

ASCIDIACEA: SOME FURTHER SPECIMENS

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A. INTRODUCTION

Two earlier papers (MILLAR, 1959, 1964) gave accounts of the ascidians collected by the Danish Deep-Sea Expedition, and the present paper deals with some further specimens.

B. LIST OF STATIONS AND SPECIES

Station	Species	Station	Species
231	<i>Hexacrobylus indicus</i> Oka	601	<i>Hexacrobylus psammatodes</i> Sluiter
234	<i>Agnesia depressa</i> Millar	716	<i>Styela milleri</i> Ritter
	<i>Culeolus suhmi</i> Herdman		<i>Cnemidocarpa</i> sp.
443	<i>Molgula immunda</i> (Hartmeyer)		<i>Dicarpa pacifica</i> Millar

C. DESCRIPTION OF SPECIES

Family AGNESIIDAE Huntsman, 1912

Genus *Agnesia* Michaelsen, 1898

Agnesia depressa Millar
(Fig. 1)

Agnesia depressa Millar, 1955, p. 223, fig. 1.

Material:

St. 234. 5°25'S, 47°09'E; 10 March 1951, 4820 m, Globigerina ooze. - One specimen.

External appearance (Fig. 1A): The form is ovoid and somewhat depressed, with the inconspicuous siphons widely separated. The test is transparent and soft, with a rather sparse coating of fine fibrils which are almost absent from much of the upper and lateral parts of the body. A network of indistinct hexagonal markings is visible on the surface of the test.

Internal structure: Most of the superficial features of the body (Fig. 1B) and the internal structure correspond to those of the type material (MILLAR, 1955). The branchial papillae (Fig. 1C) of the present specimen, however, are prominent and

have a short stalk and two slender arms, whereas the type material showed only simple rudimentary branchial papillae.

Remarks: The type material was taken from the western North Atlantic and the present specimen from the western Indian Ocean. The wide geographical separation, together with the difference in the branchial papillae may indicate some degree of genetic distinction, but the single new specimen does not in itself justify the recognition of a new species.

Family STYELIDAE Sluiter, 1895

Genus *Styela* Fleming, 1822

Styela milleri Ritter, 1907
(Fig. 2)

Styela milleri Ritter, 1907, p. 21.

Material:

St. 52. 1°42'N, 7°51'E; Gulf of Guinea, 30 Nov. 1950, 2550 m. - One specimen.

St. 716. 9°23'N, 89°32'W; off Costa Rica, 6 May 1952, 3570 m. - Two specimens.

