

On Shell-Burrowing Bryozoa and Phoronis from New Zealand

By LARS SILEN

Zootomical Institute, University of Stockholm, Sweden

[Communicated by E. J. Batham and read before Otago Branch April 19, 1955; received by the Editor, May 3, 1955.]

Summary

A member of the shell-burrowing bryozoan family Penrantiidae, *Penrantia irregularis* n. sp., is described from the shells of living *Mytilus canaliculus* collected at Little Papanui, Otago Peninsula, New Zealand. In the same shells a pseudocolony of *Phoronis ovalis* Wright was found. The species, previously known from northern Europe and Brazil, is the first member of the Phoronidea recorded from New Zealand.

RECENTLY Dr. Elizabeth J. Batham, Director of Portobello Marine Biological Station in New Zealand, found that the shells of *Mytilus canaliculus* contained a burrowing bryozoan which appeared to be new to science. She kindly placed part of the material at the present author's disposal for examination.

A previously unknown member of the genus *Penrantia* occurred abundantly in all of the shell pieces received. One of them contained, moreover, a well developed pseudocolony of a *Phoronis* species. The holotype of the new species of *Penrantia* is being deposited in the Otago Museum, New Zealand. The paratype is in the State Museum of Natural History, Invertebrate Department, Stockholm, Sweden.

I.—BRYOZOA GYMNOAEMATA.

Family PENRANTIIDAE Silén 1946.

Genus PENRANTIA Silén 1946.

Penrantia irregularis n.sp. Figs. 1-4.

HOLOTYPE. New Zealand, Little Papanui, Otago Peninsula; low tide; in shells of living *Mytilus canaliculus* on rocks; November 11, 1953. Coll. Dr. Elizabeth J. Batham.

DIAGNOSIS. *Penrantia* with brown opercula and numerous secondary stolons; autozoid with rounded posterior end and 14 tentacles; gonozoid with rounded posterior end but little longer than embryo chamber, operculum sloping down abanad, movable polypide with retractor muscle and 10 tentacles.

DESCRIPTION. The external signs of the presence of the zoarium in the shells consist exclusively in the irregularly and densely situated holes made by the zoids in the shell surface. The holes are circular. When removed from the shell the zoarium offers a confused picture. This is due to the unusually high number of stolons running in all directions and forming a veritable web, in which the zoids are inserted. The previously known members of the group possess, as the "skeleton" of the zoarium, a more or less wide and regular network of main stolons which give off short and straight lateral branches, each ending in a zoid. However, there often appear in them anastomoses between the stolons as well as, occasionally, secondary stolons directly connecting the zoids (Silén 1947, p. 6). Knowing this, we are able to disentangle the complicated structure of the form now in question. There exists, in reality, also here a network of main stolons giving rise, by means of short lateral branches, to the zoids. Very numerous secondary stolons occur, moreover, branching and fusing with other secondary stolons, with other zoids directly, and, it would seem, sometimes even with the main stolons. The stolons are all alike in structure—thin, circular in cross section, and devoid of the prominences more or less common in other species—and thus the two types of stolons could be discerned only by following them up in their whole extension. When this was done, there appeared another way of recognizing them: a stolon issuing from the upper end of a zoid is always the

primary lateral branch of the main stolon that has given rise to the zoid, stolons issuing elsewhere from the zoid being secondary ones.

The *autozoid* (Figs. 1, 2) is not very remarkable in structure. One unusual feature is the glistening brown colour of the operculum (this holds true of the gonozoid as well). The operculum is light yellow in colour in all other members of the group described. The other special feature is the high number of 14 tentacles, the number of tentacles varying between 10 and 12 in other species. Dr. Batham informed the author that the zoids when alive are whitish of colour. This presumably holds true of the autozoids as well as the gonozoids, and agrees with what was observed in other forms.

The *gonozoid* (Figs. 3, 4) is approximately one-half the length of the autozoid. Its rounded proximal end reaches but little below the posterior proximity of the embryo chamber, a feature in which the species agrees with *P. sileni* Soule (Soule 1950, p. 361); in *P. brevis* Silén (Silén 1946, p. 4) the gonozoid of the same general type though even a little shorter whereas in the remaining species it greatly surpasses the embryo chamber in length. When closed the operculum, which is placed horizontally in other forms, holds a characteristic position, sloping distinctly down towards the abanal side (Fig. 3). The polypide, though reduced, does not reach the degree of reduction found in other species. In the latter the alimentary canal is only represented by a small diffuse body on which the usually 8, in one case possibly 10, thin tentacles of degenerate appearance are situated; no observations were made to indicate that the polypide is movable there. In the present form the body representing the alimentary canal is considerably larger, though no detailed differentiation of it was discerned. A retractor muscle is present. Finally, in several gonozoids the polypide—with 10 quite normally developed tentacles—was found to be evaginated (Fig. 4). Thus, at least in this species, the polypide of the gonozoid can protrude and retract. Considering the apparently non-existent organization of the alimentary canal, it is at present difficult to understand the significance of those movements. Ova and embryos in all stages of development were contained in the embryo chambers.

