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BIOLOGICAL RESULTS OF THE SNELLIUS EXPEDITION. XXIV. PELAGIC TUNICATES OF THE SNELLIUS EXPEDITION

by

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With 1 text-figure

Eleven samples of pelagic tunicates were found in the material collected during the Snellius Expedition 1929-30. In these, seven species, viz., two pyrosomas and five salpas, are included. In addition, a few old specimens of another species of *Pyrosoma* were found in the collection of the Leiden Museum. Thus, the following eight species are recorded in the present short paper.

1. *Pyrosoma spinosum* (Herdman)
2. *Pyrosoma verticillatum cylindricum* Metcalf & Hopkins
3. *Pyrosoma atlanticum atlanticum* (Péron)
4. *Ritteriella picteti* (Apstein)
5. *Salpa fusiformis* Cuvier
6. ? *Salpa cylindrica* Cuvier
7. *Thetys vagina* (Tilesius)
8. *Pegea confoederata* (Forskål)

Most of the specimens are preserved in formalin and these, especially the salpas, are all in a poor condition. In the salpas, most of the soft tissues, inclusive of muscle bands, has been lost as if the specimens had come from the stomach contents of fishes. Fortunately, however, the size, approximate outline, and situation of the nucleus could be determined, as well as those of the stolon. In some specimens, some traces of muscle bands were visible. All these features, together with test characters and the situation of the dorsal ganglion deducible from the anterior base of the gill, enabled me to identify most of them definitely.

I want to express my cordial thanks to Dr. W. Vervoort of the Rijksmuseum van Natuurlijke Historie at Leiden for his generous help during my researches on tunicates.

1. **Pyrosoma spinosum** (Herdman, 1888) (fig. 1)

Snellius Expedition

Station 79, N.E. of Celebes, 1°52'N 125°41'E, 22 September 1929; straminpose net hauled vertically from 2500 m to the surface; a single colony, 280 mm long and 22 mm (near the colonial aperture), 25 mm (near the middle), and 23 mm (near the closed end) wide; small spinules up to 1 mm over the whole surface of the colony.

Anchorage of Batoe Ata, S.E. of Celebes, 6°10'S 122°41'E, 6 March 1930; a single colony, 295 mm long and 30 mm (near the colonial aperture), 30 mm (near the middle), and 28 mm (near the closed end) wide; small spinules over the surface as in the colony from Station 79.

Station 228, S.E. of Obi Major, Moluccas, 1°54.5'S 127°08'E, 4 April 1930; a townet hauled at the surfare; a piece of a colony, 300 mm long and 90-95 mm wide (when compressed); small spinules over the surface as in the other two colonies.

The colony is very elongate, cylindrical, and is of nearly equal diameter from end to end. The test is very transparent and flabby, the surface is slightly elevated on respective zooids and furnished all over with small spinules less than 1 mm in length.

Zooids are large, up to 7 mm, and very easily slipped out of the colony, thus the latter may be found nearly emptied. The branchial aperture is provided with more than twenty tentacles, and the atrial aperture shows a very prominent process. The structure of the branchial sac was very difficult to ascertain as all the zooids were strongly softened and deformed or injured; however, 15 or 16 bars, (?) 20 to 22 stigmata, and about 7 dorsal languets were observed in some zooids of the 295 mm long colony. There are two eye-pigment spots on the dorsal ganglion. A little more than 100 rather small testicular lobules were counted in a zooid of the colony from Station 228. These structures of the zooid are of course insufficient to permit a definite identification. However, the musculature is well developed around the branchial aperture and in the anterior part of the branchial area, as was distinctly visible in some zooids from the colony from Station 228. This feature is very characteristic for this species (text-fig. 1).

2. **Pyrosoma verticillatum cylindricum** Metcalf & Hopkins, 1919

Museum Leiden

A single 25 mm long and 9 mm wide cylindrical colony collected between June 1834 and January 1836 by S. Müller in Sumatra (probably near Padang), preserved in alcohol and of a dark brown colour.

The surface of the test is quite smooth and without any processes. The branchial sac is structured as follows:

Number of stigmata	Number of bars	Number of dorsal languets
18	11	1 + ?
about 21	14	5
about 23	15	4
25	14	5

The structure conforms well to that of the subspecies *cylindricum* of *P. verticillatum* (Neumann) as defined by Metcalf & Hopkins (1919: 227).

