

**A review of the circumaustral gorgonacean genus *Fannyella* GRAY, 1870
with descriptions of five new species
(Coelenterata: Octocorallia: Primnoidae)**

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With 61 figures

Abstract

The Antarctic primnoid genus *Ascolepis* THOMSON & RENNET, 1931, now recognized as a junior subjective synonym of *Fannyella* GRAY, 1872, is reinterpreted in relation to Antarctic species formerly attributed to *Callogorgia* (as "*Caligorgia*"). *Caligorgia kuekenthali* MOLANDER, 1929, is transferred to *Fannyella* on the basis of its moderately developed ascus-scales and distinct circumoperculum. Five species with body scales modified in different degrees toward the ascus condition are described as new species of *Fannyella*: *F. aurora*, *F. eos*, *F. lemnos*, *F. lepidota* and *F. mawsoni*. Because of its distinct circumoperculum, strongly modified ascus-scales, and distinct development of adaxial scale rows, *Caligorgia nodosa* MOLANDER, 1929, is excluded from *Callogorgia*, *Primnoella*, *Convexella* and *Ophidiogorgia*, and is now transferred to *Fannyella*. Variation in polyps and sclerites of *Fannyella rossii* GRAY, 1872, is described and illustrated.

Key words: Octocorallia, Gorgonacea, Primnoidae, *Fannyella*, *Ascolepis*, *Callogorgia*, Antarctic.

Introduction

The primnoid genus *Callogorgia* GRAY, 1858, represented by more than 20 species in temperate and tropical seas, was first reported (as *Caligorgia* GRAY, 1870) from Antarctic waters by KÜKENTHAL (1912), who established *Caligorgia* [sic] *antarctica* for a colony obtained at the "Gauss Station" by the Deutsche Südpolar-Expedition. Soon thereafter, GRAVIER (1913, 1914) described specimens of *Caligorgia* [sic] *ventilabrum* STUDER taken off Jenny Island, Marguerite Bay, by the 2e Expédition Antarctique Française. The descriptions and illustrations presented by those authors showed beyond any reasonable doubt that the specimens before them are referable not to *Callogorgia* but to the genus *Ascolepis* described by THOMSON & RENNET (1931), probably their first species, *A. splendens*, obtained by the Australasian Antarctic Expedition. That species has been shown to be a junior synonym of *Fannyella rossii* GRAY, 1872 (BAYER 1990).

The Swedish Antarctic Expedition obtained colonies of similar growth form but with polyps in crowded spirals all around the branches rather than in regular whorls, which

MOLANDER (1929) described as *Caligorgia kuekenthali* [sic]. It is clear from material now available that his species does not belong to *Callogorgia* GRAY.

Operations by the U.S. Antarctic Research Program conducted from USNS "Eltanin" and R/V "Hero" obtained large numbers of dichotomously branched colonies similar in general appearance to those illustrated by KÜKENTHAL, GRAVIER, MOLANDER, and THOMSON & RENNET. In some specimens, the polyps are crowded in more or less distinct spirals on all sides of the branches, as in MOLANDER's *C. kuekenthali*, while in others the polyps are arranged in regular whorls. Among the colonies with verticillate polyps, the body sclerites of some are longitudinally aligned, closely corresponding with the ascus-like sclerites described by THOMSON & RENNET as characteristic of *Ascolepis*, while the body scales of others are scales arranged like those of *C. kuekenthali* MOLANDER. Among those with polyps in spirals, some colonies are distinctly lyrate in form, with long but stout terminal branches, whereas others are more closely branched, with short, slender

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terminal branches and not at all lyrate in form. Between these extremes is a virtual continuum of growth forms having in common only the spiral arrangement of their polyps. The polyps of some of these have thick body sclerites more or less distinctly modified toward the ascus-scale condition and rounded, cobble-like coenenchymal sclerites, whereas the polyps of others have thin, scarcely modified body scales and thin, overlapping coenenchymal scales. The latter can be separated on the basis of skeletal characters into two species, but the former present a bewildering range of variation that so far defies subdivision.

Many colonies correspond closely with the specimens described as *Caligorgia kükenthali* by MOLANDER (1929) but, upon closer examination, reveal differences that in an earlier time would have been considered specifically distinct. However, no consistent correlation between the different growth forms and the variation of polyps nor any visible discontinuities have been detected so far, so this variable array is here regarded as a single species.

Iconography

Although the taxonomic significance of octocoral sclerites was first recognized, and the word "sclerite" coined, by A. VALENCIENNES (1855), a detailed amplification of his unillustrated preliminary classification never appeared in print. It was left to KÖLLIKER (1865), a decade later, to expand upon VALENCIENNES' system and to publish the first taxonomically applied illustrations of sclerites.

In the following years of the 19th Century, many new octocoral species were described, often from a single specimen. Owing to the time and expense of preparing and publishing illustrations, the original descriptions of many species were illustrated, if at all, by only one or two drawings of sclerites presumed to be characteristic. Little or nothing was known of skeletal variation among different colonies of a species, or from one locality to another.

It has long been clear that even within a species the "characteristic" sclerites vary, as they do among colonies from dif-

ferent localities or different habitats. It is now acknowledged that figures of only one or two sclerites of a species are wholly inadequate to represent its taxonomic characters, making it necessary in many cases to refer back to original type material in order to redefine species adequately for recognition.

The first investigator to recognize the importance of illustrating a range of sclerites for each species probably was A. E. VERRILL, whose vast monograph of western Atlantic octocorals, illustrated by more than 150 quarto plates, was never published. However, some of his other papers (e.g., 1912) show the style of illustration that he had developed, and DEICHMANN (1936), in revising his monograph for publication, followed his lead by illustrating several sclerites from each species. Even though this was a substantial improvement, it was still insufficient for accurate characterization of species.

Because the subtle but taxonomically important differences among similar types of sclerites cannot be described adequately in words, it is imperative to illustrate the skeletal characters of every species – whether new or not – as fully as possible. The development of scanning electron microscopy and micrography has rendered drawings of sclerites obsolete for all but certain limited applications, and the refinement of stereography has increased the amount of information conveyed by illustrations. Therefore it has become feasible as well as desirable to illustrate a representative character-array of sclerites for any species. Scanning micrography is especially useful for illustrating gorgonians with large sclerites covering polyps and coenenchyme, such as Primnoidae. Difficult to photograph and time-consuming to draw, these gorgonians are ideally suited for illustration by stereographic SEM, as I have previously demonstrated (BAYER 1982). With this procedure, shapes, contours and ornamentation of the sclerites in their natural relationships can be illustrated with unprecedented accuracy and clarity.

I here adopt the practice, followed in recent comprehensive publications on stony corals, of illustrating intra-specific variation as fully as possible. Even so, representation remains less than ideal because practical limitations on the number of half-tones and the many features that must be illustrated for each specimen restrict the number of variants that can be illustrated.

Taxonomic account

Callogorgia GRAY, 1858

Type species: *Gorgonia verticillata* PALLAS, 1766, by monotypy.

- 1858 *Callogorgia* GRAY: 286.
 1859 *Callogorgia*, – GRAY: 482.
 1870 *Calligorgia* GRAY: 35 [unjustified emendation of *Callogorgia*].
 1870 *Callicella* GRAY: 37. [Type species: *Callicella elegans* GRAY, 1870, by monotypy.]
 1879 *Calligorgia*, – STUDER: 645.
 1887 *Calligorgia*, – STUDER [& WRIGHT]: 47, 51.
 1889 *Caligorgia* WRIGHT & STUDER: 75 [unjustified emendation of *Calligorgia*].
 1906 *Caligorgia*, – VERSLUYS: 55.
 1924 *Caligorgia*, – KÜKENTHAL: 267 [other references].
 1956 *Callogorgia*, – BAYER: F220.
 1975 *Callogorgia*, – CARPINE & GRASSHOFF: 102.
 1982 *Callogorgia*, – BAYER: 119.

GRAY (1870: 34, 35) intentionally altered the spelling of *Callogorgia* GRAY, [1858], to *Calligorgia* and based the family name Calligorgiadae on it. Obviously GRAY intended only to correct his original spelling, not to establish a new taxon with separate standing in nomenclature as results from application of Art. 33b (i, iii) of the International Code of Zoological Nomenclature currently in force. WRIGHT & STUDER (1889: 75, 76) further altered *Calligorgia* to *Caligorgia* on the shaky grounds of GRAY's presumed intention to base the name on καλη, the feminine form of the Greek adjective, rather than on καλλος, the masculine form, thus establishing a third available name for the genus. In the present discussions I use the original spellings of the species names involved, except where formally treated as valid names in modern taxonomic sense.

As the genus *Callogorgia* has been considered at length elsewhere (BAYER 1982: 119), this account is focussed on its relevance to the Antarctic fauna. It was established by GRAY

[1858] for the Mediterranean *Gorgonia verticillata* PALLAS, 1766, a primnoid forming pinnate, plumose colonies with upwardly-directed, in-turned polyps arranged in distinct whorls. Subsequently, several additional species were described from tropical, subtropical and temperate seas around the world. The most careful study of the genus remains that of VERSLUYS (1906), although KÜKENTHAL (1919) reviewed it in considerable detail and later (1924) summarized the known species.

The diagnostic characters emphasized by VERSLUYS were

1. Colonies closely branched in one plane, either pinnate or more dichotomous, without short secondary twigs.
2. Polyps in whorls of 2–12, becoming isolated and irregular only on larger stems and branches.
3. Polyps bilaterally symmetrical but not compressed as in *Primnoella*, appressed to the coenenchyme with the adaxial body wall distinctly shortened in contraction.
4. Operculum well differentiated, without a circumoperculum.
5. Body sclerites in 8 longitudinal rows, of which the two adaxial rows are always reduced to a few isolated scales.
6. Upper end of body with 8 sclerites (the marginals) representing the original 8 longitudinal rows of body scales; each of these bears an opercular scale; adaxial and inner-lateral marginals smaller than the outer-lateral and abaxials.
7. Sclerites of the two abaxial longitudinal rows are largest and most numerous, up to 12, decreasing in size and number in the outer- and inner-lateral rows.
8. Adaxial and inner-lateral rows always reduced.
9. The operculum projects prominently and in lateral view is never covered completely by the marginal scales; operculars diminish in size from abaxial to adaxial, each scale overlapping its neighbor toward the axis.
10. Coenenchymal scales fitted as in mosaic, with their edges abutting rather than imbricating.
11. Body scales usually sculptured externally by ridges that radiate from the depositional center ("nucleus") outward to the margins, where they project as distal marginal dentations. These may be small, but scales with entire margins as in *Primnoella* are not present.

VERSLUYS's concept of the genus remained essentially unchanged (KÜKENTHAL 1919, 1924; DEICHMANN 1936; BAYER 1956, 1961) until GRAY's genus *Fanelia* was resurrected for several species usually attributed to *Callogorgia* (BAYER 1982). VERSLUYS (1906: 57) considered *Primnoella* to be the only genus of Primnoinae that was difficult to distinguish from *Callogorgia*, which could be recognized by its appressed, bilaterally symmetrical polyps, strongly differentiated operculum, and characteristically sculptured sclerites.

Until KÜKENTHAL's (1912) report of *Callogorgia* [sic] *antarctica* from the Gauss-Station, the genus had been reported only from tropical and temperate waters. The type specimen (KÜKENTHAL 1912: pl. 21, fig. 10) bears a strong resemblance to the specimens of *Fannyella rossii* in the present collection, and KÜKENTHAL's drawing of a body scale (1912: fig. 30) reinforces that resemblance. It cannot be accommodated in *Callogorgia* as now defined and is tentatively reassigned to *Fannyella* as a possible senior synonym of *F. rossii* GRAY.

Three more species assigned to *Callogorgia* (as *Caligorgia*) have been reported from Antarctic waters: *C. ventilabrum* STUDER (GRAVIER, 1914), *C. kuekenthali* MOLANDER, 1929, and *C. nodosa* MOLANDER, 1929.

Many specimens similar to the species reported from Marguerite Bay as *C. ventilabrum* by GRAVIER (1914) were

obtained by the U.S. Antarctic Research Program along the Antarctic Peninsula, not far from Marguerite Bay. They do not correspond with VERSLUYS's (1906) redescription of STUDER's original material, which showed that the body scales of the polyps are situated in a typical *Callogorgia* arrangement. Although he described the colonial form as "typisch dichotomisch," he maintained that it resembled *C. affinis* so closely that at first he thought the latter to be *ventilabrum*. His photograph of *affinis* shows an openly pinnate colony with rather zig-zag main branches, but pinnate nonetheless. When combined with a locality "north of New Zealand," these characters speak for a true *Callogorgia* that probably does not enter the sub-Antarctic fauna. It is clear from GRAVIER's drawing of a body scale (1914: fig. 114) that his specimens are referable to *Ascolepis splendens*, and therefore to *Fannyella rossii*, as are the numerous colonies obtained by USARP.

Caligorgia kuekenthali MOLANDER, 1929, from South Georgia was reported to differ from all other species of the genus in the crowded, non-verticillate arrangement of its polyps. Many colonies obtained by operations of USARP near South Georgia and at various localities along the Antarctic Peninsula closely resemble MOLANDER's specimens in the spiral, non-verticillate arrangement of polyps. Study of this rich material reveals at least two different growth forms and substantial differences in form and arrangement of sclerites. Specimens from the vicinity of Shag Rock and off South Georgia, the localities of MOLANDER's material, agree so closely with his in general appearance and morphological detail that their identification as *C. kuekenthali* can hardly be doubted. Their body scales are modified in much the same way as are those of *Fannyella rossii* although less severely, amply justifying the reassignment of *kuekenthali* to *Fannyella*.

MOLANDER (1929: 60) described *Caligorgia nodosa* on the basis of an unbranched fragment that he interpreted as a twig from a large colony. He described and illustrated (1929: fig. 14b) the characteristic ascus-like body scales ("tütenähnlich mit breiter Basis") and noted their similarity to the sclerites of GRAVIER's *C. ventilabrum*. Numerous specimens that agree with MOLANDER's in all particulars, taken by USARP in the same geographical region, show that this species is normally unbranched and also cannot be referred to *Callogorgia*. In spite of its flagelliform colony, it is here reassigned to *Fannyella* on the basis of its distinct ascus-scales, verticillate polyps, and operculum surrounded by a distinct circumoperculum.

THOMSON & RENNET's (1931: 19) report of *Caligorgia ramosa* KÜKENTHAL and GORZAWSKY from 1300 fathoms off Maria Island, Tasmania, can be nothing more than a wild misidentification, as that species was originally described from 600 m off Tokyo Bay, Japan. Although it is not possible to determine its identity from the cursory descriptive remarks and crude drawing provided by THOMSON & RENNET, it may indeed be some deep-water species of *Callogorgia*. However, the locality is well above the Antarctic convergence so it is hardly a member of the Antarctic fauna.

Investigation of many specimens from numerous true Antarctic localities extending from South Georgia to Wilkes Land clearly demonstrates that no species referable to the genus *Callogorgia* as here defined has yet been taken in Antarctic waters. As explained above, *Caligorgia antarctica* KÜKENTHAL, 1912, and *C. ventilabrum* STUDER sensu GRAVIER, 1914, are considered probable synonyms of *Fannyella rossii* GRAY, 1872. *C. nodosa* MOLANDER is now referred to *Fannyella* because of its strongly developed ascus-scales.

Fannyella GRAY, 1872

Type species: *Fannyella rossii* GRAY, 1872, by monotypy.

- 1847 *Primnoa* (part). — STOKES: 260.
 1872 *Fannyella* GRAY: 744.
 1931 *Ascolepis* THOMSON & RENNET: 20.
 1981 *Ascolepis*, — BAYER: 936, in key.
 1982 *Ascolepis*, — BAYER: 120–122, passim.
 1989 *Ascolepis*, — BAYER & STEFANI: 454, in key. (Type species, *Ascolepis splendens* THOMSON & RENNET, by subsequent designation, BAYER 1990: 774.)
 1990 *Fannyella*, — BAYER: 774.

Discussion: It has been shown (BAYER 1990) that specimens obtained in Antarctic waters by the expedition of H.M.S. "Erebus" and "Terror" (1839–1843), which CHARLES STOKES designated as *Primnoa Rossii* (1847: 261; nomen nudum) and which later were named *Fannyella rossii* by J. E. GRAY (1872: 745), actually represent the species taken by the Australasian Antarctic Expedition and described by THOMSON & RENNET (1931: 20) as *Ascolepis splendens*, new genus and new species. Therefore, GRAY's name *Fannyella* is here adopted under Article 23 of the International Code of Zoological Nomenclature as the valid name of this widespread genus of Antarctic octocorals, since the name *Ascolepis* has not been used in the literature since its original publication in 1931 except for two uses in keys (BAYER 1981; BAYER & STEFANI 1989) and passing mention in one paper (BAYER 1982). Consequently, there is no firmly established usage of *Ascolepis* to warrant its conservation.

According to THOMSON & RENNET (1931), the two members of the genus *Ascolepis*, *A. splendens* and *A. spinosa*, have "characteristic hollow ascus-like sclerites" in which "the basal portion is the substantial very warty support of a delicate cup whose concavity is open to the exterior." These sclerites are arranged on the polyps in two abaxial and two outer-lateral longitudinal rows, and the coenenchyme has "compact cupped chalices with warty bases" as well as stars and other forms. Both species were said to have a distinct operculum and circumoperculum, the circumopercular and opercular scales of one species with a marginal spine. The branching of both species is dichotomous, the growth form of *A. splendens* in particular very similar to that of *Caligorgia kükenthalii* MOLANDER.

Drawings given by GRAVIER (1914: figs. 114, 116) of sclerites of *Caligorgia ventilabrum* from Marguerite Bay are sufficiently clear to show that they are ascus-scales belonging to a species of *Fannyella*, probably *F. rossii*, not to *Callogorgia*. KÜKENTHAL's drawing (1912: fig. 30) of a body scale of *Caligorgia antarctica* also suggests an ascus-scale, making it possible that *C. antarctica* KÜKENTHAL, 1912, is a junior synonym of *Fannyella rossii* and a senior synonym of *A. splendens*.

Comparison of specimens obtained by expeditions of the U.S. Antarctic Research Program with the lectotype of *Ascolepis splendens* (Australian Museum G-13237) shows that they are conspecific. Examination by SEM reveals that although the ascus-like or chalice-like sclerites of *A. splendens* may be weakly concave externally and ornamented by complex tubercles internally, they are not "delicate" cups as implied by THOMSON & RENNET's (1931) descriptions and figures, but they may appear to be so when viewed wet under the light microscope. The body sclerites consist of a thick, weakly concave or flat outwardly facing plate with an internal warty "pedestal" near the center of the inner surface. When observed with ordinary light under the compound microscope, body sclerites appear to be concave because the margin of their outer, glassy clear,

nearly flat part reflects light so it has the appearance of a bright rim; the warty base is clearly visible through the transparent plate. When isolated, cleaned sclerites are dried and viewed under the dissecting microscope as required in preparation for scanning, they assume a pearly translucence reminiscent of moonstone (a variety of feldspar) and their shape becomes apparent. Stereoscopic scanning micrographs clearly show the form and arrangement of these sclerites on the polyps.

If the modification of body sclerites to form ascus-scales were given the primary taxonomic importance attributed to it by THOMSON & RENNET (1931) in *Ascolepis*, the genus *Fannyella* would contain at least four known species, *F. rossii* GRAY, *F. spinosa* (THOMSON & RENNET), *Caligorgia nodosa* MOLANDER, and *Thouarella abies* BROCH. The abaxial body sclerites of MOLANDER's *Caligorgia nodosa* are, in fact, externally concave scales that are more cup-like than any in *Fannyella rossii*. The distal body scales of BROCH's *Thouarella abies* are almost indistinguishable from those of *Fannyella spinosa* (THOMSON & RENNET). However, the diverse growth forms of the species having these "ascus-scales" raise doubt about their phylogenetic significance.

Careful dissection and examination of numerous primnoid species by scanning microscopy strongly suggest that the ascus-like shape of the abaxial sclerites results from the modification of imbricating scales in response to movements to which they are subjected during expansion and contraction of the polyps. The exposed part of the sclerite thickens and develops a distinctly raised proximal margin against which the thinner, distal edge of the sclerite below it rides. In some cases, this proximal margin is buttress-like and develops low, blunt indentations that loosely interlock with radial crests present along the inner margin of the subjacent scale. In the most extreme development, the raised proximal margin is a thin, curved crest that forms part of the rim of a concave external cup. This condition is clearly demonstrated in Figs. 58c–e and 61d–e. Therefore, the ascus-like sclerites are more realistically interpreted as functional adaptations rather than a generically significant sclerite form.

Abaxial body scales showing progressively weaker development of the "ascus" condition are present in several other species having a colonial form similar to that of *F. rossii*, including *Caligorgia kükenthalii* MOLANDER. In addition to growth form, these share with *F. rossii* upwardly directed, more or less recurved polyps with a circumoperculum surrounding the opercular scales, a condition which excludes them from *Callogorgia*. This raises the question of the relationship of *Fannyella* and *Callogorgia*.

Comparing the characters of *Fannyella* with a list of the characters of *Callogorgia* recognized by VERSLUYS (see p. 163 above), we find:

1. Colonies branched dichotomously, not pinnate.
2. Polyps arranged in loose or crowded spirals as well as in whorls.
3. Same as in *Callogorgia*.
4. Operculum surrounded by circumoperculum formed by marginal scales of intermediate shape, which may completely hide the operculum in lateral view.
5. Body sclerites in 8 longitudinal rows that in some cases become disrupted and irregular on proximal part of body, or in oblique rows that obscure the basic longitudinal arrangement.
6. Generally same as in *Callogorgia*.
7. Generally same as in *Callogorgia*.

8. Generally same as in *Callogorgia* but in some cases adaxial rows short but complete, so adaxial side of polyp is not naked.

9. Operculum low or only moderately prominent, sometimes completely overreached by marginal scales and not visible in lateral view.

10. Coenenchymal sclerites usually imbricating, rarely tessellated.

11. Body scales externally smooth or sculptured by simple granules, mostly low and concentrated along proximal margin of exposed surface, sometimes more prominent and pointed, more or less completely covering the exposed surface.

It is clear that the discrepancies between these dichotomous species of Antarctic waters and the predominantly pinate, tropical and subtropical species of *Callogorgia* are so great that they cannot be accommodated in a single genus. Consequently, *Fannyella* is recognized as a distinct genus characterized somewhat more broadly than was *Ascolepis*.

Diagnosis: Dichotomously branched Primnoinae with upwardly directed, more or less recurved and appressed polyps arranged in whorls or in spirals, with a circumoperculum formed by the marginal scales, which can fold over the bases of the operculars, sometimes hiding them completely. Body scales more or less distinctly aligned in 8 longitudinal rows of which the adaxials may be reduced in numbers and size, and the abaxials more or less modified as ascus-scales.

Key to species of *Fannyella*

1(2). Colonies unbranched, flagelliform; polyps regularly arranged in whorls: *nodosa* (MOLANDER).

2(11). Colonies dichotomously branched, flabelliform, sometimes lyrate; polyps arranged in regular whorls with occasional irregularly placed strays, rarely in close spirals.

3(6). Body sclerites of polyps distinctly modified as "ascus-scales."

4(5). Fully developed colonies uniplanar, flabellate, lyriform; terminal branches long and whiplike, sometimes more than 10 cm long. Exposed part of body sclerites of polyps distinctly hexagonal in outline, their distal margin at most with an apical tooth but mostly unarmed. Distal edge of marginal scales sometimes pointed but never conspicuously spinelike: *rossii* GRAY.

5(4). Fully developed colonies multiplanar, bushy, not lyriform; terminal branches short, mostly 3 cm or less in length. Exposed part of body sclerites of polyps quadrangular or fan-shaped, those of the abaxial and lateral rows with the free margin sharply angular and becoming spinelike in the distal half of the polyp. Abaxial and lateral marginal scales with strong apical spine: *spinosa* (THOMSON & RENNET).

6(3). Body sclerites weakly or not at all modified as "ascus-scales", the lower proximal border of the exposed surface at most forming a more or less thickened transverse ridge ornamented by smooth granules, which separates the exposed part of the scale from its tuberculate base.

7(8). 3 whorls in 1 cm of branch length; polyps 2.5–3.0 mm tall. Outer surface of opercular and body scales ornamented by low thorns in radial rows: *lemnus* n. sp.

8(7). 5 whorls in 1 cm of branch length; polyps 2 mm tall.

9(10). Contracted polyps clavate. Outer surface of sclerites ornamented with closely crowded smooth granules arranged in rows radiating outward from depositional center ("nucleus"); apical keel of operculars with several low, serrate ridges. Inner surface of free distal margin of body sclerites with radial ridges that do not project conspicuously as marginal dentations. No swollen brood polyps: *eos* n. sp.

