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THE ASCIDIANS OF JØRGEN BRØNLUND FJORD,
NORTH GREENLAND

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Abstract

Six species of ascidians are recorded from Jørgen Brønlund Fjord, North Greenland, one of which, *Cnemidocarpa squamata* n. sp., is new to science. The horizontal and vertical distribution of the ascidians within the area is reviewed.

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DESCRIPTION OF THE MATERIAL

Six species of ascidians, one of them new to science, were taken by the 4th Peary Land Expedition to Jørgen Brønlund Fjord. They belong to the families Styelidae and Molgulidae of the order Pleurogona.

The material is kept in the Zoological Museum, University of Copenhagen.

Family Styelidae

1. *Cnemidocarpa cirrata* ÄRNBÄCK-CHRISTIE-LINDE

Cnemidocarpa cirrata ÄRNBÄCK-CHRISTIE-LINDE, 1922, p. 34.

Cnemidocarpa rhizopus HARTMEYER, 1923, p. 245.

Material:

Bottom grab: St. 21, 11.5 m: 1 sp. — St. 22, 11.5 m: 4 sp. — St. 27, 19 m: 4 sp. — St. 29, 19 m: 3 sp.

Dredge haul: St. 34, 15 m: 27 sp. — St. 40, 30 m: 7 sp. — St. 44, 17–18 m: 3 sp. — St. 45, 10 m: 5 sp. — St. 50, 10 m: 2 sp. — St. 51, 18 m: 1 sp. — St. 57, 8–10 m: 11 sp. — St. 58, 20 m: 2 sp. — St. 60, 20 m: 2 sp. — St. 72, 10 m: 1 sp.

All specimens agree in every respect with the original description both regarding external appearance and internal structure.

HARTMEYER (1923) took the view, adopted by VAN NAME (1945) and MILLAR (1966), that *C. cirrata* be synonymous with *C. rhizopus*. To the present author this seems quite unacceptable. The two species are easily distinguishable externally as well as internally and no intermediate form has been demonstrated so far. The best external distinguishing mark is that the rhizoid-like processes in the former invariably arise from one point, whereas in *C. rhizopus* they are scattered over larger part of the base. The gonads in *C. cirrata* exceptionally exceed 3 in number on the left side, and are usually 2 or 3 on the right, the number in *C. rhizopus* being the double. The number of gonads only slightly increases with size, as shown below, indicating that the difference in this respect between *C. cirrata* and *C. rhizopus* is not a matter of size:

Number of gonads (rudimentary ones in brackets) relative to body size
in *Cnemidocarpa cirrata*

body diameter (mm)	left side	right side	total
3.5	3	1	4
4.5	3	2	5
5.0	3 + (1)	2 + (1)	5 + (2)
6.0	3	2	5
6.0	3	2	5
7.0	3	3	6

Distribution. General: Greenland, Baffin Island, Spitzbergen. N. and E. Greenland: Franz Joseph Fjord, 28–36 m.

2. *Cnemidocarpa squamata* n. sp.

Material:

Bottom grab: St. 3, 47.5 m: 2 sp. — St. 4, 47.5 m: 1 sp. — St. 5, 27.5 m: 3 sp.

Dredge haul: St. 40, 30 m: 1 sp. — St. 55, 80 m: 4 sp.

In addition two specimens were taken by the Expedition to Thule 1968 (St. 68, II, Murchison Sd., 77°25,5' N, 69°29' E, 300 m, 24.VIII. 1968, dredge).

Except for a flattened region surrounding the two openings, the body is almost globular, in one or two, however, somewhat depressed. The diameter ranges between 5.5 and 13.5 mm. The tunic is transparent (as viewed from inside) and of moderate thickness. Its surface is generally naked on a small area on the upper side surrounding the apertures apart from a few sand grains which invariably attach to this region. Surrounding it and occupying the margin of the upper side and the upper half of the sides of the body occurs a dense coating of not very long, but much curled processes; they arise either individually from the surface or in small tufts, or from a common root, and are of a bright brownish tinge. The basal half of the body is almost naked in most specimens, except for the presence of a variable number of fairly long and straight processes, which most often arise in small groups of 3–10, or have a common stem; the tunic in this lower region is generally darker than otherwise and — especially on the very base — has a warty or squamous appearance due to the occurrence of many regularly placed minute sand grains — hence the specific name. Larger sand grains are scattered all over the tunic or adhere to the processes.

The mantle musculature is faintly developed and the mantle adheres closely to the tunic everywhere. The dorsal tubercle is comparative-

ly small, it is C-shaped with the opening turned to the left. The dorsal lamina is plain-edged along its whole course. Oral tentacles are numerous and very long and slender; the largest ones are as long as the velar diameter.

The branchial sac is provided with four folds on each side; the following scheme shows the approximate number and distribution of vessels on the folds and interspaces in two specimens (diameter 13.5 and 12.5 mm respectively):

		I	II	III	IV		
right	d.l.	0 (18)	2 (10)	4 (13)	5 (7)	2 end. = 61	1)
left	d.l.	0 (17)	3 (9)	4 (12)	4 (10)	2 end. = 61	
right	d.l.	0 (15)	3 (7)	4 (12)	3 (7)	2 end. = 53	2)
left	d.l.	0 (14)	3 (5)	5 (12)	3 (9)	2 end. = 53	

Thus the number of vessels is equal on each side, and the folds are in the order I, III, II = IV. I and II are close-set or almost coalesced, being separated only by 2 or 3 close-set vessels. The stigmata are elongated, of conventional form.