MEASUREMENTS. Autozoid: length, 0.65 mm; diameter, 0.13 mm. Gonozoid: length, 0.30 mm; diameter, 0.13 mm; breadth, including embryo chamber, 0.25 mm. Stolon: diameter, 0.01 mm.

REMARKS. The family *Penetrantiidae* with the single genus *Penetrantia* has a world-wide distribution. Only the species *P. parva* Silén (Silén 1946, p. 4) was earlier described from New Zealand, inhabiting the shell of a living specimen of the gastropod *Northia maculata*; it has not been reported from elsewhere. It is easily distinguished from the form now discussed by its small size (length of autozoid 0.4 mm), pointed posterior end of the autozoid, 10–11 tentacles of the autozoid, long posterior end of the gonozoid reaching far below the embryo chamber, yellow opercula, etc.

A member of the family *Immergentiidae* likewise burrowing in shells, *Immergentia zelandica* Silén (Silén 1946, p. 6), was described from New Zealand, perforating the shell of a living specimen of the gastropod *Euthria strebeli*.

II.—PHORONIDEA.

Genus PHORONIS Wright 1856.

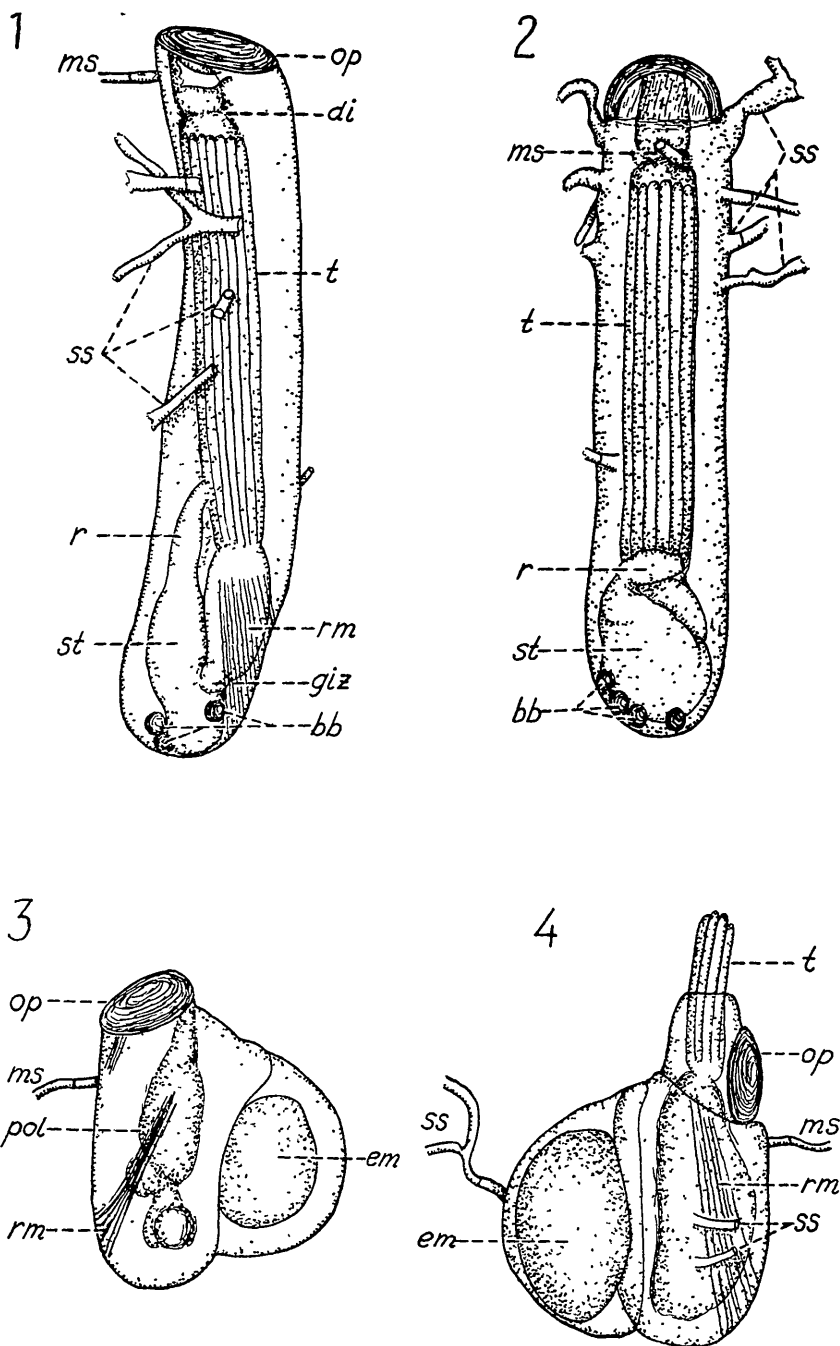
Phoronis ovalis Wright 1856.

