

ASCIDIACEA: ADDITIONAL MATERIAL

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A. INTRODUCTION

The ascidians (class Ascidiacea) collected by the Danish Deep-Sea Expedition have already been described (MILLAR 1959). Some interesting additional specimens were later found amongst other

material, however, and these are dealt with in the present paper. They were taken at Station 716 (9°23'N, 89°32'W., Acapulco-Panama, 6 May 1952, depth 3570 m, clay).

B. LIST OF SPECIES

Dicarpa pacifica n. sp.

Cnemidocarpa bifurcata n. sp.

Styela milleri Ritter.

Culeolus pyramidalis Ritter.

C. DESCRIPTION OF SPECIES

Family **STYELIDAE** Sluiter, 1895

Genus *Dicarpa* Millar, 1955

Dicarpa pacifica n. sp.

(Fig. 1; Pl. I)

Holotype:

The body is about 4 mm in diameter, and the tuft of test hairs about 6 mm long. The holotype is deposited in the University Zoological Museum, Copenhagen.

External appearance: In all 4 specimens the body is approximately spherical, with a coating of short hair-like test processes which may be fairly dense or rather sparse. On the lower side of the body these processes are much longer and usually arise in groups from a small basal papilla. In the holotype the long processes form a matted tuft. The siphons, which scarcely project from the upper side of the body, are separated by more than half of its diameter. Each siphon has 4 indistinct lobes.

Internal structure: The test is thin and semi-transparent. The body wall is also almost transparent and muscles are visible only on the siphons, where, however, they are quite strongly developed.

Two or three endocarps of moderate size are present on each side of the body. There are about 16 oral tentacles, which alternate in size, and in one specimen are quite simple but in another have occasional notches or lobes. The dorsal tubercle is small with a simple oval opening. As in *Dicarpa simplex* the branchial sac lacks folds. There are 4 curved longitudinal bars on each side which probably represent the 4 folds usually present in the Styelidae. The stigmata are narrow and number about 12 between longitudinal bars. Parastigmatic bars are present in some parts of the branchial sac. The dorsal lamina has the edge rolled over and slightly indented. The gut is confined to the posterior part of the body. It consists of a short oesophagus, vertical barrel-shaped stomach with unbroken longitudinal folds and a small curved caecum, ascending intestine and rectum lying on the left of the stomach, and anus with lobed margin. One ovoid polycarp-type gonad lies on each side of the body. The left gonad is just in front of the intestine and stomach and the right gonad in a corresponding position. In each gonad the ovary occupies the central and mesial portions, and the 8-12 male follicles lie against the body wall. The short oviduct and shorter sperm duct point towards the atrial siphon.

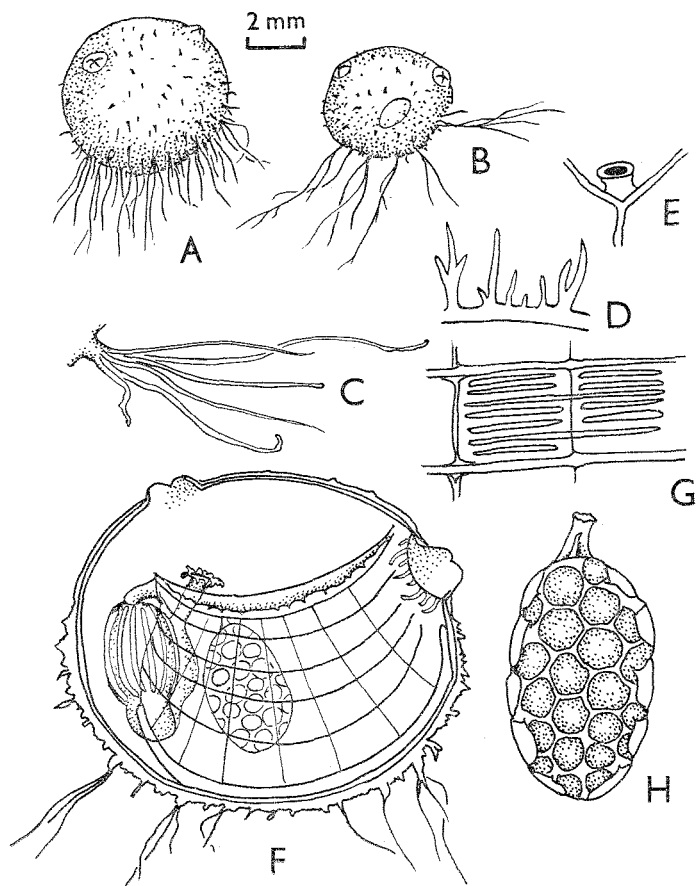


Fig. 1. *Dicarpa pacifica* n. sp. A, B, two specimens; C, test hair; D, notched oral tentacles of one specimen; E, dorsal tubercle; F, left half of animal, showing branchial bars, gut and left gonad (seen through left branchial wall); G, part of branchial wall; H, gonad.