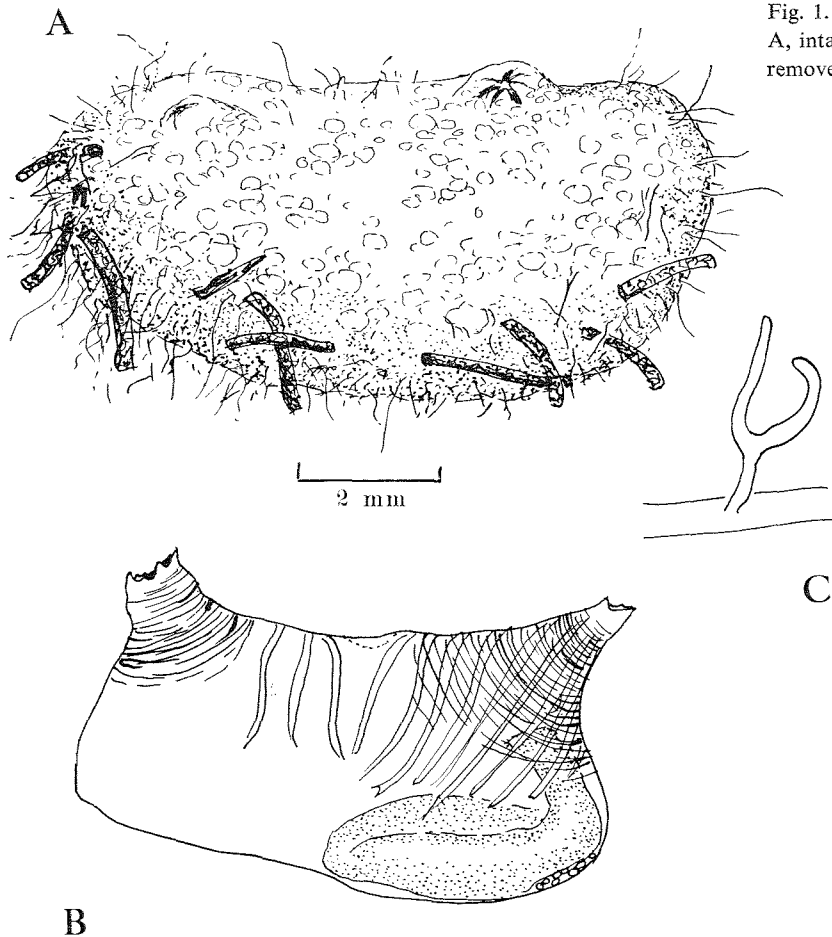


Fig. 1. *Agnesia depressa* Millar.
A, intact animal; B, animal with test removed; C, branchial papilla.

External appearance: The largest specimen is 3.5 cm in greatest diameter. All specimens are dull brown, and somewhat wrinkled, and the lower part of the body has numerous simple and branched filaments spreading over the solid object to which the animals are attached (Fig. 2A). RITTER (1907) mentioned "many short filamentous processes" on the area of attachment of the type specimen, but VAN NAME (1945) did not refer to them in the additional material which he examined. Some of the filaments on the present specimens show a tendency to form web-like expansions where they touch the solid substratum. The lower part of the test of this species appears to be variable, possibly in response to the nature of material to which it is attached.

Internal structure: This agrees closely with the original description, and shows the same form of dorsal lamina (Fig. 2B) and gonad (Fig. 2C, D) as noted by RITTER.

Genus *Cnemidocarpa* Huntsman, 1913

Cnemidocarpa sp.

(Figs. 3-4)

Material:

St. 716. 9° 23' N, 89° 32' W; off Costa Rica, 6 May 1952, 3570 m. – Two specimens.

External appearance: The specimens are dome-shaped to hemispherical with a wide thin basal expansion of test (Fig. 3A), and measure about 6 mm across the greatest diameter of the body. The two siphons scarcely project. The test is pale grey and has only a few adhering particles of bottom material. In each specimen part of the branchial sac projects through the oral siphon, presumably as a result of damage suffered during collection.

The test is rather thin, and separates fairly readily from the body wall.

Internal structure: Body wall muscles are not strongly developed and even round the siphons only a few circular muscles are present. The body wall is red-brown. Because of damage to the branchial sac,

