

USCIA MEXICANA, NEW GENUS, NEW SPECIES,
A WATERSIPORID BRYOZOAN WITH
DIMORPHIC AUTOZOIDS

WILLIAM C. BANTA

Department of Biological Sciences
University of Southern California
Los Angeles, California, 90007.

ABSTRACT: *Uscia mexicana* is described as the monotypic species of a new genus of the family Watersiporidae (Bryozoa, Eurystomata, Cheilostomata). It is similar to *Watersipora* in the structure of the frontal wall and epitheca, the shape of the operculum, the presence of lucidae, and in the absence of spines, avicularia and ovicells. It differs from *Watersipora* in having erect, bilaminar colonies, larger zoecia, and in possessing dimorphic autozooids. "Normal" A zooids possess skull-shaped opercula; B zooids, which make up less than 1 per cent of the autozooids, possess enlarged, reinforced opercula, augmented occlusor muscles, and distal, tooth-like denticles. The significance and distribution of dimorphism of autozooids in the Cheilostomata are discussed.

INTRODUCTION

During March, 1949, fragments of what appears to be a single colony of an unusually large cheilostome bryozoan were collected by the staff of the R/V *Velero IV* in a dredge sample taken at 24 m in the San Lorenzo Channel, near La Paz, Baja California, Mexico. Examination of the specimen reveals that it belongs to a new genus of the family Watersiporidae.

Uscia, new genus

Diagnosis. A watersiporid ascophoran cheilostome, without spines, avicularia or ovicells, possessing a single-layered tremocystal frontal wall overlain by a darkened epitheca. Normal autozooids ("A zooids") predominate, but occasional zooids ("B zooids") possess more heavily reinforced opercula and enlarged opercular muscles. Genotype, *Uscia mexicana*, new species.

Uscia mexicana, new species

Figures 1-4

Type locality. San Lorenzo Channel, 2 miles south of Espirito Santo Island, Gulf of California; 24° 22' 13" N; 110° 19' 16" W; 24 m; 15 March, 1949; *Velero* station no. 1738-49. Sample taken with a biological dredge; bottom "coral".

Holotype. Fragments of what appears to be a single colony, probably fixed in 10 per cent formalin in sea water. The specimen was found nearly dry in September, 1965, and placed in 70 per cent ethanol. Deposited in the Allan Hancock Foundation, University of Southern California, Los Angeles. AHF bryozoan type no. 154.

Paratype. Colony fragments at the British Museum (Natural History).

Description. The colony is erect, foliaceous and bilaminar (Fig. 1). The *Velero* specimen appears to have been broken into several pieces; fragments of other colonies may also be present. The largest piece is a spectacular coralline growth approximately 4 cm by 7 cm (Fig. 1). Its color is dark brown, but it is likely that the polypides and growing edges were red in life (Banta, 1968).

