

ANTARCTIC AND SUBANTARCTIC STYLASTERINA (COELENTERATA: HYDROZOA)

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**Abstract.** The 29 species of Stylasterina known from the Antarctic and Subantarctic regions are described, and their distributions mapped. Thirteen new species and one new genus are described; the subgenus *Lepidopora* is raised to generic rank, and *Errina antarctica* forma *kerguelensis* is elevated to specific status. Species are arranged in order of their increasing morphological complexity. All species are illustrated by scanning electron micrographs, and several new terms are introduced to describe features of coenosteal microarchitecture. A historical review of all Stylasterina reported from the Antarctic is given. A zoogeographic analysis describes common patterns of species distributions, and the faunas of various geographic areas are discussed.

Introduction and Historical Review

As of 1981, only 115 lots of stylasterines from 79 localities were reported from the entire Antarctic-Subantarctic region, the majority of which (74 lots, 43 localities) were contained in a master's thesis [Lowe, 1967]. The present paper is based on an examination of 379 lots from 205 stations (including all of Lowe's specimens), which represents more than a threefold increase in the number of lots reported previously and an increase of 2.6 times in the number of localities. In addition, most of the previously reported specimens were reexamined. Although few specimens have been reported from the Antarctic, almost a dozen authors have contributed to our knowledge of the fauna.

The first stylasterine to be reported from the Antarctic was *Errina fissurata*, collected on the *Erebus* and *Terror* expedition on January 19, 1841, in the Ross Sea, at 494 m. Stokes [1847] listed it as '*Madrepora* ? *fissurata*' (nomen nudum), and it was later described by Gray [1872b] on the basis of two color drawings; the original specimens were presumed by Gray to be lost. In the same year, Gray [1872a] described a similar species from off Burdwood Bank, *Errina antarctica*.

Moseley [1879] reported five species of stylasterines from *Challenger* station 320,

off Rio de la Plata, Uruguay, 1097 m. Although this location is north of the Subantarctic region, all five species have also been found farther south, and two extend to the Antarctic continent. His three-dimensional drawings of decalcified specimens are remarkable in detail and have never been equaled. His paper was later republished with only minor alterations in the *Challenger Reports* [Moseley, 1881]. Also in that year, Ridley [1881] reported two species of stylasterines from shallow water off Chile. Both of these records are *Errina antarctica*.

A delicate, white stylasterine, *Errina gracilis*, was described by von Marenzeller [1903] from the Bellingshausen Sea, and Hickson [1912a] reported *E. antarctica* from off Cape Horn, but it was not for 30 years that another stylasterine was recorded from Antarctica.

Broch [1942] described a new form, *kerguelensis*, of *E. antarctica* from Heard Island (elevated to full species here) and described a new species *Errina spongiosa* (later synonymized with *E. antarctica* by Boschma [1966a]). Later, on the basis of specimens from seven stations of the *Discovery* and *William Scoresby*, Broch [1951a] described two new species from the Subantarctic, gave additional records of *E. antarctica*, and discussed the zoogeography of 'Southern Ocean' stylasterines. However, because he included several species within *E. antarctica*, his zoogeographic remarks are meaningless.

Eguchi [1964] reported five stylasterine species, including one new species, from 11 stations off the Riiser-Larsen Peninsula (Cape Cook), Antarctica. Unfortunately, most of his specimens were small fragments in worn condition, and most of his identifications have been subsequently reattributed.

Boschma, by far the most prolific author of stylasterine papers, wrote seven primarily on Antarctic species, either as redescrptions and remarks on previously described species [Boschma, 1960, 1964d, 1965a] or as descriptions of new species [Boschma, 1965b, 1968a, b]. He summarized many of his views on the taxonomy and distribution of Antarctic stylasterines in his BANZARE report [Boschma, 1966b], in which he described six species,

one of them new, from four stations. However, as with Broch [1951a], his identifications of *E. antarctica* from the Antarctic coast are incorrect.

The most significant paper on Southern Ocean stylasterines, in both quantity of specimens examined and comprehensive scope, was Lowe's [1967] master's thesis. He reviewed the 14 species known from Subantarctic South America, including the description of five new species, and discussed their zoogeography. I have examined all of Lowe's material, and although I do not always agree with his taxonomic conclusions, I agree with his proposition of five new species and have benefited from his species descriptions. The five new species recognized by Lowe are described in the present paper, and in two cases the names that he assigned are used.

Although Lowe's descriptions of his new species were not published, the distributional data given in his thesis were later published in the *Antarctic Map Folio Series* [Boschma and Lowe, 1969]. Lowe's five new species are unnamed in this publication, but the species that these distributions represent are indicated in my synonyms. A sixth species, *Errina* n. sp. [Boschma and Lowe, 1969], plotted at one station (Eltanin station 993), bears the museum label *Errina divaricata*. These specimens were not included in the present paper because of my uncertainty of their identity. Boschma and Lowe [1969] plotted the distribution of every available Antarctic stylasterine record, including Lowe's [1967], but unfortunately did not document any of the records (provide a traceable reference, either bibliographic or station number). Because I have examined all of the specimens reported by Lowe, the distributional maps in the present paper, augmented by previously reported specimens and new material, document and amplify the Boschma and Lowe [1969] maps. Major points of difference between our two papers are my consideration of their *E. aspera* as *E. gracilis*, their *E. gracilis* as *E. boschmai*, and their *E. labiata* as a mixture of *E. labiata* and *E. lowei*, primarily the latter. Also, their four records of *E. antarctica* from south of the Antarctic Convergence and off the Antipodes Islands are considered to be misidentified.

The most recent contribution to the literature on Antarctic Stylasterina was the description of a new species, representing a new genus and subfamily, known only from Subantarctic seamounts [Cairns, 1982b].

#### Material and Methods

##### Material

This study is based on an examination of thousands of specimens collected throughout

the Antarctic, Subantarctic, and adjacent waters and includes new, unpublished material from 379 lots collected at 205 stations (a station list is provided as Appendix Table A1). The exact number of specimens examined was not determined because most stylasterine colonies can be and usually are fragmented into dozens, if not hundreds, of pieces when collected; only rarely is an intact corallum with basal attachment dredged. The majority of the specimens reported in this study were collected from vessels participating in the United States Antarctic Research Program (USNS *Eltanin*, now the ARA *Islas Orcadas*, and R/V *Hero*) and those participating in Operation Deep Freeze III and IV (USS *Atka*, USS *Burton Island*, and USS *Edisto*). These specimens, and more collected by the USCGC *Eastwind* and R/V *Vema*, are deposited at the United States National Museum. Additional Antarctic specimens were borrowed from the New Zealand Oceanographic Institute, Wellington; American Museum of Natural History, New York (more R/V *Vema*); Zoologisches Institut und Zoologische Museum, Hamburg (Walther Herwig); and Muséum National d'Histoire Naturelle, Paris (Marion Dufresne).

Previously reported specimens of historical interest were examined from the following museums: British Museum, London [Gray, 1872a, b; Ridley, 1881; Moseley, 1879, 1881; Hickson and England, 1909]; Rijksmuseum van Natuurlijke Histoire, Leiden [Boschma, 1966b]; Institut Royal des Sciences Naturelles de Belgique, Brussels [von Marenzeller, 1903]; Muséum National d'Histoire Naturelle, Paris [Hickson, 1912b]; Zoologische Museum, Amsterdam [Hickson and England, 1905]; Zoologisk Museum, Copenhagen [Broch, 1942]; and Museum für Naturkunde an der Humboldt-Universität, Berlin [Studer, 1878]. Broch's [1951a] *Discovery* expedition specimens were not found at the British Museum or at the Zoological Institute or Zoological Museum, University of Oslo. Eguchi's [1964] specimens could not be found at the National Science Museum, Tokyo; Tokyo Kasei University; or National Institute of Polar Research, Tokyo.

##### Methods

Scanning electron microscopy (SEM) of the stylasterine corallum has been published only twice before [Sorauf, 1974; Fenninger and Flajs, 1974], but I find the results of SEM to be invaluable to both the examination and the illustration of specimens. Small structures, such as gastrostyles, dactylostyles, nematopores, efferent canals, and coenosteal microstructure, can be seen in much greater detail than has been achieved before, and new characters are revealed as well. If SEM stereo pairs (two photographs taken at an 80 separation) are taken, another dimension is

added, allowing more accurate measurements and a better appreciation of positional relationships. Preparing a specimen for SEM is relatively simple, consisting of cutting off a small piece of corallum (usually less than 1 cm in diameter and less than 8 mm tall), cleaning it with sodium hypochlorite solution (bleach), rinsing with water, and fastening it to a stub. Internal structures, such as gastrostyles and dactylostyles, are usually revealed by natural fractures or by purposely breaking a branch. If specimens are scarce or if a particular structure is desired, a high-speed air drill equipped with a tiny burr is very effective in removing small bits of coenosteum for examination.

All holotypes and most paratypes of the new species are deposited at the United States National Museum, Washington, D.C. Some paratypes are deposited at the British Museum, London, and Rijksmuseum van Natuurlijke Historie, Leiden.

A confirmed depth range is used in the distribution sections to avoid erroneous end points (extremes) resulting from bathymetrically wide-ranging trawls. The stated bathymetric range for each species extends from the deepest shallow to the shallowest deep component of the trawled depth ranges [see Cairns, 1979, p. 10].

Boschma [1957] listed complete synonymies for all species of Stylasterina. The synonymies used in the present paper include all references in which specimens were reported or in which a significant comment is made regarding the species.

The following abbreviations are used in the text:

#### Station Data

BANZARE	British, Australian, and New Zealand Antarctic Research Expedition, 1929-1931 (reported by Boschma [1966b]).
EW	USCGC <u>Eastwind</u> .
NZOI	specimens collected by the New Zealand Oceanographic Institute (various vessels).
PD	pebble dredge (used on R/V <u>Vema</u> ).
RD	rock dredge (used on R/V <u>Vema</u> ).
Sta.	station.
WH	<u>Walther Herwig</u> .
WS	RSS <u>William Scoresby</u> .

#### Museums

AMNH	American Museum of Natural History, New York.
BM	British Museum (Natural History), London.
MNHNP	Muséum National d'Histoire Naturelle, Paris.
NMNH	see USNM.
NZOI	New Zealand Oceanographic Institute, Wellington.

RMNH	Rijksmuseum van Natuurlijke Historie, Leiden.
ROM	Royal Ontario Museum, Toronto.
USNM	United States National Museum, Smithsonian Institution, Washington, D.C.
ZIZM	Zoologische Institut und Zoologisches Museum, Hamburg.
ZMA	Zoölogisch Museum, Amsterdam.

#### Other

Coel.	coelenterate.
H:W	height to maximum width ratio of gastrostyles.
SEM	scanning electron microscopy/microscope.
USARP	United States Antarctic Research Program.
$\sigma$	standard deviation of sample.

#### Terminology

It was necessary to create some new terms to describe the characters seen with SEM and to bring into use some terms infrequently used or more commonly used in hydroid taxonomy. These terms are discussed below.

When a colony is attached to the substrate by a broad, encrusting base (2-10 times the basal branch diameter), the base is referred to as expansive. A nonexpansive base is usually less than twice the basal branch diameter.

The texture of most stylasterines is a reticulate maze of superficial calcium carbonate (usually aragonite) bands of coenosteum. These bands, called coenosteal strips in this paper, are 50-100  $\mu$ m wide and bordered by thin (5-10  $\mu$ m), usually discontinuous grooves or slits, depending on their depth of penetration. If the strips are longitudinal, parallel, and slightly convex, I have called them cords. Most strips and cords are granulated, but some bear rows of imbricated scales, called platelets.

Cyclo systems are composed of a ring of dactylopores encircling a gastropore. Each dactylo pore has an apical opening and an internal, lateral slit which borders the gastropore tube. This slit is termed the dactylo tome, and the intervening wedges of coenosteum between dactylopores the pseudosepta. Pseudosepta are sometimes enlarged, forming broad, fixed lids overhanging the gastropore; the term operculum is reserved for the hinged structure of *Adelopora*. As a cyclo system ages, some of the dactylopores become obsolete and are filled in with coenosteum. The section of the cyclo system missing dactylopores is called the diastema. The diastema usually occurs on the upper, distal part of the cyclo system (adcauline position). Other structures, such as gastropore lips and some lids, are attached to the lower, proximal (abcauline) side of the cyclo system. The

slits of dactylopore spines are adcauline if directed proximally and abcauline if directed distally.

The vertical cylinder of the gastrostyle is termed the main shaft. It invariably bears spines and is sometimes vertically ridged. The width portion of the height to width ratio (H:W) of the gastrostyle is measured at its widest point. The H:W ratio for *Errina antarctica* is 2.6-26; however, usually the range is much smaller and may sometimes be used for a specific level character. In this paper, ranges are not given; instead, the H:W ratio of a 'typical' gastrostyle is given, and the style figured. Dactylostyles are structurally quite different from the gastrostyles. A gastrostyle is a free-standing column originating from the base of the gastropore, whereas a dactylostyle is one or more lines of very small pillars (about 40-70  $\mu$ m tall) originating from the outer lateral edge of the dactylopore. Dactylopore spines are sometimes clustered two to four in a group, which produces random orientations of the dactylopore slits. These are termed clustered dactylopores. When one spine is enlarged and bears several dactylopore slits, it is termed composite.

The tube leading from the ampullae to the surface of the coenosteum is the efferent duct.

Checklist of Stylasterina Known From the Antarctic and Subantarctic Regions

Order STYLASTERINA

Family STYLASTERIDAE Gray, 1847

Subfamily ERRININAE Hickson, 1912

*Sporadopora* Moseley, 1879

*S. dichotoma* (Moseley, 1876)

*S. granulosa*, n. sp.

*Lepidopora* Pourtalès, 1871

*L. sarmentosa* Boschma, 1968

*L. acrolophos*, n. sp.

*Errinopsis* Broch, 1951

*E. reticulum* Broch, 1951

*E. fenestrata*, n. sp.

*Cheiloporidion*, n. gen.

*C. pulvinatum* n. sp.

*Errina* Gray, 1835

Subgenus *Errina* Gray, 1835

*E. (E.) antarctica* (Gray, 1872)

*E. (E.) fissurata* Gray, 1872

*E. (E.) kerguelensis* Broch, 1942

*E. (E.) laterorifra* Eguchi, 1964

*E. (E.) gracilis* von Marenzeller, 1903

*E. (E.) boschmai*, n. sp.

*E. (E.) cheilopora*, n. sp.

Subgenus *Inferiolabiata* Broch, 1951

*E. (I.) echinata* (Moseley, 1879)

*E. (I.) labiata* Moseley, 1879

*E. (I.) lowei*, n. sp.

*E. (I.) fascicularis*, n. sp.

Incertae Sedis

'*Errina*' *cyclopore*, n. sp.

*Errinopora* Fisher, 1931

*E. cestoporina*, n. sp.

Subfamily ADELOPORINAE Cairns, 1982

*Adelopora* Cairns, 1982

*A. pseudothyron* Cairns, 1982

Subfamily STYLASTERINAE Gray, 1847

*Conopora* Moseley, 1879

*C. pauciseptata* Broch, 1951

*Crypthelis* Milne Edwards and Haime, 1849

*C. fragilis*, n. sp.

*C. formosa*, n. sp.

*Stylaster* Gray, 1831

*S. densicaulis* Moseley, 1879

*Allopore* Ehrenberg, 1834

*A. profunda* Moseley, 1879

*A. eguchii* Boschma, 1966

*A. robusta*, n. sp.

*Galyptopora* Boschma, 1968

*C. reticulata* Boschma, 1968

Species Account

The following subfamilies, genera, and species are arranged according to my conception of the most primitive to the most derived. The character state series that I have used to order the taxa include the following characteristics (primitive character first, derived following): (1) coordination of dactylopores and gastropores: none -- dactylopores concentrated near gastropores (i.e., 'lips' of gastropores) -- lines of dactylopores -- pseudocyclo systems -- lines of dactylopores on either side of a line of gastropores (i.e., *Distichopora*) -- true cyclo systems; (2) dactylopore form: pore

flush with branch -- rimmed -- perforated tubercle -- perforated tubercle and grooved spines -- grooved spines -- composite spine; (3) gastrostyle: absent -- present; (4) dactylostyle: absent -- present; (5) branch shape: round in cross section, free -- elliptical in cross section, free -- highly elliptical in cross section, anastomotic; (6) gastropore: flush with branch -- bordered by lower lip -- bordered by fixed lid -- covered by hinged operculum; (7) gastropore tube: very long, forming clusters in branch axis -- short, single chamber -- short, double chamber, chamber separated by a constriction; (8) ampullae: internal -- superficial, hemispherical -- superficial, hemispherical with lateral extension for efferent duct; (9) coenosteal texture: porous -- reticulate, granular -- reticulate or corded with imbricated platelets. These character state series are offered, at this time, without justification, pending a complete reevaluation of the higher classification of the Stylasterina.

Order STYLASTERINA  
Family STYLASTERIDAE Gray, 1847  
Subfamily ERRININAE Hickson, 1912

**Diagnosis.** Dactylopores not arranged in distinct cycloastemes, usually scattered irregularly over coenosteum. If dactylopores organized into lines or circles around gastropores (pseudocycloastemes), there is a wide space between the two types of pores, and usually additional, randomly placed dactylopores are present.

Genus Sporadopora Moseley, 1879

**Diagnosis.** Colonies robust and flabellate, with stout vertical branches. Coenosteal texture homogeneously porous. Gastropores and dactylopores scattered randomly over coenosteum, both usually flush with the surface. Gastrostyles present, dactylostyles absent. Gastropore tubes continuing down branch axis for some distance. Ampullae not conspicuous superficially. Type-species: Polypora dichotoma Moseley, 1876, by monotypy.

1. Sporadopora dichotoma (Moseley, 1876)  
Figs. 1A, 1B, 2A-2I, 3A, 3B

Polypora dichotoma Moseley, 1876b, pp. 94-95.  
Sporadopora dichotoma; Moseley, 1879, pp. 429-440, pl. 34, figs. 1, 2, pl. 35, figs. 1, 2, 9, pl. 36, pl. 43, figs. 1-9, 12, pl. 44, figs. 13, 14; 1881, pp. 36-47, 83, pl. 1, figs. 1, 2, pl. 2, figs. 1, 2, 9, pl. 3, pl. 10, figs. 1-9, 12, pl. 11, figs. 13, 14.--Weill, 1934, p. 484.--Boschma, 1957, pp. 60-61; 1964, pp. 61, 62.--Squires, 1962, p. 136.--Lowe, 1967, pp. 102-104, pl. 9, figs. a-c.--Boschma and

Lowe, 1969, p. 15, pl. 5, map 5.  
? Sporadopora dichotoma; Hall, 1898, pp. 177, 178.

**Description.** Colonies are large, robust, and flabellate, with regular, dichotomous branching. In larger colonies, the sides of adjacent branches sometimes anastomose for a short distance, later becoming independent again. Terminal branches are round in cross section, gradually tapering from thick branches to cylindrical, blunt, rounded tips, 4-20 mm in diameter. Basal branches are usually elliptical in cross section, the greater axis of the ellipse being directed in the plane of the fan. The first dichotomous branching does not occur until the colony has reached 4-6 cm in height, this basal branch usually being devoid of any pores. Branching axils are usually a gentle U shape. The tallest colony known [Moseley, 1881, Plate 1, fig. 2] is 14 cm tall with a basal branch diameter of 28.3 x 25.8 mm. The thickest basal branch (syntype: BM 1957.2.28.42) is 4.45 cm in diameter. Colonies are attached to small rocks and scleractinian corals (e.g., Flabellum thoursii) by a nonexpansive base.

The colony surface is smooth, composed of a white, porous, vermiculate coenosteum (Figure 2A). The coenosteum of older, thicker branches is slightly more solid, dissected by a reticulate maze of coenosteal grooves. Small, round to elliptical, shallow pits up to 0.15 mm long (Figures 2B and 2C) are scattered over the coenosteum. Each pit usually bears a centrally placed tubercle. The function of these pits is unknown.

Gastropores are round and usually flush with the surface but are sometimes raised on a mound, up to 0.25 mm high in exceptional cases. Gastropores are quite variable in size, 0.20-0.62 mm in diameter. Some gastropores are surrounded by a ring of 10-15 shallow pits, each about 40-70  $\mu$ m in diameter. These may be an expression of the radial coenosteal canals mentioned by Moseley [1879, p. 433] or simply nematopores. Gastropore tubes are usually oriented perpendicular to the surface, but toward the center of the branch they curve downward and run longitudinally for quite a distance. In any branch cross section there will be a central core of both gastropore and dactylopores tubes. The base of a colony detached from its substrate often reveals its founder gastrozoid as a small gastropore penetrating the center of the base.

Because of the length and curvature of the gastropores the gastrostyles often are not visible from the surface. Gastrostyles are long, slender, and needle shaped, with a delicate, pointed tip. Styles may be extraordinarily long, particularly on branches of great



diameter; however, usually just the distal part is ornamented. For example, on a style 3.9 mm long and 0.19 mm wide (H:W = 20.5), only the distal 1.47 mm is ornamented, the basal shaft being irregularly cylindrical and smooth. Styles are deeply grooved by longitudinal furrows, the grooves being separated by five to seven thin ridges, bearing slender, pointed spines or tufts of spines. Sometimes, as the style tapers distally, each ridge successively becomes free and bears a separate pointed tip. Thin tabulae, about 4-5  $\mu$ m thick, traverse the gastropore at irregular intervals, providing support for the elongate, slender styles. Some gastropores have 10-15 tabulae; others, of equal length, have none.

Dactylopores are round and approximately 0.12 mm in diameter; however, the upper size range is unknown and may overlap that of the smaller gastropores. The only way to distinguish the two types of pores in a dried corallum is to search for the presence of a style or tabula in the gastropores; unfortunately, the delicate gastrostyles often are lost in sectioning, and they sometimes fall out during bleaching. Dactylopores are always flush with the surface.

Ampullae are always internal, with no surface relief, even in the distal-most branches. They are elliptical in shape, up to 1 mm long, and oriented with their greater axes perpendicular to the surface. A small efferent duct links the cavity to the surface. This tube produces an irregularly shaped pore at the surface, 60-70  $\mu$ m in diameter.

**Remarks.** Judging from the maximum basal branch diameter, *S. dichotoma* is probably the largest of the Antarctic Stylasterina.

Regeneration of branches from broken tips is common.

**Discussion.** With the exception of Hall's [1898] doubtful report of *S. dichotoma* and Lowe's [1967] unpublished records, this species was known only from the type-locality. This report represents the second published record and includes 16 new localities. Hall's specimens, from the Miocene of South Hamilton, Victoria, Australia, were not examined by the author but were assumed by Boschma [1957] to be a different species.

