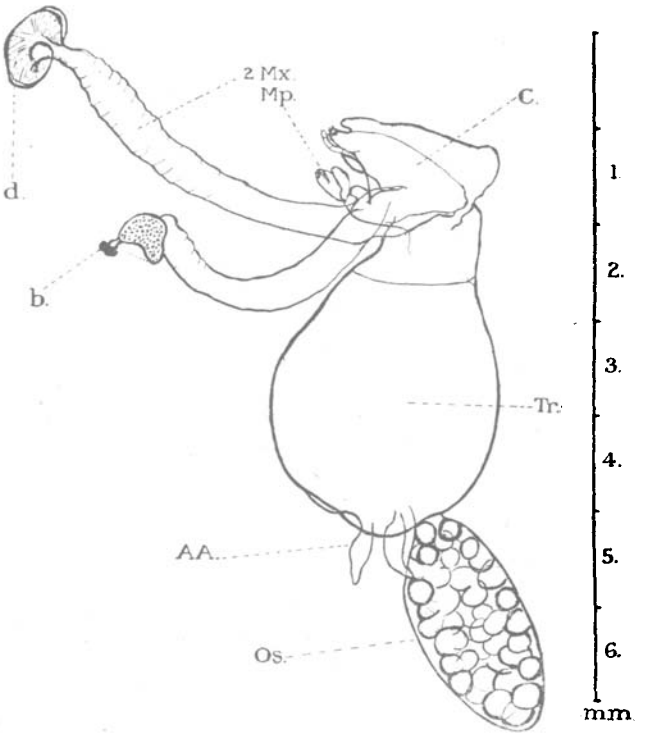

Fig. 1. *Lernaeopoda globosa*, viewed from the left side The "arms" are represented as parted, otherwise the bulla would not show in this position, and one of the discs appears to be damaged. *C.* cephalothorax; *2Mx.* second maxillae; *b.* bulla; *d.* disc; *Mp.* maxillipedes; *Tr.* trunk; *Os.* ovisacs; *A.A.* abdominal appendages.

The abdominal appendages are almost filiform and minute, being but 0·5 mm., or less than a quarter as long as the egg-sacs. They are *ventral to the ovisacs* (generic character), and diverge but slightly from one another.

The Cephalothorax is comparatively large, *at right angles* to the trunk axis (a feature unique in this genus), flattened but slightly dorsi-ventrally, and covered with a distinct dorsal carapace.

The *Trunk*, far from being slender, is always much inflated, so as to be globose, or pear-shaped. It is but twice the length of the cephalothorax. The greatest rotundity is ventral. This globular appearance of the trunk (taken in conjunction with the bent attitude of the arms, and the short, broad ovisacs)

will render this new species easily recognisable to the unaided eye. The trunk is joined to the cephalothorax by a stout neck, in which an anterior region is demarcated, but there does not appear to be any projecting "shoulder" for the location of the male as in *L. scyllicola*. The animals are of the usual pale, translucent, straw colour, but the ovisacs are densely white and opaque.

The Appendages, all paired, are the first antennae (antennules), second antennae, mandibles, first maxillae, second maxillae and one pair of maxillipedes.

The 1*st Antenna* (*antennule*) (Fig. 2) is four-jointed, the basal joint being much enlarged, somewhat spherical and having a curious spiral turn upon itself. The other joints are of approximately equal size, if anything the middle joint is the smallest. The terminal joint bears three long spines. Except in the last trifling detail, this appendage is the same as in *L. scyllicola*.

The 2*nd Antenna* (Fig. 2) consists of a basal joint bearing a large unjointed endopodite with a blunted end, and a small exopodite whose diameter is a quarter of that of the endopodite, and which is distinctly two-jointed, the terminal joint bearing three small spines. This conforms exactly with the description of *L. galei*, and not with that of *L. scyllicola*.