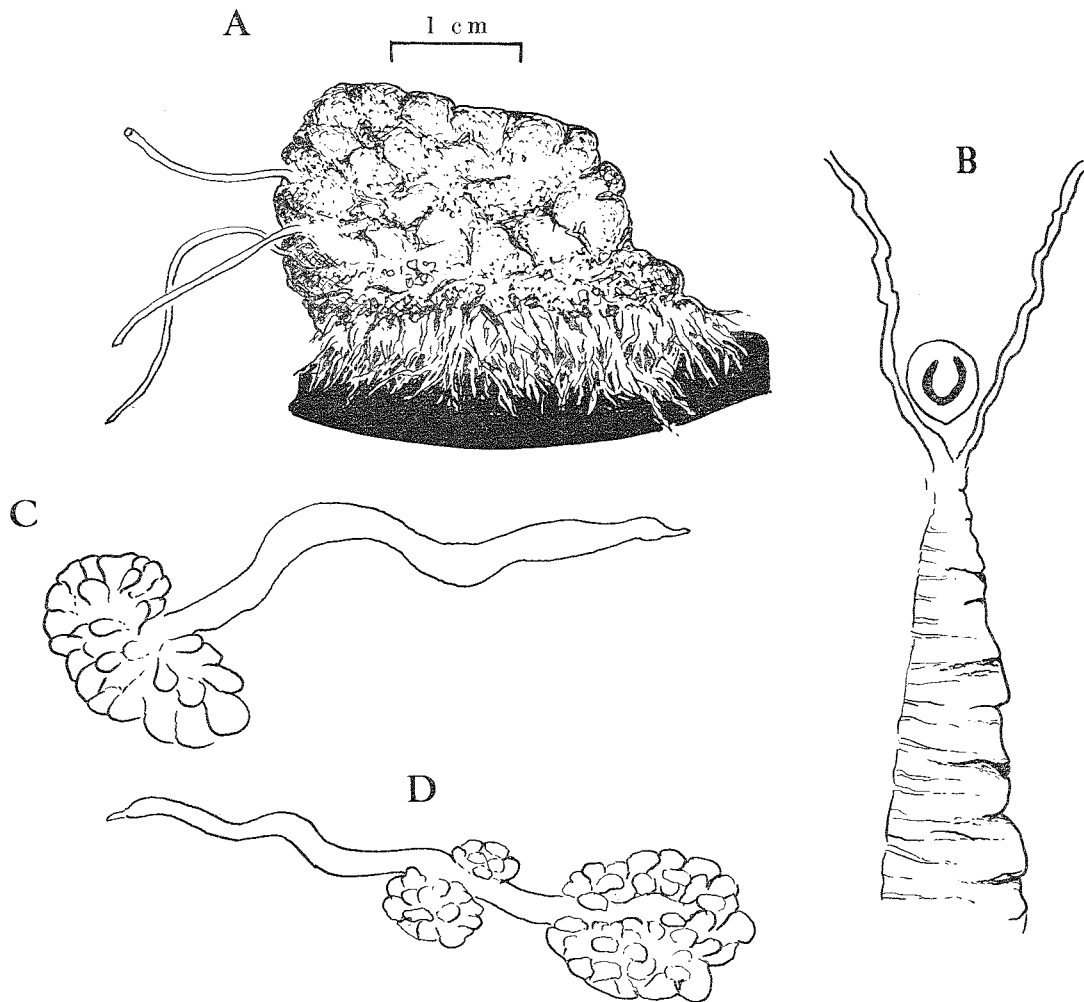


Fig. 2. *Styela milleri* Ritter. A, specimen from St. 716; B, dorsal tubercle and dorsal lamina; C, D, gonads from two specimens.

no details of the oral tentacles or dorsal tubercle could be seen. The structure of the branchial walls, too, is uncertain, but there may be two folds on each side, towards the dorsal part of the sac. Internal longitudinal bars are quite widely spaced and the stigmata are rectangular. The gut consists of a short curved oesophagus and a wide stomach with the dorsal wall bulging noticeably to give the stomach a somewhat pear-shaped appearance. About sixteen folds are present on the walls, but there is no indication of a caecum. The intestine is folded back against the stomach and the narrow rectum ends in an expanded anus. A single gonad is present on each side, lying obliquely from antero-ventral to postero-dorsal. The testis follicles lie next to the body wall and the narrow tubular ovary on the exposed inner face of the gonad. A few endocarps are present on each side.

Remarks: It is not possible to identify these

specimens because certain details of their structure are unknown. In some respects the species resembles *C. digonas* Monniot & Monniot (1968) but that species has basal filamentous processes, and four folds on each side of the branchial sac.

One further specimen from St. 716 is described below but cannot be definitely ascribed to the same species as the other two from that station because its gonads are unknown and its gut is not identical.

This specimen is 7.5 mm in greatest length, low and dome-shaped and has a flat basal membrane (Fig. 4A). It is pale buff-grey in colour. The sessile siphons are fairly close together on the upper side. The dorsal tubercle is small and round, with a simple pit-like opening. A wide smooth-edged dorsal lamina occupies the mid-dorsal line of the branchial sac. There are only two branchial folds on each side, the dorsal fold being high and wide and the