The alimentary canal is short. The stomach is oviform, well marked off from the oesophagus and the intestine; it has 12–15 somewhat irregular plications and, between them, a few short folds on the posterior part. The pyloric coecum is well-developed, curved and stalked. The intestine is of moderate length, the margins of the anus provided with 10–15 blunt lobes, most of which are very short.

The interior mantle wall with rather many endocarps which are comparatively tall and slender and protrude into the peribranchial cavity. The gonads are short, pyriform or grain-shaped. In one of the two Thule-specimens a single gonad appeared V-shaped, or rather, perhaps, two gonads have grown together. As usual for the genus the male vesicles occupy a marginal position. The following number were recorded in 4 specimens (rudimentary ones in brackets):

body diameter (mm)	left side	right side	total
8.0	(2)	(3)	(5)
9.5 × 11	5	5 + (2)	10 + (2)
12.5	4 + (1)	6	10 + (1)
13.5	5	6	11

In full-grown specimens two of the left gonads are sitting close to the anus and distinctly separated from the remaining ones. Gonads were not traceable in a specimen of 5.5 mm. The total number in adults seems to be 11–12, one (or two) more on the right side than on the left. No larvae were recorded in the atrial cavity.

C. squamata is easily distinguishable from other northern species of the genus. The folds of the branchial sac are all well-developed, whereas they are rudimentary in *C. rhizopus* REDIKORZEW and *mollispina* ÄRN-BÄCK-CHRISTIE-LINDE, and badly developed in *C. cirrata*, in which species the number of gonads is furthermore much smaller than in *C. squamata*. Neither in *C. rhizopus*, *mollispina*, nor *cirrata* do longitudinal vessels occur on the interspaces between the folds, whereas these are fairly frequent in *C. squamata*. *C. mortenseni* HARTMEYER has only one well-developed fold on each side, and the number of gonads is one on the left, and two on the right side. The branchial sac reminds somewhat of that found in *C. finmarkiensis* (KIAER) in complexity, but the number of gonads is generally much larger in that species, the shape of the gonads quite different, and the dorsal lamina provided with teeth.

The specimen from St. 4 was selected as holotype and is being kept in the Zoological Museum in Copenhagen.

Material: *Cnemidocarpa* sp.

Dredge haul: St. 42, 85–90 m: 2 sp.

The cuticular surface is very rough thanks to the inclusion of many dark-coloured sand-grains; from the base arise rather many slightly branching rhizoid-like processes to which sand grains adhere. Diameter: 5–6 mm.

The internal organs are so reduced that a determination is impossible; the branchial sac is entirely missing. Two small polycarps could be traced on the left side in one specimen.

Family Molgulidae

3. *Molgula griffithsi* (MAC LEAY)

Molgula chrystallina HARTMEYER, 1923, p. 45.

Material:

Dredge haul: St. 70, 40–45 m: 1 sp.

Distribution. General: Arctics south to Newfoundland, the Aleutian Islands, Kamchatka, Northern Norway and Iceland; Skagerrak (?).

N. and E. Greenland: Tasiussaq (S.E. Greenland).

4. *Molgula siphonalis* M. SARS

Molgula siphonalis HARTMEYER, 1923, p. 105.

Material:

Dredge haul: St. 40, 30 m: 1 sp.

Distribution. General: Greenland, Iceland, Spitzbergen, White and

Barents Sea, west coast of Scandinavia, Berings Sea, Arctic North America.

N. and E. Greenland: Angmagssalik (S.E. coast) and Öresund (N.E. coast).

5. *Rhizomolgula globularis* (PALLAS)

Rhizomolgula globularis HARTMEYER, 1923, p. 124.

Material:

Bottom grab: St. 25, 2.75 m: very many small sp.

Dredge haul: St. 26, 1.5–2.0 m: 1 sp. — St. 37, 3 m: 8 sp. — St. 38, 2–2.5 m: 26 sp. — St. 47, 3.0 m: 40 sp. — St. 48, 2.5 m: 24 sp. — St. 49, 5–6 m: 5 sp.

All specimens are very typical. In a number the ovary was dissected free; the larger specimens contained eggs that were presumably ripe and measured about 0.25 mm in diameter (inclusive follicular membrane). Embryos or larvae were never found in the atrial cavity.

REMARKS

Roughs and rocky bottom are practically absent in Jørgen Brønlund Fjord and the ascidian species occurring there are accordingly level bottom forms. Two species were taken rather frequently: *Rhizomolgula globularis* was abundant on sandy bottoms at very moderate depths (2–3 m in the inner basin, 1.5–6 m in the threshold region); *Cnemidocarpa cirrata* was found at depths between 15 and 30 m (inner basin), 10–19 m (threshold region) and 8–20 m (outer basin) and occurred here and there at a number of 10–40 specimens per m². *C. squamata* n. sp. was taken at four stations in the inner basin (27.5–47.5 m) at a number of 10–30 specimens per m².

On the material available it is not advisable to comment on the mode of reproduction apart from mentioning that in no case were embryos or larvae found in the atrial cavity. However, since similar observations are at hand from other arctic regions, it is tempting to conclude that the species in question are oviparous, and on the whole there seems to be no indication that viviparity is especially common among arctic species of ascidians. This conception does not in any way conflict with the generally accepted rule that the percentage of viviparous marine bottom invertebrates reproducing by means of lecithotrophic non-planktonic larvae increases with the latitude (THORSON, 1936), since no species of ascidians is known to have planktotrophic larvae, whether reproducing oviparously or viviparously.

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