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Article/Chapter Title: On a new example of the Opheliidae (Linotrypane apogon) from Shetland
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In the course of these experiments the action of iodacetic ether upon sulphide of methyl was studied. The reaction here takes a different course, iodide of trimethyl-sulphine being produced in large quantity.

3. On a New Example of the Opheliidæ (*Linotrypane apogon*)* from Shetland. By W. C. M'Intosh.

This peculiar iridescent pinkish Annelid was dredged in 1871 in Bressay Sound, in four or five fathoms, on a bottom of coarse sand and gravel, which abounded with finely-branched *Melobesia calcarea*, Ell. and Soland.

The form resembled an active nematoid worm, being elongated, nearly cylindrical throughout the greater part of its length, and devoid of bristles or lateral projections. It progressed in the most vigorous and spasmodic manner, by twisting or thrusting itself through the sand, after the mode of *Ammotrypane*, or a most rapid eel-like fish. Moreover, the slightest interference caused it to break in pieces, so that not a single specimen out of the whole series remains entire, though every precaution was taken to immerse the animals in spirit on removal from the dredge. The activity and purpose displayed by the species are diagnostic when compared even with the most nimble of the nematoid group, so that no difficulty is experienced in distinguishing it.

The Annelid reaches the length of three or four inches, and is only about a millimetre ($\frac{1}{25}$th inch) in diameter. The body is rounded, slightly tapered in front, where the pinkish colour is best marked, and richly iridescent, even to a greater degree than either *Ammotrypane* or *Ophelia*. The head terminates in a rounded anterior border, from which two short clavate processes project. The latter have a very thin investment of the hyaline cuticle, with a thick layer of granular cells (hypoderm) beneath. Some longitudinal fibres occur at the base, but the contractility of the organs is limited. Two eyes, consisting of encapsulated masses of black pigment, are situated near the dorsal surface of the tissues of the snout.

* λινον, a thread, and τρυπάνη; the specific name from ἀπωγων, beardless

Body-wall.—The external investment is a translucent, perfectly smooth, glistening cuticle, very thin on the snout, cephalic processes and the anterior region, but of considerable thickness and great tenacity throughout the rest of the body. It is this layer which enables such forms to bear much strain in a longitudinal direction, and, by its great elasticity, to dispense with a special circular layer of muscular fibres. In some of the Nemerteans, for instance, where the cutaneous tissues are soft and easily injured, a very perfect circular muscular coat occurs next the basement-membrane of the latter, and exterior to the longitudinal layer. When a single layer of this hyaline cuticle is examined, after mounting in chloride of calcium, a number of puncta, arranged with greater or less regularity, and apparently passing quite through it, are found. By tearing with needles, or examination in simple water, it is further seen to be composed of a closely interwoven series of very fine fibres, many of which have a crossed-spiral, or oblique direction. This is a common arrangement in such iridescent forms. The cuticle readily separates from the subjacent layers in the preparations, a feature less evident in *Ammotrypane* and *Ophelia*. Beneath the foregoing is a cellulo-granular layer (hypoderm), which in transverse sections preserves a nearly uniform thickness, except inferiorly, where the nerve-cords occur. The cells vary in size, are filled with granules, and embedded in a hyaline intercellular substance. Many granules also exist amongst the cells. In the cephalic region a considerable thickening of the coat takes place, especially inferiorly, and this enlargement coincides with the diminution of the hyaline cuticular layer formerly mentioned. A boundary or basement-layer occurs on the inner surface.

Within is a great longitudinal muscular coat, which (besides the passage of the oblique muscular fibres) is interrupted at two points in its circumference, viz., at the median line of the dorsum, and the opposite point inferiorly. The former is but a faint separation, caused by the suspensory fibres of the alimentary region; the latter is a boldly-marked hiatus—the inferior fibres of the alimentary canal, the oblique muscular bands of the body-wall, and the ventral blood-vessel meeting at this point. In ordinary transverse sections this coat presents a somewhat wavy, radiated appear-

ance, from the arrangement of the fasciculi. In stating that the direction of the muscular fibres in such sections is radiated, some explanation is perhaps necessary, for, while the fasciculi of the dorsal and lateral regions point more or less in this way, the arrangement at the raphe is different, since the oblique bands, passing down at an acute angle, direct, in the contracted state, the fasciculi upwards and outwards. They gradually become vertical, and then slant in the opposite direction, before leaving what may be termed the ventral region. A firm band, apparently of the limiting membrane of the hypoderm, proceeds from angle to angle at the raphe.