Remarks:

This species is distinguished from *D. simplex* as shown in Table 1.

Table 1.

	<i>D. simplex</i>	<i>D. pacifica</i>
Body form	triangular, with long basal stalk bearing distal processes.	spherical, without stalk, but with hair-like processes.
Body wall muscles	slender transverse and stronger longitudinal strands	only visible on siphons
Gut	with plain anal margin	with lobed anal margin
Gonads	almost spherical; few male follicles	ovoid; 8-12 male follicles

Genus *Cnemidocarpa* Huntsman, 1912

Cnemidocarpa bifurcata n. sp.

(Fig. 2)

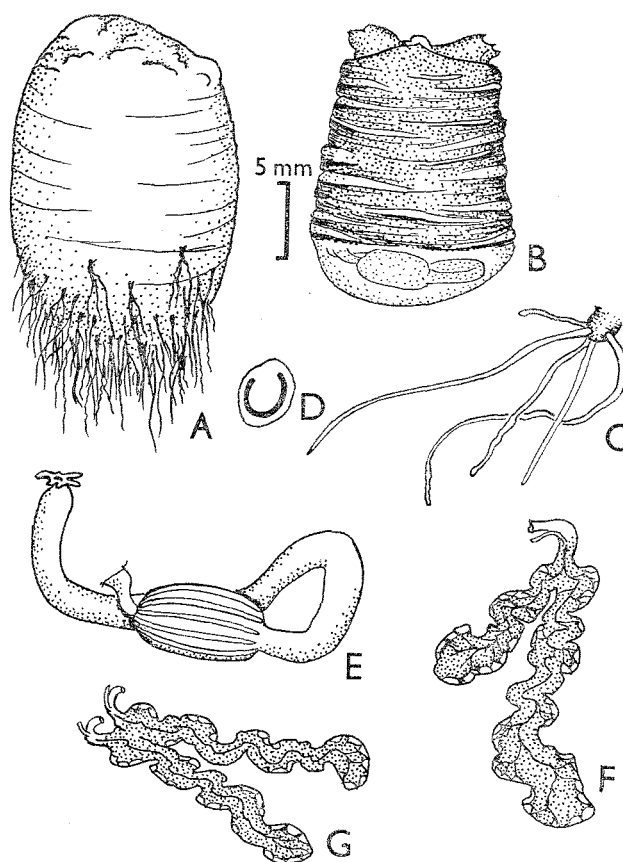
Holotype:

The body is 21 mm long and 12 mm wide.

External appearance: In both specimens the body is upright and between columnar and ovoid in form, and the surface uniformly but lightly coated with mud, and marked by slight transverse wrinkles, particularly on the upper end. From the lower quarter of the body arise long hair-like processes of the test. These are arranged in groups springing from a papilla or short stem. The siphons, both on the upper end of the body, are scarcely visible.

Internal structure: The test is rather thin, and over the whole surface is produced into very short processes which form a fine close felt visible only at magnification and when the test is cut. The body wall is red-brown except at the transparent lower end. Strong inner longitudinal and outer circular muscles are present over all but the lower part of the body. They are not organised into discrete muscles but instead form a continuous coat of diffuse fibres. The inner part of the body wall is a semi-transparent layer of tissue raised in low cushion-like pads which may have resulted from contraction of the body wall muscles. Circular ridges of

Fig. 2. *Cnemidocarpa bifurcata* n. sp. A, intact specimen; B, specimen with test removed; C, test hair; D, dorsal tubercle; E, gut; F, gonad with side branch; G, double gonad.



the body wall are conspicuous, but may possibly also be artifacts due to contraction. The internal siphons, at the upper corners of the body, are short, slightly divergent and conical. Large transparent leaf-like narrow-based endocarps are present. There are about 16 widely spaced oral tentacles of alternating lengths. The opening of the dorsal tubercle in one specimen is horse-shoe shaped and in the other is a small longitudinal slit. The branchial folds are evidently somewhat variable; in one specimen there are three well-developed folds, with 33, 20 and 15 bars respectively, and a vestigial ventral fold; in the other specimen only the dorsal fold is well developed, two others being represented by closely grouped bars. There are 8-23 bars between folds.