10(9). Contracted polyps nearly cylindrical, only slightly wider distally. Outer surface of body scales smooth save for a few low, simple granules on proximal part but not following a transverse arc. Inner surface of free distal margin of body scales with strong radial crests that

project as conspicuous marginal dentations. Opercular scales external with several granular ridges radiating from near base, distal edges finely serrate; inner surface with a prominent apical keel bearing several strong, serrate longitudinal ridges. 12–15 body scales in abaxial longitudinal rows. Brood polyps with large basal swelling present: *aurora* n. sp.

11(2). Polyps arranged in spirals around branches, in some cases with a strong but inconsistent tendency toward arrangement in whorls.

12(15). Coenenchyme with an outer layer of smooth, rounded, overlapping scales; colonies uniplanar, flabellate, of small to moderate size (mostly less than 15 cm tall). Breeding polyps with large basal swelling covered by large, smooth, imbricating scales.

13(14). Apex of opercular scales with a high, thin internal keel; outer surface of body scales smooth except for some simple granules along the thickened, proximal curved ridge: *lepidota* n. sp.

14(13). Apex of opercular scales with a broad internal keel composed of several narrow crests; outer surface of body scales with low radial ridges consisting of rows of granules more or less completely merged: *maewsoni* n. sp.

15(12). Coenenchyme with an outer layer of obliquely inserted small, thick plates often with dentate margin, producing a cobble-like or irregularly pavement-like surface. Reproductive polyps with a large basal swelling covered by small, thick scales often with marginal serration: *kuekenethali* (MOLANDER).

Fannyella rossii GRAY, 1872

Figs. 1–9

- 1847 *Primnoa Rossii* STOKES: 260, 261 (nomen nudum).
 1872 *Fannyella rossii* GRAY: 745, pl. 62, figs. 1–3 (Antarctic Ocean).
 1879 Not *Caligorgia ventilabrum* STUDER: 647, pl. 2, fig. 12 (North of New Zealand, 165 m).
 1906 Not *Caligorgia ventilabrum*, –VERSLUYS: 74, figs. 83, 84 (illustrates polyp of STUDER's type).
 1912 ?*Caligorgia antarctica*, –KÜKENTHAL: 321, figs. 27–35, pl. 21, fig. 10 (Gauss-Station, 385 m).
 1914 ?*Caligorgia ventilabrum*, –GRAVIER, 1914: 85, figs. 109–119; pl. 6, fig. 30 (Marguerite Bay, Antarctic Peninsula, 176–230 m).
 1929 ?*Caligorgia ventilabrum*, –MOLANDER, 1929: 60 (Seymour I., Graham Land, 150 m; South Georgia, 75 m).
 1931 *Ascolepis splendens* THOMSON & RENNET: 20, pl. 9, figs. 6, 7; pl. 10, figs. 1, 2; pl. 11, fig. 6 (off Wilkes Land from Adelie Coast west to Davis Sea, 46–582 m).
 1990 *Fannyella rossii*, –BAYER: 774, figs. 1–6 (Circum-Antarctic).

Material Examined: Ross Sea: Off Cape Hallett: 72°32'S, 171°26'E, 337–329 m, USNS "Eltanin" sta. 1875, 15 Jan 1967. 4 large more or less complete colonies without holdfasts, and detached branches USNM 82949 (SEM 1417, 1427; Fig. 8); 1 colony SMF 6969. –Off Cape Washington: 75°01'S, 168°23'E, 334–335 m, USNS "Eltanin" sta. 2036, 18 Jan 1968. 1 large colony lacking holdfast USNM 82078 (SEM 1471–1473). Figs. 1b, 2 top, 3 bottom, 4. –76°00'S, 176°48'W, 566–569 m, USNS "Eltanin" sta. 2045, 20 Jan 1968. 1 colony and detached branches USNM 82079; 1 branch SMF 6972. –76°25'S, 170°24'W, 568 m, USNS "Eltanin" sta. 2075, 30 Jan 1968. 1 colony without holdfast, and 1 detached branch USNM 82109. –Bay of Whales: 76°08'S, 165°04'W, 494–498 m, USNS "Eltanin" sta. 2097, 4 Feb 1968. 2 small incomplete specimens USNM 82950.

South Shetland Islands: 61°18'S, 56°09'W, 220–240 m, USNS "Eltanin" sta. 410, 31 Dec 1962. 1 colony lacking holdfast USNM 82072 (SEM 1404, 1405; Fig. 5 bottom) 1 branch SMF 6971. –61°25'S, 56°30'W, 164 fathoms (=300 m), USNS "Eltanin" sta. 993, 13 Mar 1964. 1 complete colony with holdfast attached to coral USNM 60342. –63°26'S, 62°15'W, 119–124 m, R/V "Hero" cruise 691 sta. 26, 10 Feb 1969. 1 large colony nearly complete but lacking holdfast, and 1 detached branch USNM 82952 (SEM 1448, 1449). Fig. 7.

Antarctic Peninsula: Off Brabant Island: 64°21'24"S, 61°28'12"W, 110–155 m, R/V "Hero" cruise 824 sta. 21–1, 23 Mar 1982, coll. G. HENDLER. 1 large colony complete with holdfast USNM 77360. Fig. 1a. –64°46'28"S, 63°26.5'W, 100–150 m, USARP R/V "Hero" cruise

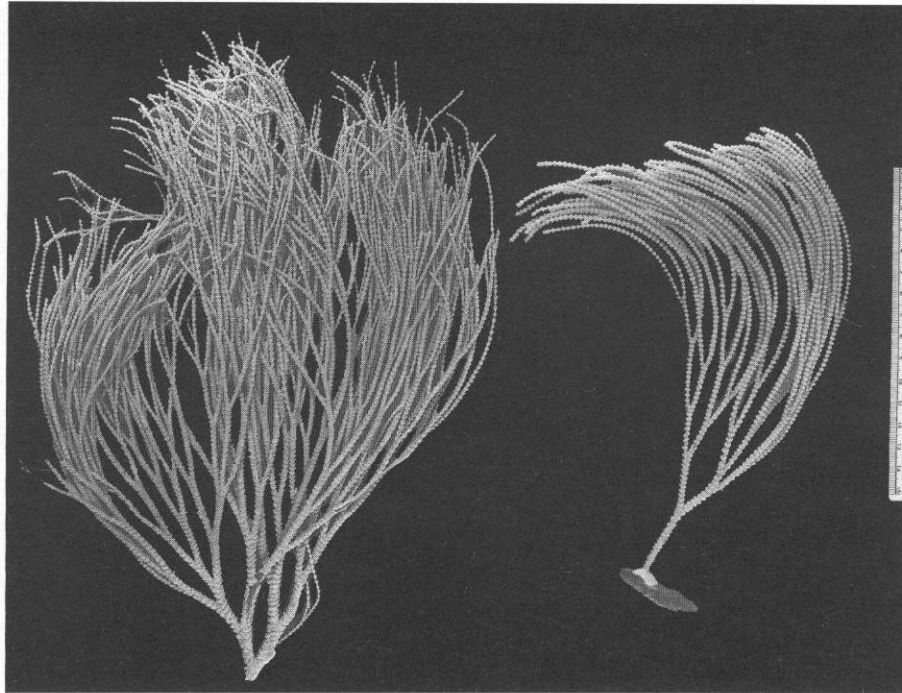


Fig. 1. *Fannyella rossii* GRAY. Right, from Ross Sea, USNM 82078. Left, from Antarctic Peninsula, USNM 77360.

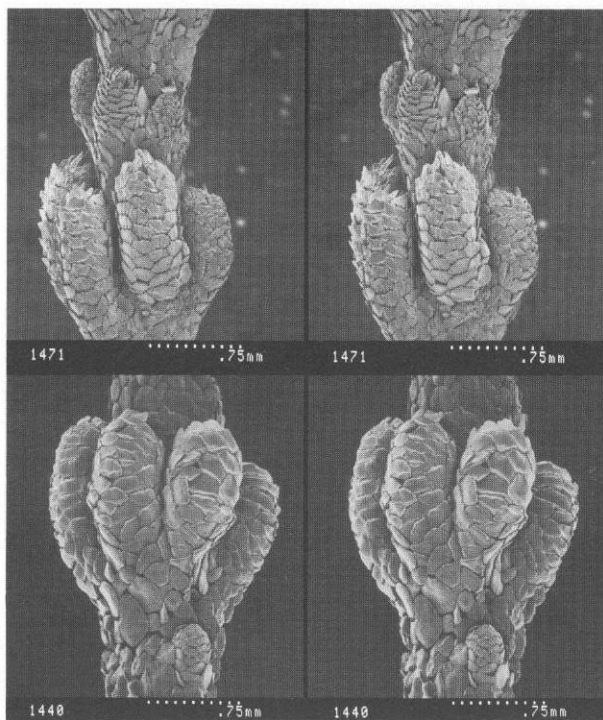


Fig. 2. *Fannyella rossii* GRAY. Top, USNM 82078 from Ross Sea, showing polyps of graduated sizes in new whorl between mature whorls (SEM 1471); Bottom, USNM 82119 from Antarctic Peninsula, showing irregular alignment of abaxial scales, and first young polyp of new whorl below mature whorl (SEM 1440). Stereo pairs.

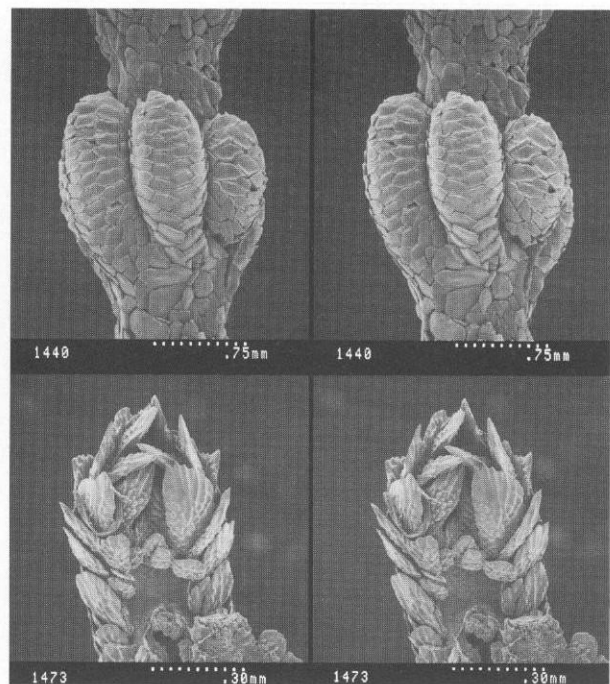


Fig. 3. *Fannyella rossii* GRAY. Top, USNM 82119 from Antarctic Peninsula, showing variation in number and alignment of abaxial scales (SEM 1440); Bottom, USNM 82078 from Ross Sea, showing operculum and circumoperculum of isolated polyps (SEM 1473). Stereo pairs.

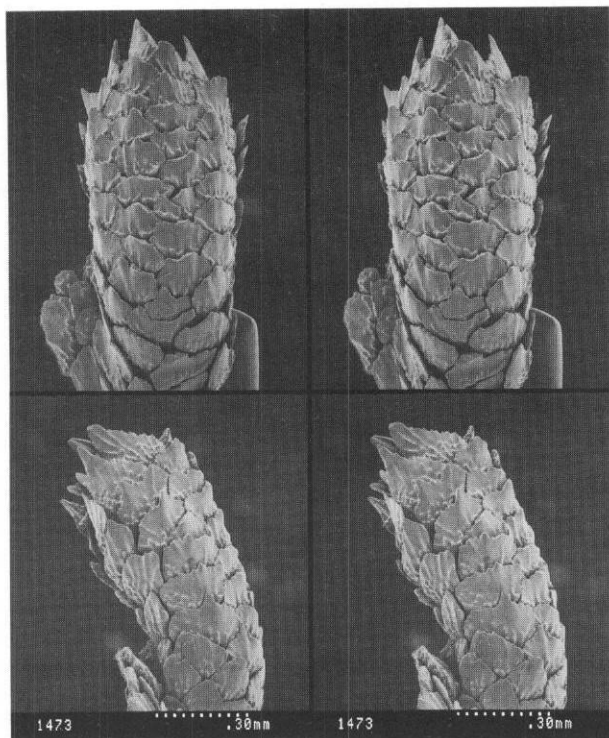


Fig. 4. *Fannyella rossii* GRAY. USNM 82078 from Ross Sea. Abaxial and lateral views of isolated polyp (SEM 1473). Stereo pairs.

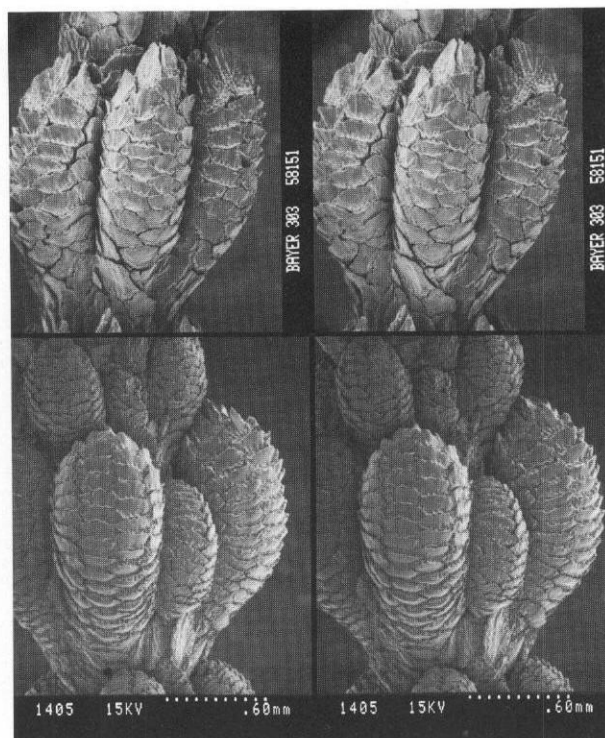


Fig. 5. *Fannyella rossii* GRAY. Top, USNM 58151 from Antarctic Peninsula, whorl of polyps (SEM 303); Bottom, USNM 82072 from Ross Sea, whorl of polyps with immature polyp between fully developed individuals (SEM 1405). Stereo pairs.

731 sta. 1944, 11 Mar 1973. 2 colonies lacking holdfasts USNM 82071; 1 colony SMF 6970. — 64°50'S, 63°12'W, 155 fath. (=283 m); "Eastwind" sta. 66-006, haul 3, coll. D. F. SQUIRES and D. L. PAWSON, 29 Jan 1966. 2 colonies USNM 58151 (SEM 303). Fig. 5 top. — 65°3.71'S, 63°57.05'W, 360-375 m, R/V "Hero" cruise 833 sta. 8-2, 10 Mar 1983. 1 colony lacking holdfast USNM 82082. — 65°06.7'S, 65°00.7'W, 100-180 m, R/V "Hero" cruise 731 sta. 1884. 1 colony extensively overgrown by hydroids USNM 82118. — 65°54.5'S, 65°15.5'W, 246-270 m, R/V "Hero" cruise 824 sta. 5-1, 16 Mar 1982. 2 incomplete colonies USNM 82119 (SEM 1440-1442). Figs. 2 bottom, 3 top, 6, 9.

Weddell Sea: 76°50'S, 40°55'W, 513 m, IWSOE University of Connecticut, USS "Glacier" cruise 2 sta. 0006, 1 Mar 1969. 1 small branch USNM 82951. — 75°02.9'S, 28°00.3'W, 451m, EPOS 3, R/V "Polarstern" sta. 241, 1 Feb 1989, Grundschieppnetz 8. 1 large branch USNM 99122. — 75°09.1'S, 27°34.7'W, 407 m, EPOS 3, R/V "Polarstern" sta. 235, 31 Jan 1989, Grundschieppnetz 7. 1 branch USNM 99123. — 75°14.8'S, 26°13.4'W, 506 m, EPOS 3, R/V "Polarstern" sta. 229, 29 Jan 1989, Grundschieppnetz 6. 1 branch USNM 99124. — 75°14.2'S, 26°59.4'W, 270 m, EPOS 3, R/V "Polarstern" sta. 230, 30 Jan 1989, Agassiz Trawl 5. 2 branches USNM 99125.

Coats Land, off Cape Norvegia: 71°39.5'S, 12°21.1'W, 402 m, EPOS 3, R/V "Polarstern" sta. 281, 17 Feb 1989, Agassiz Trawl 21. 1 branch USNM 99121.

Diagnosis: Lyriform *Fannyella* with long terminal branches (Fig. 1). Polyps 1.5-2 mm tall, facing upward in regular whorls; abaxial body sclerites distinctly modified as "ascus-scales" composed of a nearly smooth, hexagonal, more or less concave exposed plate distinctly delimited from a tuberculate base embedded in the body wall and covered by the sclerite below; circumopercular and other distal body scales with a variably developed marginal point or spine, never very strong

and commonly absent; adaxial side of body unarmed except for a few small scales immediately below the operculars.

Comparisons: Colonies of *Fannyella rossii* have a strong resemblance to those of *Callogorgia antarctica* (KÜKEN-THAL, 1912). Although KÜKEN-THAL's drawing (1912: fig. 27) is not very convincing, it also is not very good, but his illustration of a body scale (Fig. 30) can hardly be anything but an ascus-scale. It seems very likely that *C. antarctica* (KÜKEN-THAL) = *Fannyella rossii* GRAY.

The other species of *Fannyella* with regularly verticillate polyps can be separated by size of polyps, sculpture and arrangement of body scales (*F. lemnos* new species), or sculpture, form and arrangement of body sclerites (*F. eos* new species and *F. aurora* new species).

Colonies of *Fannyella rossii* superficially resemble those of *F. kuekenthalii* (MOLANDER, 1929), which differs in the predominantly spiral arrangement of its polyps. They also resemble the original drawing of *C. ventilabrum* given by STUDER (1879: pl. 2, fig. 12), in which the polyps are shown as distinctly verticillate. However, that species was obtained north of New Zealand and probably is not a member of the Antarctic or sub-Antarctic fauna. Moreover, VERSLUYS (1906: 75) in his redescription of STUDER's type shows that the armature of the polyps is similar to that of certain other *Callogorgia* species.

Remarks: Apart from the lectotype of *Ascolepis splendens*, none of the specimens examined comes from the vicinity of the localities between 145°21'E. and 92°10'E sampled by the Australasian Antarctic Expedition. A specimen from 72°32'S.,

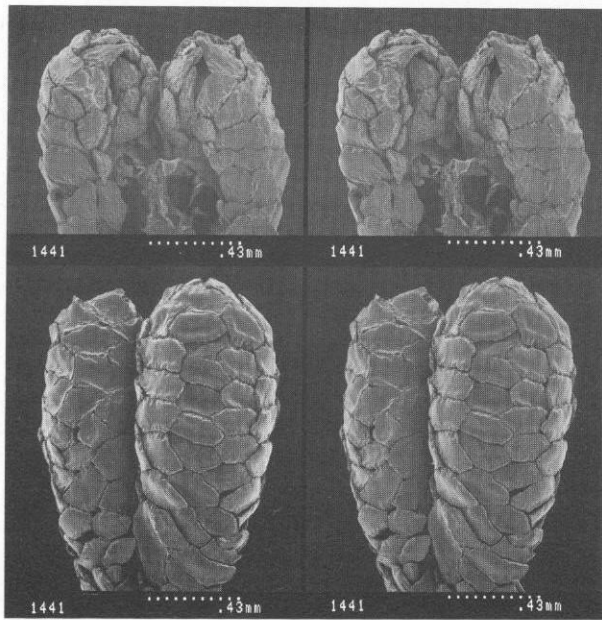


Fig. 6. *Fannyella rossii* GRAY, USNM 82119 from Antarctic Peninsula. Adaxial and abaxial views of two isolated polyps (SEM 1441). Stereo pairs.

171°26'E. off Cape Hallett (USNM 82949) was taken rather close to the location of the dredge haul reported by STOKES (1847) as the source of *Fannyella rossii*.

Specimens in the present collection show variation in the shape, ornamentation, and alignment of ascus-scales on the abaxial side of the polyps that can better be illustrated than described. The abaxial scales of some specimens tend to have a dentate distal margin (i.e. the upper rim of the "cup"), with the proximal border of the exposed surface ornamented with blunt denticles (Figs. 2 top; 4; 8d), as is rather crudely represented in THOMSON & RENNET's plate 11, fig. 6, and the distal edge of the circumoperculars projects as an angle or blunt point; several of the body scales also may have a marginal angle or point (Fig. 4). However, in other colonies, the marginal serration is fine or lacking (Fig. 9f, g), and the exposed part of the abaxial scales is so strongly hexagonal in outline that the contracted polyps resemble cycad strobili (Figs. 3 top; 6). Were it not for intermediates, the two extremes could be regarded as distinct species. Although more than one species-level taxon may be involved, it is as yet impossible to group the variants on any sound, objective basis.

The largest colony reported by THOMSON & RENNET was 31 cm tall. Several specimens among those now reported reach 40 cm in height and 30 cm in width (USNM 82078, 82949). All of the colonies from "Eltanin" sta. 1875 (USNM 82949) are somewhat decorticated, some of the branches being completely stripped of tissue while others seem quite normal and healthy. No explanation for this condition is apparent as, apart from expected breakage, damage during collection does not seem to be the cause.

THOMSON & RENNET (1931: 21) commented about the variability of the spacing of whorls of polyps and the number

of polyps comprising a whorl. They reported a range of from 6 to 11 whorls in 2 cm of branch length, and from 4 to 10 polyps per whorl. The present material shows the way new whorls of polyps are added between fully developed whorls, and new polyps produced between fully grown individuals within a whorl. Although new whorls of polyps are produced apically as branches elongate, it also is obvious that the lengthening of the branches is accompanied by growth of the coenenchyme, resulting in wider intervals between whorls. When the interval becomes sufficiently wide, new whorls of polyps are produced from the coenenchymal canal system. Similarly, as the girth of branches enlarges, the space between the polyps in each whorl increases sufficiently to accommodate new individuals. Consequently, such numerical characters must be used taxonomically with great caution.

Because the records of *Callogorgia ventilabrum* (STUDER) from South Georgia and Seymour Island, Graham Land, published by MOLANDER (1929: 60) are not illustrated, it is impossible to be certain of their identification. The number of polyps per whorl reported for branch tips is larger than in any specimens in the present collection and is the maximum mentioned by THOMSON & RENNET, presumably from larger branches rather than branch tips. However, as *F. rossii* is common around Antarctic Peninsula, it is possible that at least the specimen from Seymour Island is that species. The present collection contains no specimens of *rossii* from South Georgia.

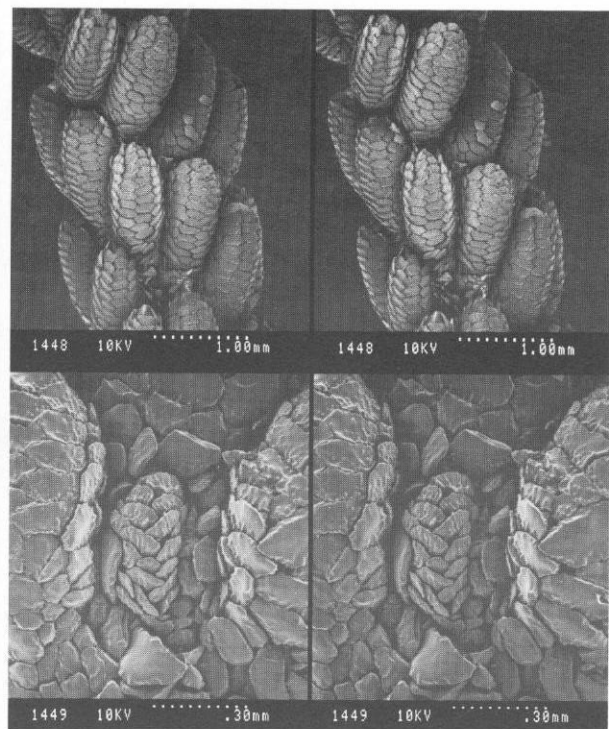


Fig. 7. *Fannyella rossii* GRAY. USNM 82952, from South Shetland Is. Top, Atypical spiral arrangement of polyps (SEM 1448); Bottom, Young polyp originating between mature polyps within a whorl (SEM 1449). Stereo pairs.