*Sporadopora dichotoma* is similar to *S. mortenseni* Broch, 1942, and Squires [1962] implied that they may be morphological variants of the same species. However, examina-

tion of two syntypes of *S. mortenseni* convinced me that they are separate species for the following reasons: *S. mortenseni* has (1) a more delicate colony with more slender branch tips, (2) a more solid coenosteal texture, never porous like that of *S. dichotoma*, even at branch tips, (3) incomplete tabulae, and (4) smaller gastropores. Furthermore, the species are substantially separated geographically and bathymetrically.

Eguchi [1964] reported *S. mortenseni* from 830 m off the Riiser-Larsen Peninsula (Cape Cook), Antarctica. These small, worn specimens are of the correct branch diameter for this species, but the very poor condition of the specimens does not make species identification probable. The deposition of these specimens is unknown, and therefore they have not been examined by the author, but judging from the description and illustration, it is premature to list *S. mortenseni* from the Antarctic coast. It appears to be endemic to the New Zealand region at depths of 122-282 m (H. Zibrowius, personal communication, 1980).

**Material examined.** *Eltanin* sta. 339, USNM 60298; sta. 684, USNM 60101; sta. 970, USNM 52647; sta. 992, USNM 52652; sta. 1088, USNM 52651, 52644; sta. 1089, USNM 52712; sta. 1536, USNM 60102; sta. 1593, USNM 60098. *Islas Orcadas* sta. 575-34, USNM 60100; sta. 575-82, USNM 62574; sta. 575-91, USNM 60097. *Hero* sta. 715-895, USNM 60099. *Vema* sta. 15 (PD) 10, USNM 52646; sta. 17-59, USNM 52645; sta. 17-65, USNM 52643. *WH* sta. 19-76, ZIZM. *Challenger* sta. 320, syntypes. Other material: Two syntypes of *S. mortenseni*, Zoological Museum, Copenhagen.

**Types.** Holotype not designated by Moseley; therefore all specimens from *Challenger* sta. 320 considered as syntypes: BM 1880.11.25.167 [Moseley, 1881, Plate 1, fig. 2]; BM 1880.11.25.166, 168, 192; BM 1957.2.28.42 (basal fragment of very large diameter). Type-locality: 37°17'S, 53°52'W (off Río de la Plata, Uruguay), 1097 m.

**Distribution.** Off Uruguay; Falkland Plateau; Scotia Ridge from Tierra del Fuego to South Georgia; South Shetland Islands (Map 1). Depth: 250-1498 m.

2. *Sporadopora granulosa*, n. sp.  
Figs. 1C, 4A-4G, 5A-5C

*Sporadopora atabulata* Lowe, 1967, pp. 96-101, pl. 8, figs. b, c, text figs. 15a-15i (unpublished manuscript name).

Fig. 1. A, B, *Sporadopora dichotoma* (Moseley): A, holotype, *Challenger* sta. 320, BM 1880.11.25.167, x0.55; B, *Vema* sta. 17-65, USNM 52643, x0.84; C, *Sporadopora granulosa*, n. sp., holotype, *Eltanin* sta. 740, USNM 52697, x0.58; D, E, *Lepidopora sarmentosa* Boschma, *Eltanin* sta. 1412, USNM 60137, both x2.9; F, *Lepidopora acrolophos*, n. sp., holotype, *Eltanin* sta. 1536, USNM 60189, x2.65; G, H, *Errinopsis reticulum* Broch: G, *Hero* sta. 715-879, USNM 60105, x0.64; H, *WH* sta. 19/76, ZIZM, x0.37; I, *Errinopsis fenestrata*, n. sp., holotype, *Eltanin* sta. 254, USNM 52693, x3.7.

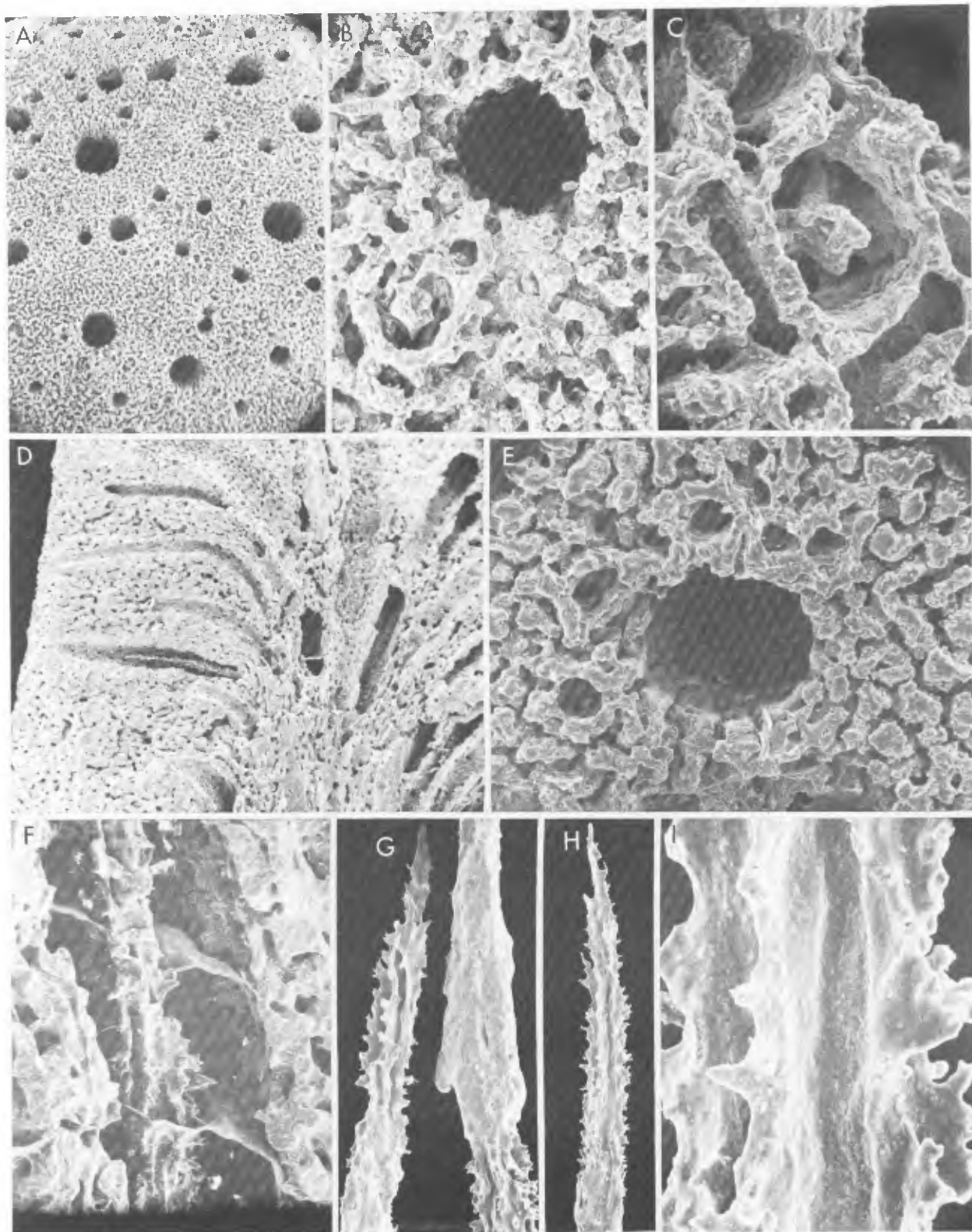


Fig. 2. *Sporadopora dichotoma* (Moseley). A, Eltanin sta. 970, gastropore and dactylo pore, x14; B, same specimen, gastropore and elliptical pit at lower left, x118; C, same specimen, coenosteal pit, x250; D, same specimen, longitudinal section of branch, x15; E, Islas Orcadas sta. 575-34, gastropore surrounded by a ring of shallow pores, x112; F, Hero sta. 715-895, gastrostyle supported by tabulae, x71; G, Eltanin sta. 1593, tip and degenerate base of two gastrostyles, x54; H, same specimen, ridged gastrostyle tip, x40; I, enlargement of Figure 2H, x285.



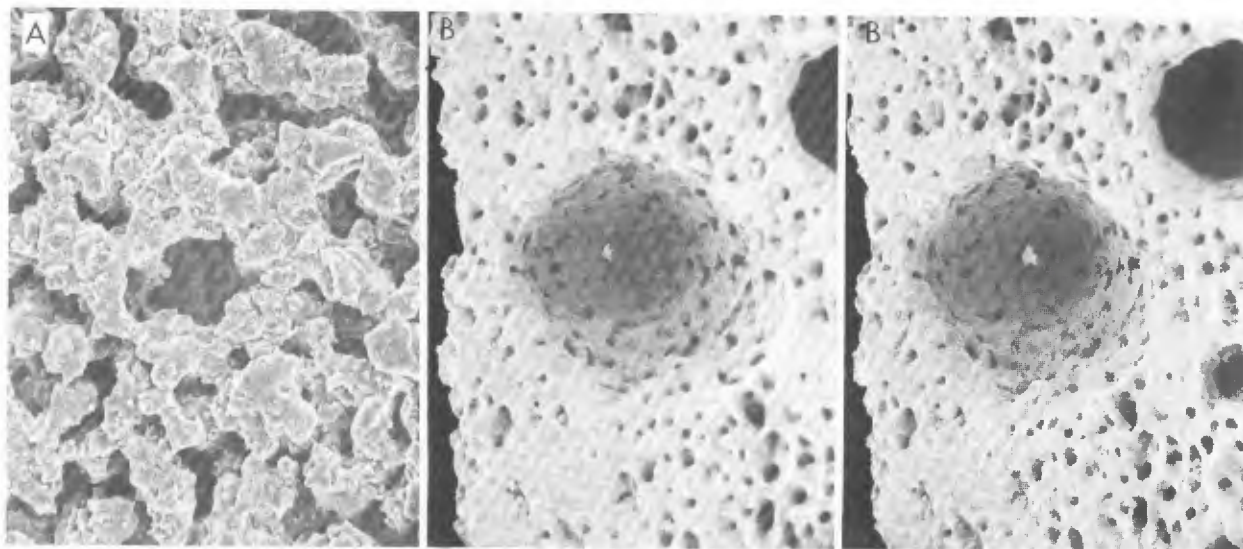


Fig. 3. *Sporadopora dichotoma* (Moseley). A, *Islas Orcadas* sta. 575-34 surface pore of efferent duct from an ampulla, x161; B, same specimen, cross section of ampulla, efferent duct and surface pore (as seen in Figure 3A from outside) visible, x43, stereo pair.

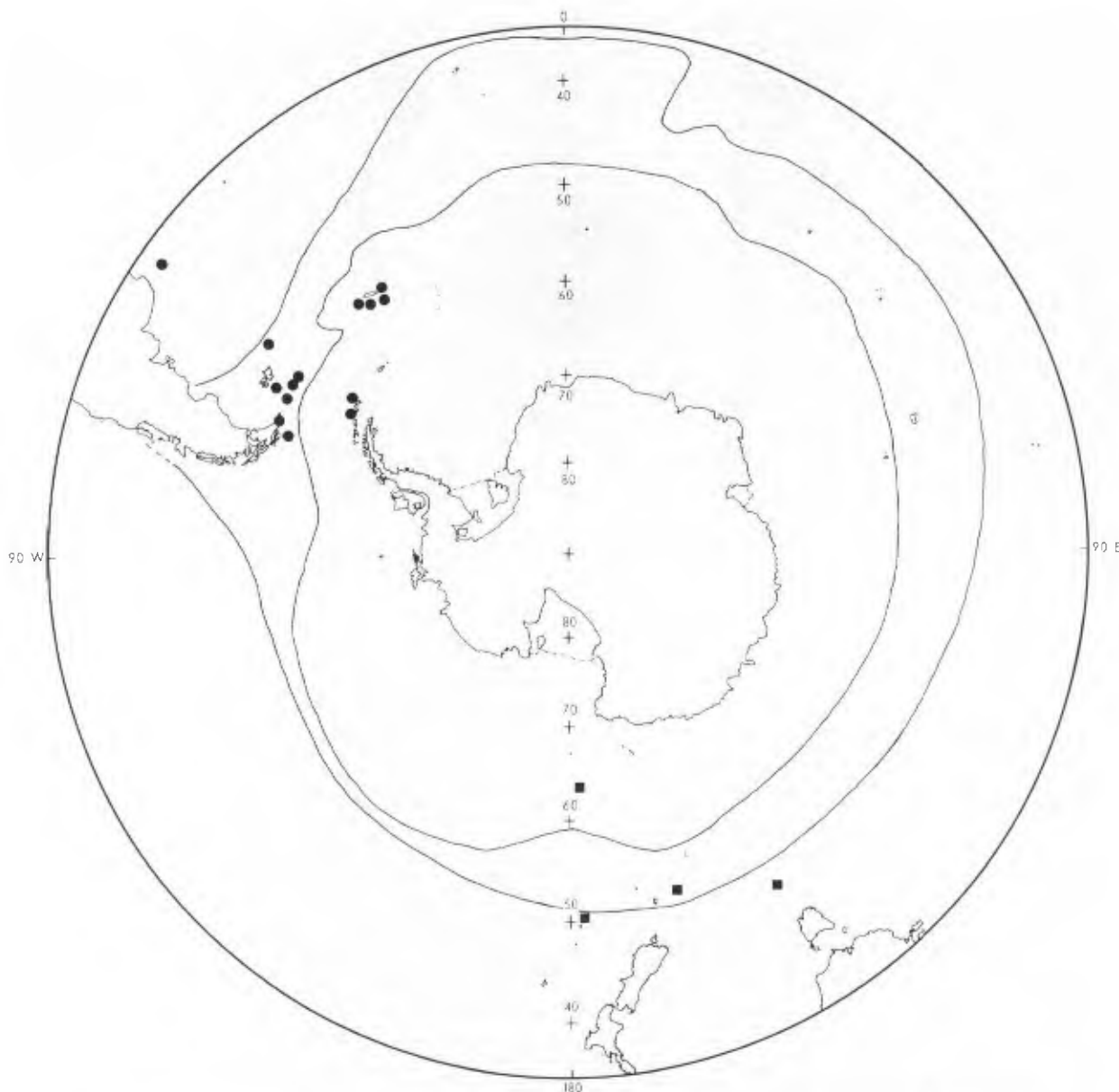
*Sporadopora* n. sp. Boschma and Lowe, 1969, p. 15, pl. 5, map 5.

**Description.** Colonies are large and robust, with sparse, irregular branching primarily in one plane. Branches are round to slightly elliptical in cross section and do not anastomose. Branch tips are blunt, sometimes slightly clavate, those on holotype colony measuring about 3.5 mm in diameter; however, coralla from deeper-water stations are smaller, having more slender branches and more acute branch tips (i.e., 2.0 mm in diameter). The holotypic colony is 17.0 cm tall, 8.0 cm broad, and 9.7 mm in basal branch diameter and is attached by a broad encrusting base to a dead corallum of the scleractinian coral *Balanophyllia malouinensis*.

The coenosteum is smooth, white to light beige, and glistens when viewed with the proper light intensity. The surface is dissected by shallow, subparallel (sometimes anastomosing) longitudinal grooves about 15-20  $\mu\text{m}$  wide. Coenosteal strips between the grooves are about 80-90  $\mu\text{m}$  wide and bear large, round to irregularly shaped, low, blunt granules 12-40  $\mu\text{m}$  in diameter. Granules are closely spaced, usually about 2-4 across the width of any strip, and also occur on the sides of the dactylopoire spines. The longitudinal striation is usually well defined, especially on branch tips, but may be obscured at points of branching or on worn branches. Irregularly shaped coenosteal pores, 30-40  $\mu\text{m}$  in diameter, are scattered along the grooves.

Gastropores are round to elliptical, 0.24-0.45 mm in diameter, and usually flush with the surface. Rarely, the gastropore is raised on a low mound, but they are never lipped or rimmed. Because of the curvature of the gastropore tube (sometimes up to 90°) and the relative shortness of the gastrostyle, the tip of the gastrostyle is often not visible from the surface (Figures 4A, 4B, 4D, 4G). A cross section of any branch will reveal between 10 and 20 circular cross sections of tubes clustered about the center of the branch and usually several tubes in longitudinal section (Figure 5C). The larger-diameter tubes, about 0.25 mm in diameter, are fewer, usually elliptical in cross section, and usually restricted to the perimeter of the cluster. These are the gastropores, and they terminate at the base of the gastrostyle. The more numerous, round dactylopoire tubes are centrally located, measure about 0.15 mm in diameter, and have a smoother inner surface. The dactylopoire tubes are usually much longer than the gastropore tubes. Gastrostyles are long and cylindrical, diminishing in thickness only at the tip. The illustrated style (Figures 4E and 4F) is 0.77 mm tall and 0.095 mm wide, for a H:W ratio of 8.1. Styles are ornamented for their entire length with rather tall, robust spines (up to 50  $\mu\text{m}$  long and 10  $\mu\text{m}$  wide at the base), which sometimes bifurcate distally.

Dactylopoires are raised on small mounds or surrounded by low rims. Pore diameter varies from 0.05 to 0.11 mm, and pores are elevated



Map 1. Distribution of *Sporadopora dichotoma* (circles) and *Lepidopora sarmentosa* (squares).

up to 0.20 mm above the surface. The greatest elevation usually occurs on slender, distal branches; dactylopores on larger-diameter branches are often flush with the surface. Gastropores and dactylopores are uniformly distributed around distal branches, but on larger branches the posterior side of the colony has many fewer pores.

Ampullae form low, superficial mounds on small-diameter distal branches. On larger branches they are seen only in branch cross section as cavities buried just beneath the coenosteal surface. The presumed male ampul-

lae are 0.57-0.82 mm in diameter; the presumed female ones are 0.98-1.3 mm in diameter. No ruptured ampullae were noted; however, sometimes a small efferent duct can be traced from a male ampulla to the surface. The duct, about 20  $\mu$ m in diameter at the surface, opens as an irregular pore into a large, shallow surface depression 0.6-0.8 mm in diameter.

**Discussion.** *Sporadopora granulosa* is similar to *S. dichotoma*, type-species of the genus, in its growth form, branch shape, random orientation of gastropores and dactylo-

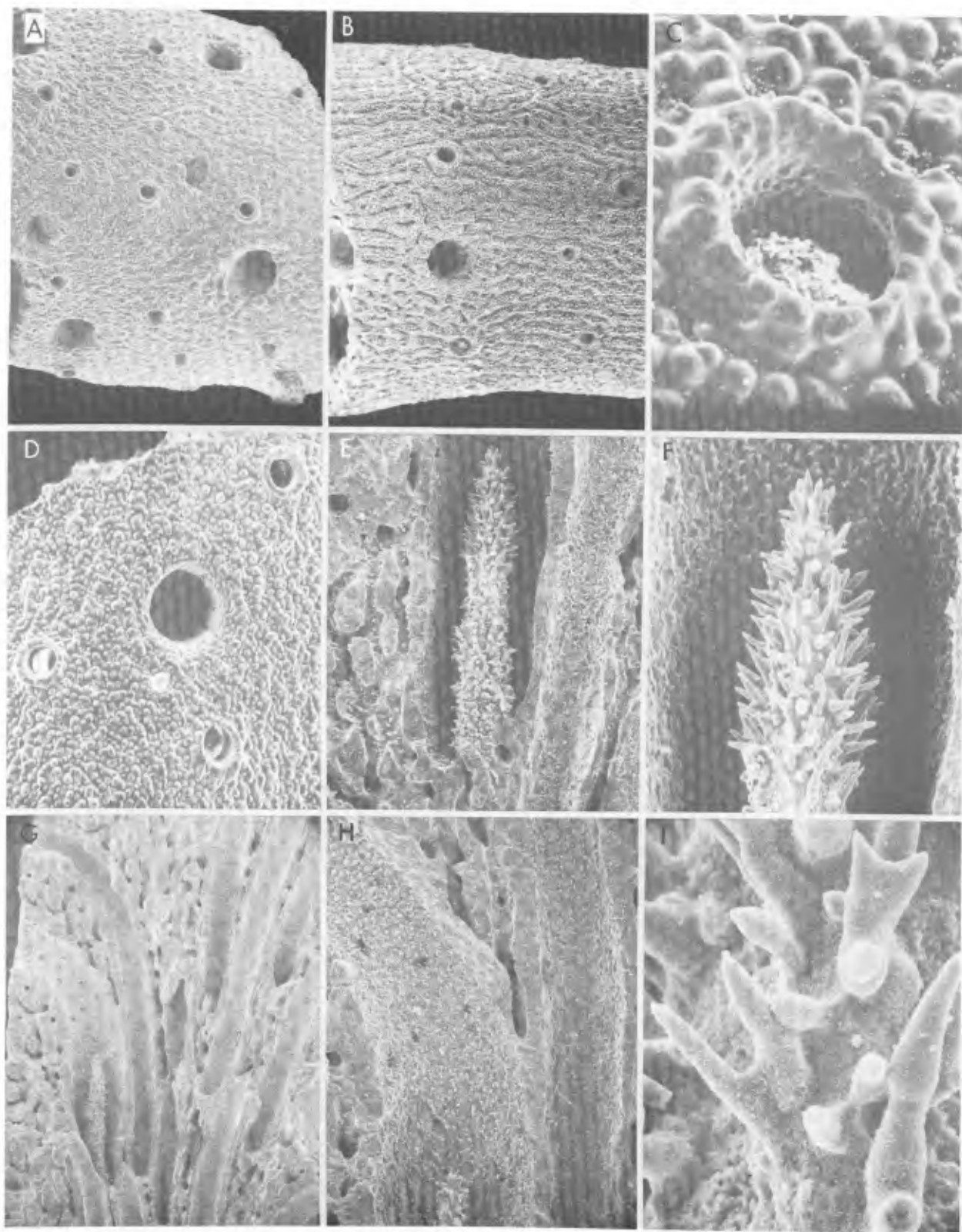


Fig. 4. Paratypes of *Sporadopora granulosa*, n. sp. A, B, Eltanin sta. 1521, gastropores and dactylopore, both x25; C, same station, dactylopore, x250; D, same station, coenosteal texture, x43; E, F, I, Eltanin sta. 740, gastrostyle, x71, x179, x820, respectively; G, H, same specimen, longitudinal section through branch showing gastropores and dactylopores, x29, x79, respectively.