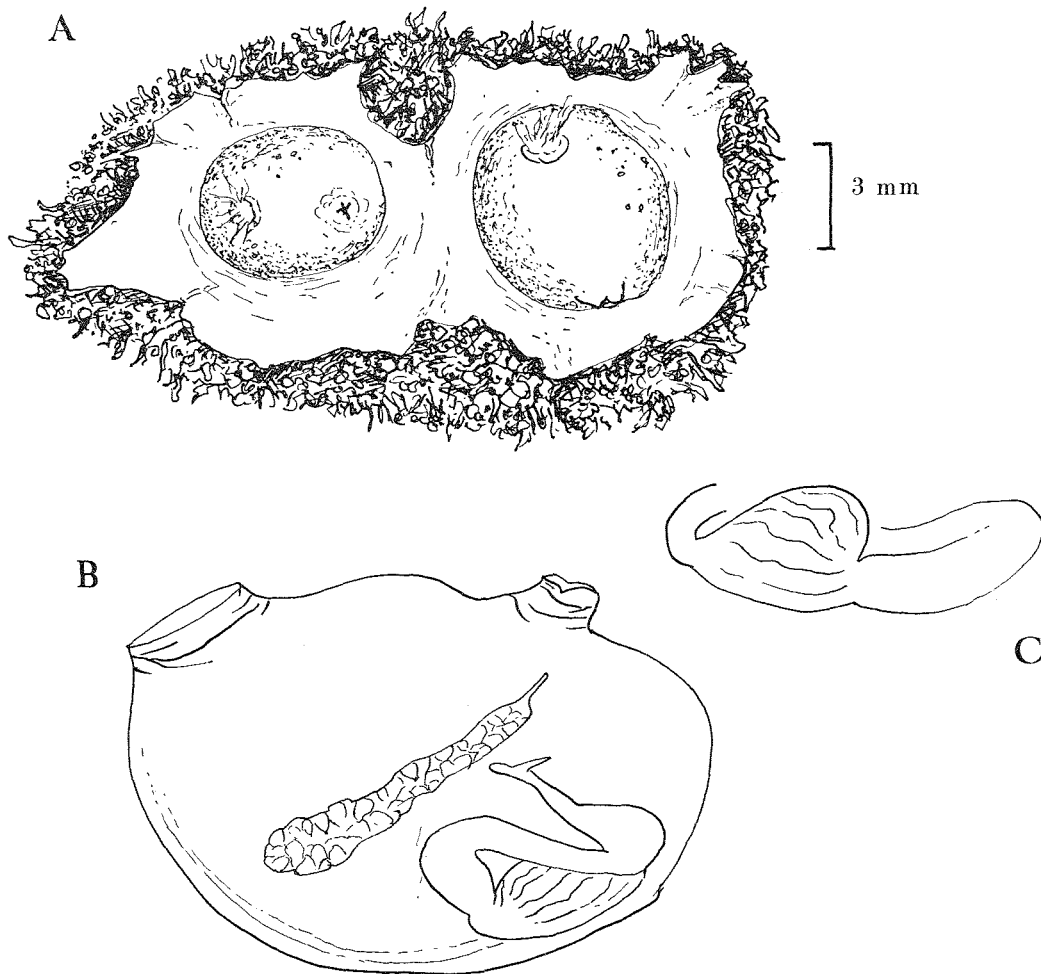


Fig. 3. *Cnemidocarpa* sp. A, two specimens from upper side; B, specimen with test removed, from left side; C, part of gut, from right side.

ventral fold low and narrow. The arrangement of longitudinal bars on the right side is:

dorsal lamina 5(10)2(6)0 endostyle.

The stigmata are straight. The gut is confined to the posterior part of the body and has a short wide stomach with at least fourteen unbroken folds and a curved caecum the basal part of which is wide and bladder-like and the apical part narrow and curved (Fig. 4B). The intestine forms a wide tube curved closely round the stomach and leading dorsally to the short rectum. No fully developed gonads are recognisable, but a narrow white strand of tissue lying obliquely across each side of the body may be the undeveloped or spent gonads (Fig. 4C). A few simple endocarps lie on each side of the body.

The structure of the branchial sac and gut suggest a polystyelid ascidian but the specimen appears to

be solitary and, if the lateral strands of tissue represent gonads, may belong to a species of *Cnemidocarpa* or *Styela*.