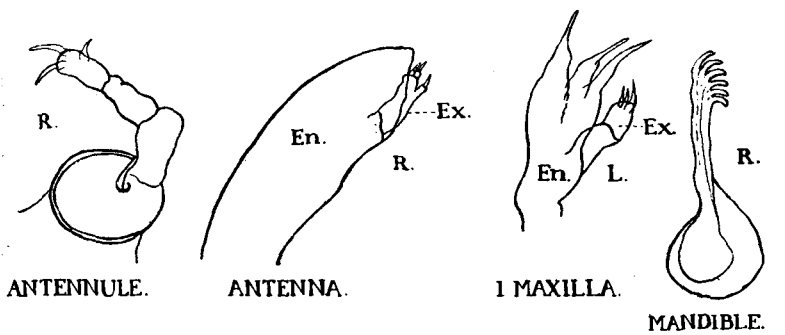

Fig. 2. *Lernaeopoda globosa*, the appendages. The antennule, antenna, first maxilla, and mandible. *Ex.* exopodite; *En.* endopodite.

The *Mandible* (Fig. 2) resembles that of the majority of the Lernaeopodidae, and is distinctly in contrast with that of *L. scyllicola*. The teeth are rounded and point posteriorly on the inner side of the blade; six appears to be a typical number, of which the first two are slightly the larger, the first being terminal; the others decrease in size posteriorly. The extremity of the shaft thus recalls the arrangement met with in certain uncini of post-larval specimens of *Arenicola*, a point I have not sufficiently accentuated in the figure. It would appear, then, that those species which live on the softer tissues (gills, olfactory sacs as in this species) have rounded teeth, while *L. scyllicola*, which has to rasp away the epidermal cells of the extra-cloacal region, or claspers, has serrate teeth.

The 1*st Maxilla* (Fig. 2) is the most constant appendage throughout the genus *Lernaeopoda*. It consists of an unsegmented endopodite, and a well

developed exopodite or palp which is jointed and tipped with three short spines, one of which is somewhat longer than the other two. The endopodite is tripartite at the distal end, one ramus being terminal, and the other two on the inner margin. Each ramus ends in a long slightly mammillated spine, and the conformation recalls the male rather than the female of *L. scyllicola*.

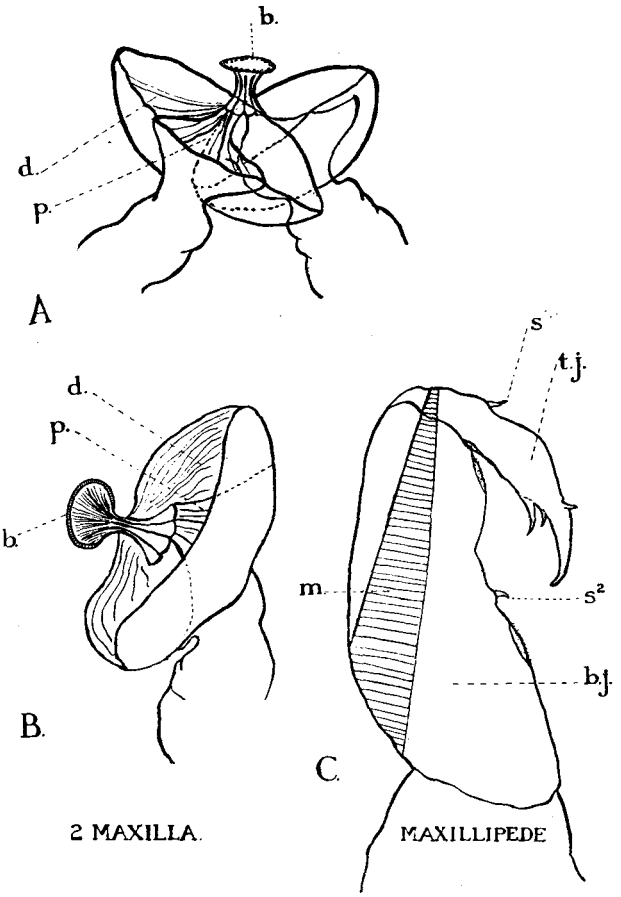

Fig. 3. *Lernaeopoda globosa*, the appendages continued. A. the distal ends of the second maxillae in front view, from a flattened preparation, so that the lower portions of the discs are pressed over one another and appear to overlap. B. the distal end of a second maxilla in side view with bulla half attached. C. the maxillipede. *b.* bulla; *d.* disc; *p.* prominence joining the bulla to the centre of the disc; *b.j.* basal joint; *t.j.* terminal joint; s^1. spine (specific); s^2. spine in same position as hook in *L. scyllicola*; *m.* muscle.

