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A new Styelid Tunicate from Norway.

By

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With 1 Plate.

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The specimen here described belongs to the collection of Ascidians in the Swedish State Museum.

The external aspect and still more the peculiarities of the internal structure of the individual excite considerable interest, uniting as they do characters which distinctly show its alliance to the *Styelidae*, thereby distinguishing it from all other known species of the group.

*Styela theeli**) n. sp.

Locality.

Norway: Hardanger, Samlenfjord. Depth 350 fathoms. Bottom, rocks. July 23, 1880. Bovallius. 1 specimen.

External appearance.

The single specimen of the collection is of elliptical outline; the body is greatly flattened dorso-ventrally and attached by the left side by a somewhat expanded base. The apertures are placed at the anterior end of the animal and not far apart. They are four-lobed and surrounded by small folds and papillae of light colour. Wrinkles in the test prevent them from being easily distinguished. (Cf. Pl 1 fig. 1).

In living specimens the siphons are in all probability projected, though in this preserved individual they are retracted.

The test of the upper side, i. e. the right side, of the animal is of dark-brown colour, coriaceous and wrinkled. It

*) In associating with the species the name of Professor Doctor Hj. Théel, I desire to express my appreciation of the interest he has taken in the study of the Swedish Tunicata.

is covered with small retracted *Bryozoa*, whence the surface looks as if it were dotted with tiny whitish tubercles (cf. Pl. 1, fig. 1). Some shells of *Foraminifera* are also attached to it. The surface is free from other foreign matter.

The left side by which the animal is attached is whitish and opaque.

The specimen measures 34 mm. in length and 19 mm. in breadth. The expanded base measures 23 mm. in breadth.

Internal structure.

The upper i. e. the right side of the test is thick and of leathery consistency. The inner surface is smooth and provided with a nacreous lining. The left side of the test — by which the specimen is attached — is thin.

The mantle musculature is powerfully developed on the right side and round the siphons as regards both the horizontal and the longitudinal layer. On the left side it is thinner and not so well developed.

The tentacles are short and conical and of different size. Their exact number could not be ascertained.

Atrial tentacles are present in great number. They are slender and club-shaped, scattered over a broad velum.

The dorsal lamina is plain-edged and rather broad. Transversally it is strongly folded, probably owing to contraction of the tissues. Its posterior part is apparently double. (cf. Pl. 1, fig. 2).

As appears from the last-mentioned figure, the dorsal tubercle is of a very characteristic structure, differing, so far as I know, from that of all other known Styelae. It is prominent and of rounded form with two small openings of semi-circular shape, the concavity of which is directed to the left.

The ganglion situated behind the dorsal tubercle is rather long.

The branchial sac resembles that of a typical Styelid. In the specimen at my disposal it is highly contracted. It is provided with four well-marked longitudinal folds on each side, each fold with numerous vessels, at least 12—15 in number. The stigmata are elongated and of the usual form. On the inter-spaces between the folds about 8—10 longitudinal vessels are

visible. Transverse vessels of different size cross the branchial sac. Here and there the stigmata are crossed by slender vessels.

The position and external structure of the alimentary canal is clearly shown from fig. 3. In examining it, one is struck by the development and arrangement of the intestine, which is of great length and characteristically bent, forming a rounded, wide loop above the stomach. It is distinctly marked off from the stomach (Pl. 1, fig. 3). Oesophagus is rather long, projecting from the base of the branchial sac.

The stomach is short, with about 22 longitudinal folds in its wall. Only a very small rudiment of a pyloric coecum is present.

The condition of the rectum is especially noticeable, as appears from fig. 3 it is long and sinuous and placed close to and on the inner side of the descending part of the loop of the intestine. The margin of the anus has at least 12 small lobes.

The reproductive organs consist of two gonads on the right side and one gonad on the left. Each gonad consists of an ovary, bordered proximally by clusters of male glands. The ovaries are tubes of great length which are bent along a sharp angle and sinuously curved, containing masses of eggs. The oviducts are wide, almost inflated, with lobated orifices, directed towards the atrial aperture. (Cf. Pl. 1, fig. 4). The two ovaries of the right side differ in size, the one being somewhat shorter and narrower than the other. In other respects they exactly agree. The ovary of the left side is in its proximal part less sinuous than those of the right side. Moreover they are of exactly the same structure and the characteristic bend along a sharp angle is common to the ovaries of both sides (Pl. 1, fig. 5).