Genus *Dicarpa* Millar, 1955

Dicarpa pacifica Millar
(Fig. 5)

Dicarpa pacifica Millar, 1964, p. 59, fig. 1.

Material:

St. 716. 9° 23' N, 89° 32' W; off Costa Rica, 6 May 1952, 3570 m, clay. – Many specimens.

Remarks: Only four specimens were available when the species was established (MILLAR, 1964), and the numerous additional specimens allow further details to be described.

Fig. 4. Unidentified specimen from St. 716, of family Styelidae. A, from upper side; B, with test removed, from lower side; C, with test removed, from left side.

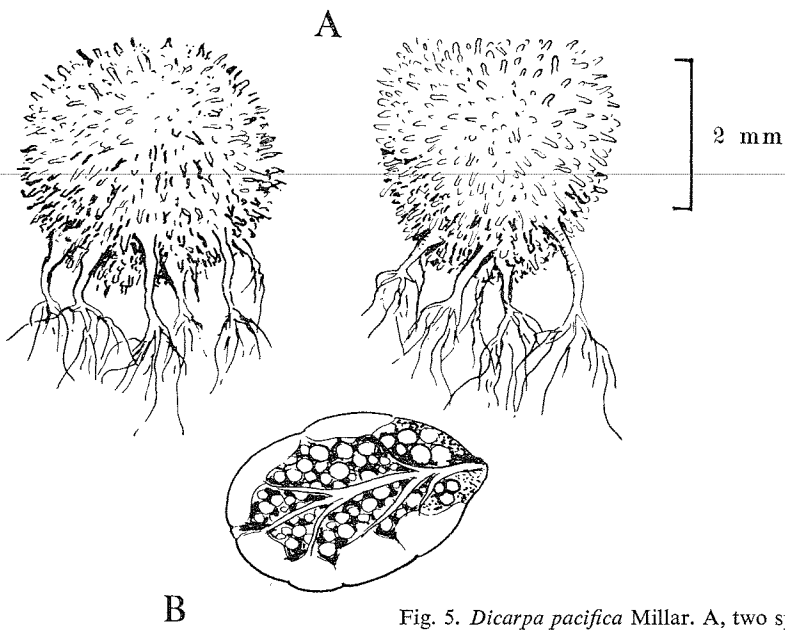
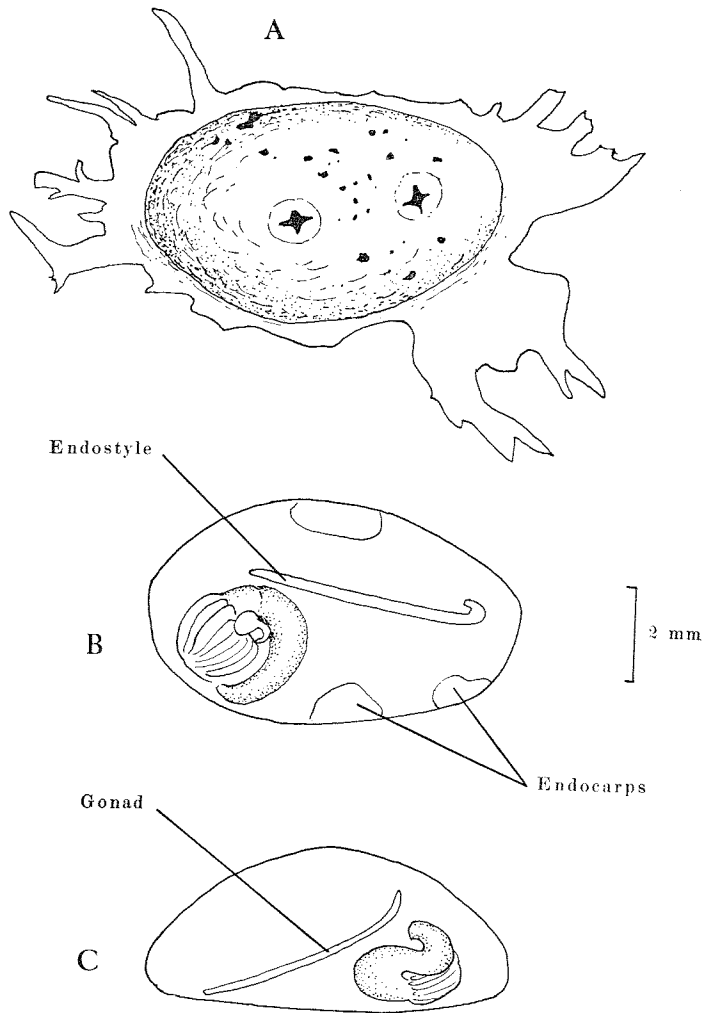