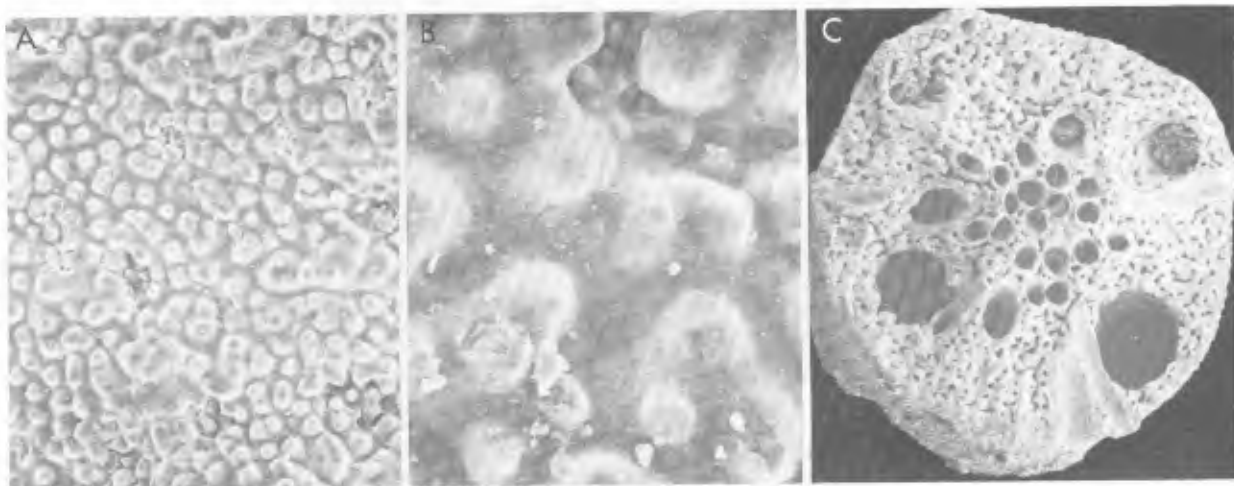


Fig. 5. Paratypes of *Sporadopora granulosa*, n. sp. A, B, Eltanin sta. 740, coenosteal texture, x179, x175, respectively; C, Eltanin sta. 1521, cross section of branch, x19.

pores, and cluster of tubes running down the axis of each branch. Points of difference include (1) different gastrostyle structure, (2) smaller branch diameter, (3) raised dactylopores tubercles on distal branches, and (4) different coenosteal texture. Points 1 and 2 are considered to be species level differences. The raised or rimmed dactylopores are similar to those of *Lepidopora*; however, *S. granulosa* has few other characters in common with this genus. Furthermore, on larger diameter branches the dactylopores are flush with the surface, similar to those of *S. dichotoma*. The difference is coenosteal texture between the two species is marked but of unknown taxonomic importance. If coenosteal texture comes to be used as a conservative generic level character, *S. granulosa* would form the basis of a new genus, closely allied to *Sporadopora* and *Lepidopora*.

**Etymology.** The specific name *granulosa* refers to the unusually large coenosteal granules.

**Material examined.** Types.

**Types.** Holotype: Eltanin sta. 740, USNM 52697. Paratypes: Eltanin sta. 740, USNM 52698, BM 1981.6.11.10, RMNH Coel. 14.107; sta. 1521, USNM 60126; sta. 1592, USNM 60125; sta. 1593, USNM 60127. Islas Orcadas sta. 575-102, USNM 60184. Vema sta. 17-54, USNM 60186; sta. 17-57, USNM 60185; sta. 17-61, USNM 60143; sta. 17-64, USNM 60187. Type-locality: 56°06.2'S, 66°19'W (off Tierra del Fuego), 384-494 m.

**Distribution.** Falkland Plateau; Scotia Ridge from Tierra del Fuego to Shag Rocks (Map 2). Depth: 357-1874 m.

Genus *Lepidopora* Pourtalès, 1871

**Diagnosis.** Colonies small, arborescent, usually flabellate. Coenosteal texture

reticulate or striate and granular. Gastro-pores irregularly scattered over branch or consistently at branch axils; abcauline (lower) gastropore lip usually present. Dactylopores tubular or raised on small mounds, either randomly or linearly arranged. Gastrostyles present; no dactylostyles. Type-species: *Errina glabra* Pourtalès, 1867, by subsequent designation [Boschma, 1963a p. 336].

**Discussion.** Boschma [1956] questionably placed *Lepidopora* in the subgenus *Errina* (*Inferiolabiata*) but later [Boschma, 1963a] established it as a separate subgenus in *Errina*, choosing *E. glabra* as the type-species. Later [Boschma 1965b] he redefined *E. (Lepidopora)*, stressing the presence of perforated dactylopores tubercles to differentiate it from the other two subgenera, both of which have grooved spines bordering each dactylopores. Boschma [1964a] noted the strong resemblance between *Lepidopora* and *Sporadopora*, concluding that the only difference between them is that the former has raised or tubular dactylopores, whereas those of the latter were usually flush with the coenosteum.

Primarily on the basis of the significant difference of the dactylopores shape (perforated tubercle for *Lepidopora*, grooved spines for *Errina* (*Errina*) and *E. (Inferiolabiata)*), *Lepidopora* is removed from the genus *Errina* and established as a separate genus having close affinities with *Sporadopora*. Its similarity to *Sporadopora* is even more apparent because both genera have long dactylopores tubes which run in clusters down the branch axis. *Lepidopora* is distinguished from *Sporadopora* by (1) having dactylopores as perforated tubercles or at the ends of tubes, whereas those of *Sporadopora* are flush with

the surface or slightly rimmed, (2) usually having a lower gastropore lip, and (3) having a smaller, more delicate colony form.

Despite the generic reviews of *Lepidopora* by Boschma [1963a, b, 1964a, 1968b], species of this genus are in great need of revision. For instance, several species listed by Boschma do not belong in *Lepidopora*: *Errina horrida* and *E. carinata* belong in *Inferiolarbiata*, and *E. cochleata* does not have perforated tubercles. A review of both *Sporadopora* and *Lepidopora* is necessary, emphasizing characteristics of coenosteal texture, gastrostyle structure, dactylopore structure, presence or absence of gastropore lips, and growth form to distinguish the two.

3. *Lepidopora sarmentosa* Boschma, 1968  
Figs. 1D, 1E, 6A-6G

*Errina* (*Lepidopora*) *sarmentosa* Boschma, 1968b  
pp. 203-208, pl. 1, figs. 1-4, text figs.  
1, 2.

**Description.** Coralla are small, delicate, and flabellate. The largest colony examined is 3.45 cm tall and 4.15 cm broad, with a basal branch diameter of 4.5 mm. Terminal branches are round in cross section, do not anastomose, and rarely exceed 0.6 mm in diameter. Tiny branchlets often originate from the larger main branch, which invariably supports a commensal worm. Therefore the tiny branchlets appear to originate from the rather thick worm tube. Thicker, basal branches are slightly elliptical in cross section and sometimes are induced to anastomose by the action of a commensal polychaete. The worm tube is elliptical in cross section, up to 6.5 x 4.5 mm in diameter, and occurs on the posterior side of the colony. One side of the polychaete tube is often formed by the union of two slender, closely adjacent branches, and the outer side is invariably solid. The narrow edges have elongate, irregular cavities.

The coenosteum is coarse, white, and covered by a discontinuous, reticulate network of shallow coenosteal canals. Periodically, within these shallow grooves a small (15  $\mu$ m diameter) coenosteal pore penetrates the surface. On slender distal branches, coenosteal canals are usually longitudinally arranged. Low, irregularly shaped granules 6-10  $\mu$ m in diameter cover the surface. The exterior surface of the worm tube sometimes bears numerous tiny spines (up to 0.31 mm tall and rarely wider than 0.10 mm), which have perforated apices. The function of these spines is unknown.

Gastropores are round, about 0.25 mm in diameter, and occur on both sides of the branch as well as in the branch axils. Each pore is bordered proximally by a broad triangular or rounded lip. The illustrated gas-

trostyle (Figure 6G) has a cylindrical, unornamented basal main shaft, which rapidly expands into a thick crown of spines about two-thirds of the distance to the tip. The spines are cylindrical and blunt, measuring up to 20  $\mu$ m long and 5  $\mu$ m thick. A short, relatively bare tip projects from the crown. This style is 0.42 mm tall, the basal main shaft is 0.13 mm in diameter, and the crown of spines is 0.18 mm in diameter (H:W = 2.3).

Dactylopore spines occur as perforated tubercles, 0.13-0.20 mm wide and up to half as tall, with an apical pore 40-60  $\mu$ m in diameter. Dactylopores are distributed sparsely and randomly over the branches; however, two to four usually occur on each gastropore lip, increasing the height of the lip and producing a crenulated upper margin.

Low, hemispherical ampullae, 0.69-0.86 mm in diameter (male?), occur on some specimens, whereas larger, more prominent ampullae, 0.98-1.06 mm in diameter (female?), occur on others. Ampullae occur on branches but are most common on the outer surface of the worm tube, where they are sometimes very dense (one per square millimeter).

**Discussion.** The specimens described above agree in every detail with Boschma's [1968b] description of the holotype. The only significant additions to his description are the sizes of ampullae and the observation that gastropores occur on both sides of the branch and at branching axils. Boschma's description, based on only one fragment, was necessarily incomplete; nonetheless, his comparisons of *E. sarmentosa* to the other species in the subgenus [Boschma, 1968b, pp. 205-208] remain valid.

**Material examined.** *Eltanin* sta. 1412, USNM 60137; sta. 1857, USNM 60135; sta. 1981, USNM 60136.

**Types.** Holotype: NZOI sta. F-132, NZOI H-50, RMNH Coel. 13756 (fragment of holotypic colony [see Vervoort and Zibrowius, 1981]). Type-locality: 49°49'S, 177°32'E (off Antipodes Islands), 1335 m.

**Distribution.** Various seamounts and islands south of New Zealand and Australia, including off Antipodes Islands, Macquarie Ridge, South Tasmania Rise, and seamount north of Scott Island on Pacific-Antarctic Ridge (Map 1). Depth: 915-1647 m.

4. *Lepidopora acrolophos*, n. sp.  
Figs. 1F, 7A-7F, 8A-8C

**Description.** From the few specimens known of this species, the corallum appears to form small colonies with loose, irregular, three-dimensional branching, producing a bushy shape. Branches are round in cross section, not anastomosing. The largest fragment is 2.5 cm tall with a maximum branch diameter of 2.8 mm. Branches gradually attenuate to

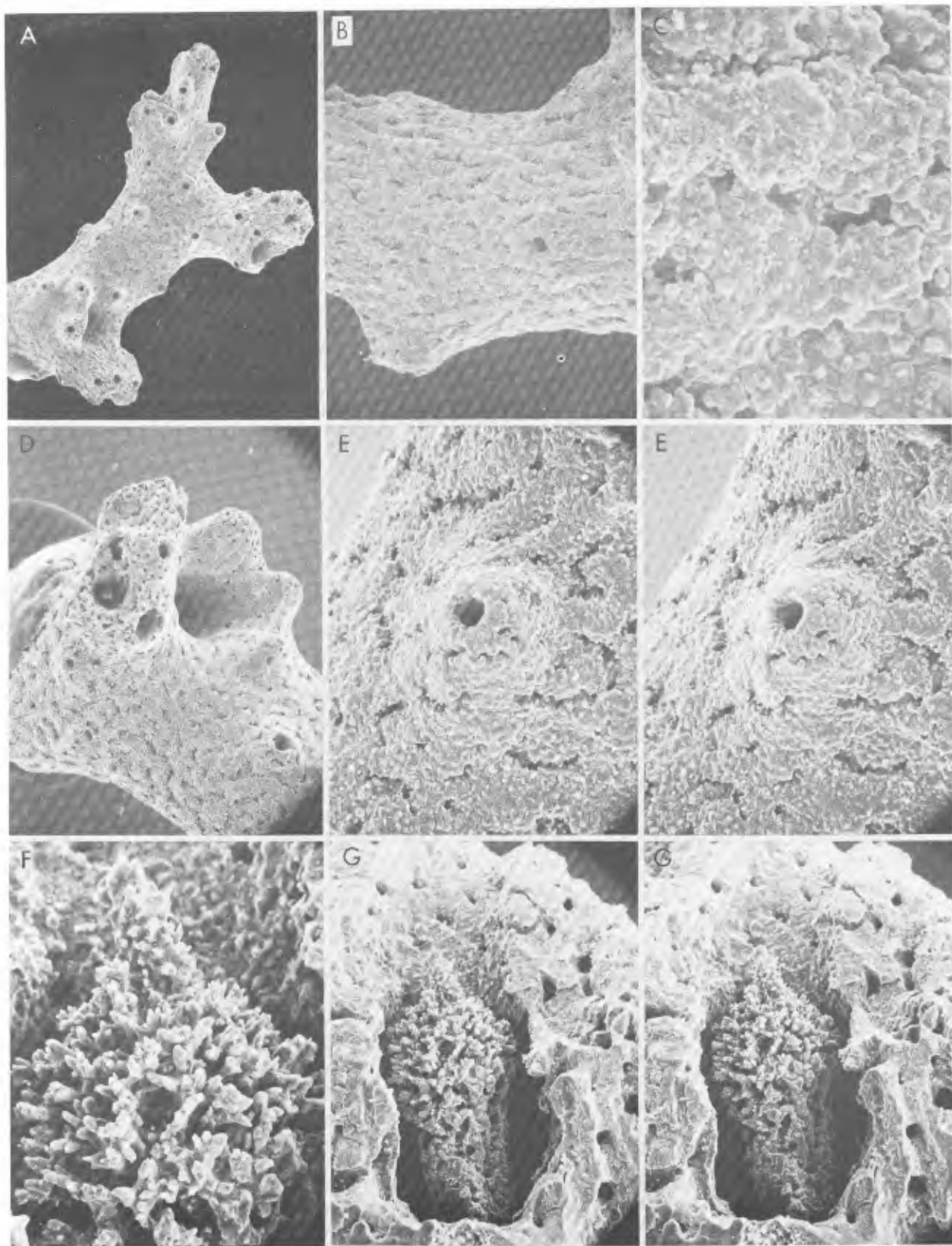


Fig. 6. *Lepidopora sarmentosa* Boschma from Eltanin sta. 1857. A, branch tip, x21; B, C, coenosteal texture, x71, x364, respectively; D, gastropore surrounded by dactylopores, x46; E, dactylopore, xl43, stereo pair; F, G, gastrostyle, x246, xl18, respectively. Figure 6G is a stereo pair.

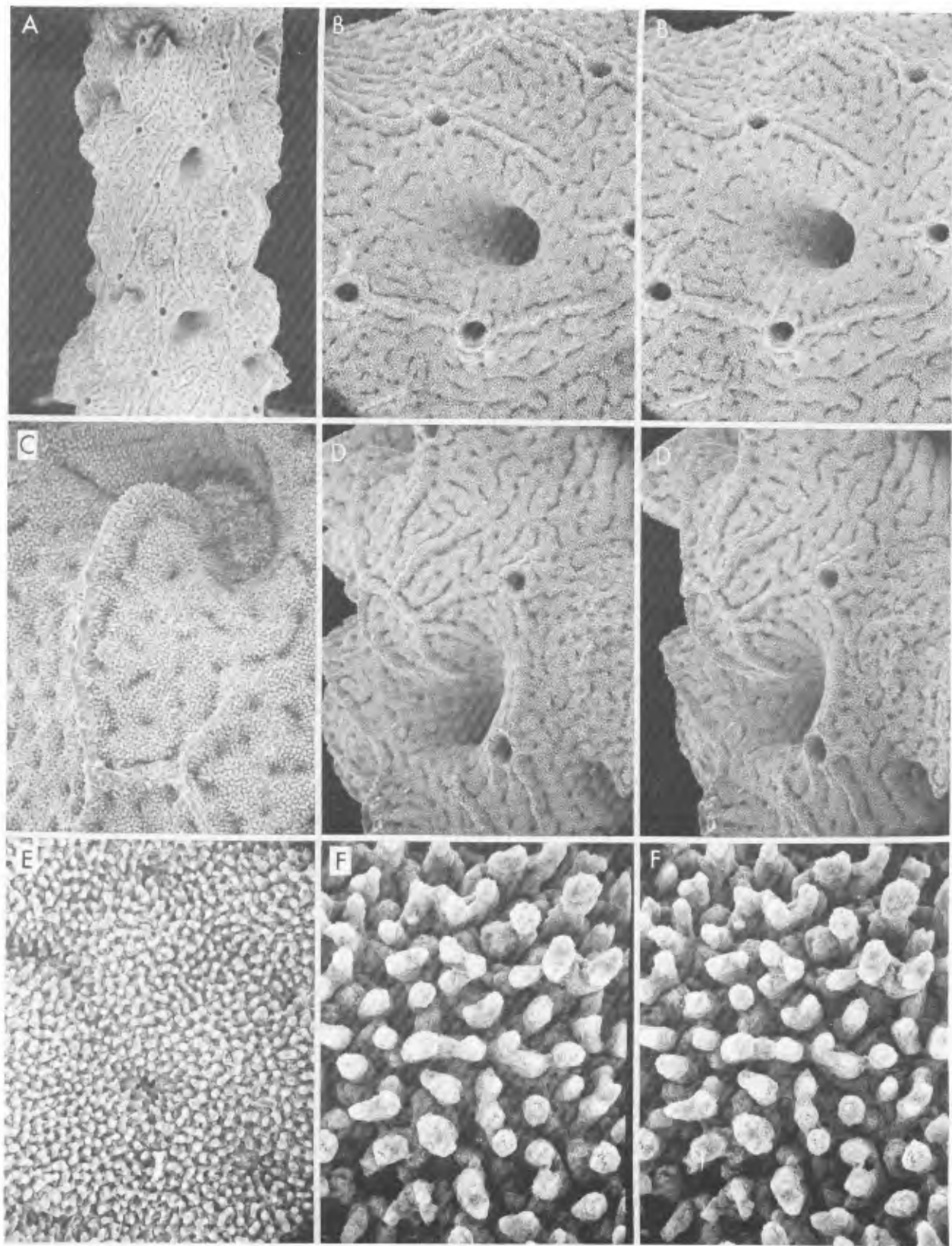


Fig. 7. Paratypes of *Lepidopora acrolophos*, n. sp. from Eltanin sta. 1536. A, branch segment with gastropores, dactylopores, ampullae, and coenosteal carinae, x12; B, gastropore surrounded by dactylopores, x34, stereo pair; C, carinate ampulla with coenosteal plug, x79; D, ampulla, gastropores and dactylopores, x36, stereo pair; E, F, coenosteal texture, x215, x715, respectively, Figure 7F is a stereo pair.

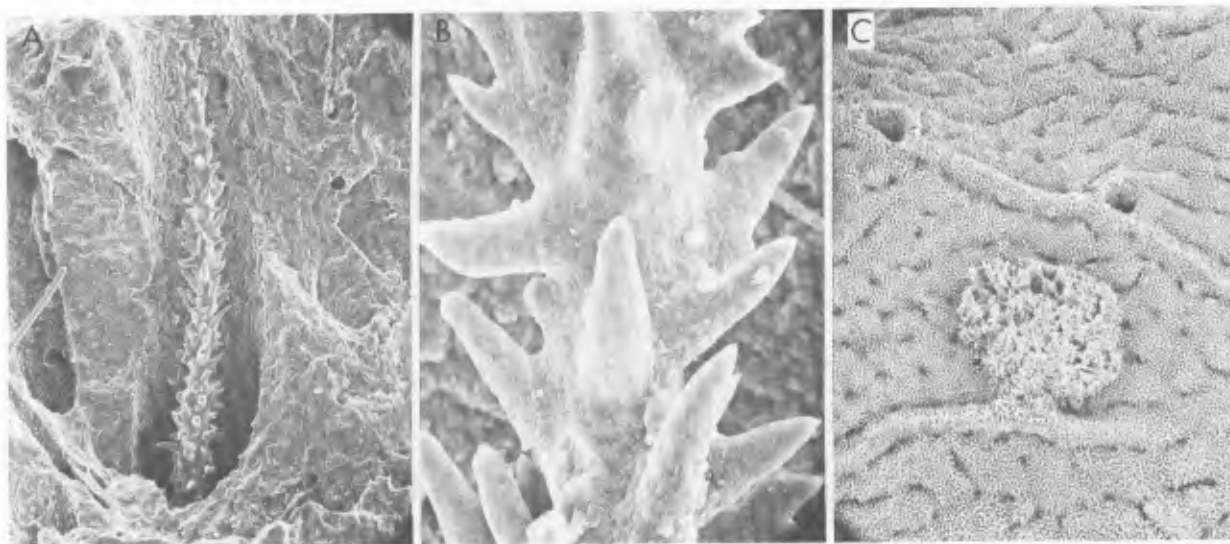


Fig. 8. Paratypes of *Lepidopora acrolophos*, n. sp. from *Eltanin* sta. 1536. A, B, gastrostyle, x93, x715, respectively; C, porous secondary deposition of calcium carbonate, x33.

slender, pointed branch tips about 1.5 mm in diameter. Attachment is unknown.

On slender, distal branches the coenosteum is striate, bearing shallow longitudinal furrows about 14  $\mu$ m in diameter. The furrows are spaced about 0.10 mm apart. On larger-diameter branches the furrows are discontinuous and irregular in length and orientation, forming a reticulate pattern. The elongate strips of coenosteum defined by two parallel furrows are sometimes elevated into a distinct ridge, up to 0.07 mm high. These ridges usually link dactylopore mounds in longitudinal series, forming short crests between each pore. The ridges also meander, bifurcate, and reanastomose, invariably having junctions on the top of female ampullae. The coenosteum is papillose, covered by a dense concentration of vertical, irregularly shaped pillars 3.5-10  $\mu$ m in diameter and about 15-20  $\mu$ m tall. Adjacent pillars are usually fused together at the surface in groups of two to five. About 7-10  $\mu$ m from the tops of the pillars there is a complex, irregular, interconnecting network uniting all of the individual and fused groups of pillars, and 5-10  $\mu$ m farther down is the solid surface of the branch. The microarchitecture of the coenosteum is therefore a very complicated structure (Figure 7F).

