III. *Scotia Collections.—Note on the Gonostyles of two Antarctic Siphonophora.* By Professor J. Arthur Thomson, M.A. [Plate I.]

(Received 14th November; read 28th November 1904.)

Mr W. S. Bruce has been good enough to entrust to me three interesting and somewhat puzzling specimens collected by the Scottish Antarctic Expedition off the South Orkneys. They seem to be the separated gonostyles of some large Siphonophore colony, and as such they certainly deserve to be recorded, since we have very little knowledge of Siphonophora from the far south. In the report on the "Southern Cross" collections, Mr E. T. Browne mentions the nectocalyces of a Diphyid, and a specimen of an Agalmid (*Halistemma*), about 6 to 10 inches long; in the *Antarctic Manual*, Mr A. E. Shipley refers to an abyssal Discalid, *Disconalia pectyllis*.

Specimen A. was obtained in July 1903 in Scotia Bay, South Orkneys, on the surface of the water, in a hole which had been cut in the ice. The depth of water at that place was 20 to 30 fathoms; the temperature 29° F. Specimen B. was dredged from among mud and pebbles in December 1903 in Scotia Bay, South Orkneys; the temperature 31° F. Specimen C. was dredged from 9 to 10 fathoms in May 1903 in Scotia Bay. It is in several respects very different from A. and B., and I have therefore referred in the title to *two* Antarctic Siphonophora. Other specimens, which I have not seen, were found in summer, floating on the ice-free surface of the bay. Specimens B. and C. were allowed to die slowly in sea-water, and were then preserved in formol. Their general structure is quite clear, but such delicate organisms require more elaborate treatment if they are to be used for histological analysis. Nevertheless the sections that have been made reveal many interesting details.

Specimen A. measures 4 inches in length by 0·7 inch in maximum diameter. It narrows gradually to one end, where there is a definite opening at the top of a small conical elevation (see Fig. I., *O.*). The other end is blunt and blind.

There is a large internal cavity, and the internal surface is continuously covered with triangular processes (1·6 to 1·8 mm. in length) projecting into the lumen (Fig. II., *T.P.*). The outer surface is densely covered with elongated, capitate, "tentacular bodies" (2 to 3 mm. in length, with a diameter of ·3 to ·35 mm. in the stalk, and ·4 to ·5 mm. in the head) (Fig. II., *Cn.*). The first half-inch of the body shows two somewhat bare annular zones, which are perhaps in part artificial. Among the capitate "tentacular bodies" in the distal half of the specimen, there are numerous spherical or flask-shaped structures (Fig. II., *Gn.*) from 1 to 2 mm. in height. Some of the spherical structures bear tentacular bodies, sometimes 1 mm. in length (Fig. III.). The natural colour—a strong orange-red—has disappeared entirely, and left a yellowish white.

I do not know how a specimen of this kind—which does not seem to be a viable animal—can be interpreted except as the separated gonostyle or sexual palpon of a large Siphonophore colony. But it is remarkable that no other trace of any Siphonophore was seen in these regions, and a colony whose gonostyles measure 4 (A.), 6 (B.), and 8½ (C.) inches in length must be a very conspicuous object. In A. and B. the terminal opening at the narrow end is very definite, and not in any way torn or jagged; it probably represents the communication between the gonostyle and some central cavity of the colony, *e.g.*, the central siphon. What I have called "tentacular bodies" are probably *stalked cnidospheres.* As to the nature of the spherical or flask-shaped structures, there can be no doubt that they are *gonophores.* There is distinct evidence of a medusoid bud of complex structure, and with reproductive elements. In one case a very distinct ovum was seen. It may be suggested that the triangular internal processes are absorptive in function.

Specimen B. measures 6 inches in length by 0·8 inch in diameter at one end and 0·2 inch at the other. Its shape resembles an elongated club, and the proximal end (corresponding to the handle of the club) is almost bare of stalked cnidospheres. In other respects it agrees with A.

Specimen C. measures 8½ inches in length by 0·4 inch in diameter, and is slightly narrower at one end. It differs from A. and B. in the fact that several—as many as seven—gonophores occur on one stalk, which may also bear several cnidospheres (Fig. IV.). The stalk bearing the gonophores and stalked cnidospheres may be 7 mm. in length, with a basal diameter of 0·7 mm. It seems to me likely that C. belongs to a different species, but it may be that an unknown Siphonophore colony has dimorphic sexual palpons. The fact that the specimens were found floating freely, suggests that the gonostyles of Siphonophora may sometimes be set adrift, and may enjoy a brief period of independent viability.

The specimens have not been particularly studied histologically, but a few points of interest may be noted.

(*a*) The body-wall shows a wrinkled ectoderm of large elongated covering cells, among which, on the gonophores and stalked cnidospheres, there are numerous very distinct elongated oval stinging-cells or cnidoblasts.

(*b*) Beneath the ectoderm is a strongly-developed muscular layer (Fig. II., *M.*), about 0·1 mm. in thickness, often showing over a dozen fibrils side by side, and with a curious suggestion of cross-striation. This muscular layer, in thinned form, is continued up the stalks of the gonophores for some distance.