Fig. 5. *Dicarpa pacifica* Millar. A, two specimens; B, gonad.

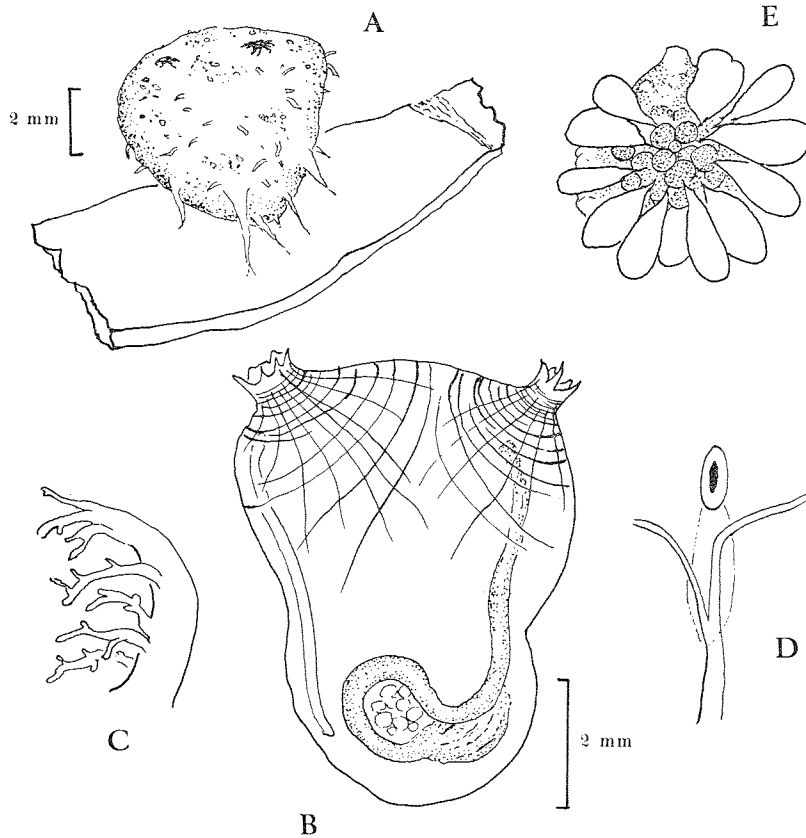


Fig. 6. *Molgula immunda* (Hartmeyer). A, intact animal, attached to substratum; B, animal with test removed, from left side; C, oral tentacle; D, dorsal tubercle; E, gonad.

The lower part of the body often bears about six stout and moderately long processes, each of which is divided distally into a group of fine filaments (Fig. 5A).

Each of the two gonads was previously described as having 8-12 male follicles, but in all of the new specimens carefully examined there were not more than 6 follicles (Fig. 5B).

A few simple endocarps are present and one of them lies on each side of each gonad.

Family MOLGULIDAE Lacaze-Duthiers, 1877

Genus *Molgula* Forbes & Hanley, 1848

Molgula immunda (Hartmeyer)

(Fig. 6)

Caesira immunda Hartmeyer, 1909-11, p. 1324.

Material:

St. 443. 8°48'N, 124°09'E; Mindanao Sea, 16 Aug. 1951, 1500 m, mud. – Two specimens.

Family PYURIDAE Hartmeyer, 1908

Genus *Culeolus* Herdman, 1881

Culeolus suhmi Herdman

Culeolus suhmi Herdman, 1881, p. 86.