For references, cf. Silén 1952, p. 135.

One piece of *Mytilus canaliculus* shell from the locality described above was found to be penetrated by a well developed pseudocolony of a small *Phoronis*. Upon comparison with Swedish material of *Ph. ovalis* no morphological or anatomical differences could be discerned.

Ph. ovalis occurs along the coasts of north-western Europe. In 1949 Marcus reported it from Brazil as well. A detailed comparison between Norwegian, Swedish, and Brazilian material made by Lönöy (1953) confirmed that determination. The occurrence of this easily overlooked species in New Zealand as well indicates a world-wide distribution.

No adult member of the phylum Phoronidea has been recorded from New Zealand before as far as I know. *Ph. australis* Haswell has been found in eastern Australia, possibly in the Philippines (as *Ph. buski* MacIntosh), and Japan, and at least this form can thus also be expected to occur in the present waters.



Penetrantia irregularis n. sp. Fig. 1—Autozoid in lateral view. Fig. 2—Autozoid in frontal view. Fig. 3—Gonozoid in lateral view. Fig. 4—Gonozoid with protruding tentacles, in lateral view. bb, brown bodies; di, diaphragm; em, embryo; giz, gizzard; ms, lateral branch of main stolon; op, operculum; pol, polypide; r, rectum; rm, retractor muscle; ss, secondary stolon; st, stomach; t, tentacles. Magnification 120 X.

It should be remarked that the presence in Wellington Harbour of a *Phoronis* larva not described was recently reported by Richardson and Garrick (1953, p 24). So much is clear that this larva can hardly belong to *Ph. ovalis*, as this species has an atypical larva not appearing in the plankton.

A special point of some interest is the fact that the pseudocolony now recorded inhabited the shell of a *living* mollusc. In all previous cases the species was explicitly stated to live in empty shells. The author himself observed it in hundreds of shells on the Swedish coast and has never before found an exception from this rule

REFERENCES

- LONoy, N., 1953. A comparative anatomical study on *Phoronis ovalis* Wright from Norwegian, Swedish, and Brazilian waters. Univ. Bergen Arbok.
- MARCUS, EVELINE DU BOIS-REYMOND, 1949. *Phoronis ovalis* from Brazil. Bol. Fac. Fil. Ci. Letr. Univ. S. Paulo, Zool., 14.
- OSBURN, R. C., and SOULE, J. D., 1953. Bryozoa of the Pacific coast of America, 3. Cyclostomata, Ctenostomata, Entoprocta, and Addenda. Allan Hancock Pacif Exp., 14, 3.
- RICHARDSON, L. R., and GARRICK, J. A. F., 1953. A guide to the lesser Chordates and the Cartilaginous fishes. Tuatara, Wellington, N. Zeal., 5, 1.
- SILEN, L., 1946. On two new groups of Bryozoa living in shells of molluscs. Ark. f. Zool. Stockholm, 38.
- 1947. On the anatomy and biology of Penetrantiidae and Immergentiidae (Bryozoa). Ibid., 40.
- 1952. Researches on Phoronidea of the Gullmar Fiord area. *Ibid*, S. 2, 4
- 1954. Developmental biology of Phoronidea of the Gullmar Fiord area (West coast of Sweden). Acta Zool. Stockholm, 35.
- SOULE, J. D., 1950. Penetrantiidae and Immergentiidae from the Pacific (Bryozoa Ctenostomata). Trans. Amer. Micr. Soc., 66.

DR. LARS SILEN,
Zootomical Institute,
University of Stockholm,
Stockholm,
Sweden.