From this coat, at somewhat regular intervals, pass a series of muscular bridles, each forming a kind of diaphragm (dissepiment). Most of the fibres have a vertical direction. The same arrangement is observed in the Nemerteans and in most of the Annelida. Such bundles, of course, are altogether independent of the characteristic oblique bands of muscular fibres which pass from the lateral dorsal region on each side to the raphe at the ventral edge. Anteriorly the latter bands form, in contraction, a curve on each side, with the convexity directed inwards, and they enclose a somewhat elliptical portion of the great longitudinal layer, with a few cells and granules. The oblique bands spring from the basement-membrane, and thus pass through the longitudinal layer,—an arrangement very well seen in front, where the bands are of great thickness. Posteriorly the comparative slenderness of the oblique muscles makes this subdivision of the longitudinal layer indistinct, but it is nevertheless present. In this region, also, the distance between the middle of the oblique band and the longitudinal coat is considerable, the space being filled with cellular tissue and a few fibres.

It will thus be observed that the animal has a very complete muscular system, relatively of great power, for the execution of its remarkable boring propensities in sand and gravel.

Digestive System.—The mouth opens in the preparations on the ventral surface, a short distance behind the tip of the snout, and has prominent lips. It leads into a richly ciliated digestive chamber, which runs to the posterior end of the body. No dental organs of any kind exist, the food apparently consisting of sand

or sandy mud, requiring nothing more than simple engulfment. Anteriorly, what may be termed the œsophageal division of the canal has internally a well-defined margin, covered with closely-set cilia, the wall consisting of the usual granular gland-cells, embedded in a hyaline stroma, with muscular fibres. Posteriorly, it is more opaque and granular, and appears to end in an anus without processes. All the specimens, however, were imperfect. The organ is thrown into innumerable rugæ internally; while externally it is kept in position by the dorsal and ventral fibres formerly noted, as well as by the dissepiments. The broad inferior fibres pass to the transverse band at the raphe, and a few even extend in some sections to the exterior border of the cellular coat in this region, at the nerve-cords.

Nervous System.—It is somewhat difficult to make out the arrangement of the cephalic ganglia in the specimens; but they are situated in the snout, near the eyes, and form two slightly tinted masses, terminating on each side in a buccal cord, which passes downwards to the ventral surface, and extends along the body beneath the transverse band of the raphe. The cords are larger in front, and somewhat farther apart, but throughout the rest of the body are closely approximated. The usual granular sheath surrounds them, and they are also protected by part of the cellular coat inferiorly.

In comparing the foregoing form with the representatives of the *Opheliidæ* at present described, it is at once distinguished by the absence of bristles. In *Ammotrypane* the united nerve-cords are situated at the ventral edge of the T-shaped prolongation of the body-wall inferiorly, and have a muscular column between them and the perivisceral cavity. In *Ophelia* the nerve-cord lies within the great longitudinal muscular cord, at the junction of the ventral prolongations (in transverse sections). The body-wall differs in the relative thickness of the several layers, and especially in the great bulk of the cellular coat in the new form. One of its nearest allies seems to be a new *Ammotrypane* dredged in Valentia harbour by Dr Gwyn Jeffreys, which shows a very minute trace of bristles, though the form of the body closely agrees with the *Ammotrypane aulogaster* of H. Rathke. In the Irish species, however, the united nerve-cords lie between the ventral ends of the powerfully-

developed oblique muscular bands which separate the longitudinal coat in the median line inferiorly.

The occurrence of an Annelid proper devoid of bristles is an interesting fact; for, though such organs are feebly developed in *Tomopteris*, they have been considered on the whole so universal, that, for example, the two great divisions Polychæta and Oligochæta rest thereon. The new form likewise shows no trace of segmentation externally, in this respect agreeing with the Nemerteans, yet in structure it is truly an Annelid proper. It is difficult to assign its exact position at present, and the association with the Opheliidæ may be regarded as provisional.

4. The following concluding Remarks were made by Mr D. Milne Home, who occupied the Chair in room of the President:—

I. I have been requested by our Secretary to announce formally from the Council, that this is the last meeting for the Winter Session.

You will have seen from the billet, that our President, Sir William Thomson, was to have been in the chair to-night, and to have closed the session with some remarks suitable to the occasion.

The Council are much disappointed, and no doubt you also are; but I am more distressed than any one at Sir William Thomson's absence. There is a letter from him to the Secretary, dated on Friday last, mentioning that he could not attend this evening, as he expected to be in his yacht to-day in the Bay of Biscay.

The Council, therefore, had no alternative but to appoint me, as the only Vice-President at hand, to occupy the chair to-night. The occupation of the chair is unaccompanied by any difficulty,—but the other duty, of offering concluding remarks worthy of your acceptance, I find it simply impossible to perform. I am sure you will neither expect it, nor wish me to attempt it.

Such remarks, therefore, as I shall offer, will be matter of mere form, and will not contain thoughts or suggestions, or information of any scientific value.