Material:

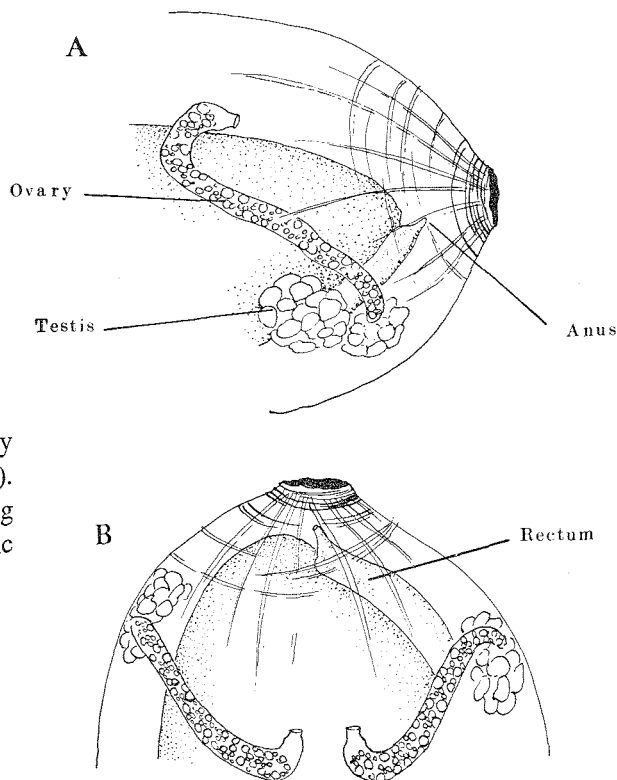
St. 234. 5°25'S, 47°09'E; Madagascar-Mombasa, 10 March 1951, 4820 m, Globigerina ooze. – Four specimens.

Remarks: Numerous specimens were noted from this station in the earlier report (MILLAR, 1959).

External appearance: The specimens are respectively 7 mm and 5 mm in greatest diameter. They are attached to pieces of solid material by several strands of the test arising from the lower part and sides of the body. In addition the test is provided with a few rather short hair-like processes (Fig. 6A). Only a little mud adheres to the test, which otherwise is semi-transparent.

Internal structure: The larger of the two specimens was dissected and confirmed the main characters of the species. The body appeared to be considerably contracted and when extended into a shape like that which it may have had in life, is more upright than previously described (Fig. 6B).

Fig. 7. *Hexacrobylus psammatodes* Sluiter. A, posterior end of animal, from left side, to show atrial siphon, rectum and left gonad; B, posterior end of animal, from dorsal side, to show atrial siphon, rectum and both gonads.



The oral tentacles are widely spaced, number only 5 or 6, and are rather simply branched (Fig. 6C). The dorsal tubercle has a small narrow opening (Fig. 6D), and the gonads are of a characteristic rounded form (Fig. 6E).

Family HEXACROBYLIDAE Seeliger, 1906

Genus *Hexacrobylus* Sluiter, 1905

Hexacrobylus psammatodes Sluiter

(Fig. 7)

Hexacrobylus psammatodes Sluiter, 1905, p. 135, plate 16, figs. 13-24.

Material:

St. 601. 45° 51' S, 164° 32' E; Tasman Sea, 14 Jan. 1952, 4400 m. – One specimen.

Internal structure: This specimen corresponds in most characters with the detailed description of the type specimen given by SLUITER (1905). The structure of the gonads, however, requires some further comment.

In the "Galathea" specimen each of the gonads (Fig. 7A, B) consists of a long tubular ovary passing from the postero-ventral part of the body obliquely towards the dorsal surface and there bending posteriorly and inwards towards the mid-dorsal line to end in a short oviduct. The opening of the oviduct is at a considerable distance from the anus, although SLUITER described them as close together. A testis is situated near the ventral end of each ovary, and is composed of a group of follicles. I could not find the sperm ducts, but SLUITER found them to open into the peribranchial cavity far from the openings of the oviducts. The principal feature of SLUITER's description which I cannot confirm is the presence of a large sac-like structure connected with each ovary and each testis, shown in SLUITER's fig. 17. Nothing

of this kind was seen in the "Galathea" specimen and indeed it is difficult to imagine what these structures might represent.

