

PROTOSTYELA HETEROBRANCHIA N.GEN., N.SP.,
A STYELID ASCIDIAN FROM THE SCOTTISH
WEST COAST

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(Text-fig. 1)

The ascidian described in this paper was collected on 22 April 1952 from the shore of the island of Luing, Argyll. It was taken, along with colonies of *Didemnum maculosum* (Milne Edwards), from the level of low water of spring tides, on a part of the shore which, although very sheltered from waves, is subject to fast tidal currents. Only a single zooid was found, but it differs so clearly from all known ascidians that it is being made the type of a new genus and new species. The following description applies to the zooid after it had been stored in 10% formalin for nearly two years.

DESCRIPTION

The body is about 2.0 mm long, ovoid, and very slightly depressed perhaps owing to contraction (Fig. 1 A). It is pale brown and has a smooth surface with no incrusting material. There is a narrow ventral area of attachment and a small basal extension of the test which spreads over the substratum and which in life was probably linked to other zooids. The test is thin and moderately tough, semi-transparent and marked with small brown spots. A circular area round each siphon is without pigment. Both siphons are round, without lobes, and are so short that they scarcely project from the surface of the body. The body-wall is thin and almost transparent and possesses very slender muscles which are visible only under high magnification. They form an open irregular mesh except on the siphons, which have radial muscles. There are about twelve simple oral tentacles of alternating sizes. The branchial sac (Fig. 1 C) is very characteristic. It possesses no folds but on each side are three narrow longitudinal bars, the dorsal one on the right side being very close to the dorsal lamina. No transverse bars are present. The stigmata, of which there are about sixteen rows, are transverse, instead of longitudinal as in almost all other ascidians. They are long rather wide rectangular openings and number about three in each transverse row. The dorsal lamina is an undivided membrane. Details of the small dorsal tubercle were not seen. A short curved oesophagus leads to the barrel-shaped stomach which has eight to ten complete longitudinal folds (Fig. 1 B). The stomach and intestine

lie to the left of the branchial sac. The intestine forms a narrow simple loop bending back close to the stomach. No pyloric caecum was seen but one may possibly be present. The short flattened rectum turns forward to end in the smooth-edged elliptical anus. On the right side of the body there are three gonads (Fig. 1D), which are attached to the body-wall and form a row parallel to the endostyle but a short distance from it. The posterior gonad (Fig. 1E) is hermaphrodite and consists of an undivided dorsal testis and a ventral ovary.

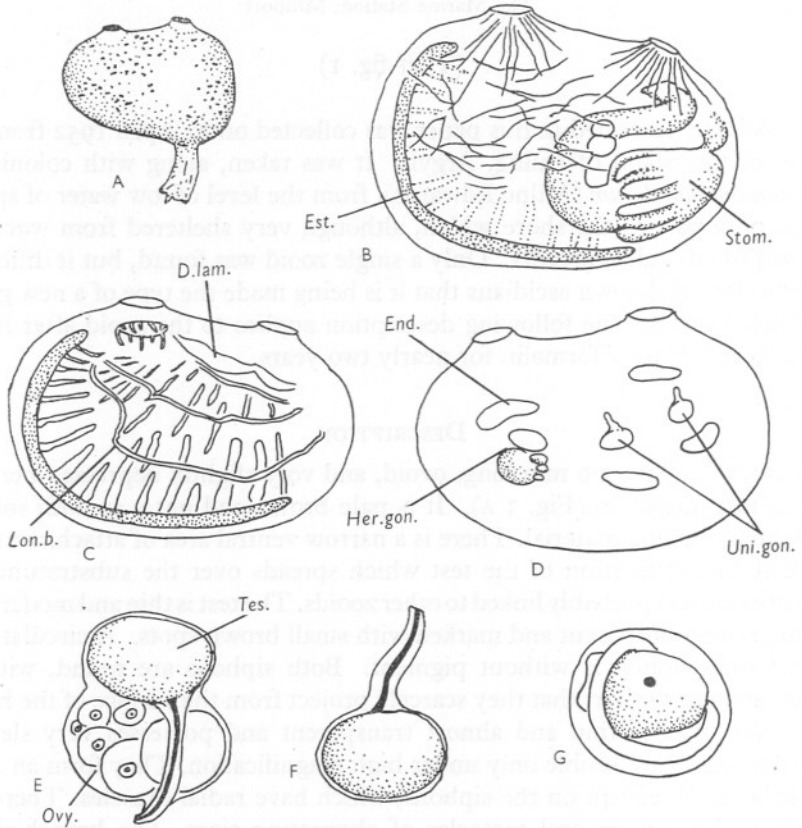


Fig. 1. *Protostyela heterobranchia*. A, zooid from right; B, zooid from left, with test removed; C, zooid from left, dissected to show right half of branchial sac; D, zooid from right to show gonads; E, hermaphrodite gonad; F, unisexual (male) gonad; G, larva. *D.lam.*, dorsal lamina; *End.*, endocarp; *Est.*, endostyle; *Her.gon.*, hermaphrodite gonad; *Lon.b.*, longitudinal bar; *Ovy.*, ovary; *Stom.*, stomach; *Tes.*, testis; *Uni.gon.*, unisexual (male) gonad.

The sperm duct passes down across the mesial surface of the ovary and opens immediately ventral to it. No oviduct was distinguished. In the two anterior gonads (Fig. 1F) only a simple testis was seen and these gonads are almost certainly unisexual. The sperm duct of each of these two male gonads is

directed dorsally. On the left side of the body there is also a hermaphrodite gonad like that on the right, but other gonads were not seen. A few ovoid endocarps are present on each side of the body.

Some developing eggs and one apparently nearly fully developed larva (Fig. 1G) were found in the atrial cavity, and the species is therefore viviparous. The developing eggs have a diameter of about 0.23 mm measured over the chorion. The trunk of the larva is about 0.22 mm long and has at its anterior end a triangular projecting structure which represents the three adhesive papillae. A single black sense organ is present. The tail of the larva was still coiled round the trunk and therefore could not be measured.

The new species, although represented by a single zooid, clearly belongs to the group of compound styelid ascidians sometimes recognized as the subfamily Polyzoinae (Hartmeyer, 1903). In many species of this group the colony consists of zooids closely united within a common test. In others, however, the zooids are widely separated and united only by a basal creeping stolon or sheet of test material, and this is apparently the condition in *Protostyela heterobranchia*.

In possessing transverse stigmata the genus differs from all known compound styelids except *Berrillia* (Brewin, 1952), but *Berrillia* is distinguished by having four longitudinal bars on each side of the branchial sac, and by the presence of gonads on the left side only.

Protostyela n.gen. may be defined as follows: a genus of the family Styelidae forming colonies of loosely united zooids; branchial sac without folds; stigmata transverse; hermaphrodite and unisexual gonads present in the same zooid.

The geographical distribution of *P. heterobranchia* is still unknown, but its apparent absence from the intensively collected areas of the Channel suggests that it may have a more northerly range. This possibility is strengthened by the presence of larvae in April long before high summer temperatures are reached.

SUMMARY

Protostyela heterobranchia n.gen. n.sp. is a compound styelid ascidian from Scottish waters. The branchial sac has three longitudinal bars on each side and no folds, and the stigmata are transverse. Both hermaphrodite and unisexual (male) gonads are present.

REFERENCES

- BREWIN, B. I., 1952. Ascidians of New Zealand. Part VII. Ascidians from Otago coastal waters. Part II. *Trans. roy. Soc. N.Z.*, Vol. 79, pp. 452-8.
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