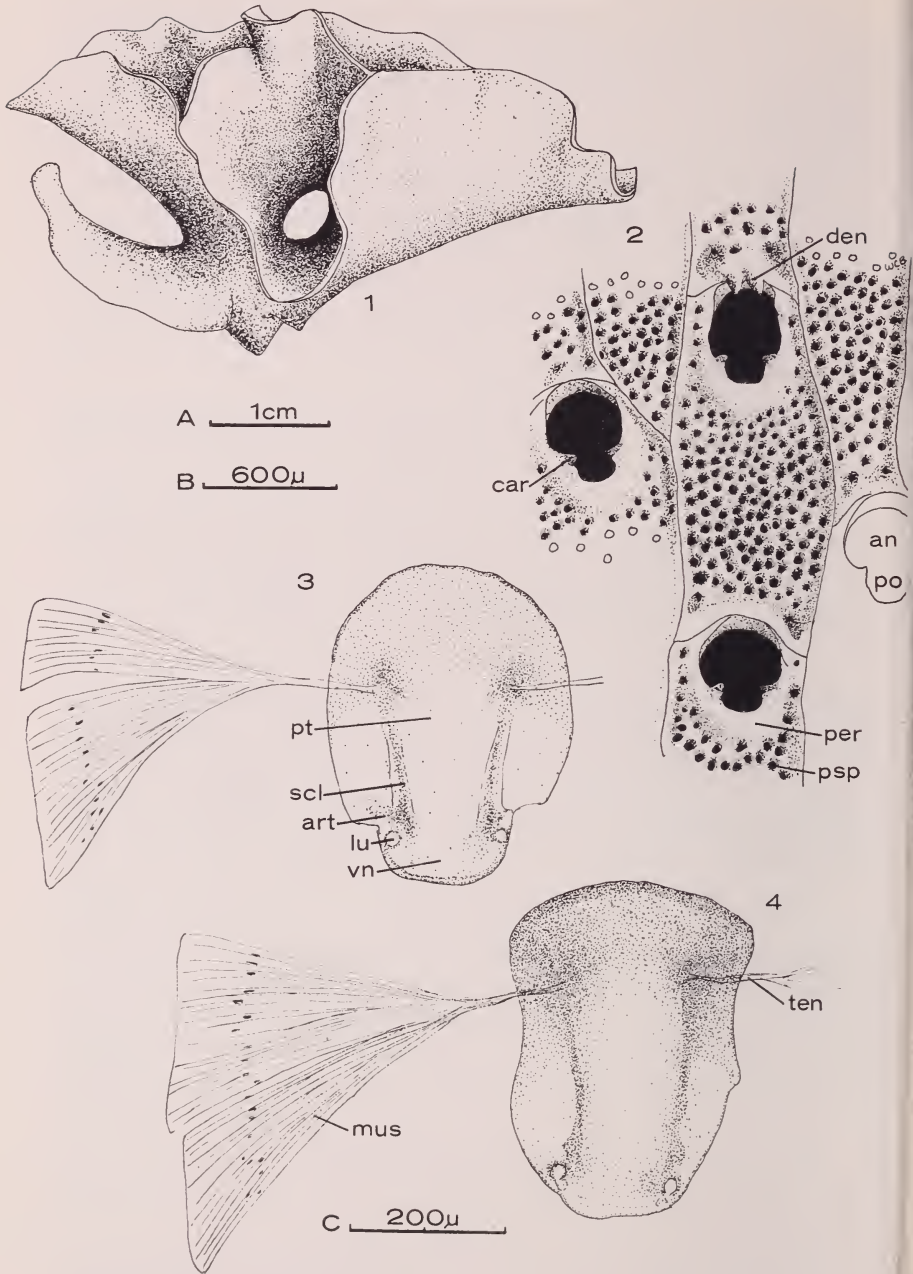
Zoecia are elongate, rectangular and unusually large, measuring approximately 1.5 mm (1.2-1.8 mm) long by 0.5 mm (0.4-0.6 mm) wide. The aperture (orifice) is terminal, occupying about a quarter of the frontal surface. Both opercula and epithecae are dark brown, nearly black. Chemical treatment in potassium hypochlorite solution exposes the underlying frontal wall, a thick (approximately 90μ) single-layered lamina evenly perforated by a hundred or so evenly-distributed pseudopores about 30μ in diameter (Fig. 2, *psp*).

The colony is composed of two types of zoids. The dimorphism is reflected in the morphology of the apertures and opercula in a way similar to that described by Harmer (1900) in the genus *Steginoporella* Smitt. Harmer named the zoids with smaller, more "normal" opercula "A zoids", and those with larger, more modified opercula "B zoids". Harmer's terminology is followed here, although I do not imply that the two types of dimorphism are necessarily related.

A zoids. A zoids make up the vast majority of autozooids. The aperture is skull-shaped in outline (Fig. 2). The anter is shaped like a horse's hoof, and measures approximately 300μ in either dimension ($270-330\mu$ long by $280-350\mu$ wide). The proximal border of the anter is marked by a prominent pair of cardelles sunken slightly below the rim of the peristome (Fig. 2, *car*). The poster (*po*) is roughly hemispherical and measures approximately 160μ ($150-180\mu$) wide by 80μ ($70-90\mu$) long. The entire aperture measures roughly 380μ long by 300μ wide.