The rectum lies on the left side of the modified pharynx, and ends in a small simple anus near the atrial opening (Fig. 7A, B).

Remarks: This is only the second specimen of *H. psammatodes* which has been found, the first having been taken by the Siboga Expedition from a depth of 1158 m in the Indonesian area. The "Galathea" specimen shows some differences, as noted above, but I do not think that these are sufficient to justify the establishment of a separate species.

***Hexacrobylus indicus* Oka**

(Fig. 8)

Hexacrobylus indicus Oka, 1913, p. 6, fig. 4.

Material:

St. 231. 8° 52' S, 49° 25' E; Madagascar-Mombasa, 7 March 1951, 5020 m. – Two specimens.

External appearance: The two specimens are similar in shape (Fig. 8A); one has a length of 2.2 cm and the other 2.0 cm. The body is laterally compressed and has test filaments which are short

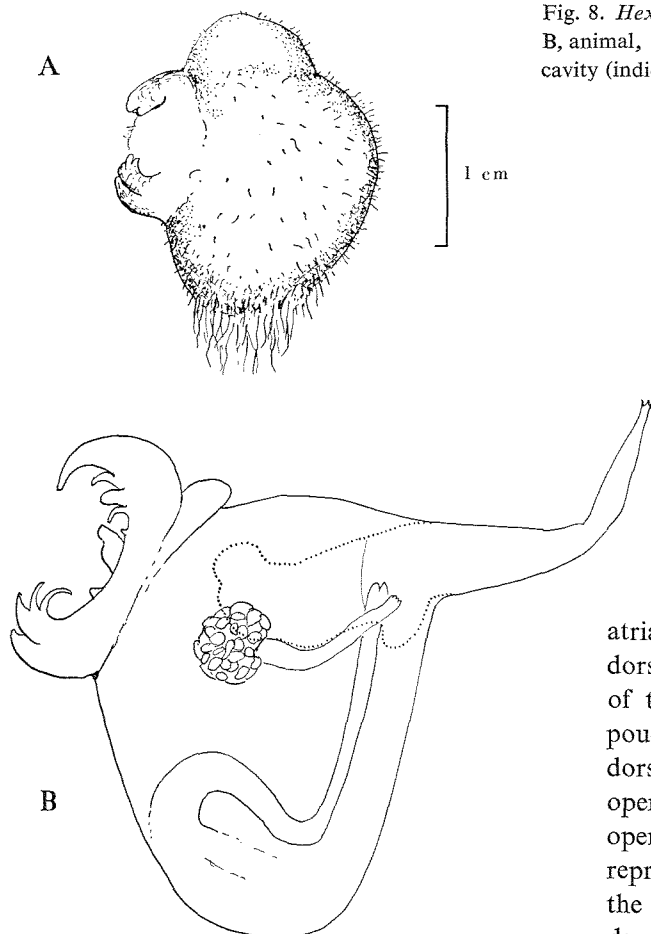


Fig. 8. *Hexacrobylus indicus* Oka. A, intact animal, from left side; B, animal, from left side, with test removed, to show extent of atrial cavity (indicated by dotted line).

and sparsely distributed over most of the surface but are longer and more numerous at the lower end of the body. The large hand-like lobes surrounding the oral opening are conspicuous.

Internal structure: OKA (1913) has described most features of the species, except the extent of the

atrial cavity. This now proves to consist of a mid-dorsal chamber which is a continuation of the cavity of the atrial siphon, and two somewhat tubular pouches leading from the chamber and extending dorsal to each gonad (Fig. 8B). The sperm ducts open into these pouches and the oviducts and rectum open into the mid-dorsal chamber. The pouches represent the peribranchial cavities which envelope the branchial sac of ascidians with a normally developed pharynx.

Remarks: These specimens are in very close agreement with the type material described by OKA (1913) and with other specimens taken in the Galathea Expedition from areas quite close to the type locality (MILLAR, 1959). The new records extend the known range of the species within the Indian Ocean to a region off the African coast.

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