

On *Lumbricillus Scoticus* n. sp.

By

Richard Elmhirst, F.L.S.,
Marine Biological Station, Millport,

AND

J. Stephenson, M.B., D.Sc.,
Zoology Department, The University, Edinburgh.

With 3 Figures in the Text.

A SMALL orange-coloured Enchytraeid Oligochaete has been known for some years to occur fairly abundantly in certain sheltered parts of the shore on the Cumbraes. It is also generally present, though scarce, on exposed parts of the shore. Hitherto it has been confounded with other species of *Lumbricillus*, but is now described as a new species.

LUMBRICILLUS SCOTICUS SP. NOV.

The worms are during life of an orange colour. They are relatively short and stout, measuring when preserved 7–9 mm. in length, and having sometimes a width of as much as 1 mm. at the clitellum. The number of segments is fairly constant—30 in 3 specimens, 31 in a fourth.

The *prostomium* is short, bluntly triangular, broader at the base than long.

The *setæ* have the lumbricilline curve. In the ventral bundles there are from 10 to 14 *setæ* in front of the clitellum, from 8 to 13 in the segments behind this. The lateral bundles contain 6 to 8 *setæ* in front (once 9), 7 to 9 (very frequently 8) behind, decreasing to 6 at the posterior end.

The *clitellum* includes, besides segments xii and xiii, a little of xi and perhaps also of xiv.

There are numerous *gland cells* in the integument, which stain deeply with hæmatoxylin.

The *cœlomic corpuscles* are numerous, narrowly or broadly spindle-shaped or occasionally oval in form, 36μ or less in length, and nucleated.

The *septal glands* are three pairs, in segments iv–vi.

There is a pair of small *post-pharyngeal bulbs*, but no salivary glands.

The *dorsal vessel* begins at septum 11/12.

The anteseptal portion of the *nephridia* is small, about one quarter the length of the post-septal, and the lumen shows no windings as it passes through this part of the organ. The post-septal portion is somewhat pear-shaped, with the narrower end behind. The duct is rather shorter than the post-septal, and comes off from the hinder end of the latter, curving ventralwards towards the surface.

The *cerebral ganglion* (Fig. 1) is one and a half times as long as broad; its sides are almost parallel, converging slightly backwards; there is a small indentation behind, and a larger one in front.

The *testes* are "divided," each being composed of a number of pear-shaped sacs, attached by the narrow end to septum 10/11, extending forwards and backwards in segments x and xi, and reaching as far in front as segment ix.

The *male funnels* are three or four times as long as broad, with a thin everted somewhat flangelike lip. The *vas deferens* is narrow, consists of a few coils, and is confined to segment xii.

The *penial body* is round, 0.2 mm. in diameter, compact, of the lumbriciline type. In it can be distinguished:—

(a) The *vas deferens*, which passes through in a dorso-ventral direction; it immediately becomes wider on entering the penial body, both the size of the lumen and the thickness of the wall increasing; it joins the next structure shortly before reaching the ventral surface at the male pore.

(b) An irregular tubular cavity, triradiate as seen in sections, which ends blindly above at the dorsal surface of the penial body, and joins the *vas deferens* lower down, as just stated; this cavity thus constitutes a diverticulum of the male duct.

(c) A mass of cells, the bulkiest constituent of the penial body; these cells seem to belong to and to spread out from the wall of the diverticulum just described.

(d) A pear-shaped aggregate of cells, perhaps glandular, on the anterior side of the mass of the penial body; the swollen ental portion of the aggregate is solid, the ectal narrower portion or stalk is hollow and tubular, and joins the lumen of the male duct below the union of the diverticulum and *vas deferens*, a little before the combined tube reaches the surface.

(e) A muscular capsule surrounds the greater part of the mass, but is somewhat deficient above, and also on the anterior side, where the pear-shaped gland is situated. In this position there is, in front of the gland, a strong muscular bundle attached below to the body-wall just in front of the penial body, and passing upwards to be attached again to the parietes above.

(f) Lastly, within the penial body there is, in addition to the cells which constitute the greater part of the mass, a little muscular tissue between the several components, and a few loose cells. In the ventral portion of the penial body, just within the body-wall, there is a certain amount of vacant space, left unoccupied by any of the above structures.

The *spermathecae* are irregularly swollen tubes; though the ental end of each is fused with the wall of the œsophagus, there is no patent communication between the cavity of the spermatheca and the œsophageal lumen. There is no great distinction externally between ampulla and duct; but the ectal portion of the apparatus—about two-fifths of its

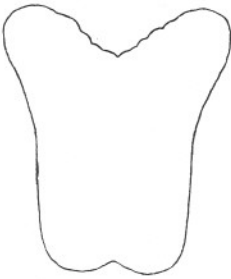


FIG. 1.—*Lumbricillus scoticus*; cerebral ganglion.