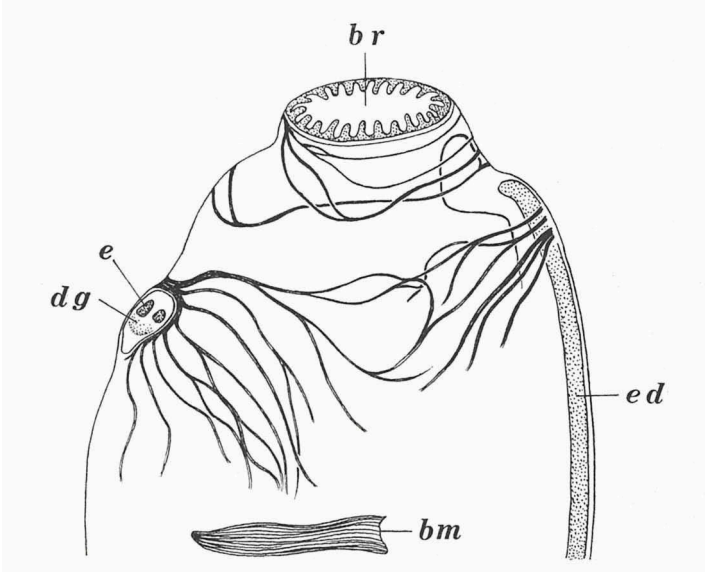

Fig. 1. *Pyrosoma spinosum* (Herdman). Musculature around the branchial aperture and in the anterior part of the branchial area. bm, body muscle; br, branchial aperture; dg, dorsal ganglion; e, eye pigment spot; ed, endostyle.

3. **Pyrosoma atlanticum atlanticum** (Péron, 1804)

Snellius Expedition

Reef of Batoe Merah, Amboina, Moluccas, 15 October 1930; a colony, 58 mm long, 16 mm wide (greatest width), and test processes up to 3 mm; preserved in alcohol and of a yellowish brown colour; nearly emptied.

Station 79, N.E. of Celebes, 1°52'N 125°41'E, 22 September 1929; straminpose net hauled vertically from 2500 m to the surface; a colony, 95 mm long and 20 mm wide (greatest width), and test processes up to 4 mm.

Number of stigmata	Number of bars	Number of dorsal languets
19	12	7
22	13	6
23	15	6
28	13	9
29	15	5

Station 288, N. of Halmahera, Moluccas, 3°17'N 128°23.5'E, 1 June 1930; a townet hauled in the upper 0-1 m of the surface waters; five colonies: 60 mm (length l) × 16 mm (greatest width w), 6 mm (maximum length of test processes p); 70 mm (l) × 24 mm (w), 5 mm (p); 82 mm (l) × 30 mm (w), 8 mm (p); 110 mm (l) × 28 mm (w), 6 mm (p); 100 mm (l) × 24 mm (w), 5 mm (p); several testicular lobes divided into about 15 lobules.

Number of stigmata	Number of bars	Number of dorsal languets
23	13	6 + ?
25	12	6
25	13	
27	14	7
28	15	9
30	13	7

Station 317a, N. of Flores, Lesser Sunda Islands, 7°55'S 122°12.5'E, 23 August 1930; three colonies: 46 mm (l) × 15 mm (w), 4 mm (p); 80 mm (l) × 20 mm (w), 7 mm (p); 94 mm (l) × 21 mm (w), 8 mm (p).

Number of stigmata	Number of bars	Number of dorsal languets
22 + ?	14	
22 + ?	14	
24	14	
24 (?)	15	6
27	15	
28	14	7
28	15	

Museum Leiden

Morotai, N. Moluccas, Indonesia, July 1861-January 1862, H. A. Bernstein, preserved in alcohol and of a yellowish brown colour; nine colonies: 27 mm (l) × 9 mm (w), nearly cylindrical and with only a few small processes; 37 mm (l) × 12 mm (w), 1 mm (p); 38 mm (l) × 13 mm (w), 1 mm (p); 38 mm (l) × 15 mm (w), 1 mm (p); 45 mm (l) × 17 mm (w), 3 mm (p); 47 mm (l) × 16 mm (w), 3 mm (p); 53 mm (l) × 18 mm (w), 2 mm (p); 58 mm (l) × 15 mm (w), 2 mm (p); 62 mm (l) × 16 mm (w), 2 mm (p).