Gastropores are round, about 0.3 mm in diameter, and unlippered. A branch cross section reveals a bundle of pores, usually two or three large, peripheral (0.2 mm in diameter) gastropore tubes and a central core of 8-12 smaller dactylopore tubes (about 90  $\mu$ m in diameter). Gastrostyles are needle

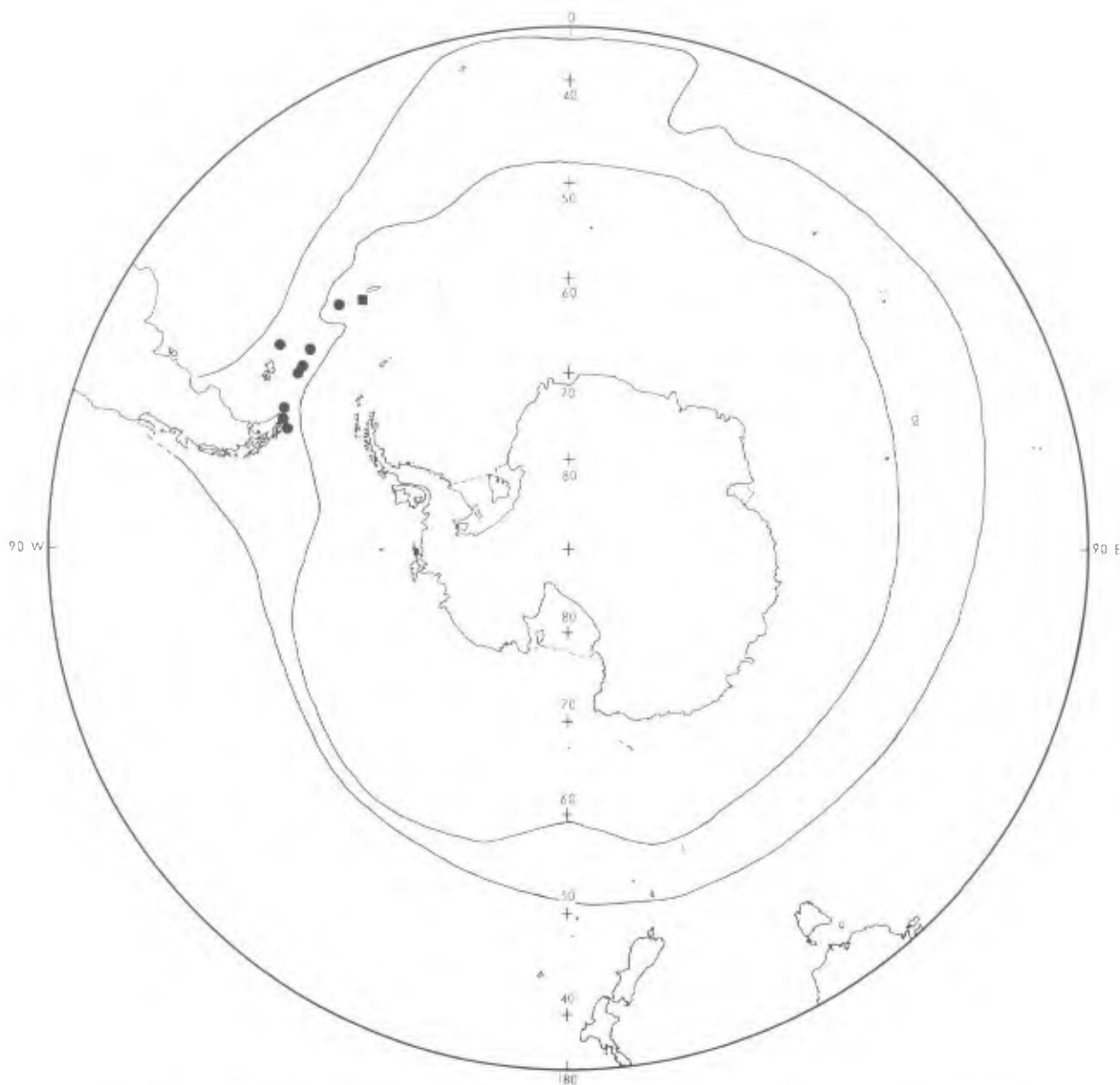
shaped, long and slender with a pointed tip. The illustrated style (Figure 8A) is 0.64 mm tall and 0.033 mm wide, for a H:W ratio of 19.3. The entire length of the style is ornamented with large spines. The robust spines, up to 36  $\mu$ m long, are sometimes longer than the width of the style to which they are attached.

Dactylopores are always elevated as small mounds resembling small truncated volcanoes. The round dactylopore is 82-105  $\mu$ m in diameter, and the mound is elevated as much as 0.49 mm. The pores are often aligned in longitudinal rows of up to 15 pores and linked by coenosteal ridges.

Male ampullae are mammiform, not much larger than dactylopore tubercles (0.45-0.49 mm in diameter), each usually bearing a tiny pore at its apex. Female ampullae are much larger (0.90-1.30 mm in diameter), hemispherical, and usually ornamented with coenosteal ridges. Some female ampullae, perhaps those that have already released their planulae, are partially excavated, and the remainder of the ampulla forms a ridged hood overhanging the cavity. The cavity is usually filled in by an irregular porous 'plug' of calcium carbonate. The plug is of a different shade of white than the coenosteum and appears to be a secondary, later deposition. There are also irregularly shaped (up to 1 mm in diameter) deposits of the same kind of calcium carbonate on the coenosteum (Figure 8C), not associated with the ampullae. The function of these structures is unknown.

**Discussion.** This species is placed in *Lepidopora* on the basis of the similarity of





Map 2. Distribution of Sporadopora granulosa (circles) and Lepidopora acrolophos (square).

its linearly arranged, perforated dactylopore tubercles to those of L. glabra. It differs from L. glabra by the absence of gastropore lower lips, the absence of gastropores at branch axils, and the presence of a highly modified striate coenosteum and dactylopores on all sides of the distal branches. Lepidopora acrolophos is distinguished from all other species of Lepidopora by its lack of gastropore lips and its unique coenosteal texture.

Etymology. The specific name acrolophos (Greek: mountain crest) refers to the sharp

carinae linking adjacent dactylopore tubercles.

Material examined. Types.

Types. Holotype: Eltanin sta. 1536 (male), USNM 60189. Paratypes: Eltanin sta. 1536 (3 branches, female), USNM 60134. Type-locality: 54°29'S, 39°22'W (Scotia Ridge west of South Georgia), 659-686 m.

Distribution. Known only from type-locality (Map 2).

Genus Errinopsis Broch, 1951

Diagnosis. Colonies uniplanar, branching highly anastomotic, forming reticulate

flabella. Coenosteum reticulate and/or striate and granular. Ridged gastrostyles present, dactylostyles absent. Dactylopores polymorphic, occurring as perforated tubercles and accompanied by tall, slitted or solid spines. Ampullae hemispherical. Type-species: Errinopsis reticulum Broch, 1951, by original designation.

5. Errinopsis reticulum Broch, 1951  
Figs. 1G, 1H, 9A-9H

Errinopsis reticulum Broch, 1951a, pp. 37-41, pl. 2, fig. 2, pl. 3, figs. 1,2, text figs. 3-7.--Boschma, 1957, p. 59.--Lowe, 1967, pp. 93-95, pl. 8, fig. a, text figs. 14a-14c.--Boschma, 1966b, p. 117.--Boschma and Lowe, 1969, p. 15, pl. 5, map 4.--Bellisio et al., 1979, p. 265, fig. 74.

**Description.** The colony is flabellate, composed of a dense network of anastomosing branches. Larger colonies have secondary flabella, which project at a right angle to the main colony. Sometimes two or more of these fans intersect at right angles forming open-ended chambers or small baskets (Figure 1G). Branches are rectangular to elliptical in cross section, the greater axis of the branch being oriented perpendicular to the fan. The ratio of length (lateral side perpendicular to fan) to width of branch cross section is up to 4. Branches are arranged in one of two configurations. In one case the upward growing branches are very closely spaced, subparallel, with few transverse branches. This produces elongate, vertical fenestrae of approximately 5.5 x 1.5 mm in diameter. In other colonies the vertical and transverse branches are of equal spacing, producing irregularly round or square fenestrae about 4 x 4 mm in size. In both cases a dense sieve is constructed enclosing hundreds of irregularly shaped fenestrae. The dactylozooids and gastrozooids that occur on the edges of the branches toward the fenestrae probably completely filter the water passing through. Branches remain about the same diameter from tip to base. Largest branches are 6.5 x 1.8 mm in diameter. The largest colony examined is 24 cm tall and 14 cm across. Colony attachment is unknown, but because the branches do not thicken basally, it is assumed that colonies have multiple attachments of narrow-diameter branches and perhaps an encrusting base.

The coenosteum is dense, porcelaneous, and orange to pink. Thin, discontinuous, elongate (2.2-7.5  $\mu$ m wide) coenosteal slits occur in parallel or reticulate arrangement. The slits divide the coenosteum into strips about 50  $\mu$ m in width. The coenosteum is sparsely covered with low, blunt granules about 6-8  $\mu$ m in diameter.

Gastrospores are round, 0.15-0.30 mm in diameter, and occur on all sides of the branches but are more common on the broad sides of branches (facing fenestrae), where they sometimes are arranged in rows. Gastrostyles are spindle shaped with pointed tips; the thickest part of the style is at the midpoint. The basal main shaft is highly ridged, with small, blunt-tipped spines arranged along the thick ridges. Ridges are less prominent on the distal half of the style, where the spines are thornier and larger and have pointed tips. The illustrated gastrostyle (Figure 9G) is 0.50 mm tall and 0.15 mm wide, for a H:W ratio of 3.3.

Dactylopores are quite variable in shape and size. The smallest and most frequent kind are round, 45-70  $\mu$ m in diameter, and raised slightly above the surface (about 25  $\mu$ m) on a small mound. Another type has dactylopore spines in the shape of rounded tubercles, with a narrow slit down one side, very similar to those of E. (E.) antarctica. These spines are up to 0.87 mm tall and usually adcauline. Similarly shaped spines without a slit also occur (Figure 9H). There are also spines with only distal pores. The slit tubercles often elongate apically, forming one or two thin extensions, which can increase its height up to 1.7 mm. These narrow extensions come into contact with dactylopore spines from adjacent branches, fuse with them, reinforce the connection, and thereby produce a branch anastomosis. These spines may bear, in addition to the one narrow slit, numerous other pores on their sides. These modified spines occur most frequently on the broad sides of branches (facing the fenestrae), whereas the simple slit spines occur primarily on the thinner outside edges of the branches. The surface coenosteum of dactylopore spines is similar to that of the branches or composed of densely fused, imbricated platelets (Figure 9D). There is a definite anterior/posterior differentiation of the colony, the posterior side having much lower dactylopore spines. Dactylopore spines are also progressively reduced in size and number away from the actively growing colony edges.

Ampullae are low, inconspicuous bulges in the coenosteum, 0.65-0.77 mm in diameter. No sexual dimorphism was observed in the specimens examined, and none of the ampullae were ruptured.

**Discussion.** In some respects, E. reticulum is similar to Errina (E.) laterorifa, particularly in coenosteal texture and color, some of its dactylopore spines, and its tendency to form fenestrate colonies. However, the branch anastomosis of E. reticulum is very regular, not coincidental as in E. laterorifa, justifying its placement in a different genus.

The following stations are the only docu-

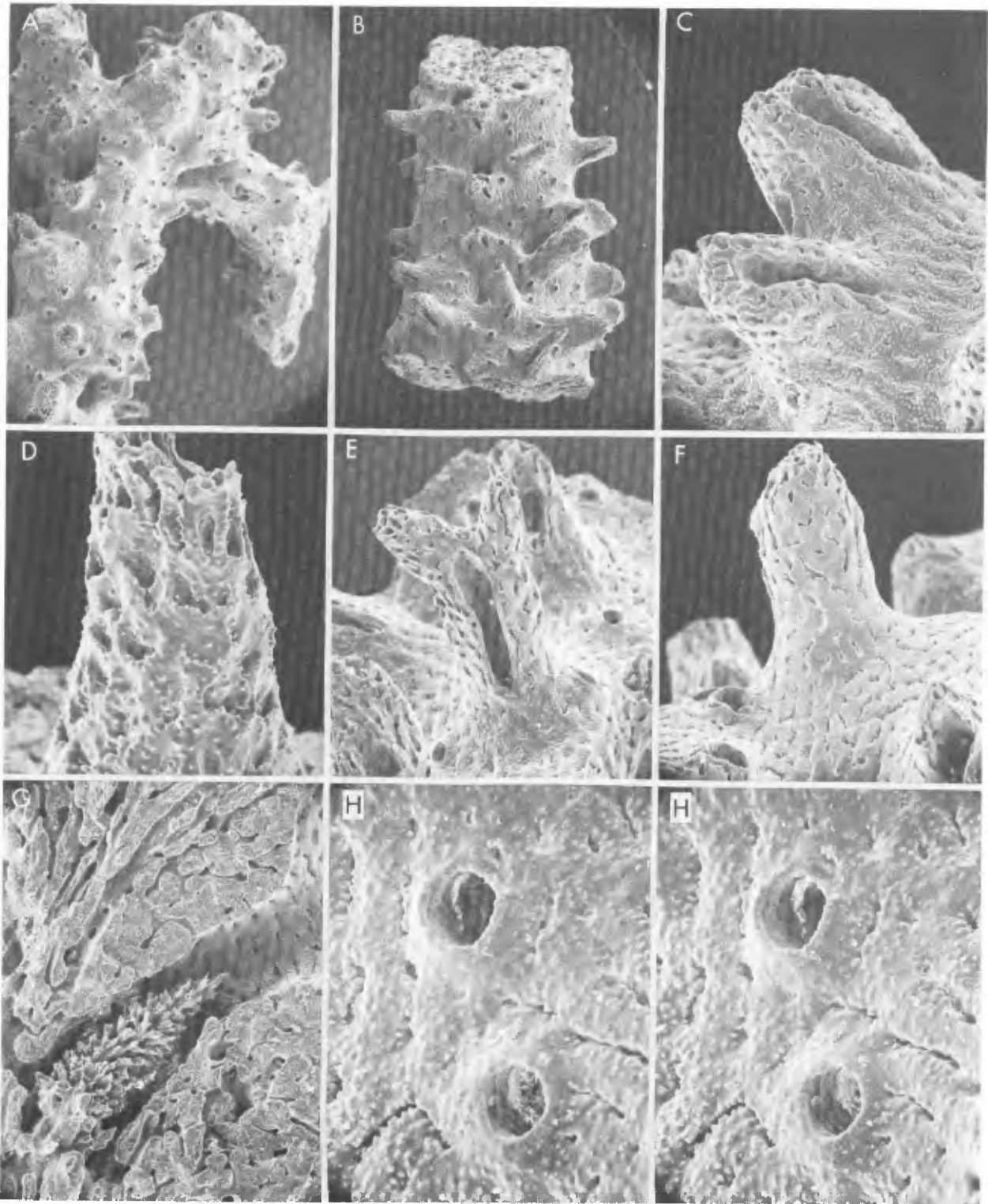


Fig. 9. *Errinopsis reticulum* Broch. A, Hero sta. 715-895, branch segment, x16; B, Hero sta. 715-879, branch segment, x15; C-E, same station, dactylopore spines, x71, x112, x57, respectively; F, Hero sta. 715-895, dactylopore spine without pore, x71; G, same station, gastrostyle, x61; H, Hero sta. 715-879, dactylopore mounds and coenosteal texture, x186, stereo pair.

mented records of this species aside from the type-locality.

**Material examined.** Eltanin sta. 369, USNM 52642; sta. 970, USNM 52641, 52691. Hero sta. 715-875, USNM 60108; sta. 715-879, USNM 60105; sta. 715-881, USNM 60110; sta. 715-887, USNM 60106; sta. 715-894, USNM 60107; sta. 715-895, USNM 60109. WH sta. 19-176, ZIZM. Burdwood Bank, depth unknown, USNM 60111. WS sta. 228, BM 1950.1.11.703; sta. 824, BM 1977.8.10.10; sta. 825, BM 1949.12.20.204; sta. 840, BM 1977.8.10.8.

**Types.** Two allotypic syntypes from four colonies were designated by Broch, all collected at WS sta. 246. Deposition unknown. Type-locality: 52°25'S, 61°00'W (south of Falkland Islands), 208-267 m.

**Distribution.** Known from a small geographical area bounded by Tierra del Fuego, the Burdwood Bank, and the Falkland Islands (Map 3). Depth: 250-771 m.

6. Errinopsis fenestrata, n. sp.  
Figs. 11, 10A-10G

Errinopsis fragilis Lowe, 1967, pp. 90-92, pl. 7, figs. c-e, text figs. 13a-13d (part: not Eltanin sta. 1088) (unpublished manuscript name).

Errinopsis n. sp. Boschma and Lowe, 1969, p. 15, pl. 5, map 4 (part: not Eltanin sta. 1088).

**Description.** The colony is delicate and flabellate, composed of a network of anastomosing branches enclosing numerous fenestrae of variable shape and size, ranging from round to square to elongate-rectangular. No accessory fans are present in the type-material. Branches are oval, rectangular, or elliptical in cross section, the greater axis being oriented perpendicular to the plane of the fan. The ratio of length (lateral side perpendicular to the fan) to width of branch cross section ranges from 1 to 2.2 (e.g., 1.2 x 1.7 mm or 0.82 x 1.8 mm); the largest branch is only 3 mm in diameter. The largest colony, a broken, worn piece, is 33.2 x 24.0 mm. The colony attaches primarily by the original main stem and secondarily by distal branches that grow downward and come into contact with the substrate. The main branch and the secondary contacts produce thin encrustations, which firmly anchor the colony to dead Scleractinia, or other stylasterines, such as E. fenestrata and Adelopora pseudothyron.

The coenosteum is dense, slightly porcelainous, and white. The texture is similar to that of E. reticulum: thin, subparallel coenosteal slits divide the surface into elongate longitudinal strips about 55-80  $\mu$ m wide. Low, sparsely distributed granules, 6-8  $\mu$ m in diameter, cover the coenosteum.

Errinopsis fenestrata differs slightly from E. reticulum in its generally shorter, more discontinuous coenosteal slits (often reduced to aligned pores) and a greater tendency for linear striation, lacking the reticulate pattern.

Gastropores are round to elliptical, 0.25-0.41 mm in diameter, occurring on the anterior and anterolateral (facing the fenestrae) branch edges. Some gastropores are surrounded by a ring of several dactylopore spines or at least two or three loosely fused spines forming a kind of abcauline lip. The gastropore tube is composed of a spherical basal chamber, which is constricted apically and reexpands gradually toward the branch surface as a cylindrical cavity. The gastrostyle is very distinctive. Supported by a narrow cylindrical base, it rapidly expands into a thick, highly ornamented middle section, then gradually tapers to a point, the distal third being highly ridged and sparsely ornamented. The tip extends above the lower gastropore tube chamber and often extends to the surface of the branch. The illustrated style (Figure 10G) is 0.47 mm tall and 0.21 mm wide, with a 0.07-mm-wide basal main shaft, for a H:W ratio of 2.2.

As in E. reticulum, the dactylopores are variable in size and shape. Small perforated tubercles with pore diameters of 26-35  $\mu$ m are common but hard to see against the white background. Normal dactylopore spines are short and slender, about 0.35 mm tall and 0.14 mm wide, bearing one short, longitudinal slit on the side or a round slit at the top. Those spines that occur near a gastropore are often enlarged in both height and diameter and have additional slits on the blunt, cylindrical structure. These spines continue to elongate, sometimes bifurcate, and eventually form small branchlets. Some of these branchlets fuse with others, forming the reticulation; others remain free, terminating within the fenestrae.

Prominent, hemispherical ampullae, 0.63-0.80 mm in diameter, occur on both the anterior and the posterior sides. They are often knobby in relief, caused by the presence of perforated dactylopores. Few ampullae are ruptured, and there is no evidence of sexual dimorphism.

**Discussion.** Errinopsis fenestrata differs from E. reticulum, the only other species in the genus, by having (1) smaller, more delicate colonies and branches, (2) white coenosteum, (3) smaller, perforated dactylopores, (4) more irregularly shaped fenestrae with some free branching within these spaces, and (5) rudimentary abcauline gastropore lips.

**Etymology.** The specific name fenestrata (Latin: windowed) refers to the irregular fenestrae produced by the highly anastomotic branching.

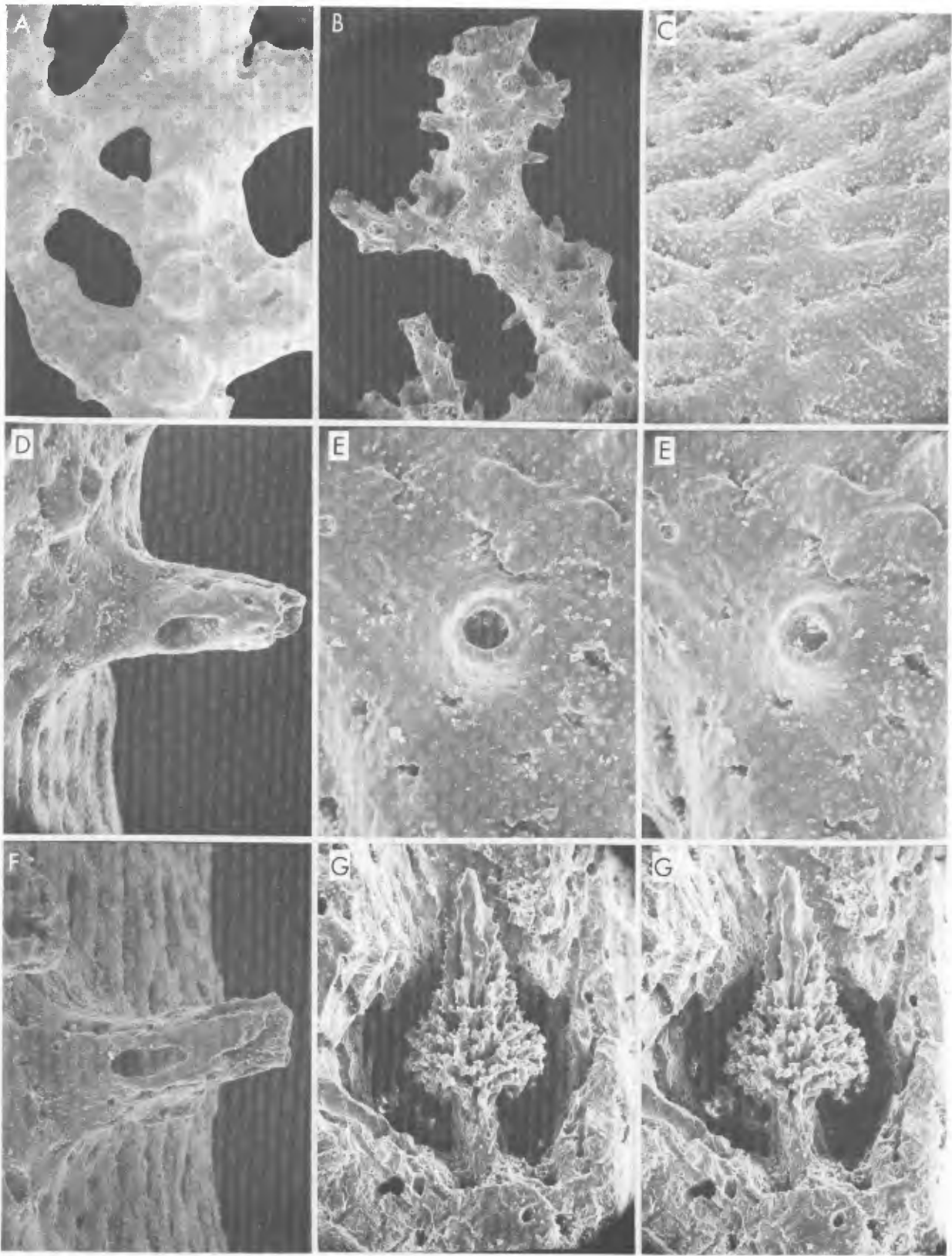
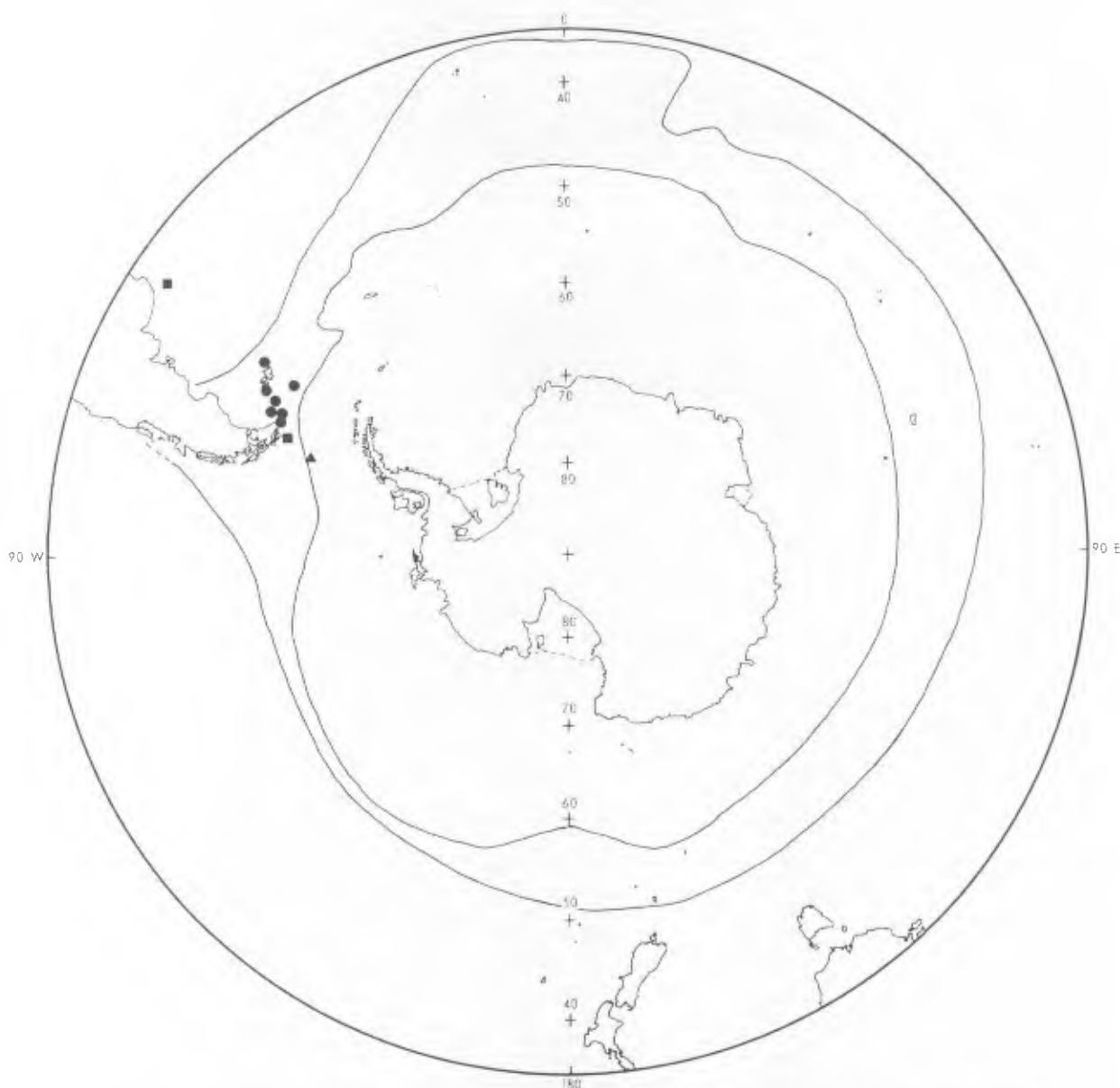