The proximal and lateral parts of the aperture are bordered by a low, smooth, imperforate portion of the frontal wall, the peristome (Fig. 2 *per*). The distal rim of the aperture is formed by the frontal part of the transverse wall.

The operculum of an A zoid is approximately the same size and shape as the aperture (Fig. 3); its color is dark reddish brown. There are three types of sclerites: (1) a thin marginal sclerite at the border of



the porta; (2) a somewhat thicker sclerite bordering the vanna and the most proximal parts of the porta; and (3) paired longitudinal connecting sclerites extending from about the middle of the vanna to the distal third of the porta (Fig. 3, *scl*). At the junction of the porta and the vanna, each connecting sclerite is extended laterally as the articulation zone of the cardelles (*art*). A pair of tiny pits ("lucidae"; see Banta, 1968) are present on the basal side of the vanna near the proximal ends of connecting sclerites (*lu*). Viewed from the frontal side, lucidae are represented by a pair of shining tubercles. Opercular occlusor muscle fibers measure about 250μ ($230-350 \mu$) from their origins to their insertions on the tendon.

The operculum is surrounded by a ring of darkened epitheca $20-50 \mu$ wide, which is herein named the "periopercular ring". The periopercular ring covers most, but not all of the peristomial part of the frontal wall, and overlaps parts of the distal zoid.

Avicularia are absent; there are no spines or ovicells.

Each zoid is provided with about 10 (8-12) lateral communication organs with multiporous pore plates arranged along the basal border of the lateral wall. Each plate is approximately 60μ in diameter and bears about 10 communication pores. Lateral walls are three-layered, consisting of two calcareous laminae and a central, dark brown intercalary cuticle (Banta, 1968). Transverse walls are unpaired and are provided with 9-15 transverse multiporous pore plates arranged along the sides and bottom of the septum.

B zoids. B zoids are much less common than A zoids, making up perhaps 1 per cent of the autozoids in the colony. B zoids are similar to A zoids in every observed respect except the morphology of the aperture and operculum.

The aperture of a B zoid is very slightly larger than that of an A zoid, measuring approximately 430μ ($400-450 \mu$) long by 300μ ($280-300 \mu$) wide. Anters of B zoids are proportionately longer than those of A zoids, measuring about 330μ ($300-350 \mu$) long by 300μ ($290-300 \mu$) wide. The lateral borders of the anter are decorated by a pair of longi-

Figures 1-4. *Uscia mexicana*, new genus, new species. 1. Holotype colony; scale A. 2. KOCL-treated zoecia, six A zoids surrounding a B zoid; paratype; scale B. 3. Operculum and occlusor muscle of an A zoid seen from the basal side; scale C. 4. Operculum and occlusor muscle of a B zoid seen from the basal side; scale C.

Abbreviations: *an*, anter of aperture; *art*, articulation region of cardelles; *car*, cardelle; *den*, denticle; *lu*, lucida; *mus*, occlusor muscle; *per*, peristome; *po*, poster of aperture; *psp*, pseudopore; *pt*, porta of operculum; *scl*, sclerite; *ten*, tendon of occlusor muscle; *vn*, vanna of operculum.

tudinal lappets. The distal border is overhung by a prominent bifid denticle continuous with the skeleton of the transverse wall (Fig. 2, *den*).

The poster of the aperture in B zoids is significantly shallower and broader than that of A zoids, measuring about 70μ ($60-90 \mu$) long by 200μ ($180-210 \mu$) wide.

Opercula of B zoids are more heavily chitinized than those of A zoids. The porta is roughly quadrangular; lateral borders are concave because of the lateral apertural lappets (Fig. 4). The vanna is likewise rectangular, corresponding to the shape of the poster. There are two main types of sclerites: (1) a thick distal sclerite reinforcing the margin of the porta; and (2) paired longitudinal connecting sclerites extending from near the proximal edge of the vanna to the middle of the porta, where tendons of occlusor muscles insert. The operculum is especially thickened here (Fig. 4). Opercular occlusor muscles are much longer in B zoids than in A zoids; they measure about 350μ ($340-450 \mu$) (Fig. 4, *mus*). A lucida occurs at the base of each longitudinal sclerite.