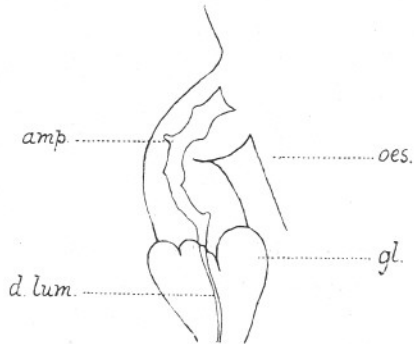


FIG. 2.—*Lumbricillus scoticus*; spermatheca. *Amp.*, ampulla; *d. lum.*, lumen of the duct; *gl.*, mass of gland cells causing a swelling round the ectal end (duct) of the apparatus; *oes.*, œsophagus. The figure has been drawn from an organ isolated by dilaceration; in sections the cavity of the ampulla appears wider than here shown.

length—is broader, owing to a development of gland cells, and may be called the duct (Fig. 2); the lumen is here much narrower.

These gland cells are the lining epithelium of the tube; they have become much elongated outwards, so that the longitudinal muscular fibres of the wall, which in the upper part of the apparatus are as usual outside the epithelium, here pass amongst the epithelial cells, which extend outwards between and beyond them; the nuclei of the cells are mostly external to the muscular layer. The region of these elongated cells is sharply delimited above (v. Fig. 2); the swelling which they occasion is lobulated on its surface, as is well seen in tangential sections of this portion.

A ventral ("copulatory") gland, lobulated, and of considerable size, is present in segment xiv; it leaves uncovered a little of the dorsal surface of the nerve cord. In one specimen a small lobe occurs in segment xv,

but this is only a part of the large gland in xiv which has spread backwards into the next segment. In a second specimen the gland is confined to xiv.

REMARKS.

In the large number of setæ per bundle, and in its short and stout habit, the present worm resembles *L. minutus* (Müll.). It differs, however, in the fact that the nephridial ducts come off from the hinder end, not from the middle of the post-septal portion; and in having a single mass of gland cells round the spermathecal duct, while Michaelsen's diagnosis (in the "Tierreich")* of *L. minutus* would indicate that this worm has two series of glands in relation with the duct.

It seems to us impossible, therefore, especially in view of the very scanty details we possess concerning *L. minutus*, to unite the two; though, notwithstanding, we find it difficult to get rid of a suspicion that they may after all really be identical.

HABITAT.

L. scoticus inhabits the mid-tidal zone, being associated with and generally creeping on *Ascophyllum nodosum*, but is also occasionally found on the surface of stones on which that weed grows. Preference is shown for parts of the *Ascophyllum* which are decaying or soft, particularly the upper and spent tips of the weed. Examination of gut contents reveals the presence of bits of epidermis and cells from the degenerating spent tips of the *Ascophyllum*.

BREEDING.

The cocoons (Fig. 3) of *L. scoticus* are found abundantly in spring on the bases of *Ascophyllum* plants and occasionally on other parts of the plants, chiefly in the shelter of air vesicles which have been opened.

They may occur singly or in bunches of six or seven, which are usually at various stages of development.

The cocoons are made of a clear straw-coloured horny material, are low and roundish, closely attached to the weed, and measure 1.6-2.2 mm. long, 0.9-1.2 mm. broad by about 0.45 mm. high. Each cocoon contains 11-14 eggs about 0.3 by 0.23 mm., and of a pale orange colour. The upper part is marked with striations (omitted in figure). A dimpled thickening occurs at each end.

Cocoons are found from January to September, being most plentiful in April and May. They may be got occasionally, as may the worms,

* Michaelsen, W. Das Tierreich X, Oligochæta, 1900, p. 82.

among seaweeds lying about h.w.m. This appears to be due to their being washed up with their food plant. This occurrence of the worms at the drift line suggests that they can withstand a certain exposure to fresh water. Experimentally about 3 hours in fresh water causes cede-

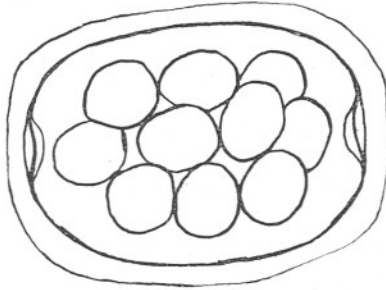


FIG. 3.—*Lumbricillus scoticus* ; cocoon.

matous swelling, followed by recovery if replaced in sea-water ; on the other hand, they live quite happily in water of as low salinity as 20% of sea-water.

GROWTH.

The young emerge by a slit which appears along the margin of the cocoon. They may be almost 2 mm. long when extended, and have usually only twenty segments. Their setæ are arranged in groups of four with a few groups of five anteriorly and three posteriorly. Immature specimens of all sizes may be obtained in the spring by washing a handful of *Ascophyllum* in water, preferably half and half sea-water and fresh water.

Young worms of 5 or 6 mm. length, with about twenty-seven segments, about one month old, show the clitellum formed, and the presence of yolk in segments xii and xiii. They are fully grown and mature at two months.