Fig. 10. Paratypes of *Errinopsis fenestrata*, n. sp. from Eltanin sta. 254. A, fenestrated branch segment with ampullae, x14; B, branch segment, x17; C, coenosteal texture, x143; D, F, dactylopore spines, x129, x143, respectively; E, dactylopore mound, x250, stereo pair; G, gastrostyle, x107, stereo pair.



Map 3. Distribution of *Errinopsis reticulum* (circles), *E. fenestrata* (triangle), and *Cheiloporidion pulvinatum* (squares).

Material examined. Types.

Types. Holotype: Eltanin sta. 254, USNM 52693. Paratypes: Eltanin sta. 254, USNM 52694, 52696, BM 1981.6.11.6, RMNH Coel. 14.111. Type-locality: 59°49.4'S, 68°51.7'W (seamount in Drake Passage), 280-340 m.

Distribution. Known only from type-locality (Map 3).

Genus Cheiloporidion, n. gen.

Diagnosis. Colonies uniplanar and fenestrated; branches carinate. Coenosteum smooth

(not granulated), composed of convex coenosteal strips in a reticulate pattern. Gastropores not lipped; gastrostyles robust and ridged. Dactylopores rimmed; no dactylostyles. Ampullae hemispherical. Type-species: *C. pulvinatum*, n. sp.

Discussion. Cheiloporidion is most similar to the two previously described species in the genus Errinopsis. It has the color and reticulate coenosteal architecture of *E. reticulum* and a growth form and gastrostyle structure similar to that of *E. fenestrata*. (If the gastrostyle of *E. fen-*

strata were compressed vertically it would resemble that of *C. pulvinatum*.) Significant points of difference of *Cheiloporidion* include (1) consistently reticulate texture with smooth (not granulated), convex coenosteal strips, (2) carinate branches, (3) no dactylopore spines, and (4) rimmed dactylopores, not raised on mounds. It is particularly characters 3 and 4 that are emphasized to distinguish *Cheiloporidion* from *Errinopsis*.

The dactylopores of *C. pulvinatum* are quite similar to those of *Sporadopora granulosa*, both having low, rimmed pores; however, the genera are distinguished by other features, such as growth form, texture and color of coenosteum, branch carinae, length of dactylopore tubes, and gastrostyle structure.

**Etymology.** The name *Cheiloporidion* is a combination of 'cheilos' (Greek: rim), 'poros' (Greek: hole), and the Greek diminutive '-idion,' which alludes to the small, rimmed dactylopores of this genus. The gender is neuter.

7. *Cheiloporidion pulvinatum*, n. sp.  
Figs. 11A, 12A-12F

*Errinopsis boschmai* Lowe, 1967, pp. 84-89, pl. 7, figs. a-b, text figs. 12a-12f (unpublished manuscript name).

N. gen., n. sp. Boschma and Lowe, 1969, p. 15, pl. 5, map 4.

**Description.** The colony is flabellate, composed of a loose network of anastomosing branches enclosing irregularly rectangular fenestrae. No accessory fans are present in the type-material. Branches are elliptical to rectangular in cross section, the greater axis of the branch being perpendicular to the fan. The ratio of length to width of branch cross section is up to 2. The largest branch is 8.1 mm in diameter; intermediate-sized branch is 6.2 x 3.4 mm in diameter. The posterior sides of large- and intermediate-diameter branches are broad and flat to gently rounded; however, the posterior side of each distal branch is distinctly keeled by a median ridge about 0.10-0.12 mm wide and 0.15 mm tall. Away from the tip the ridge becomes discontinuous and offset, as though displaced by transverse faulting. The anterior sides of branches are also ornamented by much coarser ridges, about 0.25 mm wide and up to 0.50 mm tall. These carinae are quite discontinuous, not very long, and occur only on the anterior sides of intermediate-diameter branches. (The anterior ridges may be caused by a commensal polychaete worm.) Not all branches anastomose with others. Numerous small-diameter branches (1.0 mm) terminate freely within the confines of the

fenestrae. The largest colony is 8 cm broad and 5 cm high. Colony attachment is unknown.

The coenosteum is dense, not porcelaneous, and light pink. Thin, discontinuous, short coenosteal slits dissect the surface into a reticulate maze of coenosteal strips, which are never arranged in a parallel, longitudinal pattern. The strips are about 50-65  $\mu$ m wide, slightly convex, and have rounded edges (Figures 12C and 12E), giving the appearance of irregularly shaped cushions or pillows. There are no granules. The posterior sides of large branches bear numerous low tubercles about the same diameter as the dactylopores, but they are not perforated.

Gastropores are round, 0.17-0.40 mm in diameter, and arranged in single rows on the lateral or anterolateral branch edges. Occasionally, there will be one smaller gastropore offset from the row on the anterior side. The gastropore tube consists of a spherical basal chamber which leads, via a slight constriction, to a funnel-shaped upper tube that opens to the surface. The gastrostyle is massive and squat, composed of a wide, cylindrical basal main shaft, which abruptly tapers to a lesser diameter at the upper part of the basal chamber. A narrow, pointed tip projects through the gastropore tube constriction and extends almost to the branch surface. The basal main shaft is coarsely ridged; the tapered section bears finer ridges, which are ornamented with coarse spines; and the distal tip is ridged and finely granulated (granules 4-5  $\mu$ m in diameter), with little or no other ornamentation. The illustrated style (Figure 12F) is 0.49 mm tall and 0.35 mm broad, for a H:W ratio of only 1.4.

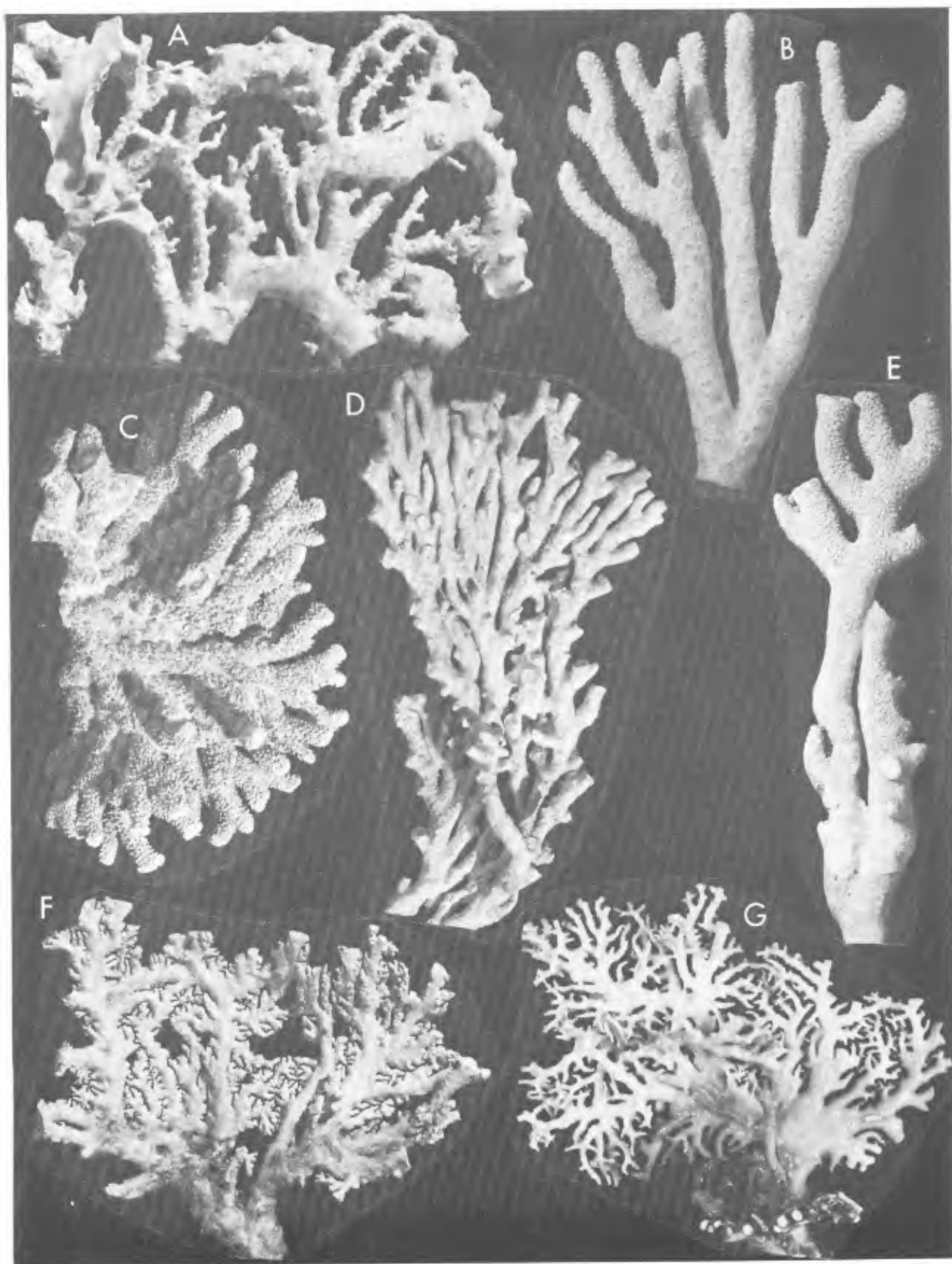
Round dactylopores, 47-80  $\mu$ m in diameter, are very common on the anterior and lateral branch edges. They are not raised on mounds but are conspicuously rimmed by a collar up to 65  $\mu$ m tall. Dactylopore spines are not present.

Ampullae are most common on the anterior and anterolateral branch edges, represented as very low convex bulges. In cross section the ampullae are round to elliptical, 0.42-0.70 mm in internal diameter. No ruptured ampullae were noted.

**Remarks.** This species is infested with a symbiotic polychaete worm, which induces the coral to form a tube on its anterior side. The tube is flattened and elliptical in cross section, the largest measuring 6.5 x 3.0 mm in diameter. The narrow lateral edges of the tube bear elongate pores. Specimens of the polychaete were not collected.

**Etymology.** The adjective 'pulvinatus' (Latin: like a pillow, cushion, pad) refers to the smooth, convex coenosteal strips, which resemble microscopic cushions.

**Material examined.** Types.





Types. Holotype: Vema sta. 17-RD14, USNM 52649. Paratypes: Vema sta. 17-RD14, USNM 52648; sta. 15-PD10, USNM 52650. Type-locality: 38°58'S, 55°17'W (off Mar del Plata, Argentina), 595-642 m.

Distribution. Off Argentina; off Cape Horn, Tierra del Fuego (Map 3). Depth: 642-1137 m.

Genus Errina Gray, 1835

Diagnosis. Colonies arborescent, flabellate to slightly bushy. Adjacent basal branches sometimes fusing but branch anastomosis not widespread or regular. Coenosteum usually reticulatae but sometimes composed of imbricated platelets. Gastrostyles present, dactylostyles usually absent. Dactylopores usually bordered by a grooved spine. Ampullae usually hemispherical and superficial. Type-species: Millepora aspera Linnaeus, 1767, by original designation.

Subgenus Errina Gray, 1835

Diagnosis. Grooved dactylopore spines in the shape of rounded tubercles, the groove of which forming a narrow slit. Grooved spines predominantly adcauline (slit directed proximally) in orientation. Dactylostyles not present.

8. Errina (Errina) antarctica (Gray, 1872)  
Figs. 11C, 13A-13G, 14A-14C

Porella antarctica Gray, 1872a, p. 482;  
1872b, p. 746, pl. 64, fig. 4.

Labiopora antarctica; Moseley, 1879, pl. 35,  
fig. 5; 1881, p. 85, pl. 2, fig. 5.--  
Ridley, 1881, p. 105.

Labiopora moseleyi Ridley, 1881, pp. 106,  
107, pl. 6, figs. 11a-11c.

Errina (Labiopora) antarctica; Hickson,  
1912a, pp. 887, 888; 1912b, pp. 462, 463  
(= forma moseleyi).

Errina (Labiopora) moseleyi; Hickson, 1912a,  
p. 888.

Errina (Eu-Errina) antarctica forma typica;  
Broch, 1942, pp. 42-44, pl. 4, fig. 12,  
text figs. 11a-11c.

Not Errina (Eu-Errina) antarctica forma  
keruelensis; Broch, 1942, pp. 44-46 (= E.  
keruelensis).

Errina (Eu-Errina) spongiosa Broch, 1942, pp.

48-51, 80-81, pl. 4, fig. 16, text figs.  
14a-14d, 28.

Errina moseleyi; Broch, 1951a, p. 46.--  
Boschma, 1953, p. 178; 1957, pp. 55, 56.

Errina spongiosa; Broch, 1951a, p. 46.--  
Boschma, 1957, p. 57.

Errina (Eu-Errina) antarctica; Broch, 1951a,  
pp. 35-37, 44-46 (in part: pl. 2, fig. 1,  
text figs. 1, 2, not pl. 4, figs. 3-6;  
sta. 652 and 2290 only); 1951b, p. 126.

Errina antarctica; Boschma, 1956, p. 288;  
1957, p. 50 (uncritical synonymy); 1964c,  
p. 285; 1965a, pp. 8-17, 2 pls., 5 text  
figs.; 1967, p. 330.--Boschma and Lowe,  
1969, p. 15, pl. 5, map 1 (in part: not  
records south of Antarctic Convergence or  
off Antipodes Islands).--Sorauf, 1974, p.  
40, pl. 6, figs. 1-5.--Fenninger and Flajs,  
1974, pp. 71, 75, pl. 6, fig. 3.

Not Errina (Luesrina) antarctica; Niino, 1958,  
pl. 2, fig. 4 (misspellings).  
Not Errina antarctica; Naumov, 1960, pp. 555,  
556 (= Errinopora).--Boschma, 1966b, pp.  
109, 117 (= E. fissurata and E. laterorifa).

Errina (Errina) antarctica; Boschma, 1963a,  
p. 337.--Lowe, 1967, pp. 51-58 (in part;  
not Eltanin sta. 993, Vema sta. 17-12, 17-  
100), pl. 3, figs. a-b, text figs. 6a-6i.

Errina (Errina) spongiosa; Boschma, 1963a,  
p. 337.

Errina (Errina) moseleyi; Boschma, 1963a,  
p. 337.

Not Errina cfr. antarctica; Eguchi, 1964,  
pp. 4, 5 (probably E. gracilis).

Description. Colonies are usually uni-  
planar, the branches often forming a dense  
flabellum spreading over 180° of arc. Basal  
branches of large flabellate colonies usually  
fuse, forming a thick stem. Slightly bushy  
colonies with no branch anastomosis also  
occur. Branches are round to slightly  
elliptical in cross section, gradually  
decreasing in size toward the blunt tips.  
The largest specimen examined (forma moseleyi)  
is 18.3 cm tall; the thickest basal branch  
diameter is 15.3 mm. Colonies are firmly  
attached to large, pebble-sized rocks, bi-  
valve shells, and gorgonian axes by an ex-  
pansive, encrusting base.

The coenosteum is orange, except for  
branch tips, inner branch core, and sometimes  
the ampullae, which are white. Coenosteum  
texture is coarse, composed of a reticulate

Fig. 11. A, Cheiloporidion pulvinatum n. sp., holotype, Vema sta. 17-RD14, USNM 52649, x1.44; B, Errina (E.) keruelensis Broch, Eltanin sta. 1592, USNM 59903, x1.41; C, Errina (E.) antarctica (Gray), Hero sta. 715-903, USNM 59842, x0.95; D, Errina (E.) laterorifa Eguchi, Eltanin sta. 2026, USNM 59898, x1; E, Errina (E.) fissurata Gray, Eltanin sta. 1875, USNM 60075, x0.75; F, Errina (E.) boschmai, n. sp., holotype, Eltanin sta. 993, USNM 52626, x0.49; G, Errina (E.) gracilis von Marenzeller, lectotype, Institut Royal des Sciences Naturelles de Belgique, Brussels, specimen 387, x0.64.

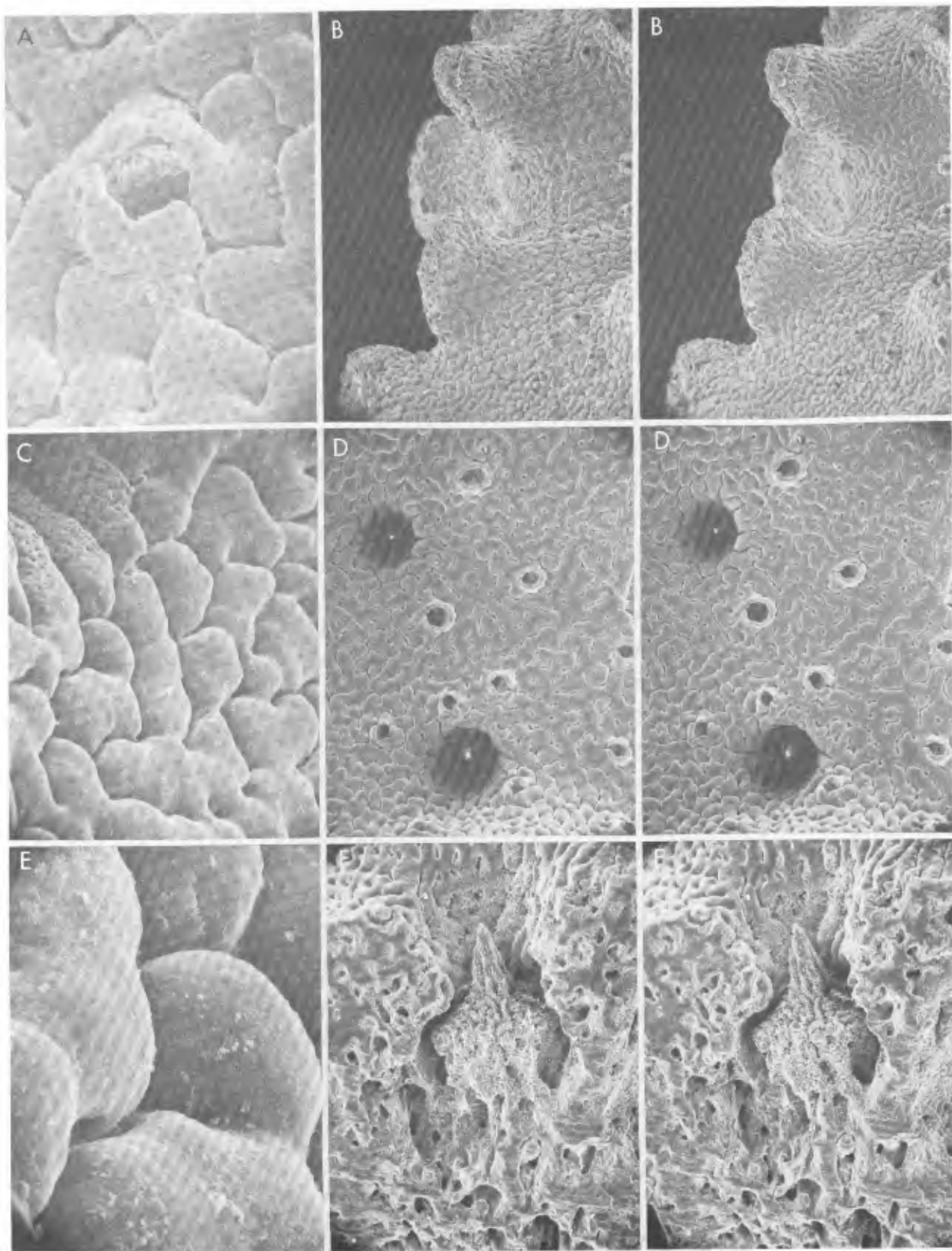


Fig. 12. Paratypes of *Cheiloporidion pulvinatum* n. sp. from *Vema* sta. 17-RD14. A, dactylopore, x250; B, discontinuous branch carina, x31, stereo pair; C, E, coenosteal texture, x215, x715, respectively; D, gastropores and dactylopores, x43, stereo pair; F, gastrostyle, x64, stereo pair.