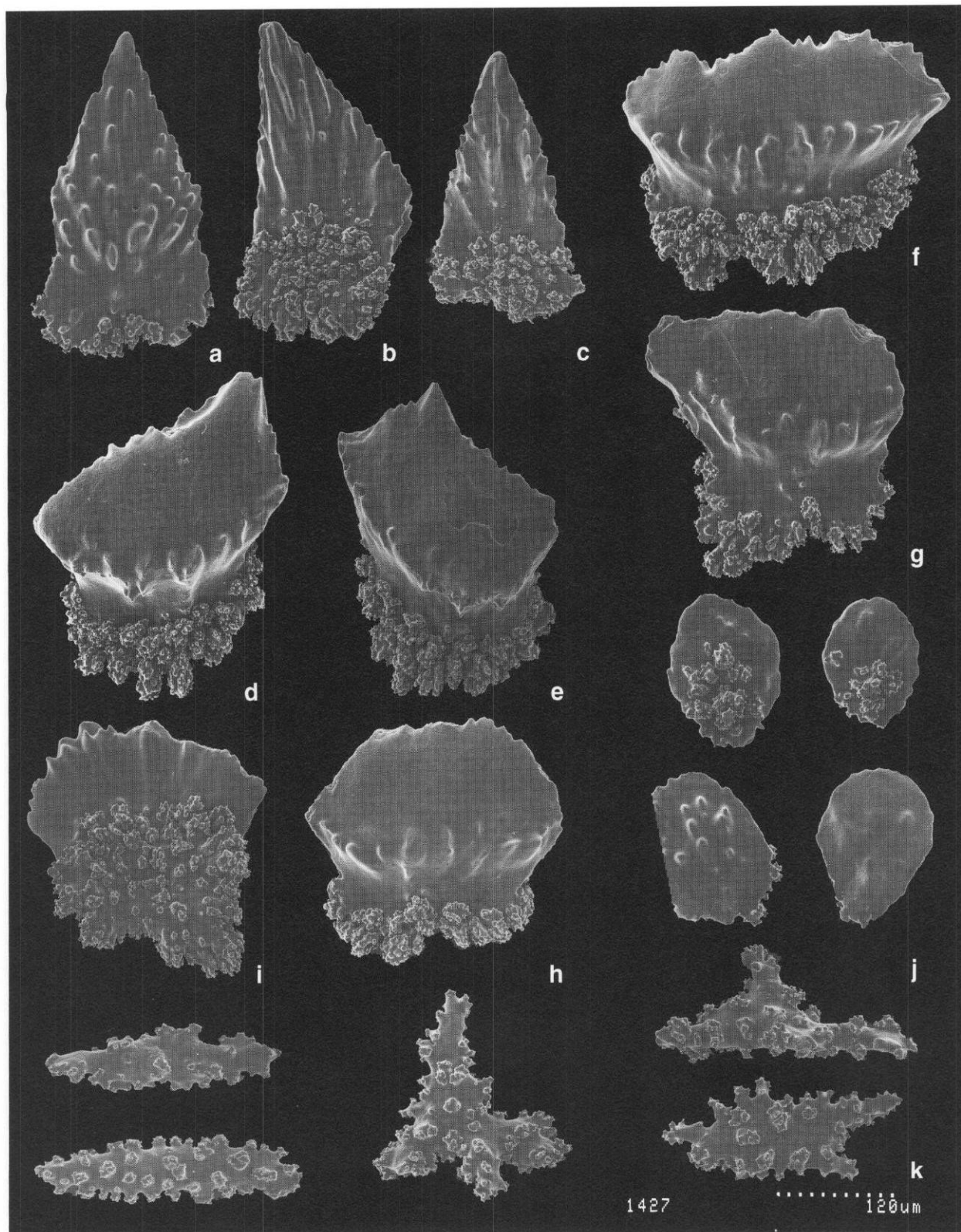


Fig. 8. *Fannyella rossii* GRAY. USNM 82949 from Ross Sea, sclerites (SEM 1427): a–c) Opercular scales; d–h) Outer surface of body scales; i) Inner surface of body scale; j) Small scales of coenenchyme; k) Tuberculate sclerites from longitudinal canal walls.

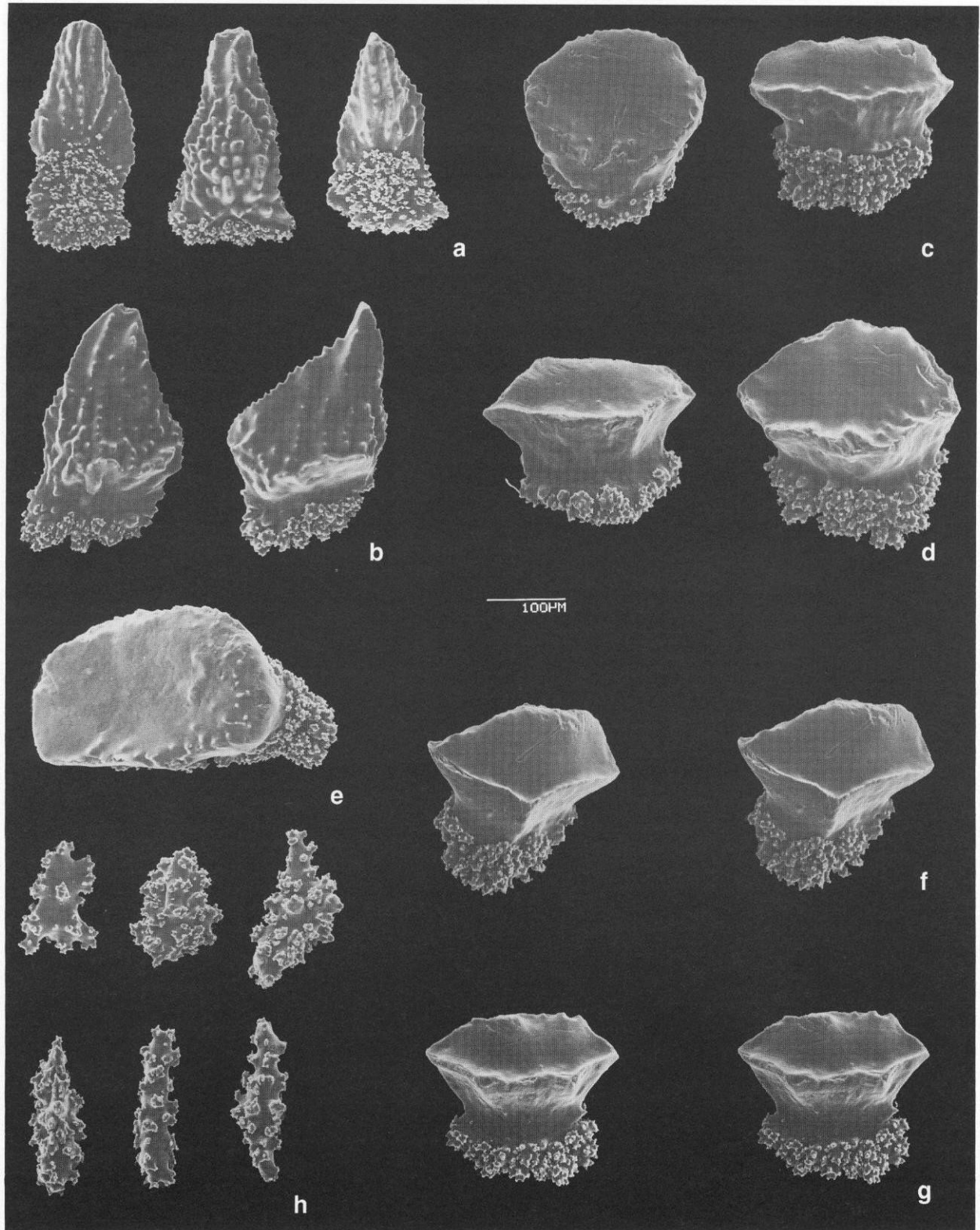


Fig. 9. *Fannyella rossii* GRAY. USNM 82119 from Antarctic Peninsula, sclerites (SEM 1442): a) Opercular scales; b) Circumopercular scales; c-e) Body sclerites; f, g) Abaxial ascus-sclerites in stereoscopic view; h) Tuberculate sclerites from longitudinal canal walls.

Fannyella spinosa (THOMSON & RENNET, 1931)

Figs. 10–13

1931 *Ascolepis spinosa* THOMSON & RENNET: 22, pl. 8, figs. 5, 6; pl. 11, fig. 5.

Material Examined: Ross Sea: McMurdo Sound: 77°39.4'S, 166°16'E, 315 m, USS "Eastwind" sta. EAD-2, 17 Feb 1960. 2 colonies, one with holdfast, in alcohol USNM 82083. – McMurdo Sound: 77°27'S, 169°30'E, 320 m, USS "Edisto" sta. ED-8, 18 Feb 1956, coll. J. Q. TIERNEY. 1 colony complete with holdfast attached to stone, and two detached and partly decorticated USNM 58153 (SEM 1524, 1525, 1534, 1535); two damaged colonies USNM 82977. – Off Cape Hallett: 72°32'S, 171°26'E, 337–329 m, USNS "Eltanin" sta. 1875, 15 Jan 1967. 4 colonies without holdfasts, and detached branches USNM 82978 (SEM 1518). Fig. 13.

South Orkney Islands: 62°06'S, 45°08'W, 485 m, USNS "Eltanin" sta. 499, 20 Feb 1963. 6 colonies and detached branches USNM 58152 (SEM 287, 1459, 1519; Figs. 10–12); 1 colony SMF 6973.

Balleny Islands: Off Buckle Island: 66°53'S, 163°19'E, 55–146 m, USARP, Scripps Institution of Oceanography, 10 Feb 1974. 5 colonies and some detached branches USNM 77329 (SEM 1406).

Coats Land, off Cape Norvegia: 71°39.5'S, 12°21.1'W, 402 m, EPOS 3, R/V "Polarstern" sta. 281, 17 Feb 1989, Agassiz Trawl 21. 1 colony USNM 99128.

Diagnosis: Dichotomously branched *Fannyella* forming compressed, more or less multiplanar flabellate colonies (Fig. 10) that may become distinctly bushy (Fig. 14). Polyps (Figs. 11, 13) with abaxial body sclerites distinctly modified as "ascus-scales" composed of a nearly smooth, concave, more or

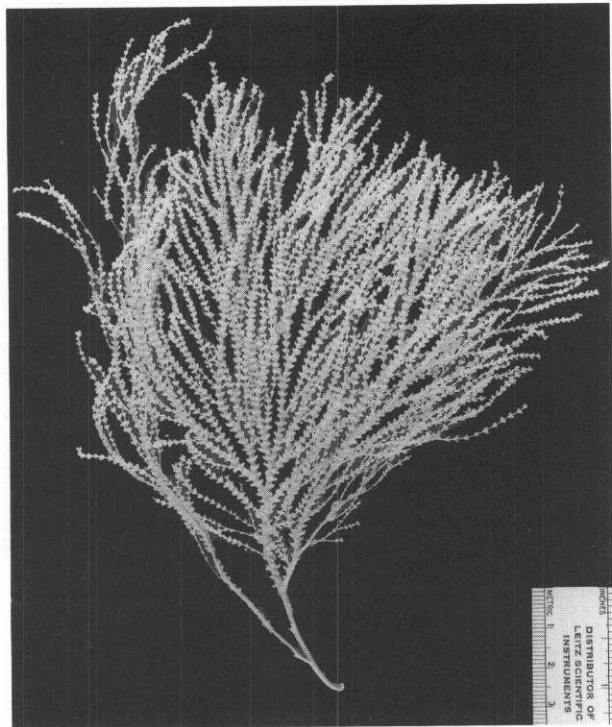


Fig. 10. *Fannyella spinosa* (THOMSON & RENNET). USNM 58152 from South Orkney Is., USNM 58152.

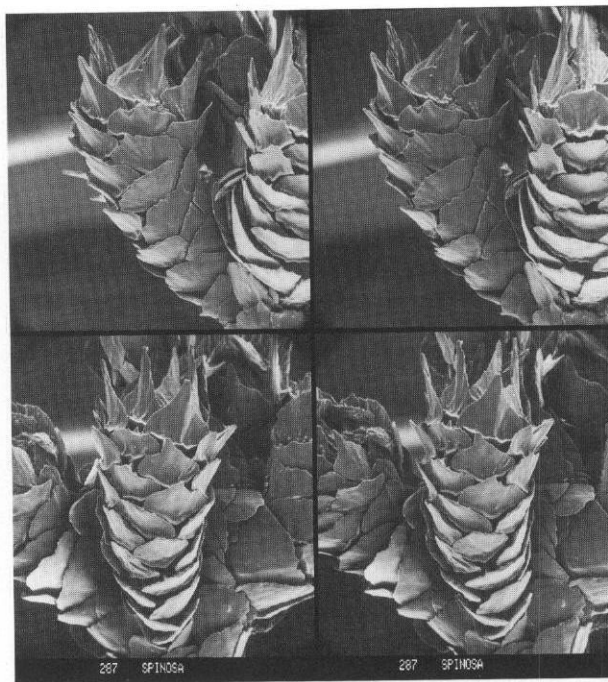


Fig. 11. *Fannyella spinosa* (THOMSON & RENNET). USNM 58152 from South Orkney Is. Lateral and abaxial views of polyps (SEM 287). Stereo pairs.

less pentagonal exposed plate with serrate distal margin, distinctly delimited from a tuberculate base by a prominent transverse crest (Fig. 12c, d); circumopercular (Fig. 12b) and some distal body scales (Fig. 12c) having a strong marginal spine; adaxial side of body shorter than abaxial but completely covered by scales.

Description: See THOMSON & RENNET, 1931: 22.

Remarks: There can be little doubt that the material here reported is *Ascolepis spinosa* THOMSON & RENNET. However, as the original specimen described in detail was only a "portion of a colony ... with a total height of 4.5 cm"¹⁾, it does not show the multiplanar, bushy aspect of complete colonies (Fig. 10). This growth form differs from that of *F. rossii* and the other species now assigned to *Fannyella*. Although the polyps and sclerites of *F. spinosa* closely resemble those of *Thouarella abies* BROCH, its growth form differs from the bottle-brush colonies associated with *Thouarella* so it is retained in *Fannyella* pending a comprehensive revision.

¹⁾ THOMSON & RENNET (1931: 22, pl. 8, fig. 5) record the height as 4.5 cm, but the illustration of it, said to be "natural size", measures 10 cm, while a second fig. 5 on the same plate shows a smaller branch, obviously enlarged, but not mentioned in the explanation.

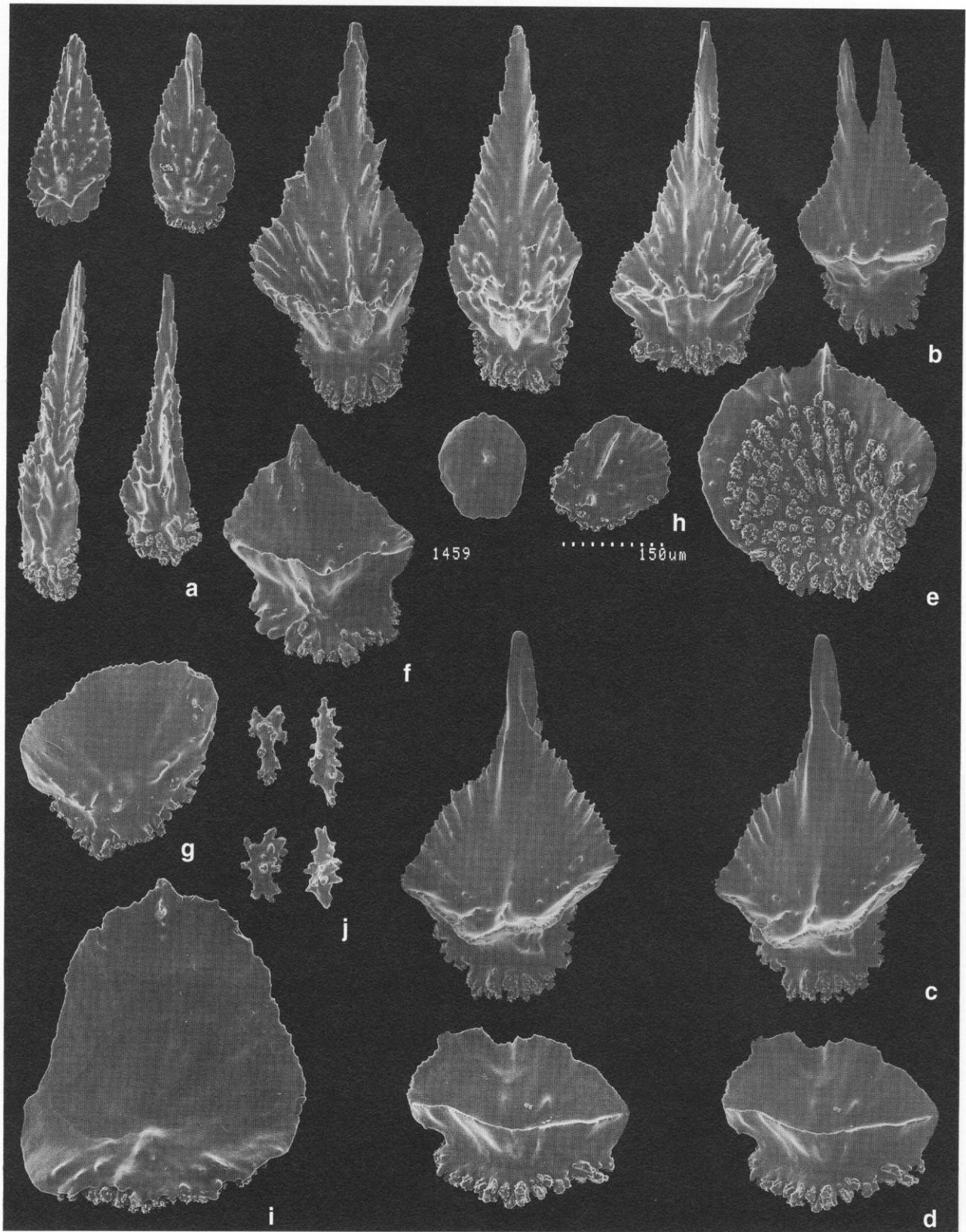


Fig. 12. *Fannyella spinosa* (THOMSON & RENNET). USNM 58152 from South Orkney Is., sclerites (SEM 1459): a) Operculars; b) Circumoperculars; c, d) Ascus-sclerites in stereoscopic view; e) Inner surface of body sclerite; f, g) Ascus-sclerites; h) Small coenenchymal scales; i) Large coenenchymal scale; j) Tuberculate sclerites from longitudinal canal walls.

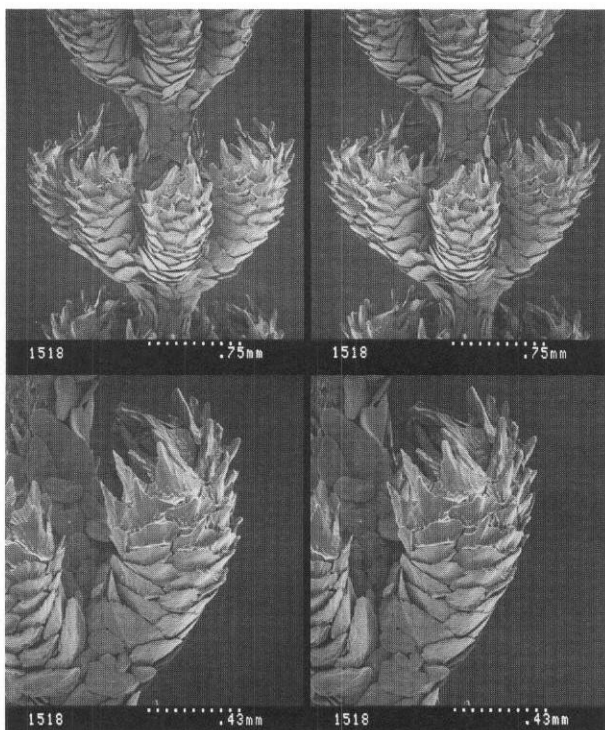


Fig. 13. *Fannyella spinosa* (THOMSON & RENNET). USNM 82978 from Ross Sea. Top, Whorl of polyps; Bottom, Oblique lateral view of polyp (SEM 1518). Stereo pairs.

"Intermediate form"

Figs. 14, 15

Material Examined: Ross Sea: 71°22'S, 170°43'E, 160–164 m, USNS "Eltanin" sta. 2125, 13 Feb 1968. 1 colony partly decorated USNM 82979 (SEM 1520). Figs. 14, 15.

A colony interpreted by THOMSON & RENNET (1931: 23) as an "intermediate form" transitional between *Ascolepis spinosa* and *A. splendens* lacked spines on the body sclerites, had short spines on the suboperculars, and triangular operculars. They reported that it had branching "much denser than in *A. spinosa* and several strata of branches overlap", also suggesting a departure from the uniplanar growth form of *Ascolepis* (= *Fannyella*).

A bushy colony (Figs. 59, 60) from "Eltanin" sta. 2125 agrees closely with details of the "intermediate form" given by THOMSON & RENNET and suggests that it represents a species distinct from *spinosa*, perhaps justifying separate generic recognition along with *spinosa* and *T. abies*. However, as the one specimen now on hand is in poor condition, further action is deferred pending availability of better material.

Fannyella lemnos n. sp.

Figs. 16–19

Material Examined: Vicinity of Cape Horn: 56°06'S, 66°19'W, 384–494 m, USNS "Eltanin" sta. 740, 18 Sep 1963. 1 nearly complete specimen without holdfast, holotype USNM 58392 (SEM 356, 1429–1432) Figs. 16–19; and 1 incomplete colony and detached branches USNM 82953, 1 branch SMF 6989 (paratypes).

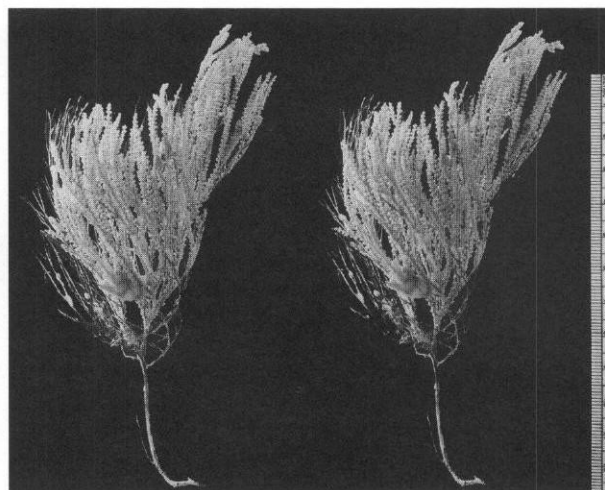


Fig. 14. *Fannyella spinosa* (THOMSON & RENNET) "intermediate form" USNM 82979 from Antarctic Ocean off Cape Adare. Colony, stereo pair.



Fig. 15. *Fannyella spinosa* (THOMSON & RENNET), "intermediate form" USNM 82979 from Antarctic Ocean off Cape Adare. Oral and lateral views of individual polyps in situ (SEM 1520). Stereo pairs.

Tierra del Fuego: Off Staten Island: 54°55.2'S, 64°09.2'W, USARP R/V "Hero" sta. 885, 493–511 m, 30 Oct 1971. 2 nearly complete colonies without holdfast, one now broken in two, and detached branch, paratypes USNM 78654.

Etymology: Greek ΛΕΜΝΟΣ, the island of Lemnos, sacred to Hephaestus, Greek God of Fire, in allusion to Tierra del Fuego, general locality of the specimens now named. Noun in apposition.

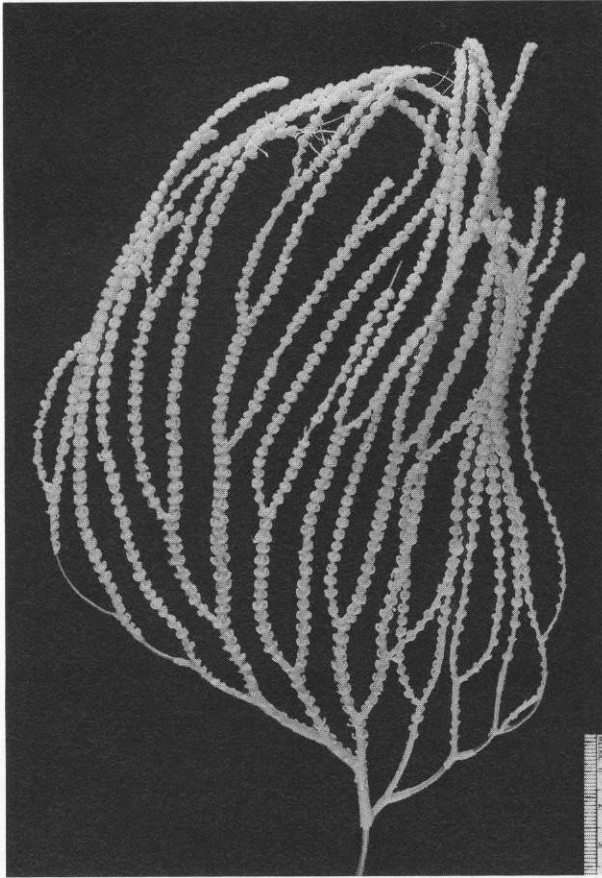


Fig. 16. *Fannyella lemnos* n. sp. USNM 58392, holotype colony from vicinity of Cape Horn.