There are usually about three stigmata in the meshes between longitudinal bars, and they may be crossed by a narrow parastigmatic transverse bar. The dorsal lamina is wide, with a plain edge. The gut is largely confined to the posterior part of the body and is visible through the transparent body wall of this region. It consists of a short curved oesophagus, barrel-shaped stomach with folded wall, intestinal loop which is partly horizontal, and

short ascending rectum ending in an anus with a few lobes. Gonads are present on both sides but are confined to the posterior half of the body. The typical form seems to be sinuous and tubular, with one short side branch, and with one oviduct and one sperm duct. The ovary occupies the central part and the male follicles, which are present only on the lateral and parietal surfaces, are closely bound to the ovary, as in the characteristic *Cnemidocarpa*-type gonad. One gonad of this type is present on each side in one specimen. In the other specimen, although the gonad of one side is of this type, that of the other side has the form of two sinuous tubular organs joined near the upper end, but each bearing a pair of genital ducts. This type of gonad suggests that the lateral branch of the more usual form represents an originally separate gonad, and that there may have been two gonads on each side in the ancestral species.

Remarks:

C. bifurcata might be confused with *Styela milleri* Ritter, but differs in the muscles and in the form of the gonads.

The specific name refers to the forked gonads.

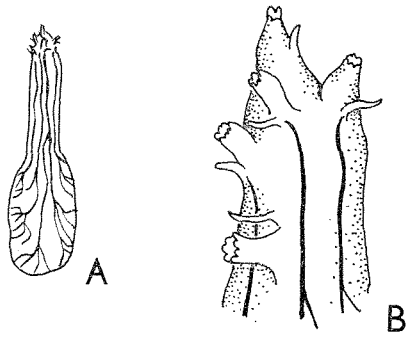


Fig. 3. *Styela milleri* Ritter. A. gonad; B, upper end of gonad, to show pairs of genital ducts.

Genus *Styela* Fleming, 1882

Styela milleri Ritter, 1907
(Fig. 3)

Remarks:

Eight typical specimens are present. Another specimen, of length 29 mm, has gonads of the usual number but of unusual form (Fig. 3). They are straight and tubular with a wide lower end, and with 5 or 6 pairs of genital ducts at the upper end. The single specimen with unusual gonads does not justify specific separation from *S. milleri*, but should other similar specimens be found a new species might have to be recognised.

Family **PYURIDAE** Hartmeyer, 1908

Genus *Culeolus* Herdman, 1881

Culeolus pyramidalis Ritter, 1907
(Fig. 4)

Internal structure:

The two specimens add a few details to the description by RITTER (1907). Ritter stated that the rectal limb of the gut is ventral to the stomach, a position which VAN NAME (1945) regarded as probably due to damage. The gut of the new specimens (Fig. 4), although damaged, shows that the curvature is that usual in *Culeolus*. Ritter also failed to discover the nature of the gonads. In the larger of the new specimens they consist of a curved row of loosely connected ovoid sacs on each side of the body, the left gonad lying in the primary gut loop and following the curve of the gut.

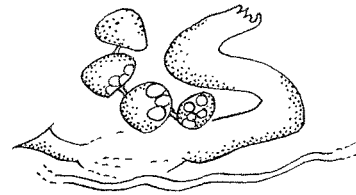


Fig. 4. *Culeolus pyramidalis* Ritter.
Gut (damaged) and left gonad.

D. REFERENCES

- MILLAR, R. H., 1959: Ascidiacea. - Galathea Rep. 1: 189-209.
 RITTER, W. E., 1907: The ascidians collected by the United States Fisheries Bureau steamer *Albatross* on the coast of California during the summer of 1904. - Univ. Calif. Publ. Zool. 4: 1-52.
 VAN NAME, W. G., 1945: The North and South American ascidians. - Bull. Amer. Mus. nat. Hist. 84: 1-476.