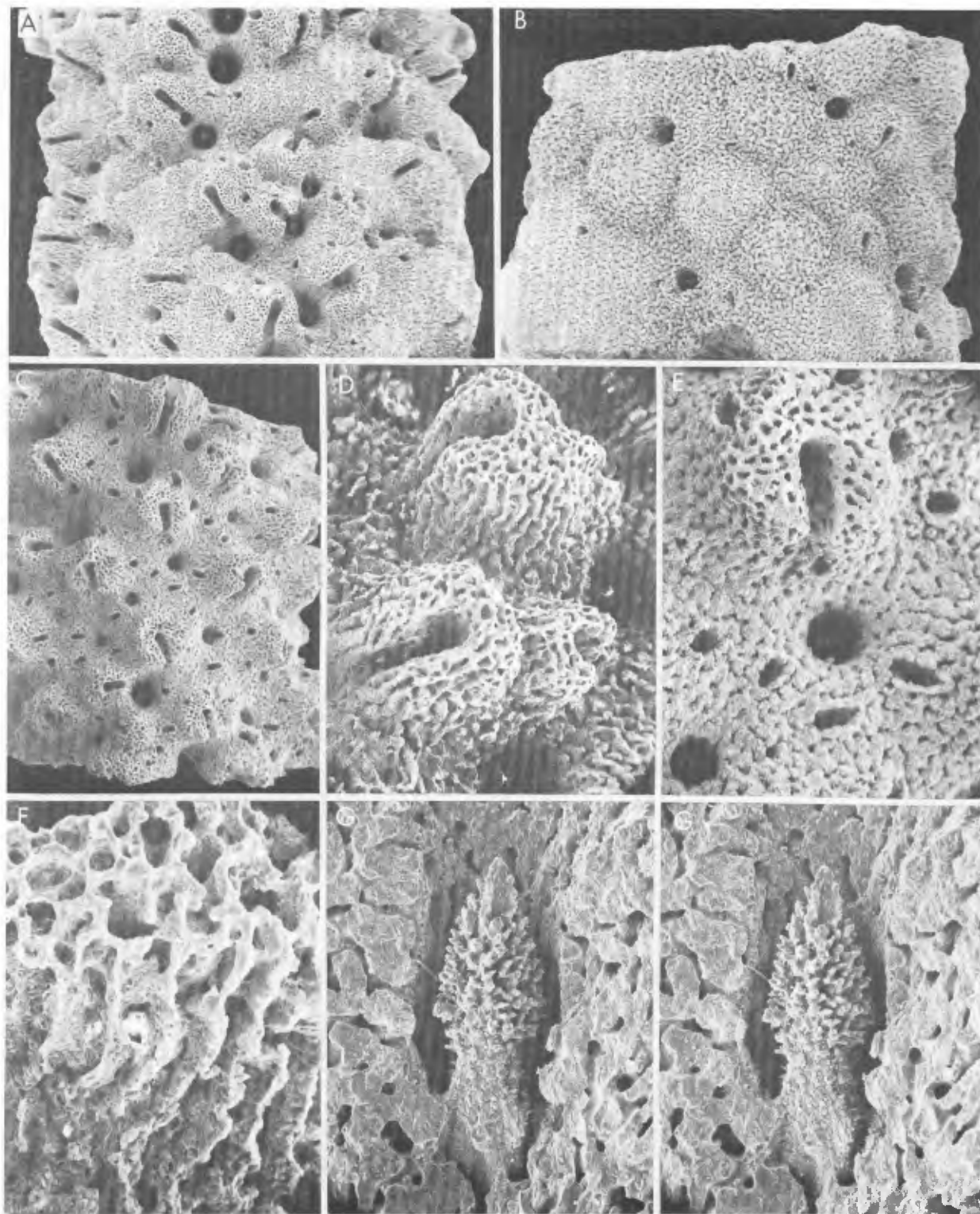


Fig. 13. *Errina* (*E.*) *antarctica* (Gray). A, *Eltanin* sta. 222, gastropores and dactylo-pore spines, x18; B, same station, branch segment with ampullae, x18; C, E, same station, branch segment with many low dactylo-pore spines, x16, x50, respectively; D, F, *Hero* sta. 715-683, cluster of dactylo-pore spines showing ridged sides, x46, x143, respectively; G, same specimen, gastrostyle, x89, stereo pair.

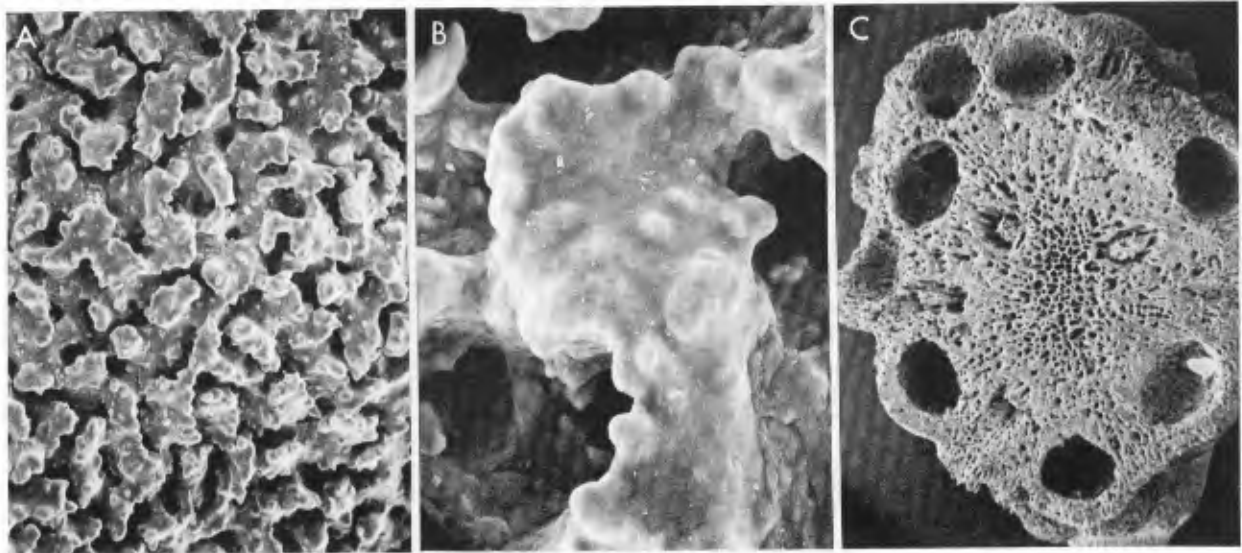


Fig. 14. *Errina (E.) antarctica* (Gray). A, B, *Eltanin* sta. 222, coenosteal texture, x143, x715, respectively; C, same station, cross section of branch cutting through many ampullae, x15.

pattern of coenosteal strips 45-60  $\mu\text{m}$  wide bordered by deep slits about 12  $\mu\text{m}$  wide. The strips are covered with irregularly shaped granules 5-11  $\mu\text{m}$  in diameter.

Gastropores are round, 0.17-0.30 mm in diameter, and are not lipped. The tip of the style is visible from the exterior. Gastrostyles are spindle shaped; the illustrated style (Figure 13G) is 0.49 mm tall and 0.21 mm wide, for a H:W ratio of 2.6. The basal quarter of the main shaft is relatively unornamented, bearing only scattered tiny spines about 20  $\mu\text{m}$  tall and 4  $\mu\text{m}$  in diameter. The remainder of the style bears much larger spines (e.g., 32  $\mu\text{m}$  x 16  $\mu\text{m}$ ) which are arranged singly or in clusters on longitudinal ridges. The tip of the style is sparsely granulated. In thick branches, longer styles are held in place by one to several transverse tabulae, which are about 4  $\mu\text{m}$  thick. One such gastrostyle was 2.9 mm long and 0.107 mm wide (H:W = 26.7).

Dactylopore spines are relatively tall (up to 0.65 mm), are about 0.50 mm wide, and bear slits approximately 0.11-0.13 mm wide. Spines occur singly and in clusters of two to four, sometimes back to back. The single spines usually bear an adcauline slit, but the orientation of the slit in clustered groups is random. The coenosteum composing the sides of the dactylopore spines is vertically striate, composed of thin, parallel ridges, about 11  $\mu\text{m}$  wide, 35  $\mu\text{m}$  tall, and separated from adjacent ridges by about 45  $\mu\text{m}$  (Figure 13F). A second type of small, slit-like dactylopore is also scattered over the coenosteum. These pores are 60-70  $\mu\text{m}$  wide

and 90-170  $\mu\text{m}$  long, flush with the surface, but invariably surrounded by a low rim about 15-20  $\mu\text{m}$  in height.

Prominent, hemispherical ampullae up to 1 mm in diameter are abundant, especially near branch tips. A cross section of a branch might easily cut through 8-10 ampullae. As the branch increases in diameter, the ampullae are covered such that there is no external evidence of them in basal branches, only internal cavities.

**Discussion.** The synonymy of *E. (E.) antarctica* is long and complex for a number of reasons: (1) it is a variable species which led to the description of at least two junior synonyms; (2) it was incorrectly and unnecessarily placed in several different genera and subgenera; and (3) it is a species found in relatively shallow water and therefore frequently collected but not always correctly identified. Until recently, all orange Southern Ocean *Errina* were referred to *E. antarctica*, but it is now clear that there are at least six species of orange *Errina*. *Errina antarctica* is highly provincial, known only from the southern tip of South America. Previous records from south of the Antarctic Convergence and other Subantarctic localities pertain to different species, mainly *E. laterorifa* and *E. fissurata*.

A robust, shallow-water form of *E. antarctica* occurs in the fjords of southwestern Chile (4-119 m). Ridley [1881] named it as a new species, *E. moseleyi*, but Boschma [1965a] showed that it was within the range of variation of *E. antarctica*. It differs primarily in having larger, more erect colonies with

thick, flattened basal branches. Furthermore, the anterior and posterior surfaces are distinguishable, the posterior side having areas devoid of dactylopores or fewer dactylopores. Additional specimens of this form are represented by Eltanin stations 958 and 288 and Hero station 695-209, all from the fjords of Chile. The specimens reported by Hickson [1912b] and subsequently discussed by Boschma [1965b, 1967] from 'Cape Horn' are also forma moseleyi. The robustness and shallow-water occurrence of this form might be explained by its inclusion in nutrient-rich upwelling waters of the Chilean fjords.

A similar phenomenon also occurs with the deep-water, scleractinian coral Desmophyllum cristagalli. Extremely large, robust, pseudo-colonial specimens of this species occur in great abundance in unusually shallow water in the Chilean fjords [Cairns, 1982a]. Its abundance and robustness also suggest an upwelling condition. Coincidentally, the robust form from the fjords was also described as a new species, D. ingens Moseley, 1881, and was later considered as only a forma [Cairns, 1982a].

An undescribed species, similar to E. antarctica, is known from two localities off Uruguay (see Lowe [1967] and Boschma and Lowe [1969] for plots of Vema stations 17-100 and 17-12 (RD)). It differs from E. antarctica in its (1) thicker and shorter gastrostyles, (2) lower and less crowded dactylopores spines, (3) wider gastropores, and (4) light lavender color.

Material examined. Eltanin sta. 217, USNM 52669, 52682; sta. 219, USNM 52677; sta. 222, USNM 52672; sta. 369, USNM 60297; sta. 370, USNM 60243; sta. 958, USNM 59868; sta. 960, USNM 59846; sta. 969, USNM 52668, 52670; sta. 970, USNM 52680; sta. 974, USNM 52678; sta. 980, USNM 52676; sta. 1594, USNM 59860; sta. 1596, USNM 59854; sta. 21-288, USNM 59870. Hero sta. 693-11, USNM 59851; sta. 702-450, USNM 59843; sta. 702-470, USNM 59841; sta. 715-683, USNM 59864; sta. 715-855, USNM 59863; sta. 715-856, USNM 59845; sta. 715-863, USNM 59862; sta. 715-864, USNM 59853; sta. 715-865, USNM 59859; sta. 715-870, USNM 62573; sta. 715-873, USNM 59850; sta. 715-874, USNM 59855; sta. 715-875, USNM 59861; sta. 715-881, USNM 59852; sta. 715-882, USNM 62572; sta. 715-887, USNM 59867; sta. 715-893, USNM 59849; sta. 715-894, USNM 59865; sta. 715-895, USNM 59844; sta. 715-896, USNM 59847; sta. 715-903, USNM 59842; sta. 715-905, USNM 59866; sta. 715-907, USNM 59857; sta. 695-209, USNM 59869. Vema sta. 14-13, AMNH; sta. 14-T15, USNM 52689, AMNH; sta. 14-T16, USNM 52688; sta. 14-19, USNM 52684; sta. 15-98, AMNH; sta. 15-102, USNM 52687; sta. 15-107, USNM 52685, AMNH; sta. 15-112, AMNH. Yelcho sta. 2-7, AMNH. Type of Porella antarctica, BM. Type of Labiopora

moseleyi, BM. Hickson's [1912b] specimens of E. (L.) antarctica from Cape Horn, MNHNP.

Types. Holotype of Porella antarctica, figured by Gray [1872b], deposited at BM (1872.4.29.2). Type-locality: 54°27'S, 59°40'W (off Burdwood Bank), 82 m.

Holotype of Labiopora moseleyi, from 4-18 m off Puerto Rosario, Chile, deposited at BM (1879.12.27.3). Syntypes of Errina (Eu-Errina) spongiosa Broch, 1942, were collected from 53°45'S, 61°10'W (Burdwood Bank), 137-150 m; deposition unknown.

Distribution. Known only from the southern tip of South America from Tierra del Fuego to Punta Rosario, Madre de Dios Archipiélago, Chile; off Falkland Islands and Burdwood Bank. Form moseleyi known only from Chilean fjords (Map 4). Depth: 18-771 m, but rarely deeper than 300 m.

9. Errina (Errina) fissurata Gray, 1872  
Figs. 11E, 15A-15H, 16A-16C

Madrepora fissurata Stokes, 1847, p. 336  
(nomen nudum).

Errina fissurata Gray, 1872b, p. 745, pl. 62, figs. 5-6.--Moseley, 1879, p. 479; 1881, p. 84.--Boschma, 1957, pp. 53, 54; 1964c, p. 284.--Boschma and Lowe, 1969, p. 15, pl. 5, map 2.

Labiopora fissurata; Hickson, 1912a, p. 878.

Errina (Eu-Errina) fissurata; Broch, 1942, p. 38.

Errina (Eu-Errina) antarctica; Broch, 1951a, p. 35 (part: probably sta. 1948).

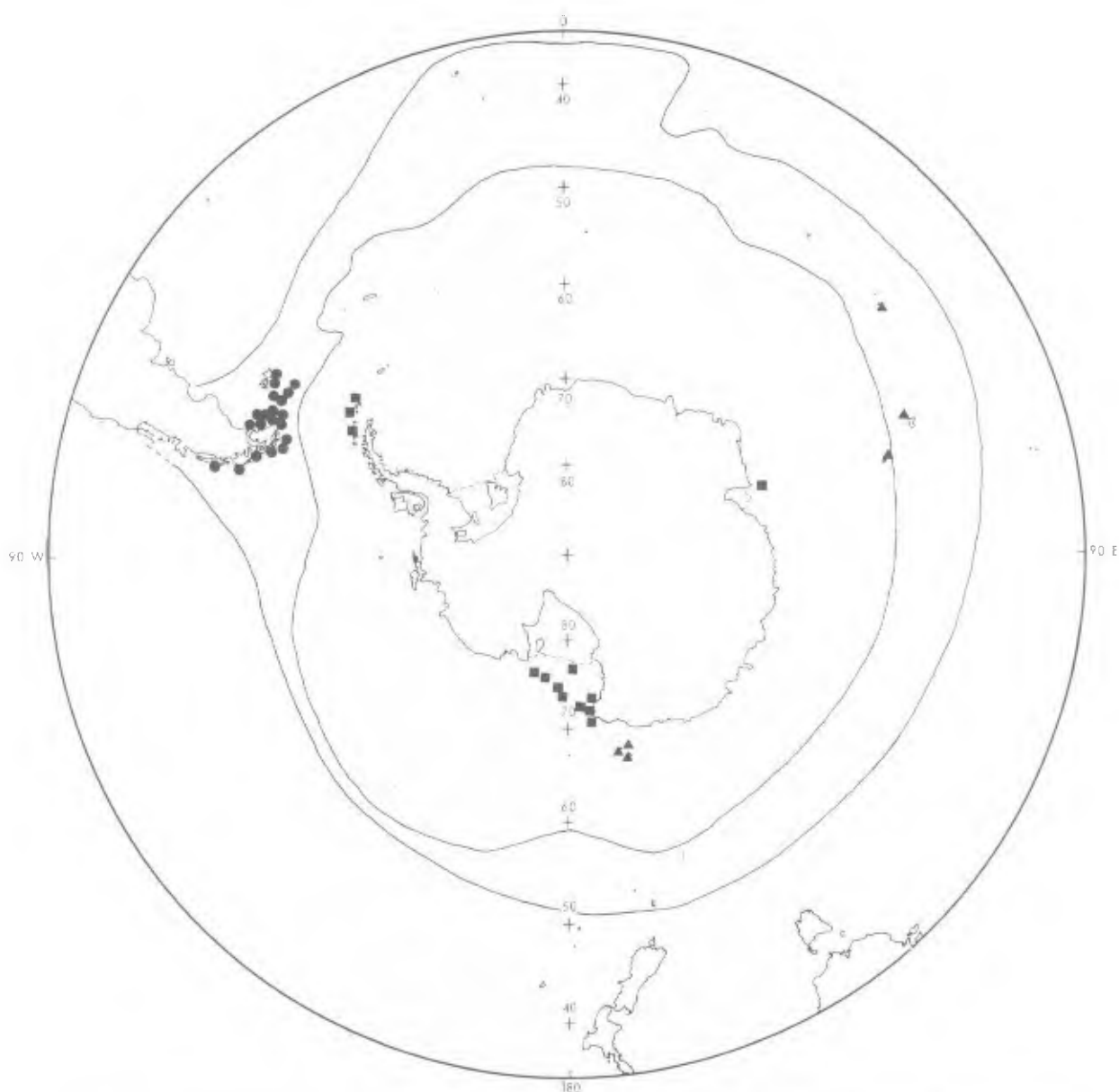
Errina (Errina) fissurata; Boschma, 1963a, p. 337.

Errina antarctica; Boschma, 1966b, p. 109 (part: part of sta. 30).

Description. Like the previous species, E. fissurata forms uniplanar colonies with thickened basal branches which sometimes anastomose into almost solid plates. Distally, the branches are free, round in cross section, and gradually taper to a blunt tip 3.5-4.2 mm diameter. Branching is sparse, and adjacent branches often grow closely parallel for 1-3 cm before bifurcating again. Judging from the largest broken branch fragment (12.3 mm in diameter), this species probably attains a height of up to 20 cm. Attached colonies are rarely collected.

Coenosteal texture is reticulate and solid, having no other coenosteal pores other than the gastropores and dactylopores. The width of coenosteal slits varies from 60 to 110  $\mu$ m. The color of the coenosteum is a uniformly dull, nonporcelaneous orange with a white branch core and light orange ampullae. Blunt granules 5.0-5.2  $\mu$ m in diameter cover the coenosteum but do not occur on the sides of the dactylopores spines.

Gastropores are round, not lipped, and



Map 4. Distribution of *Errina* (*E.*) *antarctica* (circles), *E.* (*E.*) *fissurata* (squares), and *E.* (*E.*) *kerguelensis* (triangles).

0.15-0.43 mm in diameter. Gastrostyle tips are easily visible from the exterior. Gastrostyles vary in shape and length, but most are torchlike with a bare basal main shaft, a robust middle area, and a pointed distal end. A typical gastrostyle (Figure 15H) is 0.51 mm tall, 0.29 mm in diameter at the widest point, and 0.20 mm in diameter at the basal main shaft (H:W = 1.75). Tabulae are sometimes present. The distal two thirds of the gastrostyle is highly ornamented with tall, crowded, multitipped bifurcating spines.

Dactylopoire spines of two kinds project

perpendicularly from the branches. The large spines are rarely clustered, and most have their slits oriented proximally. They are uniformly arranged around distal branches but asymmetrically about basal branches, creating distinct anterior and posterior sides. These larger spines are usually 0.5 mm tall, some up to 1 mm, and about 0.61 mm wide, with a slit width of about 0.1 mm. They usually occur toward the distal ends of branches, becoming shorter and more worn toward the base. The sides of the larger dactylopoire spines are composed of smooth (nongranulated),

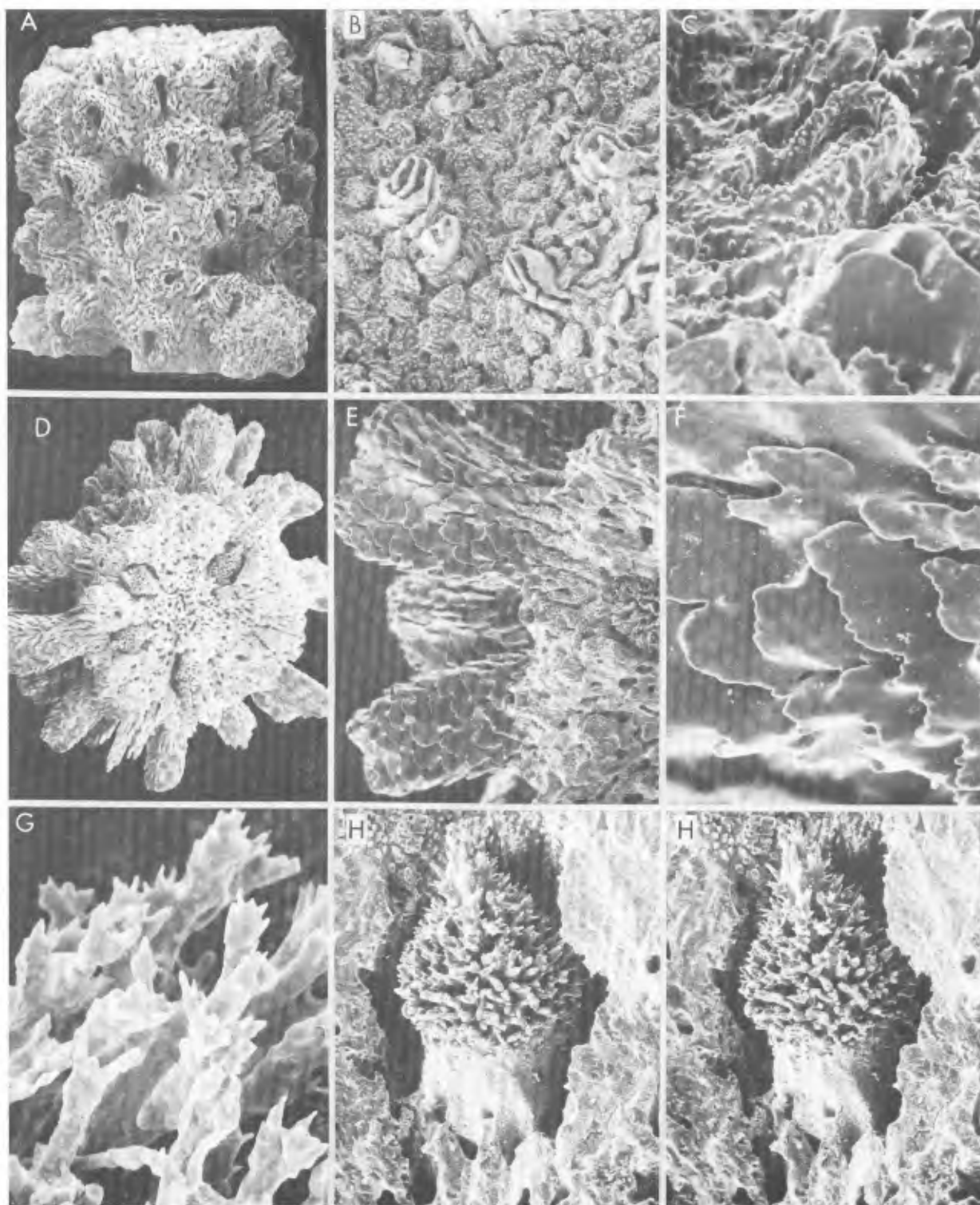


Fig. 15. *Errina* (*E.*) *fissurata* Gray. A, Atka sta. 23, branch segment, x16; B, C, Eltanin sta. 1870, small dactylopore spines, x71, x164, respectively; D, same specimen, cross section of branch revealing gastrostyles, x16; E, F, same specimen showing imbricated scales of dactylopore spines, x42, x170, respectively; G, same station, spines of gastrostyle, x344; H, Atka sta. 23, gastrostyle, x106, stereo pair.