(*c*) Then follows a very definite transparent middle lamella (Fig. II., *m.l.*), which is continued below the ectoderm into the gonophores and stalked cnidospheres, and internally along the triangular processes. A piece of it, isolated without breakage, appeared to have a fibrillar structure. The apparent striation of the muscular layer seems to be due to an outward extension of processes from the middle lamella, between which the fibrils are interwoven.

(*d*) The endoderm consists of very large vacuolated cells. Some of those next the middle lamella appear to have muscular roots.

(*e*) The internal isosceles-triangular processes usually narrow into one layer of cells on each side of an inward continuation of the middle lamella. In other cases the triangular pro-

cesses are broader, as if two adjacent filaments had joined and had enclosed a cavity; in some of these there were two prolongations from the middle lamella (Fig. II., *T.p'.*). Some of the large clear cells of the triangular processes look as if they were amœboid. Various inclusions were seen in the (endoderm) cells of the triangular filaments, some doubtless food-particles, others perhaps symbiotic Algæ.

(*f*) In some cases a narrow canal was seen entering the base of the gonophore. This crosses the body-wall, and communicates with the central cavity of the gonostyle between two adjacent triangular filaments (Fig. II., *C.*). Thus the cavity of the gonophore communicates freely with the cavity of the gonostyle.

If the interpretation given be correct, that these specimens are the separated gonostyles of a Siphonophore colony, or of two closely-related Siphonophore colonies, the question of further classification arises. But this is hardly answerable. I have not been able to find any description of a gonostyle which agrees with what I have observed. All that one can venture to say is that the complete animal is a Siphonophore of large size, with mouthless gonostyles bearing fixed gonophores.

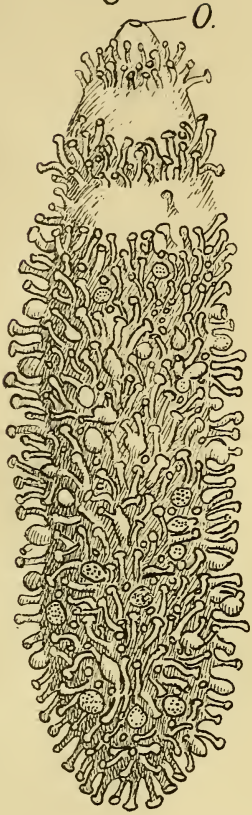
IV. *Note on* Limax tenellus (Müll.), *with Exhibition of Living Examples from the "Forth" Area.* By William Evans, F.R.S.E.

(Read 24th October 1904.)

The three examples of *Limax tenellus* now exhibited were, along with several others, found by me in The Forest, Clackmannanshire, on 3rd September 1904, and have since been kept in a box filled with damp moss and pieces of fir bark. For food, they have been given various kinds of woodland fungi (*Russula* and other Agarics, and *Boletus*).

This pretty little slug has a rather interesting history. Though apparently described by Müller so long ago as 1774, and certainly by Nilsson in 1822, it remained little known even on the Continent till within comparatively recent years.

Fig. I.



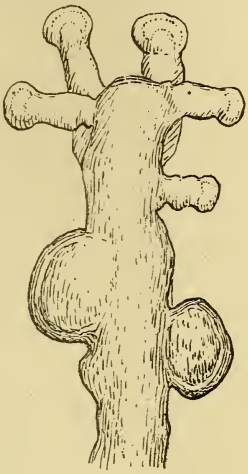


Fig. IV.

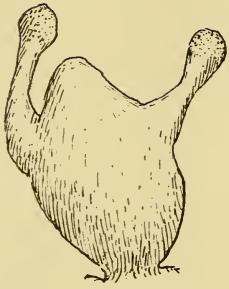
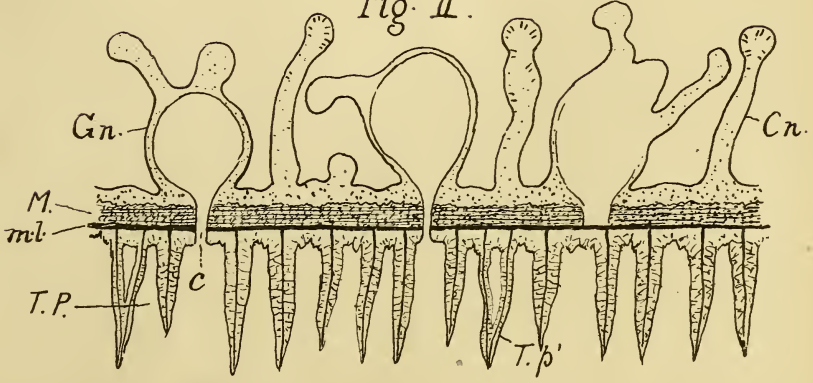


Fig. III.

Fig. II.



TO ILLUSTRATE PROF. THOMSON'S PAPER ON GONOSTYLES.