Number of stigmata	Number of bars	Number of dorsal languets
16	10	3 + ?
19	12	6
20	12	6
21	13	4
21	13	4 + ?
22	14	5
22	13	6
23	14	5
25 — 26	14	7

The colony of this species is characterized by its general form which is thicker near the colonial aperture and thinner toward the closed end; this does not preclude, however, that there may occur somewhat more cylindrical colonies. The test is rather rigid, little transparent, and the surface is very characteristically furnished with many prominent spinose processes. The branchial aperture is provided with a single prominent tentacle, the testis consists of lobes, which are further divided into two or three lobules, which are evidently larger than in *P. spinosum*. The elements of the branchial sac vary so remarkably in number that it is impossible to show any definite relation among these numbers or between these and colony sizes. Apparently, different stocks or clones have their own range of variation.

4. **Ritteriella picteti** (Apstein, 1904)

Snellius Expedition

Anchorage of Amboina, Moluccas, May 5, 1930; townet hauled from 50 m to the surface; a solitary form.

The mantle body, which is 54 mm long, was found slipped out of the test; tissues are mostly decomposed, the outlines of the alimentary canal and stolon are visible, the arrangements of muscles otherwise are suspected only by their traces; only about ten atrial sphincters are still remaining.

The alimentary canal never forms the nucleus, but the intestine is running posteriorly on the ventro-median line, while the stolon stretches straight anteriorly. About thirty muscle bands, inclusive of a few thicker anterior atrial sphincters, can be traced on the dorsal side of the body. As the arrangement of body muscles is not strictly symmetrical in this species, the number given above can not be exact, but still it is evidently larger than the numbers(8-24) so far given for this species. Probably the range of the number of body muscles may be extended slightly more.

5. **Salpa fusiformis** Cuvier, 1804

Snellius Expedition

Station 317, N. of Flores, Lesser Sunda Islands, 8°00.5'S 122°19'E, 21 August 1930; fourteen aggregated forms up to about 30 mm in length.

All mantle bodies have slipped out of the test. The specimens are too big for *S. cylindrica*, but smaller than fully grown aggregated forms of *S. maxima* Forskål. The anterior and posterior processes are rather prominent and situated nearer to the median line, therefore the material is attributed here to *S. fusiformis* rather than to *S. maxima*.

6. ? **Salpa cylindrica** Cuvier, 1804

Snellius Expedition

Anchorage off Bongao, Tawitawi, Sulu Islands, Philippines, 9 September 1929; townet hauled at the surface; two solitary forms, mantle body 40 and 45 mm in length.

The mantle bodies are found to have slipped out of the test. The arrangement of body muscles was suggested by muscle traces. No special processes are found with certainty on the test surface. The nucleus is very compact and relatively small, the stolon proceeds straight anteriorly at least as far as the distance equivalent to the nucleus length; these are the main features for the present identification.

7. **Thetys vagina** (Tilesius, 1802)

Snellius Expedition

Station 44, off the east coast of Borneo, 2°00'N 118°41.5'E, 14 August 1929; townet hauled at the surface; a single aggregated form.

The mantle body has slipped out of the test; it is 45 mm in length. The part of the test including the nucleus is markedly thickened and the surface, especially on the dorsal side, is sparsely furnished with spinules. The nucleus is very large. The existence of five interrupted body muscles was suggested by muscle traces. The feature of the test and the remarkable size of the nucleus are sufficient to attribute the specimen to the aggregated form of the present species.

8. **Pegea confoederata** (Forskål, 1775)

Snellius Expedition

Station 138, Dao Strait, S.E. of Timor, 10°43'S 122°21.5'E, 16 November 1929; in a plankton sample from the surface to about one meter deep; a single 23 mm long solitary form preserved in alcohol.

The specimen is somewhat deformed, but the internal structures are all perfectly preserved.

Reference

METCALF, M. M. & H. S. HOPKINS, 1919. Pyrosoma. — A taxonomic study based upon the collections of the United States Bureau of Fisheries and the United States National Museum. — Bull. U.S. Nat. Mus., 100 (2)(3): 195-275.