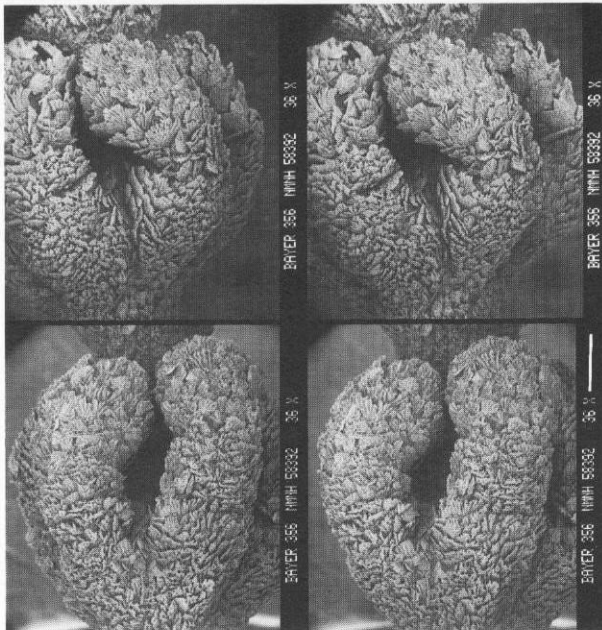


Fig. 17. *Fannyella lemnos* n. sp. USNM 58392, holotype from vicinity of Cape Horn. Parts of two whorls (SEM 356). Stereo pairs, scale bar represents 0.5 mm.

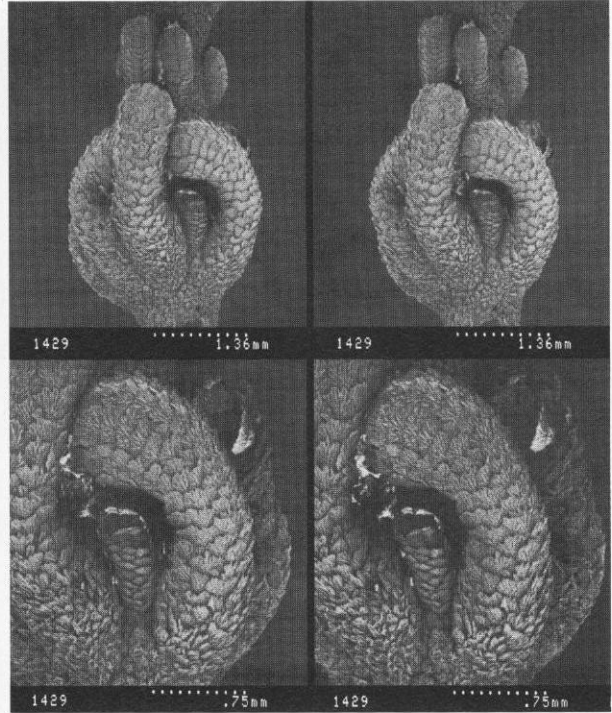


Fig. 18. *Fannyella lemnos* n. sp. USNM 58392, holotype from vicinity of Cape Horn. Top, New whorl originating between mature whorls; Bottom, Young polyp originating between mature polyps within whorl (SEM 1429). Stereo pairs.

Diagnosis: Lyriform *Fannyella* with long terminal branches. Polyps 2.5–3 mm tall, facing upward in regular whorls; body sclerites not strongly modified as “ascus-scales”, the exposed part ornamented by radially aligned, smooth spinules, arranged in distinct longitudinal rows only in distal part of body, becoming irregular in proximal part, abaxial side with 5–6 up to 10–12 scales longitudinally aligned before regular arrangement is disrupted; outer- and inner-lateral rows with 4–5 up to 10–12 scales; adaxial side fully covered by smaller scales in two longitudinal rows. Closed operculum inconspicuous, surrounded by circumoperculars.

Description: The holotype (Fig. 16) lacking holdfast is 28 cm tall, 17 cm broad, dichotomously branched in one plane to produce a flabellate, roughly lyrate colony with ascending, nearly straight undivided terminal branches up to 17.5 cm long. Distally the axis is round in cross section, with obscure irregular longitudinal grooving, pale straw-colored, darkening proximad and developing a moderate metallic luster. Polyps are arranged in regular whorls usually of 6, 6–7 whorls in 2 cm of branch length. The main trunk and first internode of the lowest branches are devoid of polyps.

The contracted polyps are directed upward and curved inward toward the axis, 2.5–3 mm tall, with a median constriction that imparts a somewhat clavate appearance (Figs. 17, 18). In some polyps, the abaxial body scales are aligned in longitudinal rows in the distal portion of the polyps, but near or somewhat below the level of the median constriction the rows become disrupted by the random addition of numerous small scales (Fig. 18), but in others there is little or no indication of

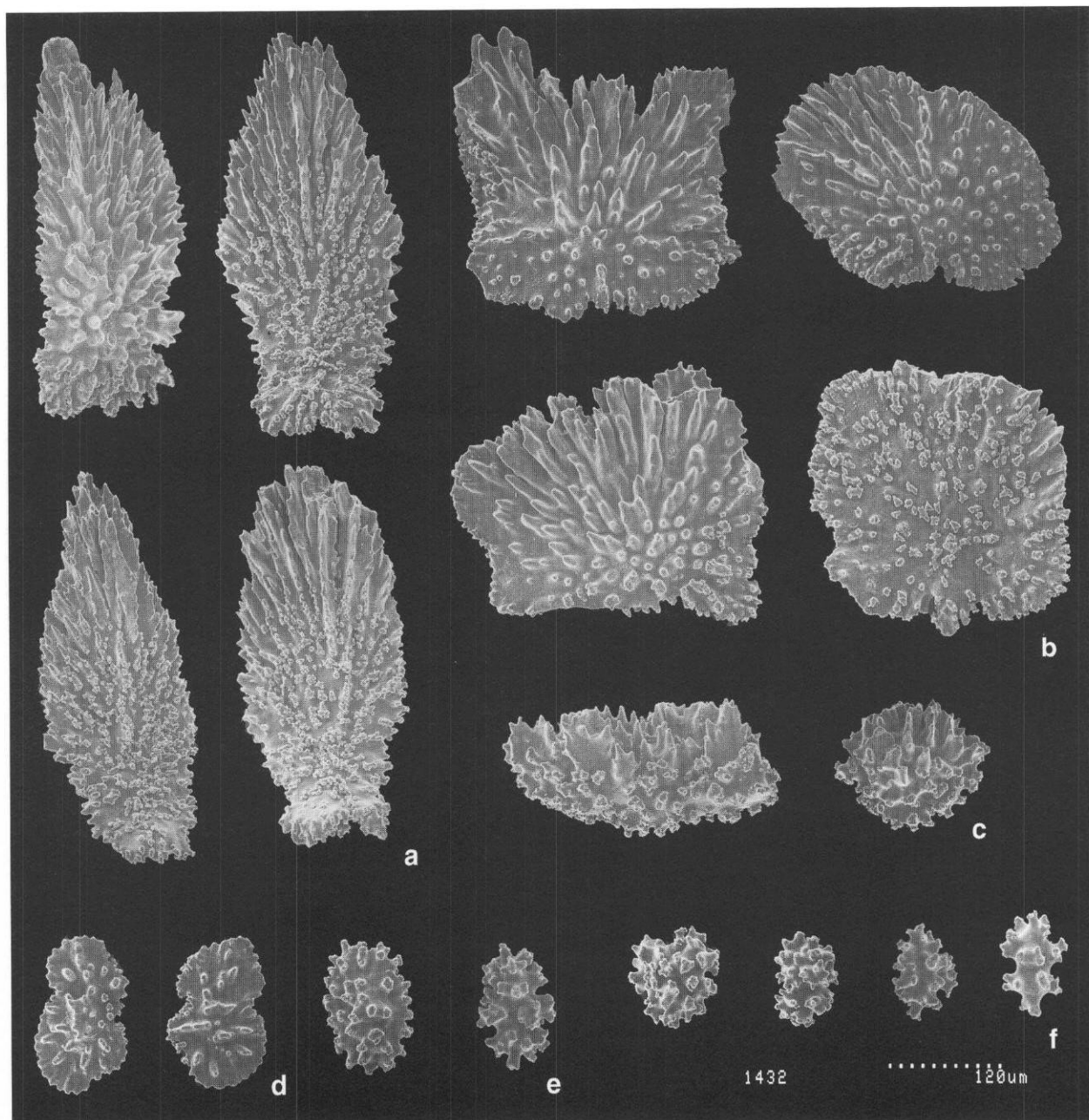


Fig. 19. *Fannyella lemnos* n. sp. USNM 58392, sclerites (SEM 1432): a) Operculars; b) Body scales; c) Irregular sclerites from outer coenenchyme; d) Small scales from coenenchyme and base of polyps; e, f) Tuberculate sclerites from longitudinal canal walls.

longitudinal alignment (Fig. 17). The number of abaxial scales in the distal, longitudinally aligned rows varies from 6 or 7 to 10–15 or more; the outer and inner lateral rows are well developed also, comprising up to 10–12 scales each; the adaxial side of the polyps is completely covered with small, thin scales distinctly aligned in longitudinal rows, 10 or more in each row because the scales are much smaller than the abaxials and laterals. The opercular scales (Fig. 19a) are well differentiated, lancet-shaped or narrowly pentagonal, decreasing in size from the abaxial to the adaxial position. The outer surface of the scales is ornamented with narrow, thorny ridges radiating outward from the depositional center (“nucleus”) and the inner surface by small tubercles that are most clearly aligned in a radial direction only near the distal margin.

The abaxial body scales (Fig. 19b) are roundedly quadrate, transversely rectangular or ovate, 0.25–0.3 mm high and up to about 0.4 mm wide. The abaxial operculars are about 0.45 mm tall, decreasing toward the adaxial side; the two adaxial operculars are narrow, with nearly parallel sides, about 0.35 mm tall and 0.1 mm wide. The coenenchyme of the branches is filled with rounded or oval platelets, sometimes with a median waist, up to about 0.3 mm long (Fig. 19c); the cortex of the trunk contains smaller tuberculate spheroids, some approaching the shape of capstans, 0.1–0.15 mm long (Fig. 19d).

The colony in alcohol is white.

Comparisons: Only the dichotomously branched, flabellate colonial form of this species resembles that of *F. kuekenthali*. It differs in the larger size of its polyps and their regular arrangement in whorls. The disorderly organization of body scales on the proximal part of the polyps is distinctive, as are the complete rows of adaxial body scales. The sharply thorny external ornamentation of the body scales differs from the nearly smooth outer surface of the body scales of *F. kuekenthali*.

Fannyella eos n. sp.

Figs. 20a, 21, 22

Material Examined: South Pacific Ocean: Southwest Auckland Rise, 51°00'S, 162°01'E, 333–371 m, USNS “Eltanin” sta. 1411, 8 Feb 1965. 1 damaged colony with holdfast, holotype USNM 82074 (SEM 1457, 1458) Figs. 20a, 21, 22; 2 incomplete colonies lacking holdfast, and detached branches USNM 82975; 1 colony, SMF 6987 (paratypes).

Etymology: Eos, from Greek EOC, Greek name of Aurora, Goddess of Morning. A noun in apposition.

Diagnosis: Flabellate *Fannyella* with short terminal branchlets. Polyps 2 mm tall, distinctly clavate, facing upward in regular whorls. Body scales in distinct longitudinal rows; abaxial body scales weakly modified as ascus-scales, externally

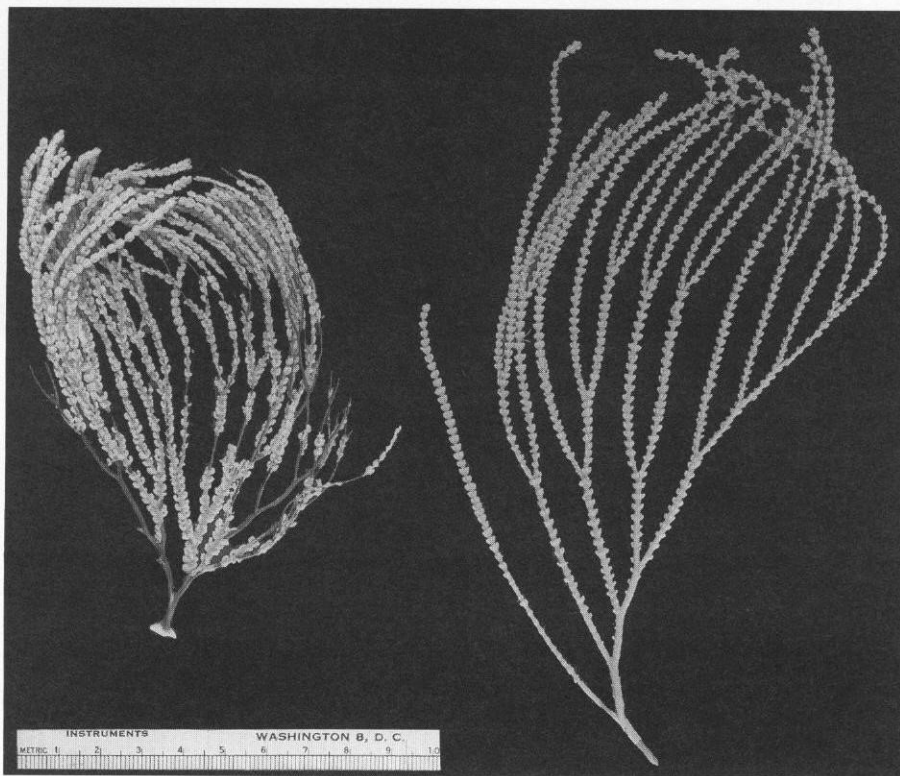


Fig. 20. Left, *Fannyella eos* n. sp., USNM 82074, holotype from the Southwest Auckland Rise. — Right, *Fannyella aurora* n. sp., USNM 82955, holotype from off Antarctic Peninsula.

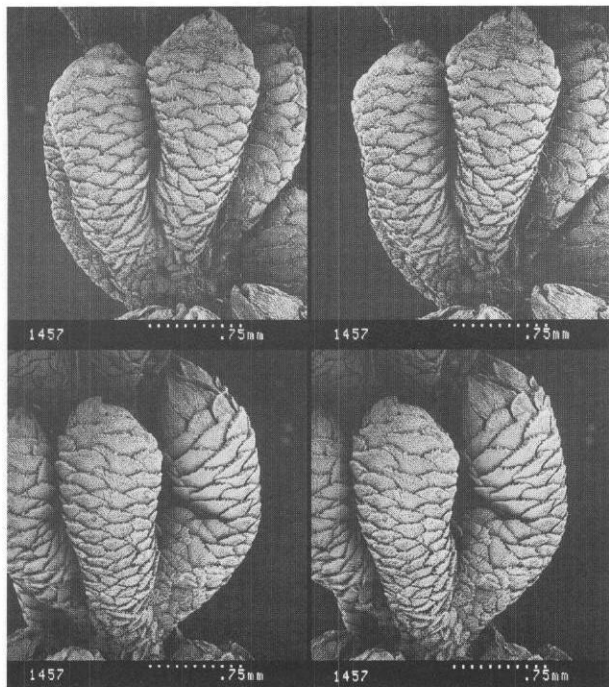


Fig. 21. *Fannyella eos* n. sp., USNM 82074, holotype from the Southwest Auckland Rise. Parts of two whorls of polyps (SEM 1457). Stereo pairs.

sculptured by smooth granules. Closed operculum prominent, conical; opercular scales with high apical keel. Coenenchymal scales tessellated. No swollen brood polyps.

Description: The holotype is a dichotomously branched colony 13 cm tall and 10 cm wide, somewhat damaged but with holdfast intact (Fig. 20a). Bifurcations occur at intervals of about 7 to 32 mm, with undivided terminal branchlets up to about 50 mm in length. The axis is strongly calcified, marked by weak, irregular longitudinal striations, dull greenish bronze in color.

The polyps are arranged in regular whorls of 4–7, commonly 5 or 6, but at the tips of branchlets may be as few as 3; 9–11 whorls occur in 2 cm, commonly 10. The polyps are directed upward and toward one face of the colony in such a way that in many places on the “back” side of the branches they face away from the midline. They are club-shaped, about 2 mm tall and 0.9 mm wide distally, narrowing basad to about 0.7 mm (Fig. 21). The body sclerites are arranged in 8 longitudinal rows that may become oblique; the abaxial rows each comprise about 15 scales before they merge with the coenenchymal scales. The adaxial side of the polyps is completely covered by sclerites but the number in the rows is less, owing to the upward curvature of the body. The closed operculum is prominent, conical, surrounded by the circumoperculum composed of the 8 marginal scales; the circumoperculars have only a narrow free distal margin and thus do not override the operculars, although they slope gently inward with the operculars above the widest part of the polyp.

The proximal part of the inner surface of the opercular scales is covered by crowded, complex tubercles, the free margin

by serrate radial ridges that extend onto a high apical keel (Fig. 22a–e). The body scales (Fig. 22f–k) vary in outline, those of the abaxial rows more or less fan-shaped, curved to fit the body, those of the other rows becoming increasingly asymmetrical toward the axis and toward the base of the body, where some take the shape of thick crescents (Fig. 22l); the smaller forms are ovate (Fig. 22m). The outer surface of the sclerites is sculptured by rows of smooth, prominent granules radiating outward from the nucleus, the inner surface by crowded, complex tubercles. The inner surface of the free distal margin of the body scales is marked by several low radial ridges that do not form strong dentations along the distal margin.

The coenenchyme is covered by small, more or less polygonal tessellated plates (Fig. 22n) sculptured externally by reticulating raised riblets, internally by crowded, complex tubercles, and abundant smaller bodies of diverse size, those of the canal walls in the form of small, irregular, tuberculate spheroids (Fig. 22o).

Comparisons: Superficially, this species bears some resemblance to *Fannyella aurora* but can be distinguished at once by the club-shaped polyps, the external sculpture and nearly smooth margin of the body sclerites. Because of its regular whorls of polyps, the gross appearance of *F. eos* is similar to *F. rossii* but can be recognized easily by the shape and ornamentation of its sclerites (cf. Figs. 8, 9, 22).

Remarks: In examining alcoholic specimens under the dissecting microscope, it must be kept in mind that the radial ridges along the inner distal margin of the body scales can be seen through the thin, translucent edge of the sclerites, considerably exaggerating the appearance of the fine marginal serration.

Fannyella aurora n. sp.

Figs. 20b, 23–25

Material Examined: Antarctic Peninsula: Off d’Urville Island, Bransfield Strait: 62°42’S, 56°10’W, 406–465 m, USNS “Eltanin” sta. 415, 2 Jan 1963. 2 damaged colonies and detached branches USNM 82954. — Off d’Urville Island, Bransfield Strait: 62°39’S, 56°10’W, 426–311 m, USNS “Eltanin” sta. 418, 2 Jan 1963. 1 large branch (holotype) USNM 82955 (SEM 1491–1493) Figs. 20c, 23–25; and a damaged colony with detached branches USNM 82956; 1 branch SMF 6988 (paratypes). — Bransfield Strait: 62°14’S, 57°17’W, 509–549 m, USNS “Eltanin” sta. 419, 3 Jan 1963. 1 small dichotomous branch USNM 82957 (SEM 1506).

Etymology: This species is named in honor of HMS “Aurora”, research vessel of the Australasian Antarctic Expedition 1911–1914.

Diagnosis: Lyriform *Fannyella* with long terminal branches. Polyps 2 mm tall, weakly clavate, facing upward in regular whorls. Body sclerites in distinct longitudinal rows; abaxial body scales about 15 in each row, weakly modified as ascus-scales, externally smooth. Closed operculum low, mostly hidden by circumoperculars; opercular scales with strong apical keel flanked by secondary crests. Swollen brood polyps covered by smooth, rounded, imbricating scales. Coenenchymal scales imbricated.

Description: The holotype (Fig. 20b) is a dichotomously subdivided branch with 18 terminal branchlets, 19 cm tall and lacking holdfast, possibly part of a larger flabellate colony. Side branches arise from the main branch at intervals of about 1 cm, and the side branches bifurcate at intervals of 1–5 cm, producing terminal branchlets 5–11 cm long.

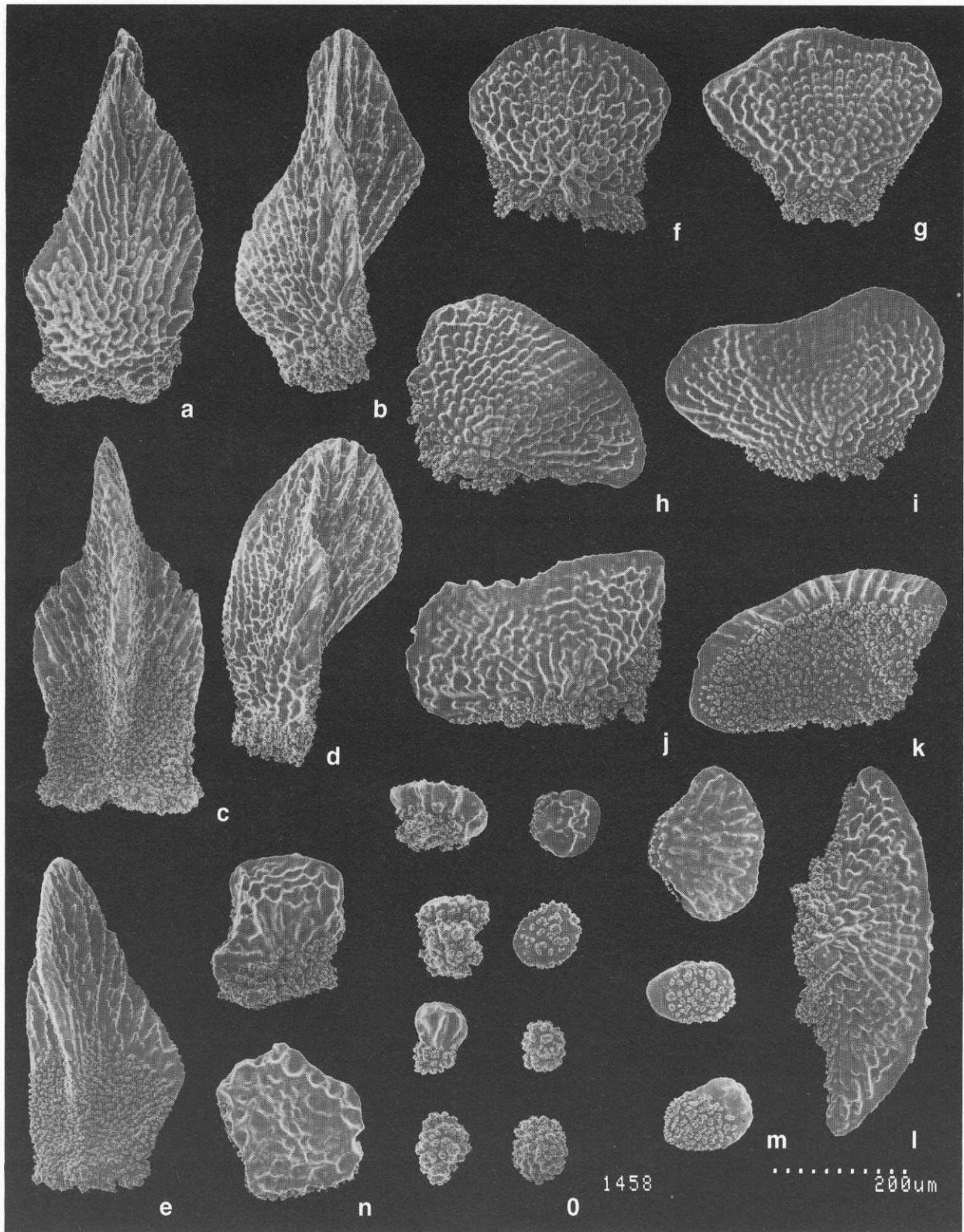


Fig. 22. *Fannyella eos* n. sp., USNM 82074, holotype from the Southwest Auckland Rise, sclerites (SEM 1458): a–e) Operculars; f–k) Abaxial and lateral body scales; l) Proximal body scale; m) Small body scales; n) Outer coenenchymal scales; o) Small scales and irregular bodies from outer coenenchyme, and tuberculate spheroids from longitudinal canal walls.