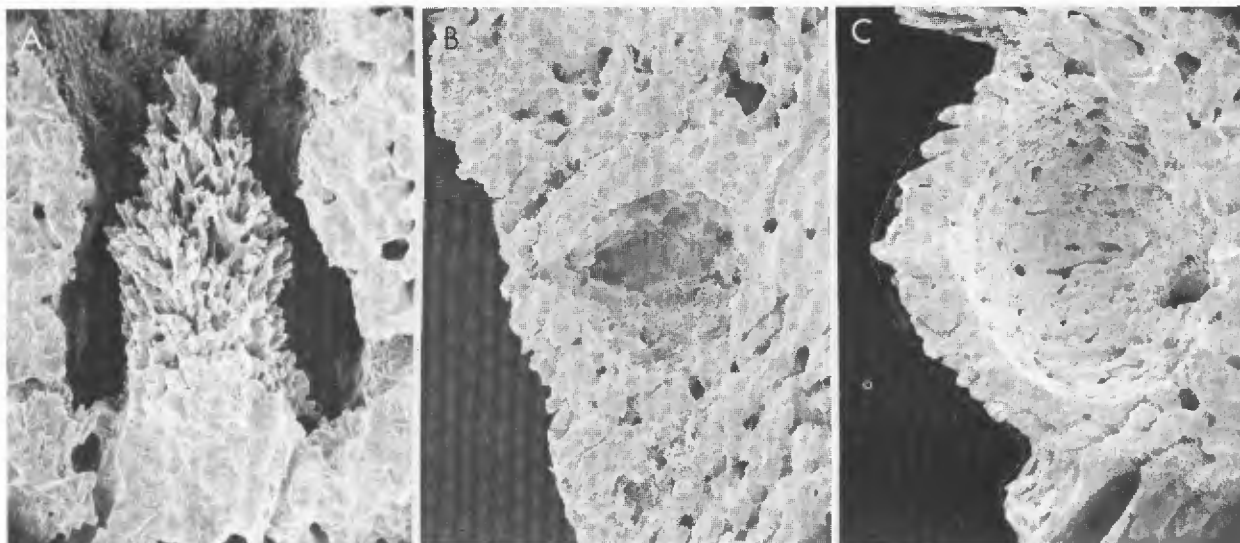


Fig. 16. *Errina* (*E.*) *fissurata* Gray from Eltanin sta. 1870. A, gastrostyle, x71; B, cross section of male ampulla, x46; C, cross section of female ampulla, x46.

fused, overlapping platelets with jagged distal ends. The smaller kind of dactylopore spines, about one-tenth the size of the larger (65  $\mu\text{m}$  tall), occur abundantly between the larger spines and especially on the posterior side, where there are few or no large dactylopore spines. These spines are also composed of platelets or have a solid, granulated surface.

Sexual dimorphism occurs regarding size and position of ampullae. Female ampullae are superficial, appearing as large (0.9-1.3 mm in diameter and up to 0.61 mm tall), hemispherical bulges on the coenosteum. Often dactylopore spines partially obscure their outline. Male ampullae are smaller, 0.49-0.65 mm in internal diameter, and buried just beneath the coenosteal surface, sometimes with a small efferent duct leading to the surface. Often three or four male ampullae are present in a cross section of a branch. All ampullae are round to elliptical, the elliptical cavities having their greater axes parallel to the surface. Ruptured ampullae were not seen.

Remarks. *Errina fissurata* was collected in great abundance (hundreds of broken branches) from several Eltanin stations in the western Ross Sea. It is invariably collected with another orange *Errina*, *E.* (*E.*) *laterorifa*, and *E.* (*I.*) *labiata*. *Errina fissurata* is usually the dominant coral component of the assemblage.

Discussion. Gray described *E. fissurata* on the basis of a single drawing, the specimen of which was lost before the description was made; however, H. Zibrowius (personal communication, 1981) informed me that topo-

typic specimens have recently been found at the British Museum. Although there are a number of literature references to *E. fissurata*, only those identified as *E. antarctica* represent valid distributional records. Therefore until recently, *E. fissurata* has been known only from its brief original description and no type-material.

*Errina fissurata* is grossly similar to *E. antarctica*, especially in color, colonial form, and coenosteal texture, and probably for these reasons both Boschma [1966b] and Broch [1951a] identified continental Antarctic specimens of *E. fissurata* as *E. antarctica*, the latter known only from off South America. Aside from the distinct geographic separation, *E. fissurata* is most easily differentiated from *E. antarctica* by its more erect, vertically growing branches and sparser branching with longer distances between bifurcations. In addition, *E. fissurata* has a more robust gastrostyle, differently sculptured and more homogeneously arranged dactylopore spines, and sexual dimorphism of the ampullae. Also, thus far, *E. antarctica* has rarely been collected deeper than 300 m, and *E. fissurata* rarely shallower than 300 m.

Material examined. Eltanin sta. 993, USNM 52675; sta. 1870, USNM 59876; sta. 1873, USNM 59875; sta. 1875, USNM 59882; sta. 1877, USNM 59874; sta. 1924, USNM 59884; sta. 1995, USNM 59873; sta. 1996, USNM 59872; sta. 1997, USNM 59883; sta. 2007, USNM 59881; sta. 2026, USNM 59878; sta. 2092, USNM 59879; sta. 2095, USNM 59871; sta. 2097, USNM 59880. Hero sta. 721-725, USNM 59877. Atka sta. 23, USNM 52706-52709. Burton Island sta. 3, USNM 52710. NZOI sta. A-445, A-449, A-455, A-463, A-464,



A-465, A-521, A-527, E-179, E-180 (all deposited at the NZOI). BANZARE sta. 30, RMNH.

Types. Topotypic specimens of E. fissurata deposited at BM (H. Zibrowius, personal communication, 1981), BM 1890.11.27.1. The type-locality, as stated by Gray [1872b], was simply 'Antarctic Ocean ... entirely destitute of any special habitat.' Apparently, Gray overlooked an earlier paper by Stokes [1847], who stated that Madrepora fissurata was collected at 72°31'S, 173°39'E, 270 fm (494 m) on January 19, 1841, which constitutes the type-locality (H. Boschma, unpublished manuscript, 1969).

Distribution. Known only from the Ross Sea, South Shetland Islands, and eastern coastal Antarctica (Map 4). Depth: 146-796 m, but rarely shallower than 300 m.

10. Errina (Errina) kerguelensis Broch, 1942  
Figs. 11B, 17A-17G

Errina (Eu-Errina) antarctica forma kerguelensis Broch, 1942, pp. 44-46, text fig. 12; ?1951a, pp. 35-37 (part: probably sta. 2200, pl. 4, figs. 3-4).

Description. Colonies are uniplanar, up to 12 cm tall and 7 cm wide, with a basal branch diameter up to 6.5 mm. Branches do not anastomose, are round to slightly elliptical in cross section, and gradually taper to blunt distal tips 2-3.5 mm in diameter. Branching axils are gently U shaped. Colonies attach to large pebble-sized rocks by nonexpansive bases.

The coenosteum is solid and very coarse, composed of a reticulate maze of short coenosteal strips varying from 80 to 110  $\mu$ m in width, which are delimited by short, discontinuous slits. The slits bear small pores that penetrate the surface of the branch. The texture of the coenosteal strips is not granular, as in most other species of Errina, but composed of a labyrinthine arrangement of irregularly bifurcating low ridges of variable length (about 8  $\mu$ m wide) interspersed with small, irregularly shaped granules (Figure 17E). The microtexture is therefore very rough and also uneven in relief. The coenosteum is light orange in color; branch tips and branch cores are white.

Gastropores are round, not lipped, and 0.20-0.41 mm in diameter. The pointed tip of the gastrostyle is easily visible from the exterior. Gastrostyles are spindle to bullet shaped and rarely exceed 0.40 mm tall. The illustrated style (Figure 17G) is 0.30 mm tall and 0.12 mm wide; H:W ratios vary between 2.4 and 2.6. Styles are rather sparsely ornamented, bearing short spines from base to tip, revealing most of the main shaft to view. Each style bears several dozen large blunt spines, about 18 x 13  $\mu$ m,

and numerous smaller, slender spines, about 11 x 4  $\mu$ m. The gastropore tube in the vicinity of the upper third of the style is slightly constricted and bears large, round tubercles up to 39  $\mu$ m in diameter and 27  $\mu$ m tall.

Dactylopore spines are short and truncate, rarely taller than 0.45 mm, and, on distal branches, consistently oriented with their slits pointed proximally. They are about 0.41 mm wide, and the dactylopore slit is usually 0.10 mm wide. Spines on the posterior side of the colony are fewer in number and shorter, sometimes almost flush with the surface. Spines are larger, basal branches are also short and randomly oriented, often aggregated about gastropores with their slits pointed toward the pore. The sides of the dactylopore spines are composed of coenosteal strips, like the rest of the branch, but arranged in a parallel, vertical orientation. The coenosteal slits of the spines are deeper, the strips are slightly convex, and the complex textural ornamentation is often missing from the upper edges of the dactylopore spine.

Ampullae are abundant but always buried just beneath the branch surface, rarely with any superficial indication. They are round to elliptical and 0.61-0.89 mm in greater diameter. No sexual dimorphism or ruptured ampullae were noted.

Discussion. Broch [1942] originally described E. kerguelensis as a form of E. antarctica and later [Broch, 1951a] considered it within the variation of the latter species. Broch had limited material available to him, and at that time the species complex of Southern Ocean orange Errina was not known. Now, with many more specimens at hand and a closer examination by means of SEM, it is clear that Broch's forma kerguelensis is a distinct species, most similar morphologically to E. fissurata, not E. antarctica. Errina kerguelensis is distinguished from E. fissurata by (1) its consistently buried (subsurface) ampullae, (2) its bullet-shaped gastrostyle, which is only sparsely ornamented, and (3) its coarse, unique coenosteal texture and differently constructed dactylopore spines. Furthermore, E. fissurata is Antarctic circumpolar in distribution, whereas E. kerguelensis is known only from off islands in the Southern Ocean.

The deposition of Broch's [1951a] Discovery Investigations specimens is unknown; however, on the basis of geographic distribution and his figures, it is assumed that those specimens identified as E. antarctica represent a mixed lot: those from station 2200 are probably E. kerguelensis; those from stations 652 and 2290, E. antarctica; those from station 1948, E. fissurata; and those from station 2215 are unknown.

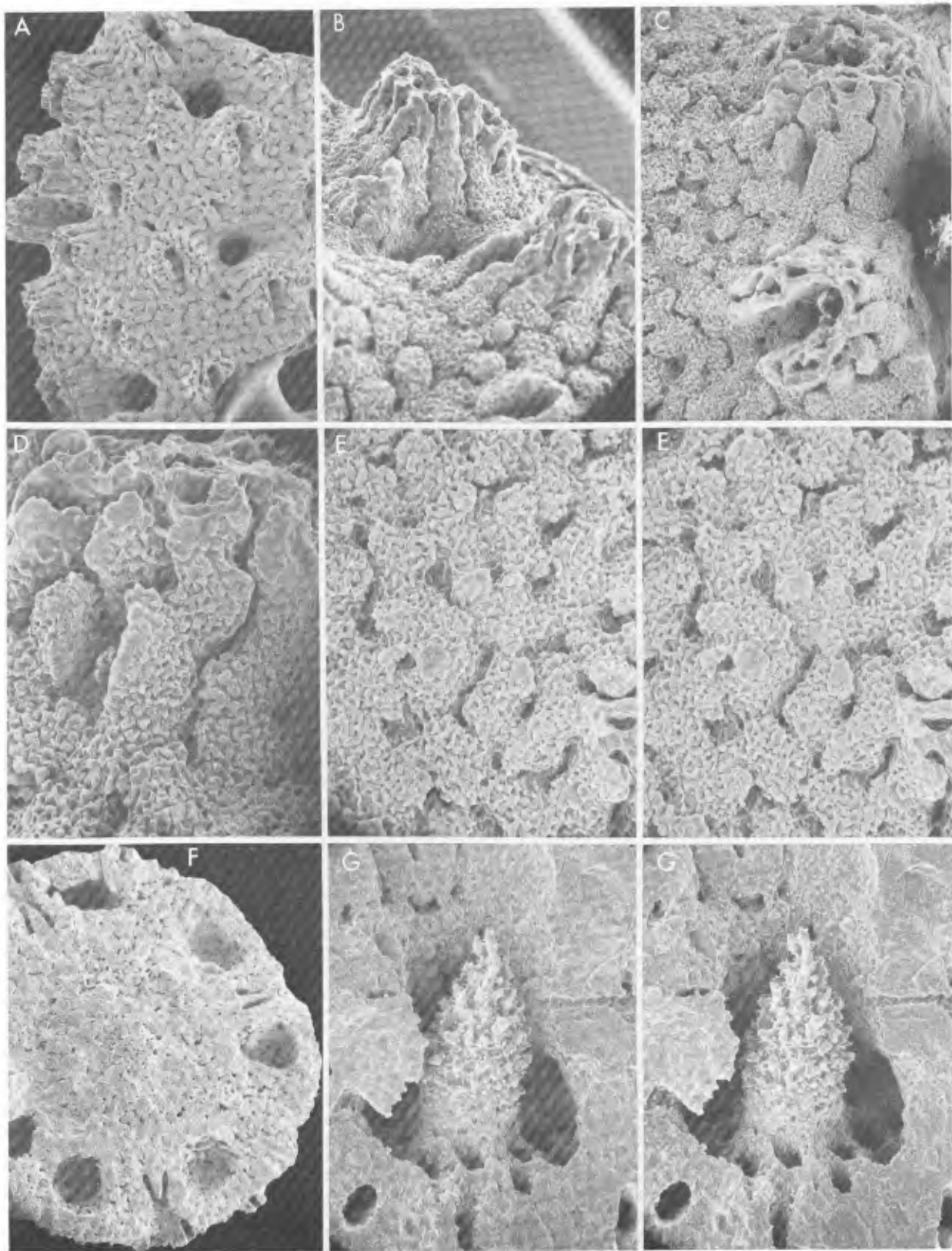


Fig. 17. *Errina* (*E.*) *kerguelensis* Broch. A, NZOI sta. E-218, gastropores and dactylopore spines, x21; B-D, same specimen, dactylopore spines, x71, x68, x143, respectively; E, same specimen, coenosteal texture, x107, stereo pair; F, NZOI sta. E-213b, cross section of branch revealing ampullae and gastrostyles, x16; G, *Eltanin* sta. 1952, gastrostyle, x107, stereo pair.

Material examined. Eltanin sta. 1952, USNM 59903; sta. 1953, USNM 59905. NZOI sta. E-205, E-207, E-209b, E-212b, E-213b, E-218, E-224, E-225 (all deposited at the NZOI). Marion Dufresne sta. 03-26-64 CP17, 04-C24-DR58, 08-78-C319 (all deposited at the MNHNP). Challenger sta. 151, BM 1960.2.16.1, 1936.10.15.3, 1900.2.16.2 (topotypic but not type-material).

Types. Broch's description, based on specimens collected at Challenger sta. 151, are deposited at Zoological Museum, Copenhagen. Type-locality: 52°59.5'S, 73°33.5'E (off Heard Island), 137 m.

Distribution. Off Îles Crozet, Îles Kerguelen, Heard Island, and Balleny Islands (Map 4). Depth: 91-512 m.

11. Errina (Errina) laterorifa Eguchi, 1964  
Figs. 11D, 18A-18G

Errina laterorifa Eguchi, 1964, pp. 5, 6, pl. 2, figs. 1-5.--Lowe, 1967, pp. 72-78, pl. 5, figs. c-d, text figs. 10a-10g.--Boschma, 1966b, pp. 109, 117.--Boschma and Lowe, 1969, p. 15, pl. 5, map 1.

Errina (Errina) carnea Boschma, 1965b, pp. 21-24, pl. 1, figs. 1-2, text figs. 1a-1k.

Errina antarctica, Boschma, 1966b, p. 109 (most of BANZARE sta. 30).

Description. Colonies are usually flabellate with dense branching. Basal branches of larger colonies often anastomose laterally, forming a reticulate fan. The largest colony examined is 14 cm tall and 9.5 cm broad. The largest basal branch measured 12.5 mm in diameter; terminal branches are slender, round to elliptical in cross section, and 1.6-3.0 mm in diameter. Numerous, small branchlets less than 5 mm in length are common throughout the colony. There is invariably an anterior and a posterior branch surface, the posterior surface having many fewer or no gastropores and dactylopore spines. Colonies are usually firmly attached to medium to very large pebble-sized rocks.

The coenosteum is dense and porcelaneous, producing a glazed appearance. There are often hairline fractures of the coenosteum up to 1 cm long oriented in the direction of the branch, indicating the brittle nature of the corallum. At an actively growing branch tip the coenosteum is porous and reticulate, as in E. fissurata, but within 2 mm of the tip the coenosteum becomes more dense, the surface characterized by short, discontinuous coenosteal slits. Farther away from the branch tip the coenosteum appears pitted with small coenosteal pores (about 30  $\mu$ m in diameter), the remnants of the filled-in slits. Small, slightly elevated, circular pores (probably nematopores) 20-25  $\mu$ m in diameter are scattered between the irregularly shaped

coenosteal pores and slits. Granules of low relief, about 6  $\mu$ m in diameter, are sparsely scattered over the surface. The coenosteum is pinkish orange, sometimes dark orange, and rarely completely white. The growing branch tips and central core are white, and the larger ampullae are lighter in color. Just beneath the surface, not visible in surface relief, is a fine anastomosing network of white coenosteal canals.

Gastropores are round to elliptical in shape, 0.15-0.31 mm in diameter. The gastropore style tips are easily visible from the exterior. Styles gradually taper from base to tip, the widest point being at the base. A typical gastropore style is 0.50 mm tall and 0.19 mm wide at the base (H:W = 2.6). Ornamentation consists of rather large (up to 41  $\mu$ m tall), blunt spines, which are arranged in vertical rows, sometimes on ridges, extending from the base to the tip. The spination is sparse, and the entire main shaft is visible. The orientation and size of the dactylopore spines are extremely variable. The largest spines, up to 1 mm tall, occur on the lateral sides of branches that are closely adjacent to other branches. Some of these spines are elaborately hooded (Figure 18F) or bifid and have features similar to those of E. fissurata but with greater fusion of the platelets. Most dactylopore spines, however, are much smaller, rarely taller than 0.15 mm and about 0.27-0.33 mm wide (therefore usually wider than tall). They resemble low horseshoe-shaped rims with narrow slits on one side, the slits being 0.09-0.11 mm wide. The slits of the dactylopore spines are usually abcauline, but different branches of the same colony may have both abcauline and adcauline slits. It is also common for the spines away from the branch tip to be oriented laterally, with the slits pointed toward the posterior side of the branch. Dactylopore spines are rarely, if ever, clustered, as in E. antarctica. On large-diameter branches the dactylopore spines are very low or even flush with the branch. On the posterior sides of branches and on older branches where gastropores are infrequent, it is common to find several dactylopore spines arranged in an irregular circle around the gastropore, resembling a pseudocyclosystem.

Ampullae are expressed either as hemispherical bulges near branch tips or as buried cavities, without surface relief, in larger-diameter branches. Superficial female ampullae are 0.82-1.06 mm in diameter, and what are believed to be superficial male ampullae are 0.41-0.45 mm in diameter. Ruptured ampullae were never seen.