DISCUSSION

Uscia mexicana appears to be closely related to the genus *Watersipora*, which it resembles, in the following respects: (1) the frontal wall is an evenly perforated tremocyst (see Canu and Bassler, 1920; 1930; (2) the frontal wall is overlain by a darkly pigmented epitheca; (3) spines, ovicells and avicularia are absent; and (4) it possesses a skull-shaped aperture with proximal lucidae, a characteristic feature of *Watersipora* (Osburn, 1952). It differs from known species of *Watersipora*, however, in three respects: (1) the colony is erect and bilaminar; (2) the zoeia are much larger than those of any known species of *Watersipora*; and (3) autozoids are dimorphic.

Although polymorphism is common (probably universal) in the Cheilostomata, dimorphism in autozoids with functional polypides is rare. The cases in which it occurs can be divided into two categories: sexual and non-sexual dimorphism.

A number of cheilostomes possess dioecious autozoids (Vigelius 1884; Stach, 1938), but sexual dimorphism of autozoids appears to be known in only two cases. In *Thalamoporella evelinae* Marcus, female zoids possess only 14 short (150μ) tentacles, compared with 17 long (250μ) tentacles in sterile and male autozoids (Marcus, 1949). Gordon (1968) reports that in *Hippopodinella adpressa* (Busk), females possess 15-16 tentacles, but male zoids bear only eight ("four short and four long"). Since males are apparently unable to feed, their status as autozoids is open to question.

According to Hyman (1959: 327), non-sexual dimorphism of autozooids is known in seven genera. Since the genera do not appear to be closely related, it is likely that dimorphism has evolved independently several times. In each case "normal" A zooids, with relatively unmodified opercula, considerably outnumber B zooids, in which the opercula are enlarged, reinforced, and provided with augmented occlusor muscles. B zooids apparently represent incipient avicularia (Harmer, 1900; Hyman, 1959). It is likely that dimorphism in *Uscia mexicana* is non-sexual, but inasmuch as the polypides have not been adequately examined, the possibility cannot be excluded that the dimorphism is sexual.

ACKNOWLEDGEMENTS

I thank Dr. John D. Soule, Mrs. Dorothy F. Soule, and Dr. Russel L. Zimmer for their critical reviews of the manuscript. Contribution no. 327 of the Allan Hancock Foundation.

LITERATURE CITED

- BANTA, W. C., The body wall of cheilostome Bryozoa, I. The ectocyst of *Watersipora nigra* (Canu and Bassler) *J. Morph.*, 125: 497-506.
- CANU, F. AND R. S. BASSLER, 1920. North American early Tertiary Bryozoa. *Bull. U. S. Nat. Mus.*, 106: 1-879.
- 1930. The Bryozoon fauna of the Galapagos Islands. *Proc. U. S. Nat. Mus.*, 76: 1-78.
- GORDON, D., 1968. Zooidal dimorphism in the Polyzoon *Hippopodinella adpressa* (Busk). *Nature*, 219: 633-634.
- HARMER, S. F. 1900. A revision of the genus *Steganoporella*. *Quart. J. Micr. Sci.*, 43: 225-297.
- 1902. On the morphology of the Cheilostomata. *Quart. J. Micr. Sci.*, 46: 263-350.
- MARCUS, E., 1941. Sobre Bryozoa do Brasil. *Bol. Fac. Filos. Ciênc. Letr. Univ. São Paulo, Zool.* 5: 3-169.
- OSBURN, R. C., 1952. Bryozoa of the Pacific coast of America. Part II. Cheilostomata-Ascophora. *Allan Hancock Pac. Exped.*, 14: 271-611.
- STACH, L. W., 1938. Observations on *Carbasea indivisa* Busk (Bryozoa). *Proc. Zool. Soc. London*, ser. B, 108: 389-399.
- VIGELIUS, W. J., 1884. Morphologische Untersuchungen über *Flustra membranaceo-truncata*. *Biol. Zentralbl.*, 3: 705-721.

Accepted for publication November 14, 1968.