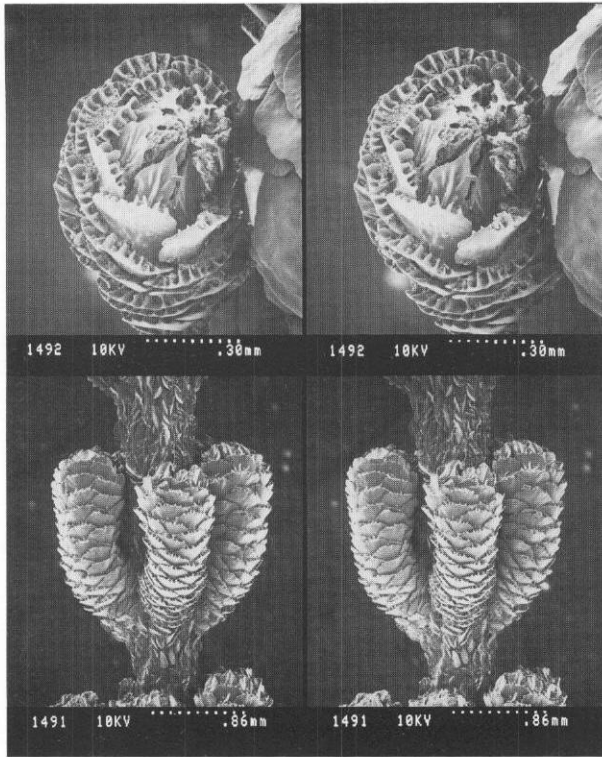


Fig. 23. *Fannyella aurora* n. sp., USNM 82955, holotype from off Antarctic Peninsula. Top, Opercular view of closed polyp showing operculum and circumoperculum (SEM 1492); Bottom, Whorl without brood polyps (SEM 1491). Stereo pairs.

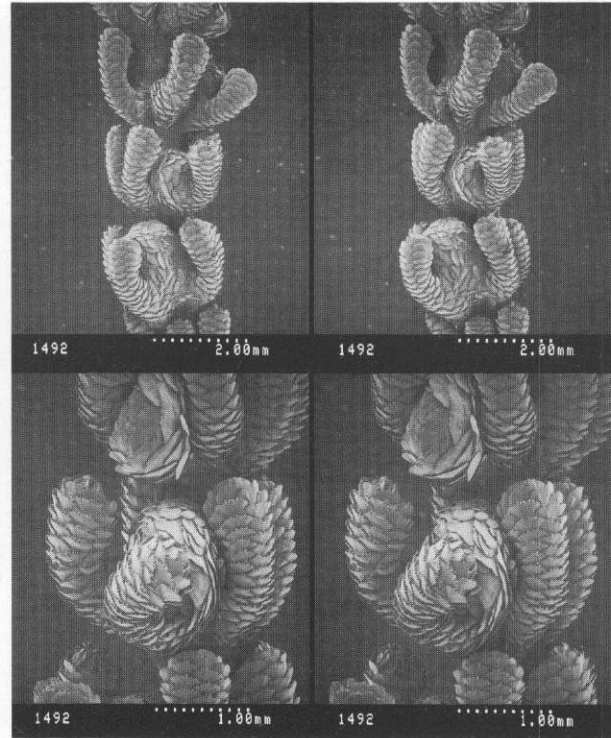


Fig. 24. *Fannyella aurora* n. sp., USNM 82955, holotype from off Antarctic Peninsula. Top, Three whorls containing brood polyps; Bottom, Detail of whorl with brood polyp (SEM 1492). Stereo pairs.

The axis is strongly calcified, with longitudinal grooves marking the course of the stem canals, bright gold in color, becoming somewhat darker toward the base.

The polyps are arranged in regular whorls of 6 (Fig. 23 bottom), of which 8–10 occur in 2 cm. They are about 2 mm tall and 0.75 mm in diameter, directed sharply upward, nearly cylindrical but slightly wider distally, gently recurved toward the axis. They are covered with 8 longitudinal rows of body scales, about 15 in the abaxial and lateral rows, somewhat fewer in the adaxial rows but even those are well developed. The operculum is low, scarcely visible in lateral view, surrounded by the inwardly folding marginal scales that form a circumoperculum (Fig. 23 top). Some of the polyps of colonies in breeding condition are modified as brood polyps, conspicuously swollen by developing larvae (Fig. 24).

The inner surface of the opercular scales (Fig. 25b) has a high, longitudinally ridged keel that projects strongly beyond the apex of the scale, as well as lower radial ridges that end in conspicuous marginal dentations. The body scales (Fig. 25 c–e) are of the usual rounded-trapezoidal outline, size and shape being determined by position on the polyp. The scales are curved to fit the contours of the body, with the free margin recurved outward, resulting in a roughly saddle shape. The outer surface is nearly smooth, the inner surface sculptured with scattered tubercles concentrated around the depositional center ("nucleus"), from which radiate several narrow, sharp ridges that extend along the inside of the free distal edge to project as conspicuous marginal dentations.

The coenenchyme is covered by small, oval or roundish imbricated scales with nearly smooth, somewhat concave outer surface and convex inner surface sculptured near the center or toward one edge by a cluster of tubercles (Fig. 25g, h). The walls of the longitudinal stem canals contain small, stubby, tuberculate bodies (Fig. 25i).

Distribution: At present known only from off the Antarctic Peninsula, 311–549 m.

Comparisons: This species is similar to *F. splendens*, but its body scales are not strongly developed as ascus-scales and have conspicuous radial crests along the inner distal margin, and the opercular scales are larger and have a strong apical keel.

Remarks: The poor condition of the specimens from stas. 415 and 419 is no doubt the result of collection by rock dredge.

Fannyella lepidota n. sp.

Figs. 26–31

Material Examined: Antarctic Peninsula: 64°50'S, 63°12'W, 155 fath. (= 283 m), USS "Eastwind" sta. EW-66-006, 29 Jan 1966. 1 colony lacking holdfast USNM 58159 (SEM 1533). Fig. 31 top. –Vicinity of Joinville Island: 62°40'S, 54°45'W, 265 m, USNS "Eltanin"

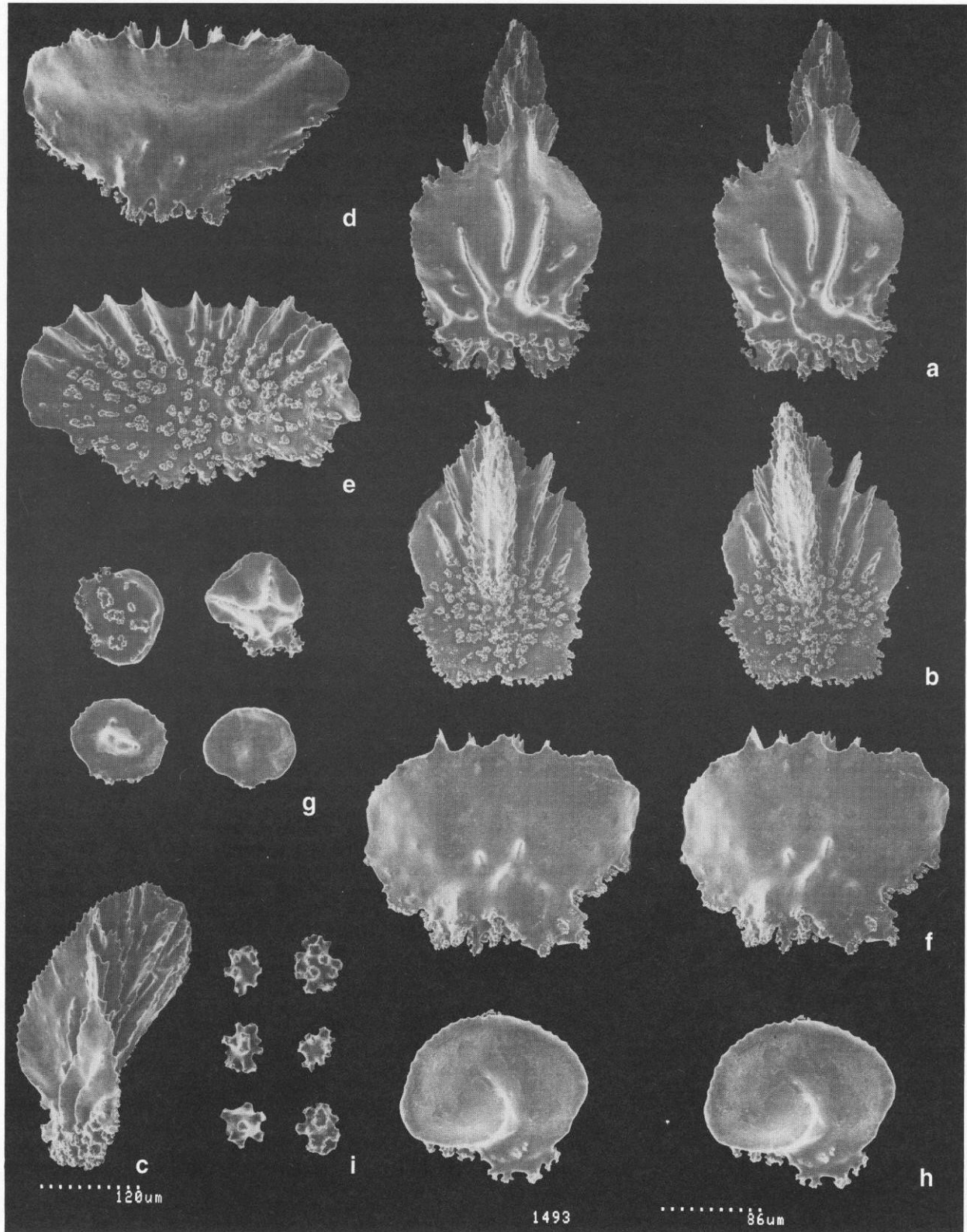


Fig. 25. *Fannyella aurora* n. sp., USNM 82955, holotype from off Antarctic Peninsula, sclerites (SEM 1493): a, b) Outer and inner surfaces of opercular scales, stereoscopic views; c) Opercular scale, side view; d, e) Outer and inner surfaces of body scales; f) Body scale in stereoscopic view; g) Scales of outer coenenchyme; h) scale of outer coenenchyme in stereoscopic view; i) Tuberculate bodies from longitudinal canal walls. 86 μ m scale applies to h only; 120 μ m scale to all others.

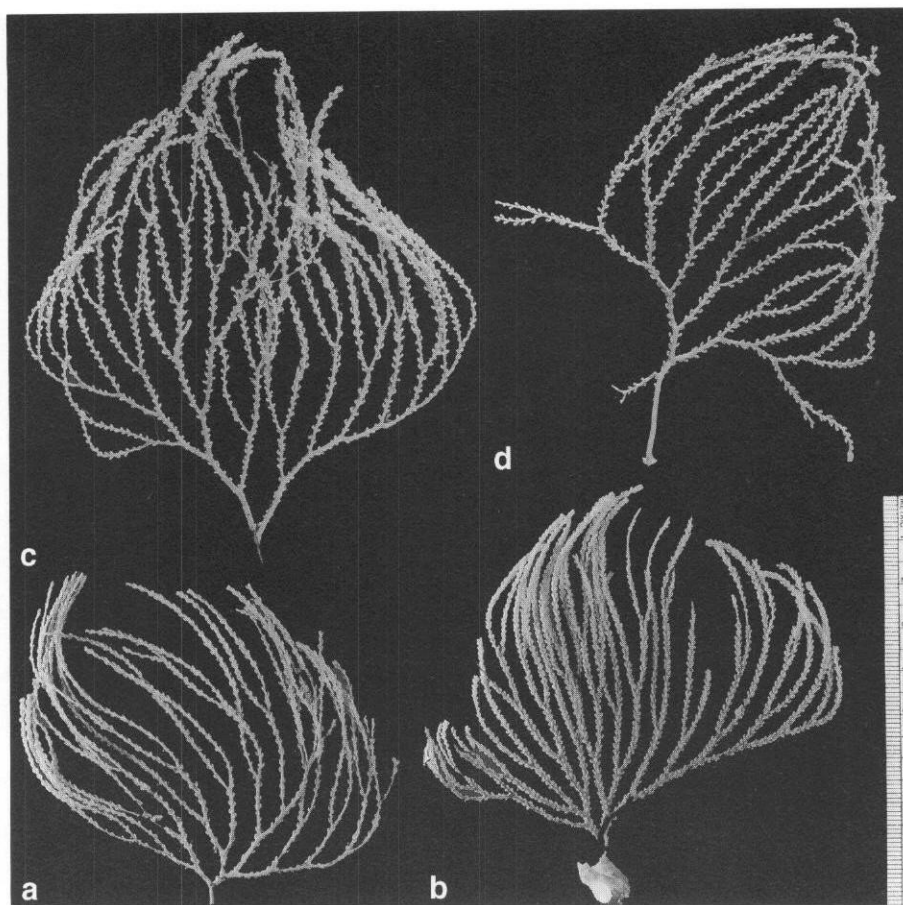


Fig. 26. a) *Fannyella lepidota* n. sp., USNM 82958, paratype from Scotia Sea between S. Orkney and S. Sandwich Is.; b) USNM 82961, holotype from Ross Sea; c) *F. mawsoni* n. sp., USNM 58158, holotype from Weddell Sea; d) USNM 82970, paratype from Weddell Sea.

sta. 1002, 15 Mar 1964. 2 colonies without holdfast USNM 83044 (SEM 1532). Fig. 31 bottom.

Scotia Sea: Between South Orkney and South Sandwich Islands: 61°38'S, 34°35'W, 3514–3495 m, USNS "Eltanin" sta. 1063, 6 Apr 1964. 2 colonies, one damaged and one lacking holdfast USNM 82958 (SEM 1508, 1510). Figs. 26a, 29. — Off South Orkney Islands: 60°51'S, 42°57'W, 284 m, USNS "Eltanin" sta. 1083, 14 Apr 1964. 4 incomplete colonies USNM 56660 (SEM 1511).

Ross Sea: 73°56'S, 178°56'W, 401–399 m, USNS "Eltanin" sta. 1931, 29 Jan 1967. 5 colonies and branches USNM 82959. — 73°49'S, 178°13'W, 495–503 m, USNS "Eltanin" sta. 2021, 15 Jan 1968. 7 colonies and branches USNM 82960. — 73°51'S, 178°15'W, 485 m, USNS "Eltanin" sta. 2022, 15 Jan 1968. 1 colony with holdfast (holotype) USNM 82961, Figs. 26b, 27, 28, 30; and one lacking holdfast (paratype) USNM 82962 (SEM 1436, 1463, 1499, 1500). — 76°25'S, 170°24'W, 568 m, USNS "Eltanin" sta. 2075, 30 Jan 1968. 2 colonies lacking holdfast USNM 82963. — 75°50'S, 173°08'W, 468–474 m, USNS "Eltanin" sta. 2080, 31 Jan 1968. 5 more or less complete colonies and fragments USNM 82964. — 76°04'S, 164°46'W, 513–550 m, USNS "Eltanin" sta. 2095, 3 Feb 1968. 6 more or less damaged colonies (paratypes) USNM 82965 (SEM 1452). — 76°08'W, 165°04'W, 494–498 m, USNS "Eltanin" sta. 2097, 4 Feb 1968. 4 incomplete colonies USNM 82966. — 73°05'S, 180°00', 567 m, USNS "Eltanin" sta. 2119, 11 Feb 1968. 1 colony attached to scleractinian coral USNM 82967.

Etymology: *Lepidotus*, from Greek ΛΕΠΙΔΩΤΟΣ, scaly, from ΛΕΠΙΣ, scale.

Diagnosis: Flabellate *Fannyella* of small size, more or less distinctly lyriform in aspect. Polyps about 1 mm tall, facing upward in spirals with a tendency to separate into whorls. Body scales in distinct longitudinal rows; abaxial body scales 7–8 in each row, moderately developed as ascus-scales, externally nearly smooth except for simple granules along proximal margin of exposed surface. Closed operculum conical, partly obscured by circumoperculars. Opercular scales with thin apical keel. Swollen brood polyps covered by large, rounded, imbricating scales. Coenenchymal scales smooth, rounded, imbricated.

Description: The colonies (Fig. 26a, b) are dichotomously branched in one plane, producing uniplanar fans of small size, mostly about 10 cm tall, composed of slender, flexible branches up to 5 cm long and about 1 mm in diameter including the contracted polyps. The axis is dark brown with bronze metallic luster, its surface irregularly wrinkled and obscurely grooved longitudinally, fixed to the substrate by a small discoidal holdfast.

The polyps, about 1 mm tall or slightly more depending upon degree of contraction, are placed in irregular whorls or in open spirals around the branches (Figs. 27–29); when whorls are developed, 7–8 occur in 1 cm of branch length. Polyps containing planulae are conspicuously distended as a

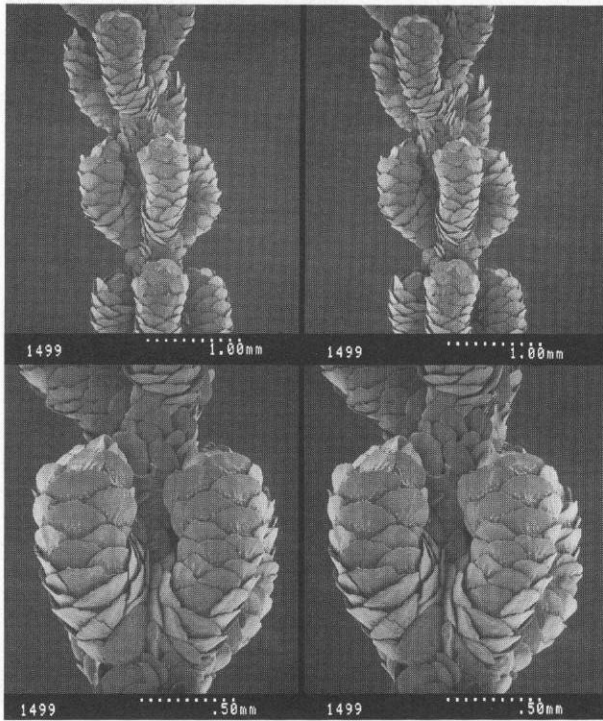


Fig. 27. *Fannyella lepidota* n. sp., USNM 82961, holotype from Ross Sea. Top, Three whorls of polyps; Bottom, Whorl of polyps at higher magnification (SEM 1499). Stereo pairs.

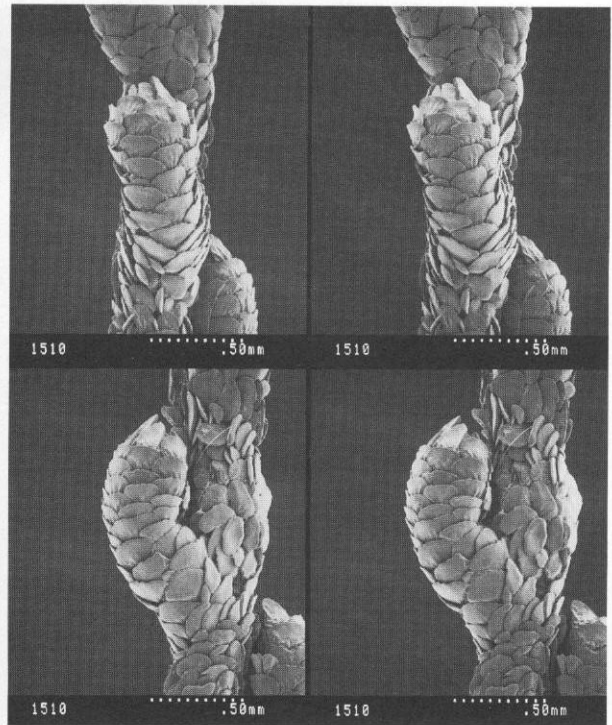


Fig. 29. *Fannyella lepidota* n. sp., USNM 82958, paratype from between S. Orkney and S. Sandwich Is. Top, Abaxial view of polyp; Bottom, Oblique lateral view of polyp (SEM 1510). Stereo pairs.

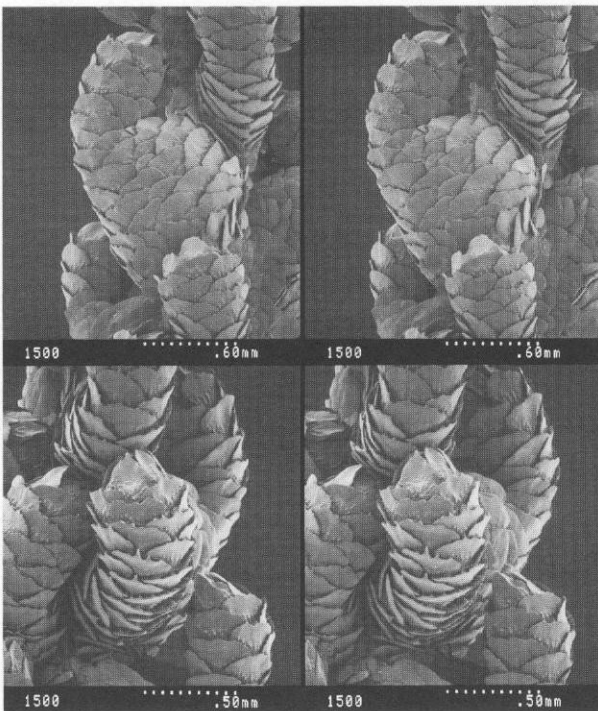


Fig. 28. *Fannyella lepidota* n. sp., USNM 82961, holotype from Ross Sea. Top, Brood polyp in lateral view; Bottom, Non-brooding polyp in abaxial view (SEM 1500). Stereo pairs.

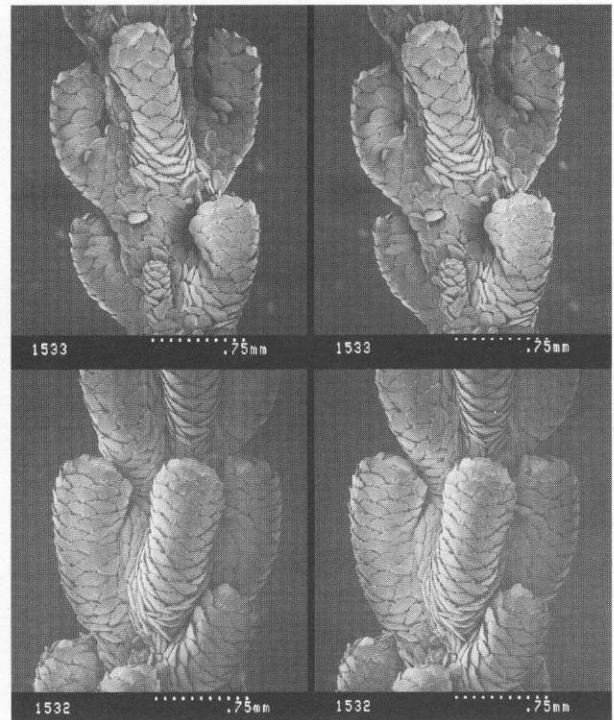


Fig. 30. *Fannyella lepidota* n. sp. Top, USNM 58159 from Antarctic Peninsula, whorls of polyps, the lower with young individual (SEM 1533); Bottom, USNM 83044 from Antarctic Peninsula, whorls of polyps (SEM 1532). Stereo pairs.

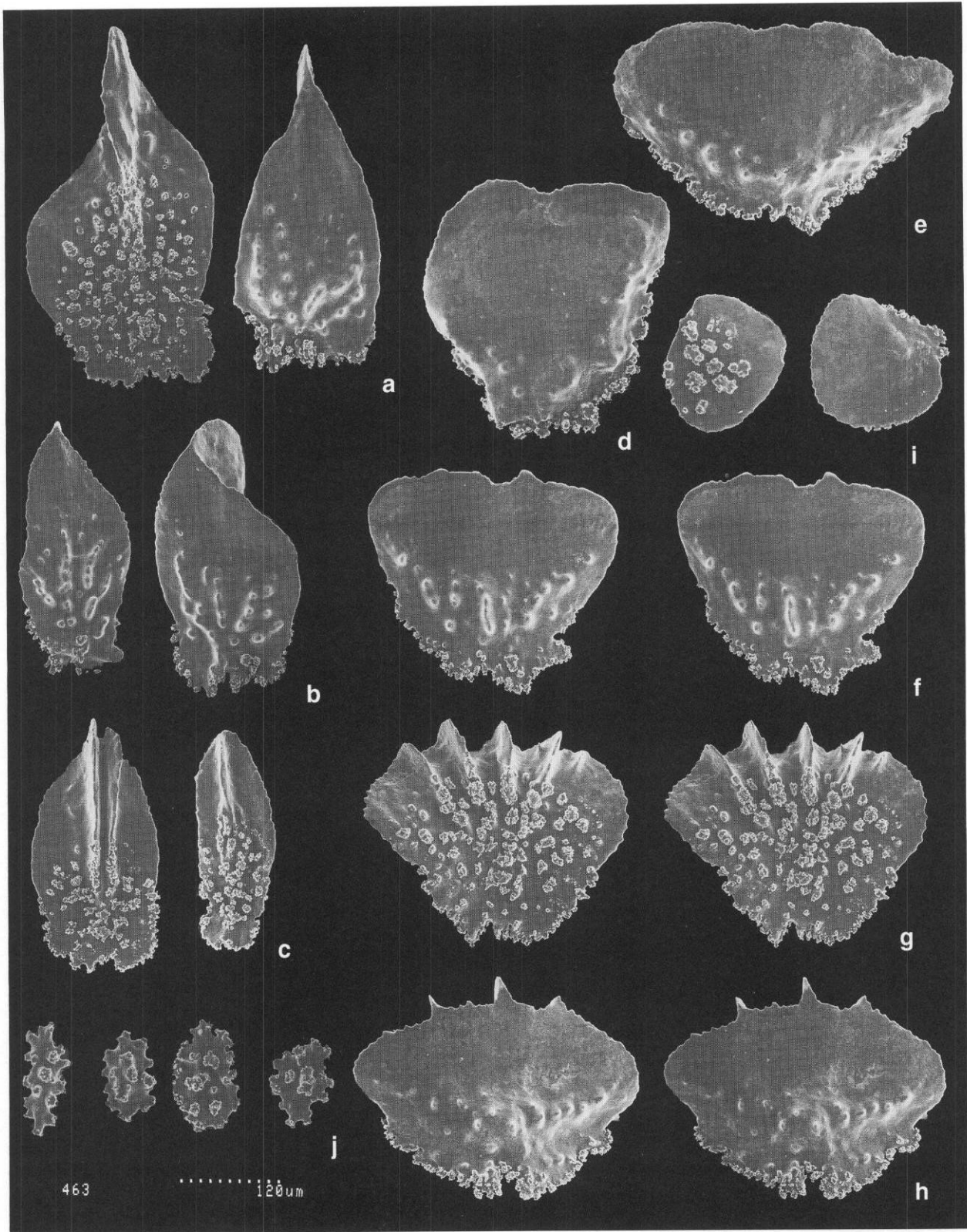


Fig. 31. *Fannyella lepidota* n. sp., USNM 82961, holotype from Ross Sea; sclerites (SEM 1463): a–c) Operculars; d, e) Body scales; f–h) Stereo views of outer and inner surfaces of body scales; i) Scales of outer coenenchyme; j) Tuberculate bodies from longitudinal canal walls.

hemispherical brood chamber covered by smooth, oval, imbricating scales (Fig. 30 top).