The want of symmetry is manifested not only in the arrangement of the ovaries but also in that of the male organs. If we compare figs. 4 and 5 it will be seen that the testis on the left side is much more developed than the corresponding organ on the right. On the latter side, the clusters of male glands are few and are placed only at the proximal end of the oviduct, whereas on the left side they are numerous, forming a series of testicular masses, grouped along the ovary at one side and bordering the greater part of its length. The

vasa efferentia embrace the proximal part of the ovary and unite in forming a common vas deferens, which lies on the inner free surface of the ovary and ends close to the orifice of the oviduct. Both the oviduct and the vas deferens open at the end of the gonad near each other.

On the inner side of the mantle a large number of *endocarps* are visible.

Remarks.

In comparing *Styela theeli* with other *Styelids*, it appears that, while it agrees in some external and internal features with the members of the group *Goniocarpa*, it is distinctly marked off from other species. No *Styelid* that has been described has gonads which agree with those of *Styela theeli*, nor a dorsal tubercle which resembles the corresponding organ in the latter; even the alimentary canal is unlike that of other species. In some respects *Styela theeli* resembles in appearance *Styela loveni*: The leathery test, the expanded base and the depressed form are characters which remind one of *Styela loveni*. And as to the internal anatomy, it should be observed that the structure of the gonads offers several points of agreement with the last-mentioned species. In both, the ovary is a sinuously curved tube of considerable length and with the same characteristic bend, the testis and the vas deferens show the same general plan of arrangement and structure. The situation of the orifices of the gonads which in both species are directed towards the atrial aperture, is also the same.

There exist, however, more essential differences. With regard to the external aspect I would point out that *Styela theeli* is of greater size, that it is attached by the left side, and that the apertures are not so wide apart. It also differs in the condition of the test: the wrinkles and the arrangement of the folds around the apertures are dissimilar. With respect to the internal structure, there are several important differences. If we compare the gonads of the two species, it will be evident that, while agreeing in some general features, they differ in form and size, in the inflated oviducts and above all in the number, a character which is considered to be of great value in distinguishing the different groups

of the family *Styelidae* from each other. In no other known *Styela* there are, normally, two gonads on the one side and only one on the other. In *Styela loveni* the presence of one gonad on each side is considered to be constant.

As far as concerns the number of gonads, *Styela theeli* might be regarded as an intermediate form between the *Goniocarpa*-group having one gonad on each side and the *canopus*-group with two gonads on each side. So far as one can judge from this single specimen of *Styela theeli*, there does not seem to exist any greater resemblance between it and the latter group in any other respect.

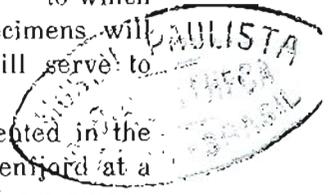
In regard to the systematical position of *Styela theeli* it should be observed that, though the species is no doubt nearly allied to the group *Goniocarpa*, it can not be referred to this group without further evidence. If forms like *Styela theeli* are to be included, the definition of the group should be altered.

Or a new genus must be established.

Provisionally, however, it may conveniently be referred under the genus of *Styela* to the *Goniocarpa*-group — to which *Styela loveni* also belongs — until further specimens will have been found, the investigation of which will serve to complete the description of this species.

As mentioned above, *Styela theeli* is represented in the collection by a single individual, dredged in Samlenfjord at a considerable depth — 350 fathoms. So far as I am aware, no further specimen has been collected in the Norwegian fjords nor off the coast, though the fauna of those waters has been explored by several naturalists even in later times. And according to the literature of the subject, no *Styelid* resembling it has been reported elsewhere. For those reasons one can not at present determine whether the species here described is to be regarded as endemic or as a relic form, or whether possibly its occurrence there is accidental, the animal having been carried, as larva or adult, from other regions to Samlenfjord.