Discussion. It is with hesitation that the name Errina laterorifa is used for this species. The original description mentions the presence of ruptured ampullae and gastro-

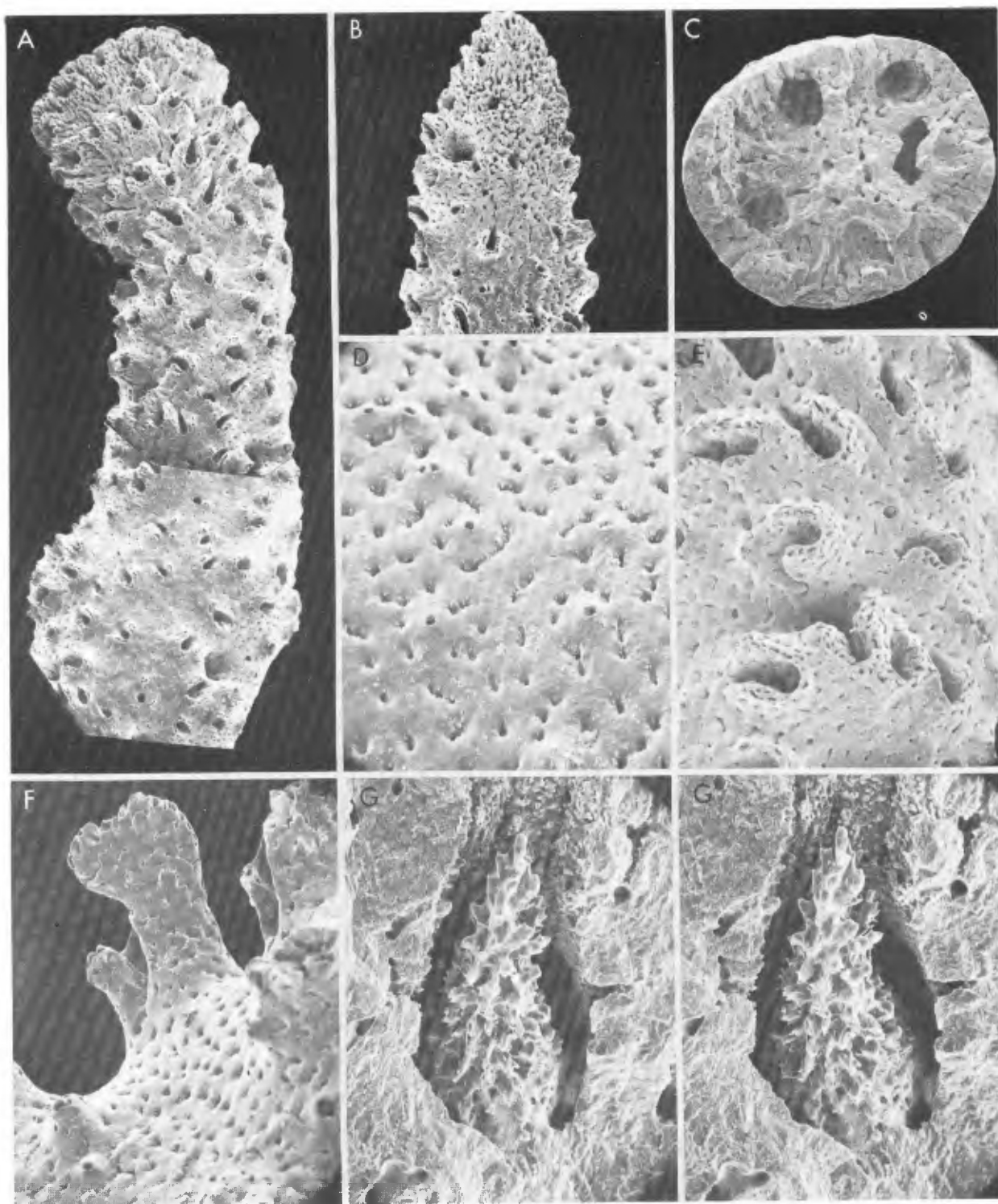
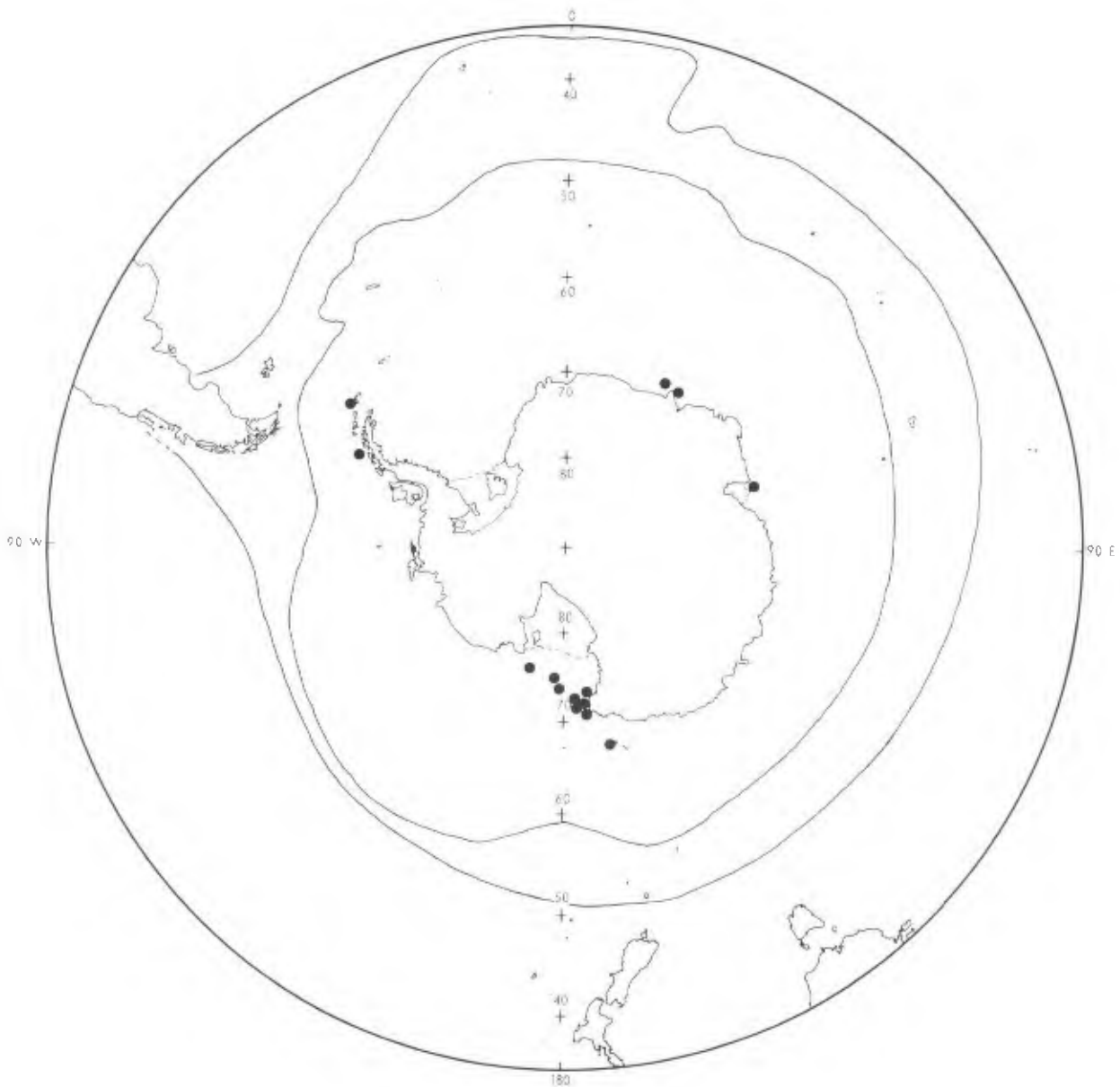


Fig. 18. *Errina* (*E.*) *laterorifa* Eguchi. A, *Eltanin* sta. 1925, branch tip showing orientation of dactylopore spines, x15; B, *Eltanin* sta. 1924, branch tip, x16; C, *Eltanin* sta. 1875, cross section of branch revealing ampullae, x18; D, *Eltanin* sta. 993, coenosteal texture and nematopores (?), x71; E, *Eltanin* sta. 1925, dactylopore spines, x36; F, *Eltanin* sta. 993, hooded dactylopore spine, x43; G, same specimen, gastrostyle, x107, stereo pair.



Map 5. Distribution of Errina (E.) laterorifa.

pore diameters of 0.4-0.7 mm. None of the specimens examined in this study had ruptured ampullae and usually had much smaller gastropores. Unfortunately, Eguchi's [1964] type specimens are not traceable, and his illustrations, as well as the figured specimens, are of poor quality. There is no doubt that my specimens correspond to E. carnea Boschma, 1965; however, I accept Boschma's [1966b] synonymy of his own species, assuming that Eguchi's material represented a mixed lot, including both E. laterorifa and perhaps E. labiata (specimen with ruptured ampullae as figured by Eguchi [1964, Plate 2, fig. 2b]).

Until Eguchi's material can be located, the correct usage of E. laterorifa will be in doubt.

Errina laterorifa is most similar to E. fissurata, especially in color and size, and they are often collected together. Errina laterorifa can be distinguished by the following criteria: (1) branches more delicate with more numerous, short side branchlets, (2) coenosteum denser, porcelaneous, (3) dactylopore spines smaller and variously oriented, not predominantly adcauline, and (4) gastrostyles differently shaped and sculptured.

Material examined. Eltanin sta. 993, USNM 52632-52634, 52636, 52692, 53391; sta. 1870, USNM 59892; sta. 1875, USNM 59894; sta. 1924, USNM 59891; sta. 1925, USNM 59888; sta. 1995, USNM 59889; sta. 1996, USNM 59890; sta. 1997, USNM 59893; sta. 1999, USNM 59900; sta. 2007, USNM 59896; sta. 2026, USNM 59898; sta. 2092, USNM 59895; sta. 2095, USNM 59899. Atka sta. 23, USNM 59901. Burton Island sta. 3, USNM 59902. Yelcho sta. 2-8, USNM 52635. NZOI sta. A-455, A-527, E-179, E-205, E-207, E-212b (all deposited at the NZOI). BANZARE sta. 30, RMNH; sta. 98, RMNH.

Types. Deposition of Eguchi's types of E. laterorifa unknown. His types are not at the National Science Museum, Tokyo; Tokyo Kasai Daigaku, Tokyo; or National Institute of Polar Research, Tokyo. Type-locality: 68°12.0'S, 35°52.0'E (off Gunnerus Bank and Riiser-Larsen Peninsula, Antarctica), 870 m.

No types of E. (E.) carnea were designated by Boschma. Lectotype: NZOI sta. A-463, NZOI P-290 (chosen by Vervoort and Zibrowius [1981] and figured by Boschma [1965b, Plate I, fig. 2]). Paralectotypes: NZOI sta. A-455, NZOI P-291; sta. A-464, NZOI H-77; sta. A-455, RMNH Coel. 13761; sta. A-464, RMNH Coel. 13752. Type-locality: Ross Sea, 322-468 m.

Distribution. Circumantarctic (Map 5), 91-1772 m; however, the two deepest stations may represent contamination from the previous very productive, shallower station. Eliminating these two records yields a range of 91-870 m.

12. Errina (Errina) gracilis  
von Marenzeller, 1903  
Figs. 11G, 19A-19F, 20A-20B

Errina gracilis von Marenzeller, 1903, pp. 4-7, figs. 1-4.--Boschma, 1957: p. 54; 1966b, pp. 109, 117 (part: BANZARE sta. 98 and part of BANZARE sta. 30).

Errina (Labiopora) gracilis; Hickson, 1912a, pp. 889, 890.

Errina (Eu-Errina) gracilis; Broch, 1942, p. 38.

Errina (Errina) gracilis; Boschma, 1963a, p. 337.

Not Errina gracilis; Boschma, 1964d, pp. 298, 299, figs. 4b-4e (actual identity uncertain); Boschma and Lowe, 1969, p. 15, pl. 5, map 2 (= E. boschmai).

? Errina cfr. antarctica; Eguchi, 1964, pp. 4, 5, pl. 1, figs. 2, 3.

Errina (Errina) aspera; Lowe, 1967, pp. 58-63, pl. 3, figs. c, d, text figs. 7a-7f.

Not Errina (Errina) gracilis; Lowe, 1967, pp. 64-68, pl. 4, figs. a-c (= E. boschmai).

Errina aspera; Boschma and Lowe, 1969, p. 15, pl. 5, map 2.

? Errina gracilis; Fenninger and Flajs, 1974, pp. 71, 76.

Description. Colonies are uniplanar, with moderately dense, irregular branching. If branch anastomosis occurs, it is induced by a commensal polychaete worm. Distal branches are round in cross section, tapering gradually to blunt tips. Terminal branch diameters, measured 2 mm from the tip, range from 1.7 to 2.5 mm; however, the delicate specimens from the Ross Sea have narrower branches of the order of 1.0-1.2 mm in diameter. The largest colony is 12 cm tall with a basal branch diameter of 1.2 cm. Colonies are usually attached to medium to large pebble-sized objects by a nonexpansive base.

The coenosteum is coarse, nonporcelaneous, and always white. Short, discontinuous slits delimit strips of coenosteum 75-85  $\mu$ m wide arranged in a reticulate pattern. Scattered over the surface are numerous round pores 55-70  $\mu$ m in diameter, some of which are flush with the surface and others elevated on a low mound. The function of these pores is unknown, but perhaps they serve as reduced dactylopores. Granules 5-7  $\mu$ m in diameter cover the coenosteum.

Gastropores are round, 0.15-0.25 mm in diameter. There is often a single dactylopores spine or cluster of spines directly proximal to each gastropore. Sometimes the pore is bordered by a broad, triangular lip, but often there is no adjacent structure at all. The tip of the gastrostyle projects almost to the surface of the branch and sometimes extends slightly above it. Gastrostyles are elongate and spindle shaped with a bare basal main shaft and a sparsely ornamented distal two thirds. The illustrated gastrostyle (Figure 19F) is 0.43 mm tall and 0.11 mm wide for a H:W ratio of 4.1.

Dactylopores spines are large, up to 1 mm tall and 0.27-0.33 mm wide, and often clustered, with four or five spines fused together. When spines are clustered, the dactylopores slits are oriented in various directions, but individual dactylopores spines invariably have their slits oriented proximally. The tallest spines usually occur on the most slender branches, such as those from the Ross Sea. Large individual spines and most clustered spines usually have several smaller slits of the order of 45 x 130  $\mu$ m, which are scattered over the sides of the spine. These appear to be accessory dactylopores. There are fewer dactylopores spines and ampullae on one side of the colony, especially toward the base, defining the posterior side.

Ampullae are extremely common, occurring the entire length of distal branches, even near the main branch. They are large, 0.61-1.10 mm in diameter, bulbous, and often ruptured, producing a large crater in the coenosteum. Another smaller ampulla or a small dactylopores often forms in the old ampullar

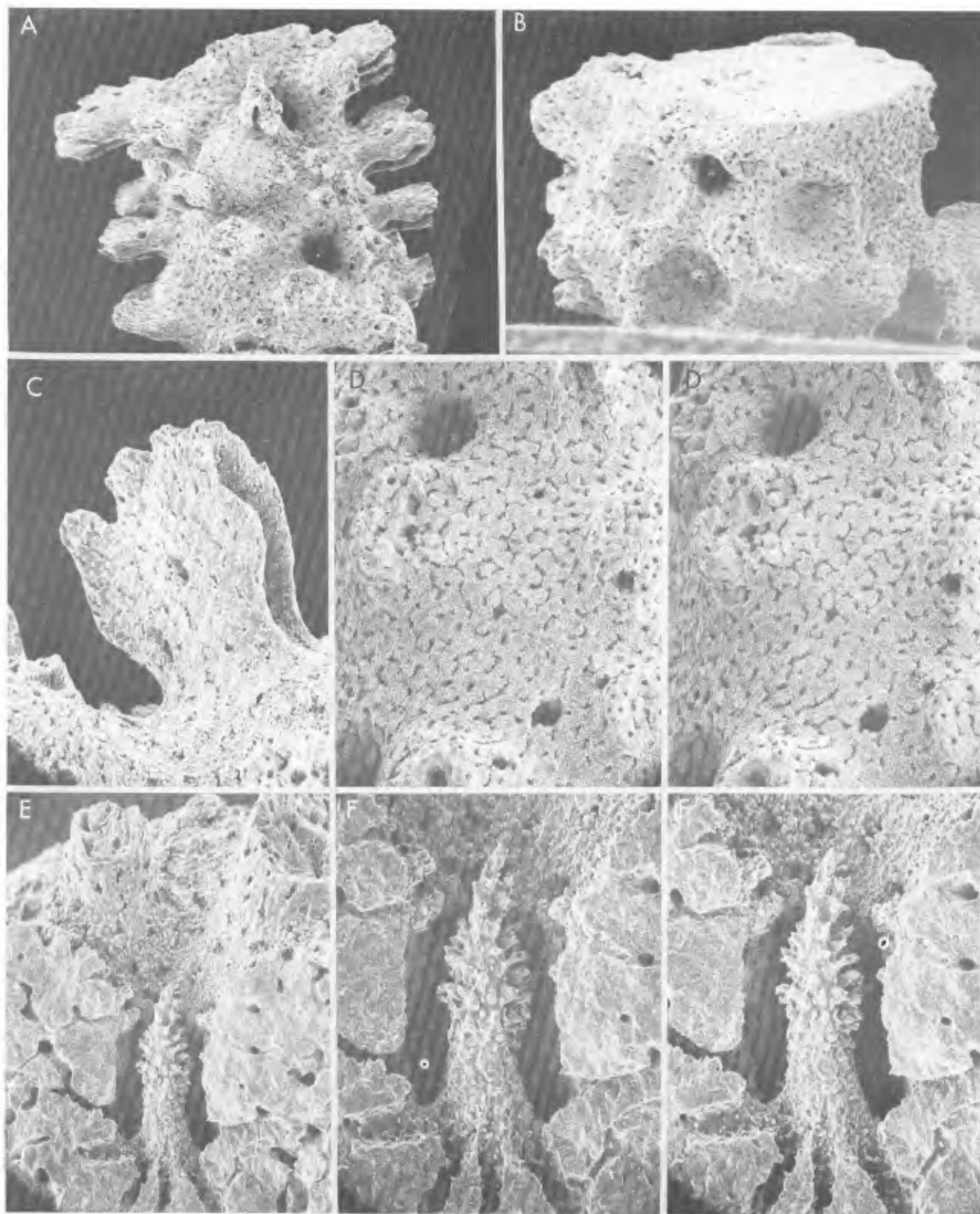


Fig. 19. *Errina* (*E.*) *gracilis* von Marenzeller. A, Eltanin sta. 1089, branch segment with gastropores, dactylopore spines, and ampullae, x18; B, same station, branch segment with ruptured ampullae, x21; C, Eltanin sta. 1089, composite dactylopore spine, x54; D, Eltanin sta. 993, coenosteal texture, x39, stereo pair; E, F, same station, gastrostyle, x68, x107, respectively. Figure 19F is a stereo pair.

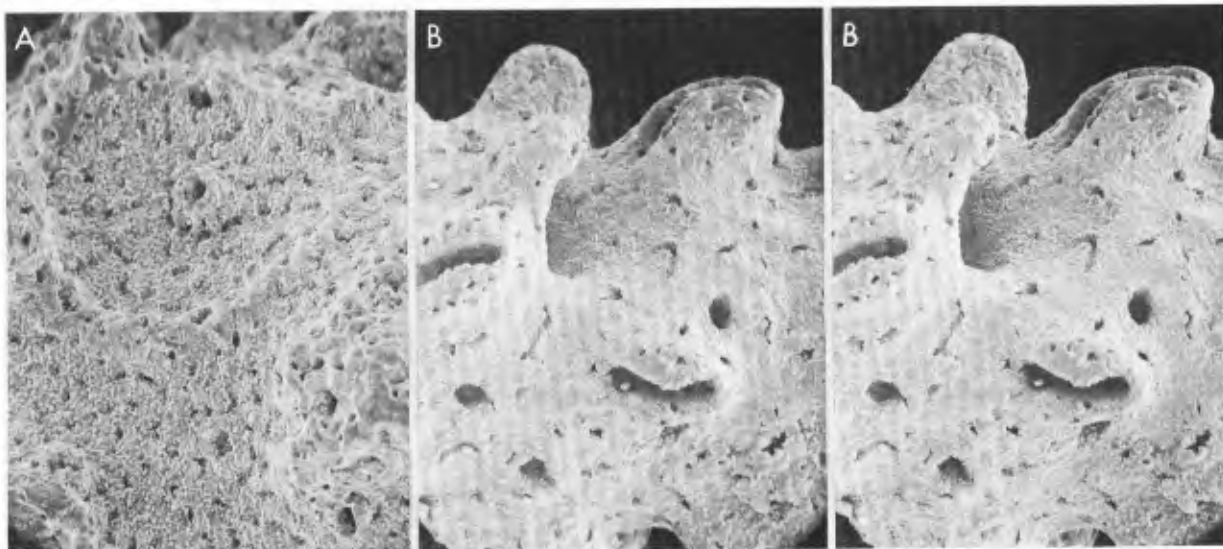


Fig. 20. *Errina* (*E.*) *gracilis* von Marenzeller. A, *Eltanin* sta. 1089, ruptured ampulla with secondary ampulla or dactylopore spine forming at center, x54; B, lectotype, branch segment showing dactylopore spines and lower gastropore lip, x58, stereo pair.

crater. No sexual dimorphism was noted.

**Remarks.** A polynoid polychaete was found associated with about half of the specimens examined. The worm induces the coral to secrete a flattened, porous tube 3–5 mm broad and about 2 mm high on its posterior side. The presence of the worm usually causes the colony to have an irregular growth form.

The robustness of colonies varies markedly, such that the most delicate and the most robust specimens look quite different. However, there seems to be a continuous variation between the two extremes, and all other characters remain constant. The most robust specimens come from a seamount in the Subantarctic South Pacific, and the most delicate forms are from the Ross Sea and Bellingshausen Sea.

**Discussion.** *Errina gracilis* is very similar to *Errina aspera* (Linnaeus, 1767) and was identified as such by Boschma and Lowe [1969]. Prior to their report, *E. aspera* was known only from the Mediterranean Sea and Mauritius, Indian Ocean. (According to H. Zibrowius (personal communication, 1981) the record from Mauritius is not valid.) When the two species are closely compared, the following differences are noted: *E. aspera* has bushier colonies, smaller dactylopore spines, and a coarser coenosteal texture. The sculpturing of its dactylopore spines consists of imbricated plates, not reticulate coenosteal strips as in *E. gracilis*. *Errina aspera* also appears to have a sexual dimorphism with regard to ampullae: some colonies have large superficial ampullae; others have smaller, buried ampullae. The ampullae of *E. gracilis* are always superficial.

Although specimens were not examined, the description and figures of Eguchi's [1964] *Errina* cfr. *antarctica* appear to be those of *E. gracilis*.

**Material examined.** *Eltanin* sta. 254, USNM 59935; sta. 494, USNM 59929; sta. 684, USNM 60266; sta. 993, USNM 60268; sta. 1089, USNM 60242; sta. 1343, USNM 59923; sta. 1345, USNM 59925; sta. 1346, USNM 59924; sta. 1419, USNM 60077; sta. 1422, USNM 59926; sta. 1536, USNM 59932; sta. 1691, USNM 59922; sta. 1870, USNM 59927; sta. 2092, USNM 59933; sta. 2095, USNM 59934. *Atka* sta. 23, USNM 60078. *Burton Island* sta. 592-3, USNM 59936. *Yelcho* sta. 2-8, USNM 60267. NZOI sta. A-455, A-463, A-464 (all deposited at the NZOI). *Marion Dufresne* sta. 03-28-71CP 19 (deposited at MNHNP). BANZARE sta. 30, RMNH; sta. 98, RMNH. *Belgica* paralectotypes 310, 319, 387, 429, 940, and 941 (Brussels Museum).

**Typea.** Ten lots of specimens from four closely adjacent *Belgica* stations were cited by von Marenzeller as type-material. These, as well as two more lots numbered 310 and 319 (from *Belgica* stations but exact locality unknown), are labeled as 'cotypes' at the Institut des Sciences Naturelles, Brussels. The largest specimen, von Marenzeller's Figure 1, is specimen 387; Figures 2 and 3 are based on specimen 310. The large specimen (387) is herein designated lectotype; remaining specimens, paralectotypes. Type-locality: 71°15'S, 87°039'W (Bellingshausen Sea), 100 m.

**Distribution.** Widely distributed in Antarctic and Subantarctic waters (Map 6), including South Georgia, South Shetland Islands,