The opercular scales (Fig. 31a–c) are lanceolate with a nearly transverse base, externally smooth except for some smooth granules arranged in irregular rows radiating outward from the vicinity of the nucleus; the central part of the inner surface has scattered, complex tubercles, and a thin, sharp longitudinal keel extends from the apex to near the nucleus. Some of the abaxial body sclerites are weakly modified as ascus-scales (Fig. 31d–h), externally almost smooth except for some simple granules localized along the curved, thickened ridge separating the exposed part of the sclerite from its tuberculate base embedded in the body wall and overlapped by the edge of the scale below; the proximal part of the inner surface (Fig. 31g) is covered by complex tubercles, the free distal margin smooth except for a few sharp radial crests that may or may not project as marginal dentations. The abaxial rows contain 7–8 scales, decreasing to 5–6 in the lateral rows and in the adaxial rows only 1–2 below the operculars. The coenenchyme is covered by smooth, rounded imbricating scales (Fig. 31i), and the walls of the longitudinal stem canals contain small, tuberculate, flattened ovals and rods (Fig. 31j).

Distribution: Ross Sea; Scotia Sea.

Comparisons: Of the species with polyps arranged more or less in spirals, *F. lepidota* most closely resembles *F. mawsoni* n. sp., which differs in the beaded radial ridges marking the exposed surface of the body scales (Fig. 36e–g) and the thick apical keel of the opercular scales, which is composed of several longitudinal crests (Fig. 36b, c). Well-developed colonies may superficially resemble small, lyrate colonies of *F. kuekenthali*, which can be recognized by their cobblestone-like coenenchyme (Fig. 41) and nearly smooth, thick body sclerites (Fig. 33). Specimens of *kuekenthali* equivocal regarding these characters can usually be distinguished from *lepidota* by their opercular sclerites, which tend to be thick and tooth-like, with several more or less strongly serrate apical crests (Figs. 33a, 35a, 38a, 40a).

Remarks: Traditional sclerite preparation and/or examination of whole mounts by SEM may be necessary for accurate separation of *F. lepidota* from *mawsoni*, as the translucency of the body scales makes observation of the surface sculpture difficult.

Variations in the shape and spiculation of polyps occur among colonies from the same part of the Antarctic (cf. Fig. 25 top, 25 bottom), as well as among colonies from widely separated localities (cf. Figs. 21, 25).

Although the depth of collection of the two colonies from sta. 1063 (USNM 82958) is unusually deep, they agree with this species in growth form and type of opercular sclerites. However, it is possible that they represent a different species as all other records of *lepidota* range from 400 to 568 m. Consequently, these two colonies are excluded from the type series of *F. lepidota*.

Fannyella mawsoni n. sp.

Figs. 26, 32–36

Material Examined: Weddell Sea: West of Cape Norvegia: 71°45'S, 15°36'W, 695 fath. (= 1271 m), USS "Edisto" sta. ED-16 (TR-2), Operation "Deep Freeze IV", 23 Jan 1959. 12 nearly com-

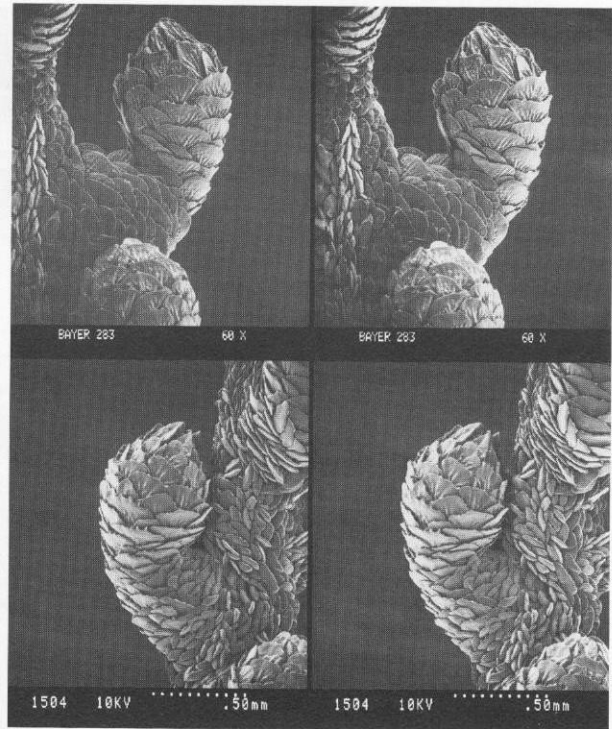


Fig. 32. *Fannyella mawsoni* n. sp. Top, USNM 58158, holotype from Weddell Sea, side view of polyp with incipient brood pouch (SEM 283); Bottom, USNM 82970, paratype from Weddell Sea, side view of non-brooding polyp (SEM 1504). Stereo pairs; scale at bottom applies to both.

plete colonies without holdfast, holotype USNM 58158 figs. 26c, 33, 36; and paratypes 82968 (SEM 283, 1462, 1468, 1469); 1 colony SMF 6978. – West of Cape Norvegia: 71°55'S, 15°35'W, 700 fath. (= 1280 m), USS "Edisto" sta. ED-15 (TD-3), Operation "Deep Freeze IV", 23 Jan 1959. 3 small more or less damaged colonies with holdfasts USNM 82969. – West of Cape Norvegia: 71°55'S, 15°35'W, 700 fath. (= 1280 m), USS "Edisto" sta. ED-15 (OP-3), Operation "Deep Freeze IV", 23 Jan 1959. 1 colony lacking holdfast and one small colony attached to pebble, with detached branchlets (paratypes) USNM 82970 (SEM 1504). Fig. 26d.

Scotia Sea: Off South Orkney Islands: 62°06'S, 45°08'W, 485 m, USNS "Eltanin" sta. 499, 20 Feb 1963. 9 colonies and detached branches USNM 82971 (SEM 1516); 1 colony SMF 6981. Fig. 35. – Scotia Ridge between South Sandwich and South Orkney Ids.: 59°50'S, 32°27'W, 531–659 m, USNS "Eltanin" sta. 1058, 4 Apr 1964. 10 more or less damaged colonies lacking holdfast, and broken branches USNM 82972 (SEM 1521); 1 colony SMF 6980. – Scotia Ridge between South Sandwich and South Orkney Ids.: 59°52'S, 32°19'W, 522–668 m, USNS "Eltanin" sta. 1059, 4 Apr 1964. 7 more or less complete colonies lacking holdfast, and broken branches USNM 82973; 1 colony SMF 6979. – Scotia Ridge between South Sandwich and South Orkney Ids.: 60°02'S, 32°56'W, 862–917 m, USNS "Eltanin" sta. 1556, 16 Feb 1966. 5 incomplete colonies and branches USNM 82974 (SEM 1464, 1517). Fig. 34.

Etymology: Named in honor of Sir DOUGLAS MAWSON, leader of the Australasian Antarctic Expedition and the B. A. N. Z. A. R. Expedition.

Diagnosis: Flabellate *Fannyella* of small size. Polyps about 1.5 mm tall, facing upward in loose spirals, not grouped in whorls. Body scales in distinct longitudinal rows; abaxial scales weakly modified as ascus-scales, externally sculptured by

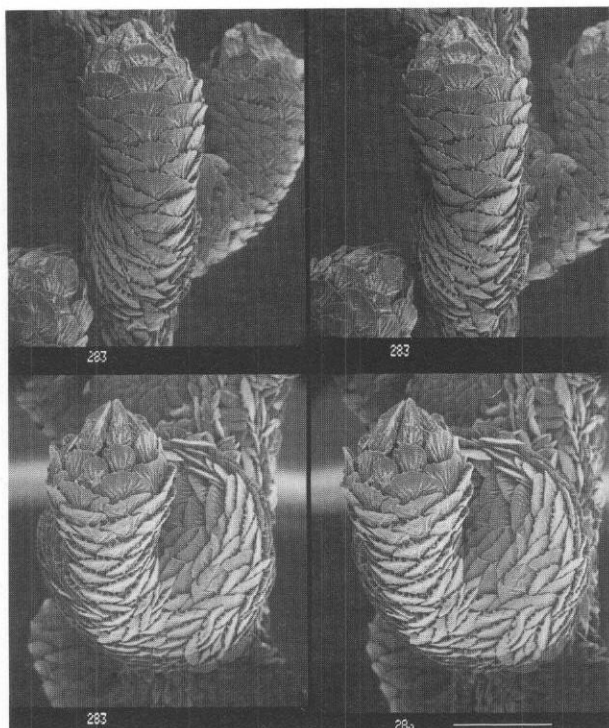


Fig. 33. *Fannyella mawsoni* n. sp., USNM 58158, holotype from Weddell Sea. Top, Abaxial view of polyp with incipient brood pouch; Bottom, Abaxial view of polyp with fully developed brood pouch (SEM 283). Stereo pairs; scale bar representing 0.5 mm applies to both.

radial rows of simple granules more or less fusing to form low radial wrinkles. Closed operculum conical, prominent but surrounded by circumoperculars; opercular scales with a broad apical keel composed of several longitudinal crests. Swollen brood polyps covered by large, rounded scales more or less distinctly sculptured by radial wrinkles. Coenenchymal scales nearly smooth, imbricated.

Description: The colonies (Fig. 26) are dichotomously branched in one plane, producing flabellate colonies of small size, mostly less than 15 cm tall, composed of slender, flexible branches with bifurcations 1–2.5 cm apart and unbranched terminal twigs up to 5 cm long and about 2 mm in diameter including the contracted polyps. The axis is brown with bronze metallic luster, becoming paler in the distal parts, its surface irregularly wrinkled and obscurely grooved longitudinally, fixed to the substrate by a small discoidal holdfast.

The polyps (Figs. 32–35) are about 1.2–1.5 mm tall in contracted condition, distributed around the branches in loose spirals of 10–12 (commonly 11) individuals in 1 cm, without any evident tendency toward grouping in whorls. The polyps are covered by glassy, translucent scales, those of the body weakly modified as ascus-scales, externally ornamented by narrow radial ridges composed of smooth granules more or less completely merged, which fade out toward the distal margin of the sclerite (Fig. 36, h–j); the inner surface (Fig. 36, k) is covered with complex tubercles over the area surrounding the nucleus, and several sharp radial crests occupy the inner edge of the finely serrate distal margin, the strongest of them occasionally projecting as marginal dentations. 10–12 scales occur

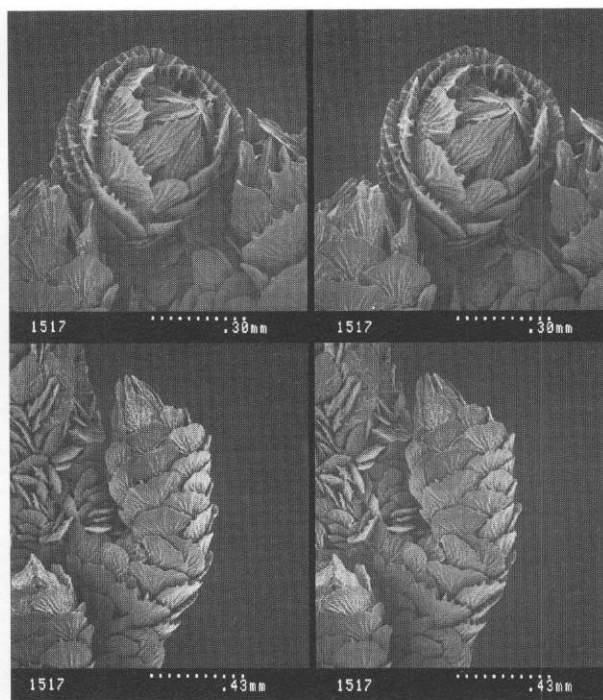


Fig. 34. *Fannyella mawsoni* n. sp., USNM 82974 from Scotia Sea. Top, Oral view of polyp showing operculum and circumoperculum; Bottom, Lateral view of polyp (SEM 1517). Stereo pairs.

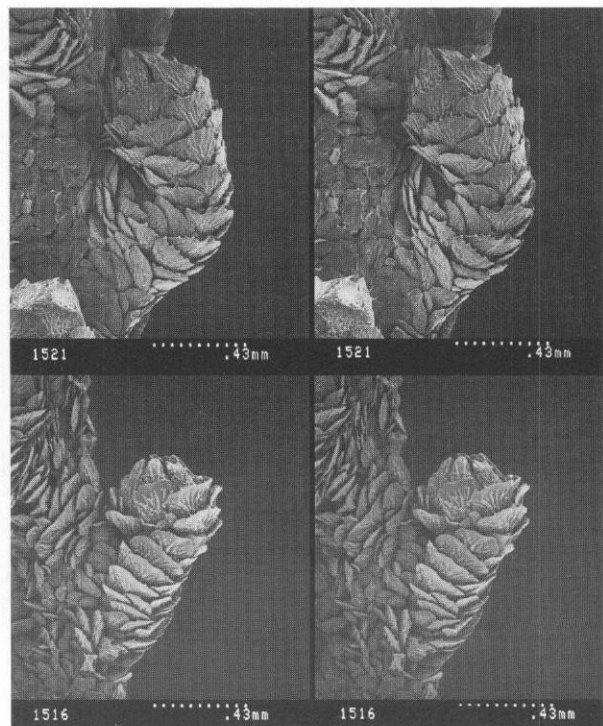


Fig. 35. *Fannyella mawsoni* n. sp. Top, USNM 82971 from S. Orkney Is., oblique view of polyp (SEM 1521); Bottom, USNM 82972 from Scotia Ridge, lateral view of polyp (SEM 1516). Stereo pairs.

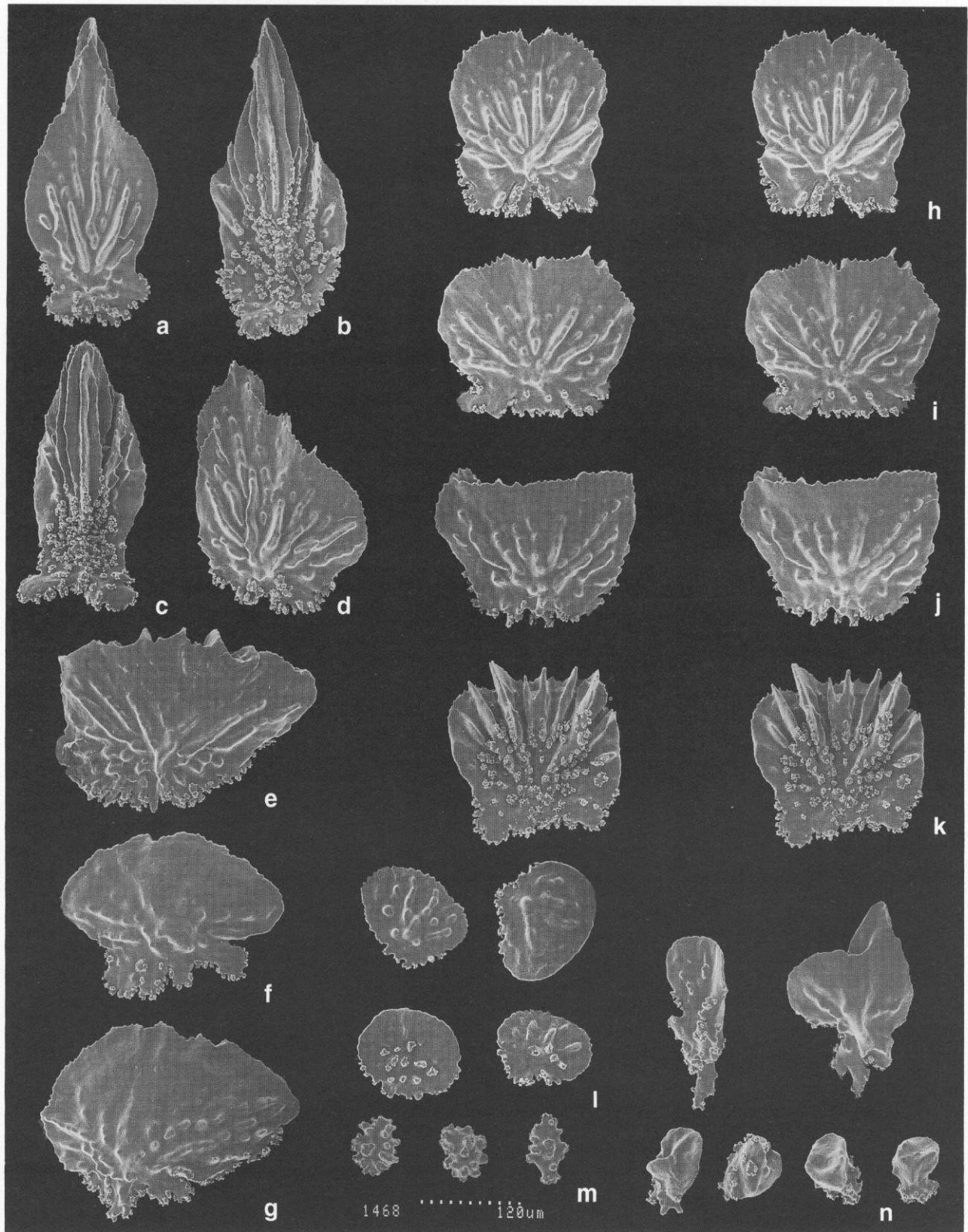


Fig. 36. *Fannyella mawsoni* n. sp., USNM 58158, holotype from Weddell Sea; sclerites (SEM 1468): a–c) Operculars; d) Circumopercular; e–g) Body scales from different positions on polyp; h–j) Outer surface of body scales in stereoscopic view; k) Inner surface of body scale in stereoscopic view; l) Small scales from outer coenenchyme; n) Tubercular sclerites from walls of longitudinal stem canals.

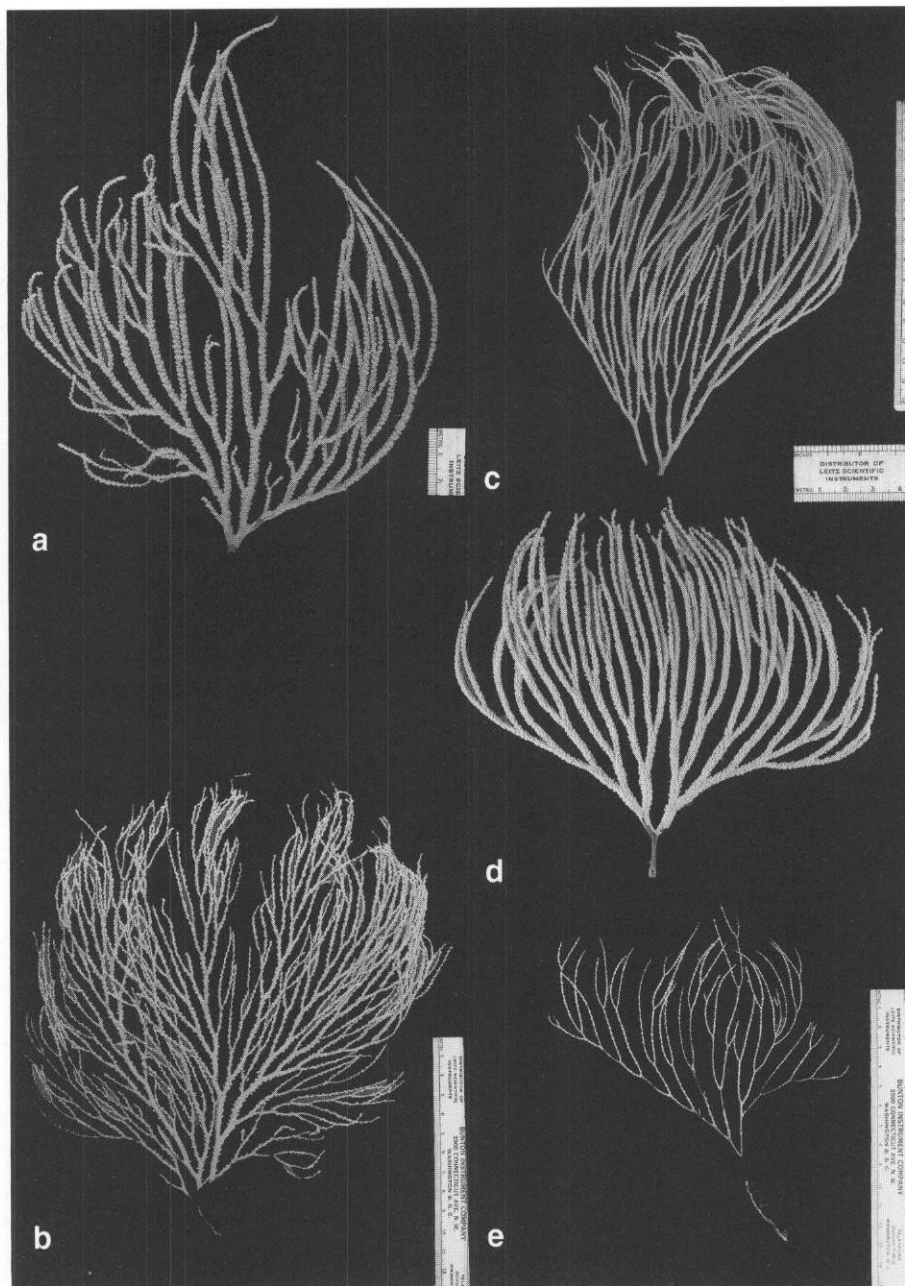


Fig. 37. *Famyella kuekenthali* (MOLANDER), colonies showing variation in growth form: a) USNM 83031 from Shag Rocks; b) USNM 60343 from South Georgia; c) USNM 83029 from South Shetlands; d) USNM 83035 from South Georgia; e) USNM 83027 from South Georgia.

in the abaxial rows, 6–7 in the lateral rows. The shorter adaxial side of the polyps in contracted state is completely covered by small scales, several in each irregular row below the operculars; possibly part of the adaxial surface would be unprotected upon extension of the polyp, or the imbricated scales may have enough overlap to cover the area as it elongates. The opercular scales (Fig. 36, a–c) are lanceolate with a tuberculate base and finely serrate lateral margins, externally ornamented by conspicuous ridges radiating upward and outward from the nuclear area; the central part of the inner surface has scattered, complex tubercles, and a conspicuous api-

cal keel composed of several longitudinal crests. from the apex to near the nucleus. The coenenchyme is covered by overlapping rounded scales ornamented externally by more or less distinct radial wrinkles (Fig. 36, l) together with irregular sclerites (Fig. 36, m), and the walls of the longitudinal stem canals contain small, tuberculate spheroids and ovals (Fig. 36, n).

All of the colonies have conspicuously distended polyps containing developing planulae (Fig. 33 bottom). The brood chambers are covered by smooth, oval, imbricating scales.

Distribution: Weddell Sea; Scotia Sea. 485–1280 m.

Remarks: The operculum of polyps of USNM 82971 (Fig. 35 bottom) is somewhat less prominent than in other colonies (Fig. 34 bottom), and the body scales are flared outward more conspicuously, but all specimens in this lot are exceptionally soft and appear to have undergone some deterioration prior to preservation. The sclerites are in such close conformity with those of other lots that there is little doubt about their identification.