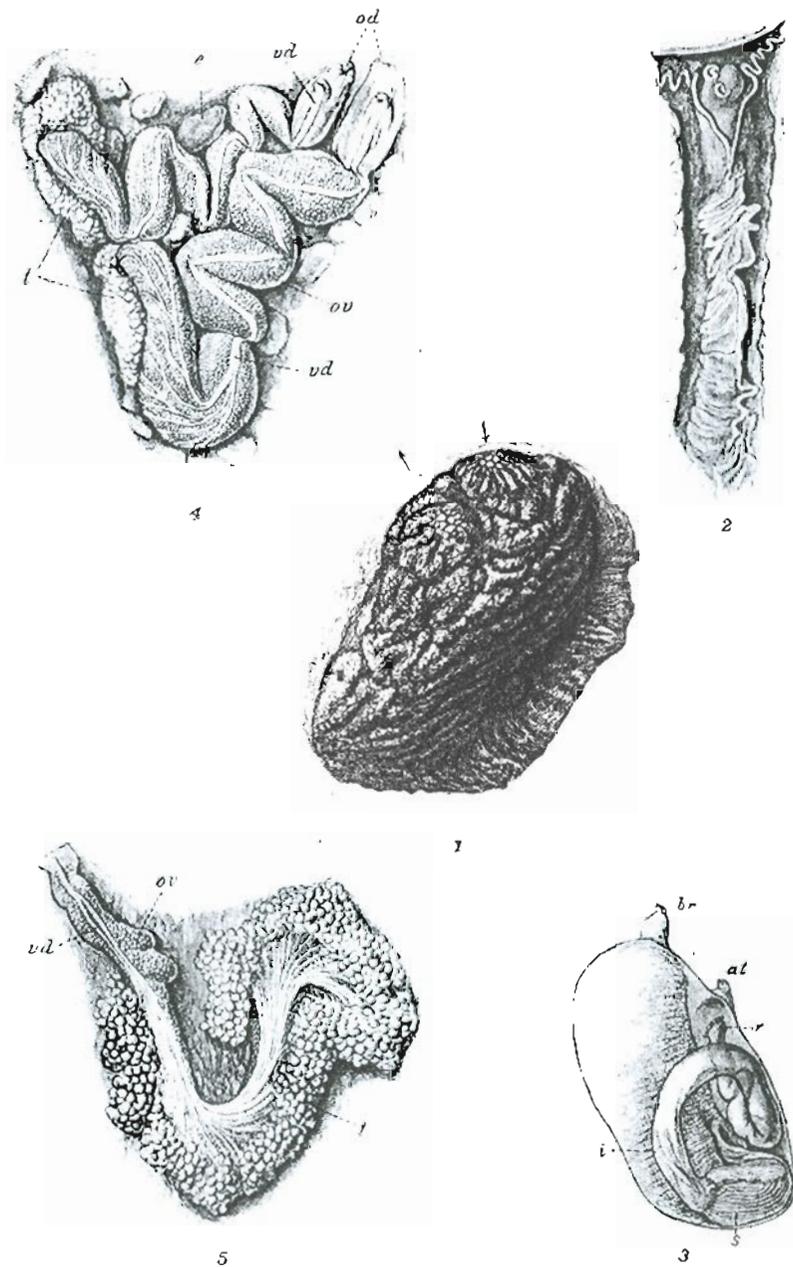
In this connection I should mention that both *Styela loveni* and *Styela rustica* were dredged in Samlenfjord simultaneously with *Styela theeli*. Of the former species, seven very small specimens were collected at a depth of 280 fathoms; of the latter, only one large individual was caught at a depth of 80 fathoms.



Explanation of the Plate.

- Fig. 1. *Styela theeli*. n. sp. $\times 1\frac{1}{2}$. External view.
 Fig. 2. *Styela theeli*. n. sp. $\times 10$. Dorsal tubercle and part of dorsal lamina.
 Fig. 3. *Styela theeli*. n. sp. $\times 2$. Left side of body.
 Fig. 4. *Styela theeli*. n. sp. $\times 6$. Right gonads.
 Fig. 5. *Styela theeli*. n. sp. $\times 6$. Part of left gonad.

- al Atrial aperture.
 br Branchial aperture.
 e Endocarp.
 i Intestine.
 od Oviduct.
 ov Ovary.
 r Reclum.
 s Stomach.
 t Testis.
 vd Vas deferens.



G. Liljevall del.

A. Årnäck-Christie-Linde, foto. (fig. 1).