The *2nd Maxillae* (Figs. 1, 3 A and 3 B) are nearly as long as the body, slender, cylindrical, bent sharply half way along their length, and expanded at the distal ends into a large sucker-like organ, the *disc*. They are the organs of attachment to the host. The two are partly in contact with one another, and partly fused to a minute *bulla* or *button*, which is almost vestigial in this species. In detaching the parasites it is very difficult not to leave the bulla

behind. When first they arise in the meta-nauplius stage, these appendages are clawed and similar to the maxillipedes (in other species). In the free-swimming or first copepod stage, when the larva attaches itself to the host, the 2nd maxillae become fastened to the proximal end of the frontal filament. Fig. 3 A is drawn from a flattened preparation, so that the bottom portions of the discs appear to overlap, and in it I have endeavoured to show, that from the centre of the concavity of each disc a prominence arises, which on fusing with its partner from the other disc passes almost imperceptibly into the bulla; thus, in Fig. 3 B (in side view) only half the bulla is shown to be attached. The bulla is embedded beneath the cellular tissues of the host. The inner half of the disc is in contact with the inner half of its partner, while the outer or more distal half overlaps a papilla of the host in which the bulla is embedded, the papilla being induced by the clasping together of the discs. The result is the same as in the bidiscoid condition described by Kane in *L. bidiscalis*, though from his figures the details appear to be different. It is extremely difficult to detach parasites intact from Elasmobranch claspers; invariably the bulla is left behind. Now Kane collected all his specimens from the tips of the claspers of *Galeus vulgaris*. As no other species of *Lernaeopoda* is without a bulla I throw out the suggestion that *L. bidiscalis* may possess a vestigial bulla also, and it is within the bounds of probability that Kane overlooked it.

The *Maxillipedes* (Fig. 3 C) are clawed appendages situated between the bases of the second maxillae, and consist of a basal joint, which is stout instead of being slender as in *L. scyllicola*, and well supplied with powerful muscles which move the terminal joint and flex it down against the inside of the basal joint which is provided on the inner side with two but slightly developed rounded cushions (as compared with *L. scyllicola*), covered with minute spines. Between these cushions is a small spine in the position where *L. scyllicola* bears a large curved hook. The terminal joint, though slender, is not so long and slender as in *L. scyllicola*, and terminates in a long abruptly hooked claw, with two accessory claws at its base on the inner side. On the outer side of the terminal joint there is a small spine at the base of the large claw, and, also, at the proximal end, in an unique position, a further specific spine (Fig. 3 C *s'*). Near the proximal end of the terminal joint on its inner side there is barely recognisable a rounded cushion of small spines, which, when the joints are brought together, would be nearly, but not quite, opposite the more distal cushion on the basal joint. The maxillipedes have lost their function as attaching organs, and are used only for pulling the head down to the host while the animal feeds.

The **Mouth parts,** lips and **Alimentary canal** are as described in *L. scyllicola*.

The **Reproductive System** is in the main as described for *L. scyllicola* save that the oviducts leave the ovaries at the anterior outer borders instead of half way along their sides. The ovisacs, however, are characteristic. Far from

being long and slender, they are short and thick, only as long as the trunk, and end bluntly in a cigar-shaped manner. They contain 6–8 rows of but 12 eggs each. The eggs are comparatively large, spherical, and slightly flattened at the poles. Each of the specimens taken from the nasal grooves (but not the one near the spiracle) bore but one ovisac. This is probably not normal, since both ovaries were fully developed, but due to the confined space in which they were located.

The male dogfish in whose nasal grooves the representatives of this new species were discovered, possesses three specimens of *L. scyllicola*, two of them with attached males, in its extra-cloacal aperture.

Generic characters of female. See *Parasitology*, VIII. 272.

Specific characters of female. Size small (5–6 mm.). Cephalothorax at right angles to the trunk axis. Second maxillae nearly as long as the body, much curved, and expanded at the tips into large cupuliform discs which unite with a minute vestigial bulla. Abdominal appendages almost filiform and minute (0·5 mm.), less than a quarter as long as the ovisacs. Ovisacs short and broad, of the same length as the trunk (a little over 2 mm.). Trunk *globose* or pear-shaped. Second maxillae much bent in a characteristic attitude instead of being raised straight above the head. Mandibles with a few curved teeth. Maxillipedes with a specific spine on the outer edge of the terminal joint, and a small spine on the basal joint, which is stout, where *L. scyllicola* has a large curved hook.

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