Comparisons: Colonies of *Fannyella mawsoni* superficially resemble those of *F. lepidota*, but can be separated by the prominent, conical operculum, which is surrounded by circumopercular marginal scales that incline inward around it, and by the radial, wrinkle-like sculpture of the body scales. The opercular scales, with their broad apical keel composed of several strong longitudinal crests, distinguish the species from both *F. lepidota* and *F. aurora*.

Fannyella kuekenthalii (MOLANDER, 1929)

Figs. 37–52

1929 *Caligorgia kuekenthalii* MOLANDER: 62, figs. 15, 16, pl. 1, fig. 3. (Shag Rock Bank, between Falkland Is. and South Georgia, 160 m; South Georgia, 75 m.)

1929 ?*Caligorgia ventilabrum*, –MOLANDER: 62. (Graham Land, SE of Seymour I., 150 m; South Georgia, 75 m.) [Possibly = *Fannyella rossii* GRAY = *Ascolepis splendens* THOMSON & RENNET.]

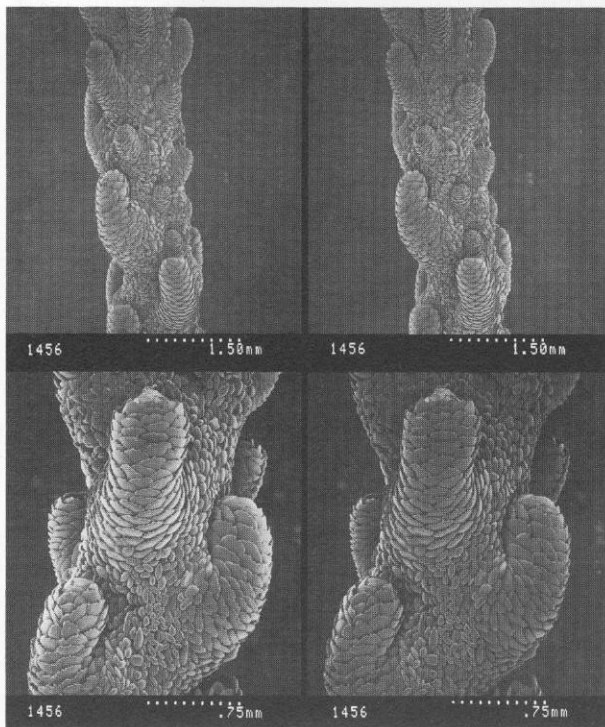


Fig. 38. *Fannyella kuekenthalii* (MOLANDER), USNM 83028 from off South Georgia. Top, Part of branch showing spiral arrangement of mature and immature polyps; Bottom, Abaxial and lateral views of fully developed polyps (SEM 1456). Stereo pairs.

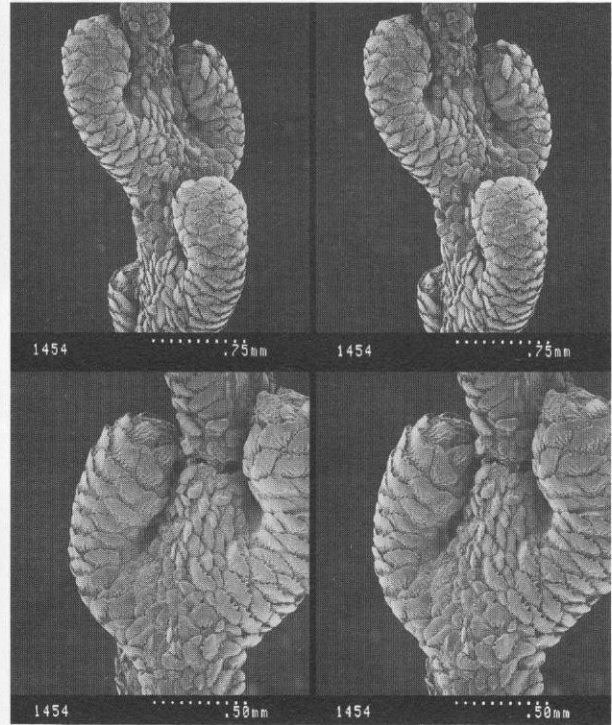


Fig. 40. *Fannyella kuekenthalii* (MOLANDER), USNM 83035 from off South Georgia. Polyps of slender non-lyrate colony (SEM 1454). Stereo views.

Material: Lyriform colonies. Scotia Sea: Off South Georgia: 54°41'S, 38°38'W, 220–320 m, USNS "Eltanin" sta. 671, 23 Aug 1963. 1 incomplete colony USNM 82073. – Off South Georgia: 53°36'S, 36°51'W, 220–265 m, USNS "Eltanin" sta. 732, 12 Sep 1963. 1 colony without holdfast USNM 60343 (SEM 1512) Fig. 37c; 1 colony lacking holdfast USNM 82087 (SEM 1528, 1529); 1 colony SMF 6976. – Off South Georgia: 53°51'S, 37°38'W, 97–101 m, USNS "Eltanin" sta. 1535, 7 Feb 1966. 3 incomplete colonies and fragments USNM 83027 (SEM 1522, 1523, 1526, 1527). Figs. 37e, 49, 50. – Off South Georgia: 54°29'S, 39°22'W to 54°31'S, 39°19'W; 659–686 m. USNS "Eltanin" sta. 1536, 8 February 1966. 10 more or less complete colonies and many detached branches USNM 83028 (SEM 1456, 1466). Figs. 37b, 38, 39. – Off South Georgia: 54°50.6'S, 37°23.8'W, 223–227 m, R/V "Islas Orcadas" cruise 575 sta. 90, 7 Jun 1975. 2 colonies, one with holdfast USNM 83030 (SEM 1509, 1514, 1515). Figs. 45, 46. – Off South Georgia: 55°00'36"S, 37°42'36"W, 494–501 m, R/V "Islas Orcadas" cruise 575 sta. 91, 7 Jun 1975: 4 colonies and branches USNM 77342 (SEM 1530, 1531, 1536; Fig. 51); 1 colony SMF 6974. – Off South Georgia: 54°30'S, 38°56'W, 220–232 m, R/V "Professor Siedlecki", USARP cruise 601, sta. 28, 3 Dec 1986. 1 large colony lacking holdfast USNM 83041. – Vicinity of Shag Rocks: 53°27.1'S, 41°39.2'W, 371–424 m, R/V "Islas Orcadas" cruise 575 sta. 102, 11 Jun 1975. 2 colonies without holdfasts USNM 83031 (SEM 1433, 1460). Figs. 37a, 43, 47, 48. – Vicinity of Shag Rocks W. of South Georgia: 53°36'S, 42°06'W, 142–160 m, R/V "Professor Siedlecki", USARP cruise 601 sta. 8, 30 Nov 1986. 3 colonies lacking holdfast USNM 83032 (SEM 1482, 1483; Fig. 52); 1 branch SMF 6977. – Vicinity of Shag Rocks W. of South Georgia: 53°32'–53°41'S, 41°47'–42°07'W, 133–165 m, R/V "Professor Siedlecki", USARP cruise 601 stas. 9–10, 30 Nov 1986. 1 colony lacking holdfast USNM 83033.

South Shetland Islands: Off Clarence I.: 60°49'S, 53°28'W, 587–589 m, USNS "Eltanin" sta. 1088, 17 Apr 1964. 2 small colonies, one with holdfast USNM 75152. – 63°26'S, 62°15'W, 119–124 m, R/V "Hero" cruise 691 sta. 26, 10 Feb 1969. 6 colonies and fragments USNM 83029 (SEM 1439, 1467); 2 colonies SMF 6975. – 63°16'42"S,

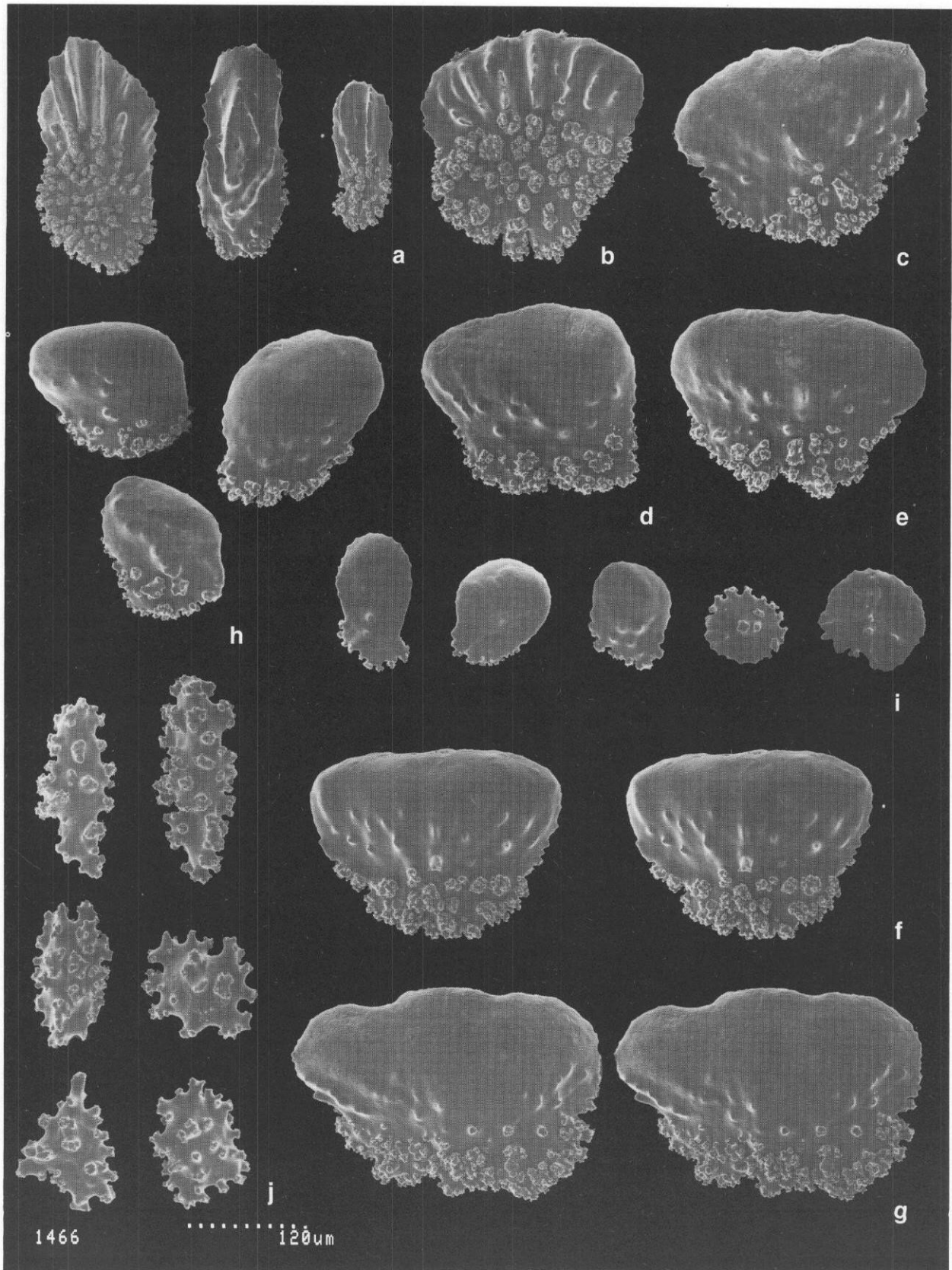


Fig. 39. *Fannyella kuekenthali* (MOLANDER), USNM 83028 from off South Georgia, sclerites (SEM 1466): a) Operculars; b–e) Abaxial scales; f, g) Outer surface of abaxial scales, stereoscopic views; h) Large sclerites of outer coenenchyme; i) Small scales of outer coenenchyme; j) Tuberculate bodies from longitudinal canal walls.

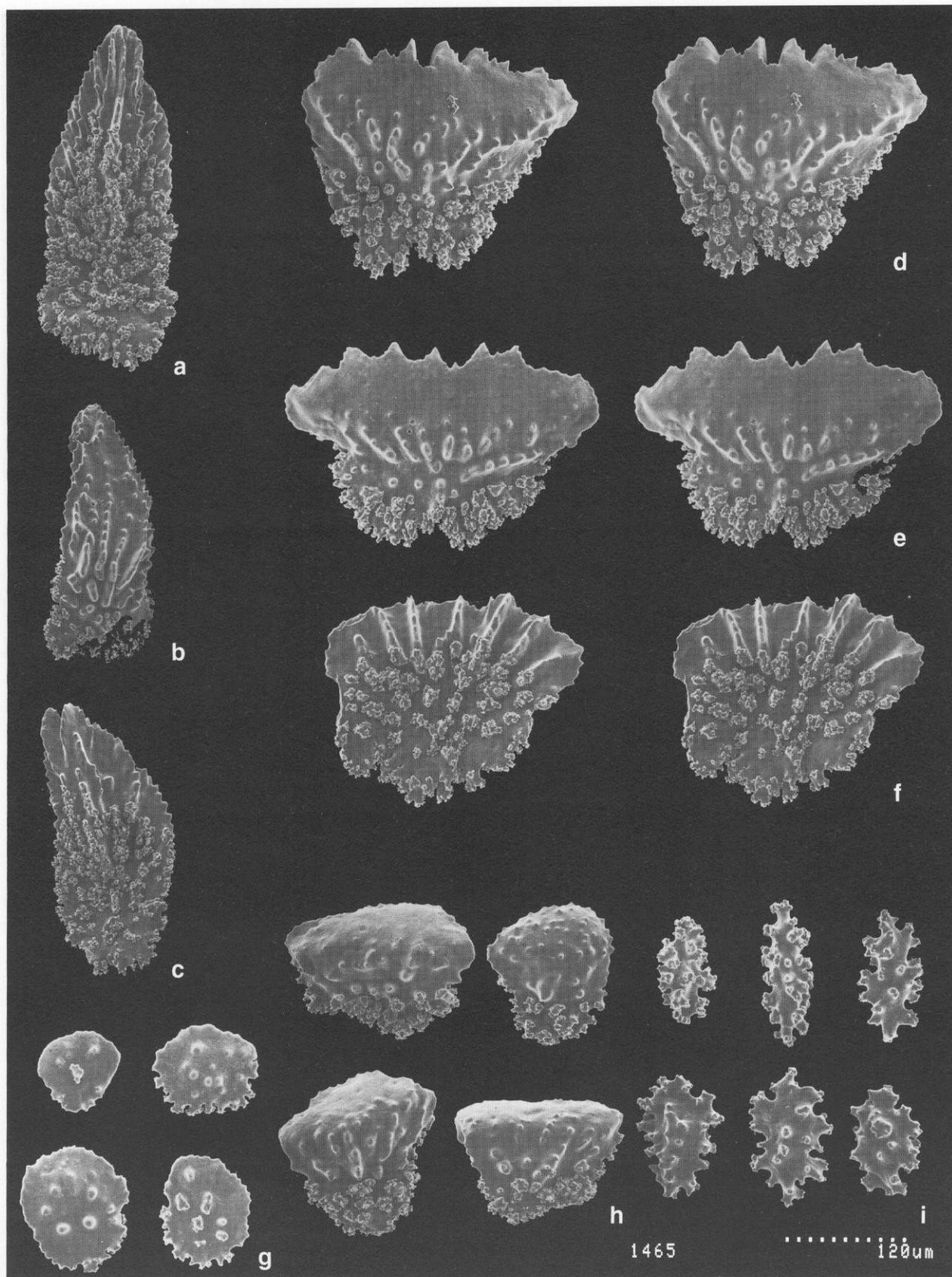


Fig. 41. *Fannyella kuekenthali* (MOLANDER), USNM 83035 from off South Georgia, sclerites (SEM 1465): a–c) Operculars; d–f) Abaxial scales in stereoscopic view; g) Small scales from outer coenenchyme; h) Thick plates from outer coenenchyme; i) Tuberculate bodies from longitudinal canal walls.

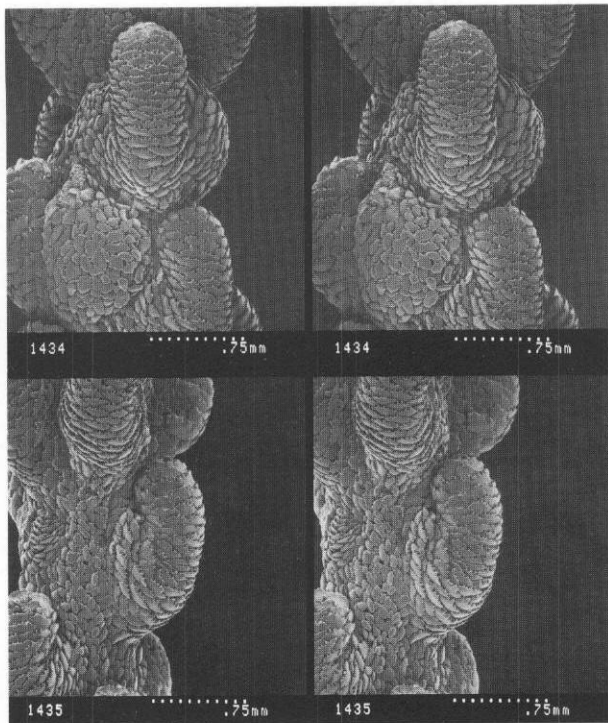


Fig. 42. *Fannyella kuekenthali* (MOLANDER), USNM 83038 from off South Georgia. Polyps with brood pouch (SEM 1434, 1435). Stereo pairs.

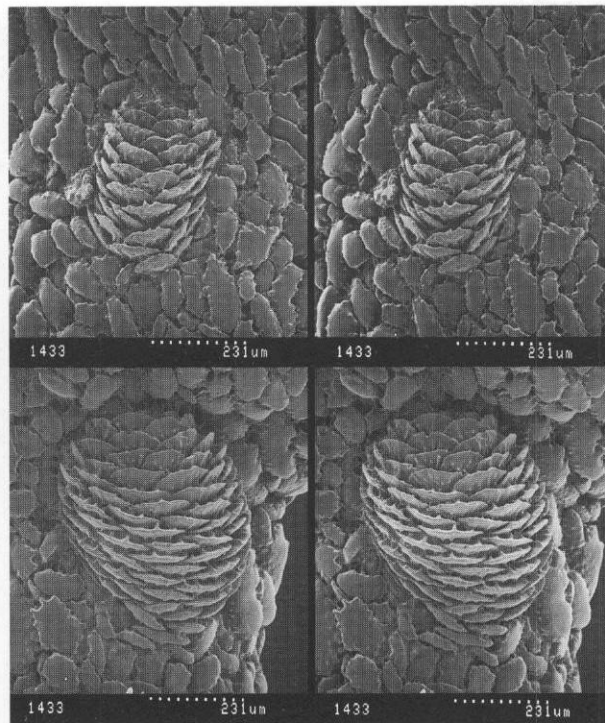


Fig. 43. *Fannyella kuekenthali* (MOLANDER), USNM 83031 from Scotia Sea vicinity of Shag Rocks. Young polyps (SEM 1433). Stereo pairs.

59°44'36"W, 95 fath. (= 174 m), USS "Eastwind" sta. 66-16, 5 Feb 1966, D.L. PAWSON and D.F. SQUIRES coll. 3 colonies USNM 82086.

South Orkney Islands: 60°37.6'S, 46°58.1'W, 237 m, EPOS3 R/V "Polarstern" sta. 217, 18 Jan 1989, Grundschieppnetz 3, 1 large branch in poor condition USNM 99129. - 62°06'S, 45°08'W, 485 m, USNS "Eltanin" sta. 499, 20 Feb 1963. 1 colony USNM 58157 (SEM 284, 1461, 1498, 1501).

Antarctic Peninsula: Vicinity of Anvers I.: 64°46'28"S, 63°26.5'W, 100-150 m, USARP R/V "Hero" cruise 731 sta. 1944, 11 Mar 1973. 1 incomplete colony USNM 83043. - Off Victor Hugo Island: 65°08'S, 66°04'W, depth not recorded, USS "Edisto" sta. ED-28, J.C. TYLER coll., TR-13, 22 Mar 1959. 1 colony USNM 81543.

Non-lyriform colonies. Scotia Sea: Off South Georgia: 54°29'S, 39°22'W to 54°31'S, 39°19'W; 659-686 m. "Eltanin" cruise 22, sta. 1536, 8 February 1966. 40 more or less complete colonies and many detached branches USNM 83035 (SEM 1438, 1454, 1465) Figs. 37d, 40, 41; 20 colonies and branches, 83036. - Off South Georgia: 53°36'S, 38°03'W, 122-124 m, R/V "Islas Orcadas" cruise 575 sta. 17, 14 May 1975. 1 small colony without holdfast USNM 77336. - Off South Georgia: 54°05.6'S, 36°30.8'W, 130-143 m, R/V "Islas Orcadas" cruise 575, sta. 31, 19 May 1975. 1 colony USNM 83037 (SEM 1487). - Off South Georgia: 54°41.6'S, 34°51.1'W, 563-598 m, R/V "Islas Orcadas" cruise 575 sta. 34, 19 May 1975. 1 large colony USNM 83038 (SEM 1434, 1435, 1486). Figs. 42, 44. - Off South Georgia: 54°38.8'W, 38°51.3'W, 261-270 m, R/V "Islas Orcadas" cruise 575 sta. 93, 9 Jun 1975. 2 colonies USNM 83039 (SEM 1513). - Off South Georgia: 54°48'S, 37°02'W, 224-236 m, R/V "Professor Siedlecki", USARP cruise 601 sta. 49, 6 Dec 1986. 1 colony lacking holdfast USNM 83042. - Vicinity of Shag Rocks W. of South Georgia: 53°20'S, 42°42'W, 417-514 m, R/V "Professor Siedlecki", USARP cruise 601 sta. 2, 29 Nov 1986. 2 colonies lacking holdfast USNM 83040.

Diagnosis: *Fannyella* forming flabellate colonies reaching large size (to 40 cm tall), sometimes more or less lyriform, with long, rather stiff terminal branches (Fig. 37b), sometimes with short, slender, flexible terminal branches and not at all lyriform (Fig. 37d). Polyps about 1.5-2 mm tall, in more or less closely crowded spirals around all sides of branches (Figs. 47, 52), commonly arranged inconsistently in whorls (Figs. 50, 51). Body scales arranged in oblique rows obscuring longitudinal alignment (Fig. 42); abaxial body scales modified as ascus-scales (Figs. 39e, f; 41d, e; 44c-e; 46c,d; 48f, g), externally ornamented with simple granules along proximal margin of exposed surface internally by complex tubercles and radial marginal crests (Figs. 39c, 41f, 44f, 46e, 48b). Closed operculum broadly conical, low (Fig. 40), usually but not always (Fig. 50) clearly visible in contracted polyps; opercular scales with an apical keel composed of several more or less strongly serrate crests (Figs. 39a, 41a-c, 44a, 46a, 48a). Swollen brood polyps (Fig. 42 top) covered by sclerites like body scales with prominent radial crests along inner free margin. Similar scales having inner marginal crests, obliquely embedded in outer coenenchyme.

Description: See MOLANDER, 1929: 62.

Remarks: The definition of this species is most unsatisfactory. In forming a valid taxonomic concept of MOLANDER's *Caligorgia kuekenthali*, it must be kept in mind that the species was originally based upon only two incomplete specimens from the vicinity of South Georgia. The abundance of material from the same part of the Antarctic now available for

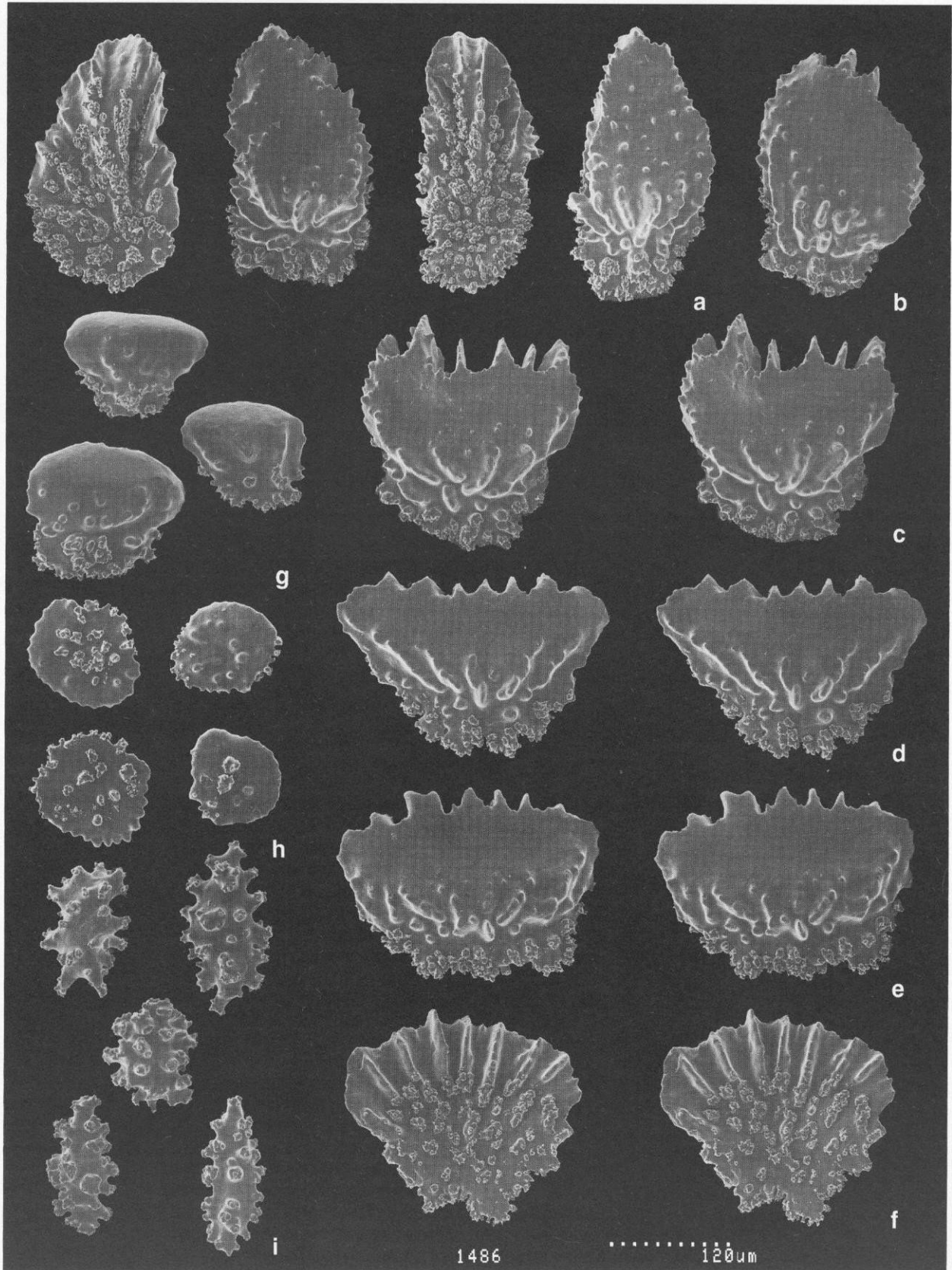


Fig. 44. *Famyella kuckenthalii* (MOLANDER), USNM 83038 from off South Georgia, sclerites (SEM 1486): a) Operculars; b) Circumoperculars; c-f) Abaxial scales in stereoscopic view; g) Thick plates of outer coenenchyme; h) Small scales of outer coenenchyme; i) Tuberculate bodies from longitudinal canal walls.

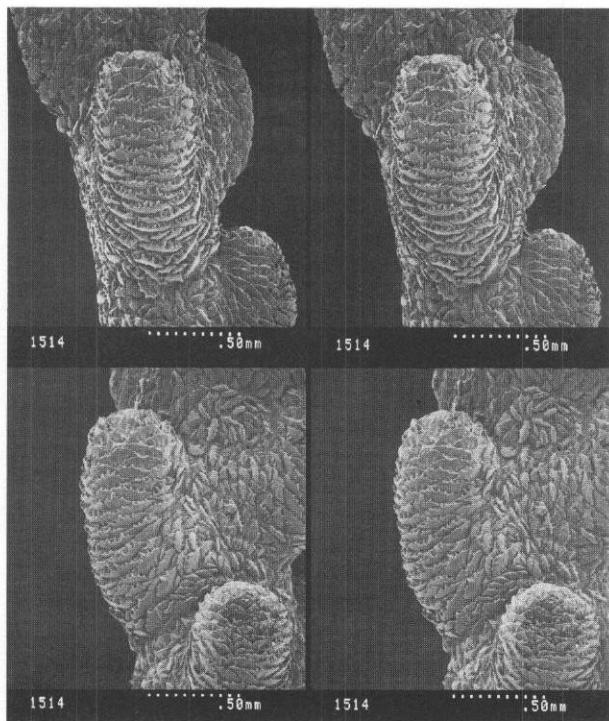


Fig. 45. *Fannyella kuekenthali* (MOLANDER), USNM 83030 from off South Georgia. Polyps of lyriform colony (SEM 1514). Stereo views.

study shows a bewildering amount of variation that has not yielded to analysis. As no clear discontinuities separating morphological variants have so far been found, it is necessary for the present time to consider the observed differences as intraspecific variation. This does not make for an unambiguous diagnosis of the species. Essentially topotypic specimens that conform as closely as possible with the characters described by MOLANDER have been taken as representative of *F. kuekenthali*, and the variants treated pro tem. as phenotypes.

Although the definitive growth form is not clear from MOLANDER's scanty material, specimens in the present collection from virtually the same locality that have a lyriform aspect, with long, rather thick terminal branches (Fig. 37a) closely resemble his photograph (1929: pl. 1, fig. 3). The longest undivided terminal branches are more than half the height of the complete colony. The branches have an overall diameter of about 4 mm, with about 30 polyps in 1 cm. The polyps agree in the main with MOLANDER's account, from which there are no consistent and tangible differences. He described them as 1–1.5 mm tall, with a distinctly projecting operculum (1929: fig. 15). However, the prominence of the operculum depends not only upon the degree of contraction of the individual but also upon the size of the opercular sclerites. In some colonies it consists of rather large scales and is as prominent as illustrated by MOLANDER, but in others it is composed of smaller scales and is scarcely visible, if at all, in profile.

MOLANDER reported 10–12 body scales in the abaxial longitudinal rows, 10–11 in the outer lateral rows, and 7–9 in

the inner laterals. However, in all the material now studied the body scales are not clearly arranged in orderly longitudinal rows, nor does his drawing (1929: fig. 15) convincingly portray regular rows. In the present material, the body scales are placed in oblique rows because of their size, shape, and location relative to the mesenteries. Therefore, recognition of longitudinal rows is difficult and counting sclerites only vaguely aligned longitudinally becomes ambiguous. Nevertheless, it is possible to arrive at a count of 10–12 abaxials in agreement with MOLANDER's observation, but as many as 14 or 15 can easily be found. The outer and inner lateral rows are so irregular that an exact count is meaningless. In most cases, my counts for both rows are substantially less than MOLANDER's, but this could be the result of a different interpretation of those "rows."

In some colonies, the distal part of some branches narrows to about 2 mm overall diameter, where 1 cm of length accommodates only 12–13 polyps. The slenderest specimens have terminal branches only 1.2–1.5 mm wide including the polyps, which are arranged in alternating pairs that may be more or less out of line (USNM 83027, Fig. 49), or in whorls that become disrupted proximad (USNM 82087, Fig. 50).

In the material now on hand, polyps vary in shape from tall, nearly cylindrical, weakly clavate and curved inward toward the axis but with a narrow base and not at all adnate (Figs. 40, 50, 52), to almost fully adnate, with no free adaxial wall below the operculum (Fig. 51). No observations have been made on living specimens, but it seems unlikely that the adnate polyps can extend outward to any extent, although the closely packed sclerites of the abaxial wall probably can spread apart as the polyp inflates itself during expansion. The degree of adhesion of polyps to coenenchyme is not related to girth of the branches, as both adnate and free-standing polyps occur on both slender and stout branches, but not on the same colony. There is also wide variation in the shape and ornamentation of the body scales, and in the size and ornamentation of the operculars.

Many specimens with polyps indistinguishable from those of lyriform colonies in size, shape and spiculation have a conspicuously different growth form. Although still clearly dichotomous and flabellate, the bifurcations are more numerous and closer together, resulting in a growth form that is not at all lyriform. The branches repeatedly bifurcate at intervals of 2 cm or less, forming large, uniplanar fans reaching 40 cm or more in height. Undivided terminal branchlets are at most 6 cm long, commonly less, nearly straight, flexible, and narrower than in lyriform colonies, commonly about 2 mm in diameter including the contracted polyps, but in this feature the two growth forms show considerable overlap.

Upward orientation of polyps is a rule occasionally broken by rogue individuals that face downward. On stouter branches, production of new individuals seems to follow the course of the longitudinal stem canals, from which they probably are budded. Polyps tend to be rather crowded and new individuals are produced at random where space permits, rather than more or less simultaneously in transverse girdles, so the occurrence of whorls is haphazard. Nevertheless, wherever whorls are developed, that pattern prevails for longer or shorter distances. On slender branches the polyps are more widely spaced, sometimes placed in pairs or whorls of three (Figs. 49–52).

Mature polyps containing ripe gonads or planulae develop an enlarged proximal brood chamber, so the number of scales along the abaxial side of the body increases, but this appears to result from augmentation of the adjacent coenenchymal

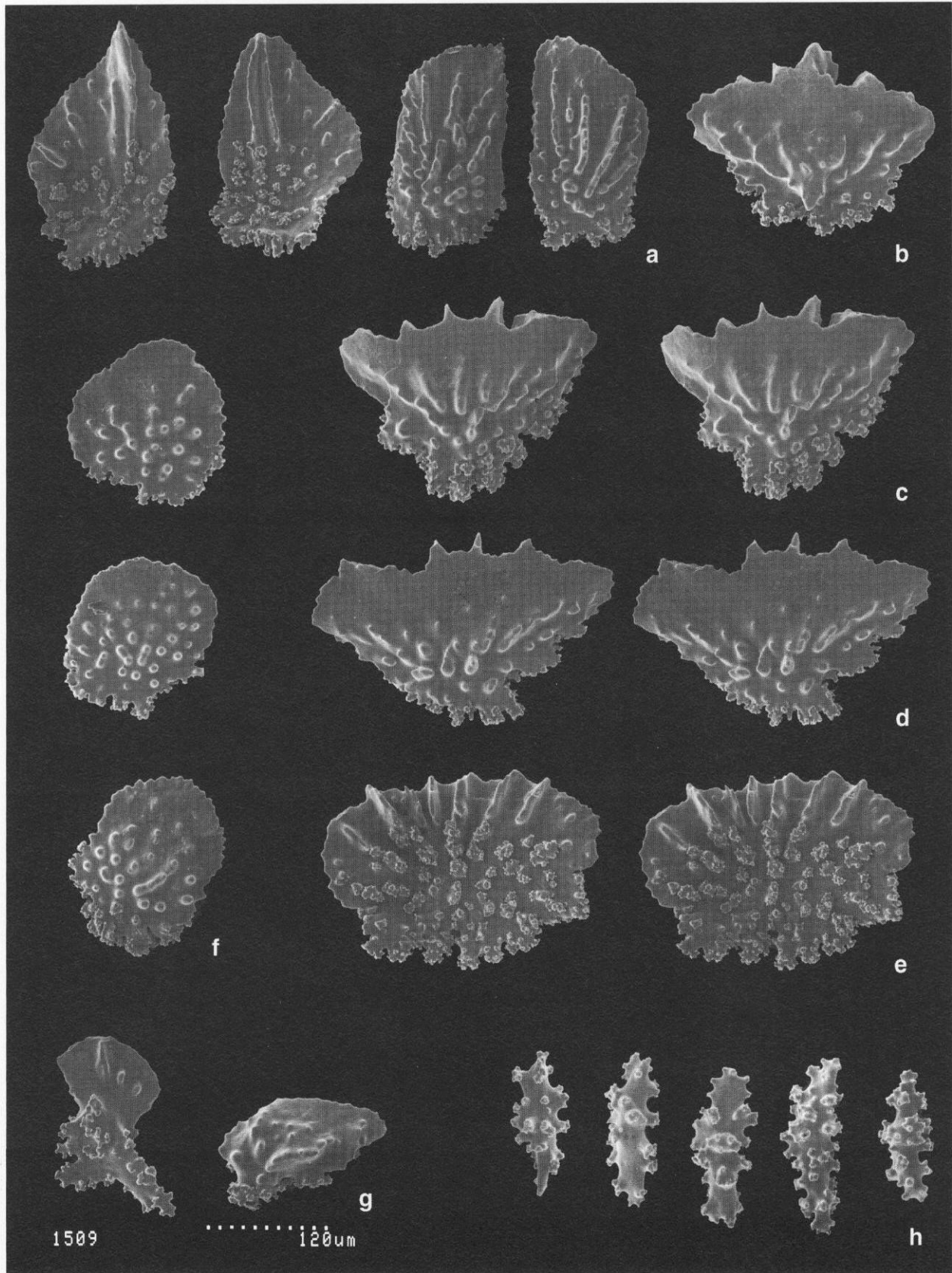


Fig. 46. *Fannyella kuekenthali* (MOLANDER), USNM 83030 from off South Georgia, sclerites (SEM 1509): a) Operculars; b) Abaxial scale, outer surface; c–e) Abaxial scales in stereoscopic view; f) Small scales of outer coenenchyme; g) Thick plate and foliate form from outer coenenchyme; h) Tuberculate bodies from longitudinal canal walls.

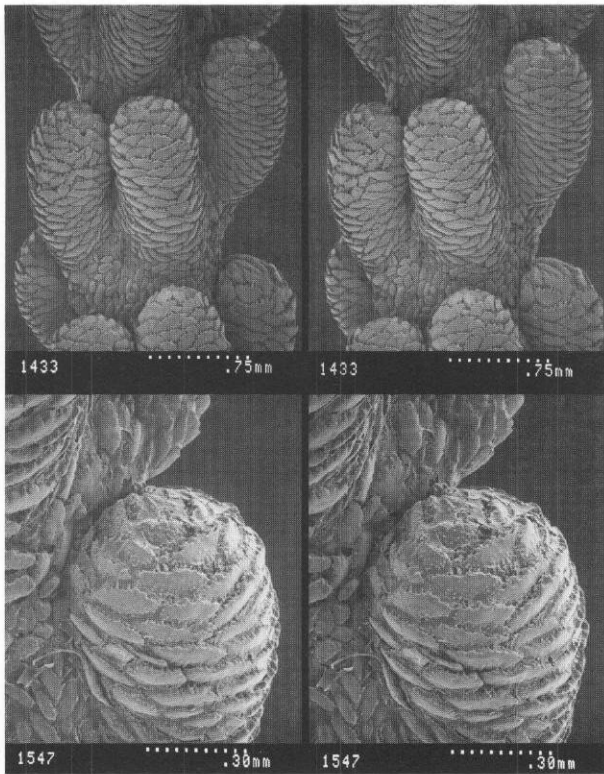


Fig. 47. *Fannyella kuekenthali* (MOLANDER), USNM 83031, nearly topotypic colony from Shag Rocks west of South Georgia. Top, Part of branch with polyps arranged in spirals (SEM 1433); Bottom, Oral end of contracted polyp (SEM 1547). Stereo views.

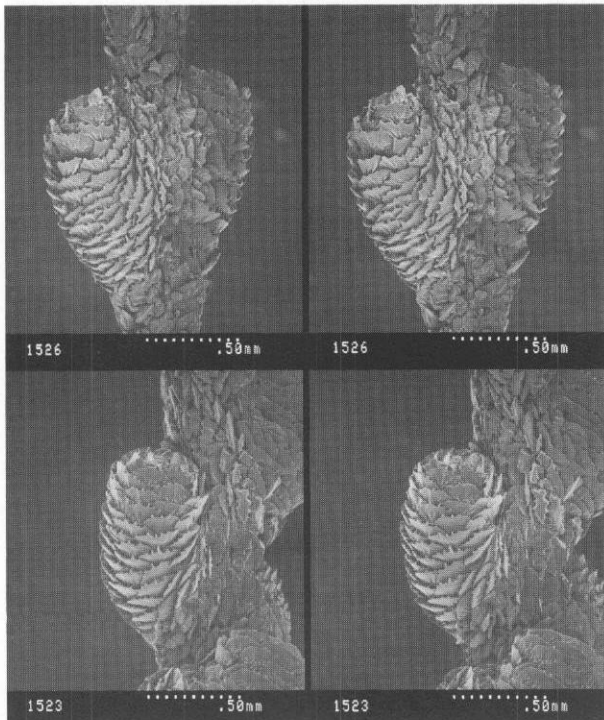


Fig. 49. *Fannyella kuekenthali* (MOLANDER), USNM 83027 from off South Georgia. Top, Paired polyps (SEM 1526); Bottom, Spiraled polyps (SEM 1523). Stereo pairs.

sclerites rather than of the body sclerites of the polyp itself. In counting the sclerites it is virtually impossible to determine where the scales of the body stop and those of the brood chamber begin (Fig. 42).

Comparisons: Apart from the irregular distribution of polyps, lyriform colonies of this species have a superficial resemblance to those of *Fannyella splendens*, which can be recognized easily by the strobilus-like appearance of their polyps resulting from the hexagonal exposed surfaces of the abaxial ascus-scales. Smaller specimens of the non-lyrate form may resemble colonies of both *F. lepidota* n. sp. and *F. marwsoni* n. sp., both of which can be distinguished by their distinctly scaly coenenchyme, the large, thin scales of the swollen brood chambers, the weaker modification of the body sclerites in the direction of ascus-scales, and the more prominent operculum.

Although there appears to be a complete range of intermediates between the stout and the slender, the lyriform and the non-lyriform colonies, it is probable that an exhaustive analysis of comprehensive collections from around the Antarctic will show that what is here called *F. kuekenthali* is actually a complex of closely related species.

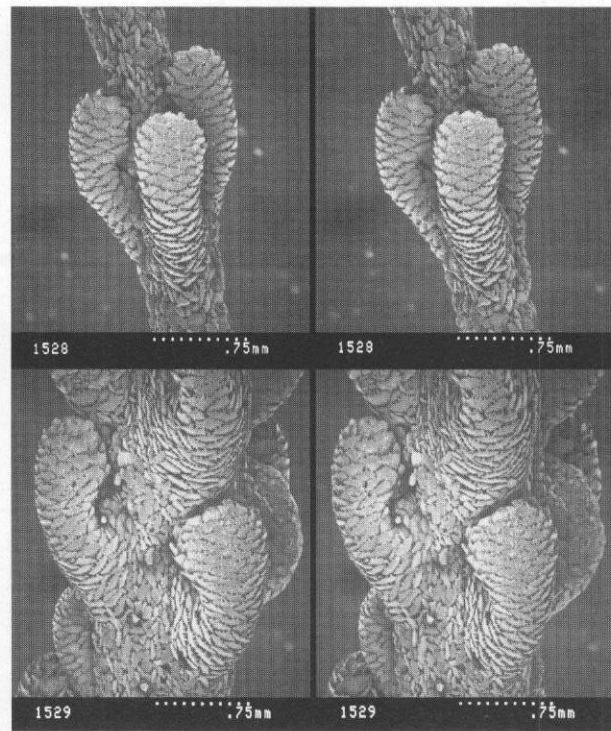


Fig. 50. *Fannyella kuekenthali* (MOLANDER), USNM 82087 from off South Georgia. Top, Nearly verticillate polyps from distal part of terminal branch (SEM 1528); Bottom, Spiraled polyps from proximal part of same terminal branch (SEM 1529). Stereo pairs.

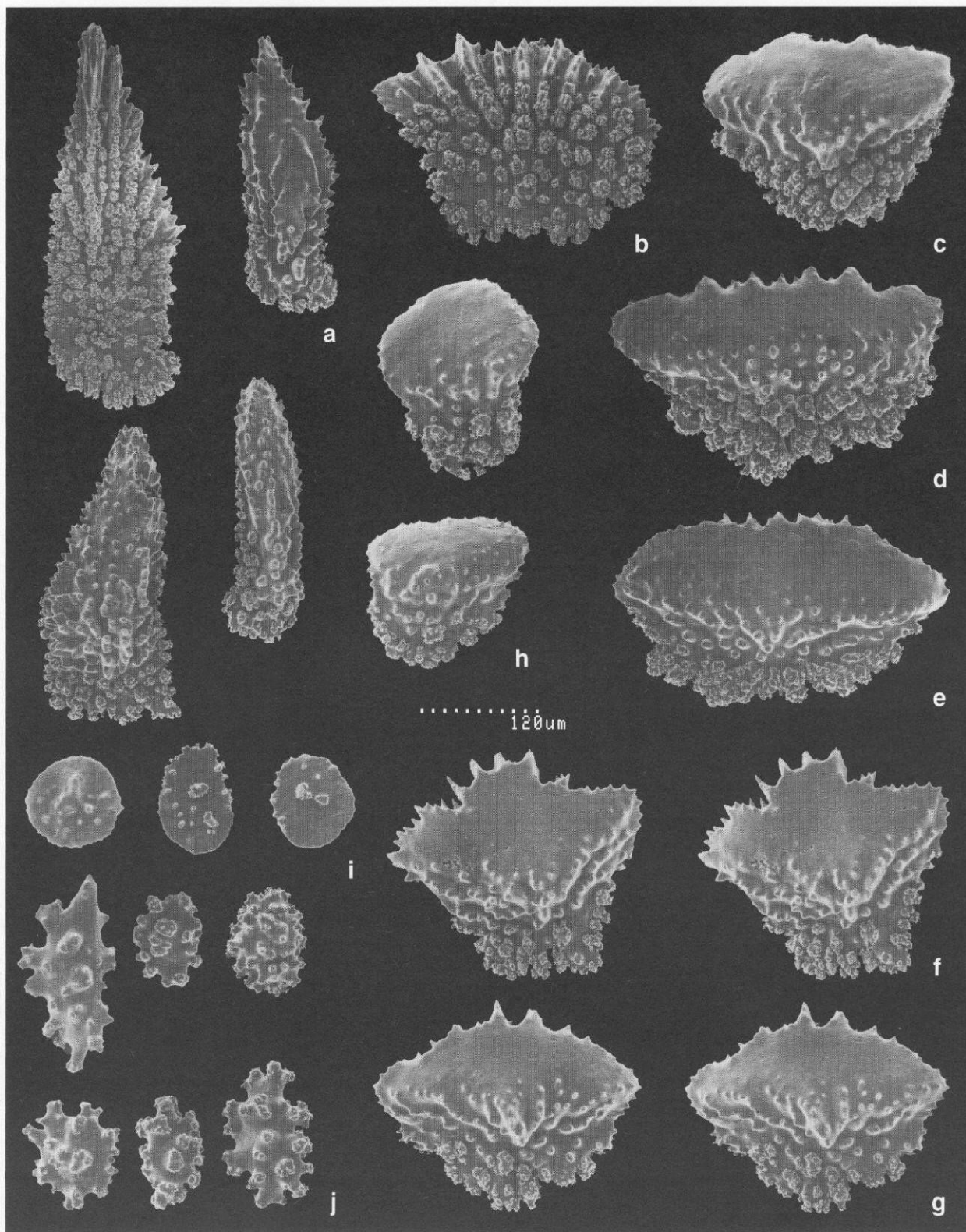


Fig. 48. *Fannyella kuekenthali* (MOLANDER), USNM 83031, nearly topotypic colony from Shag Rocks west of South Georgia, sclerites (SEM 1460): a) Operculars; b–e) Abaxial scales; f, g) Abaxial scales in stereoscopic view; h) Thick plates from outer coenenchyme; i) Small scales from outer coenenchyme; j) Tuberculate bodies from longitudinal canal walls.

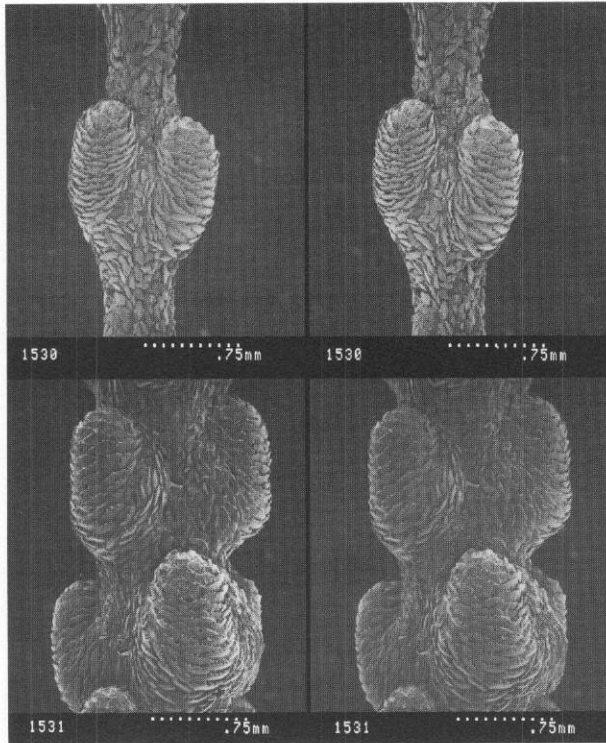


Fig. 51. *Fannyella kuekenthali* (MOLANDER), USNM 77342 from off South Georgia. Top, Whorl of adnate polyps from distal part of terminal branch (SEM 1530); Bottom, Whorls of adnate polyps from proximal part of same terminal branch (SEM 1531). Stereo pairs.

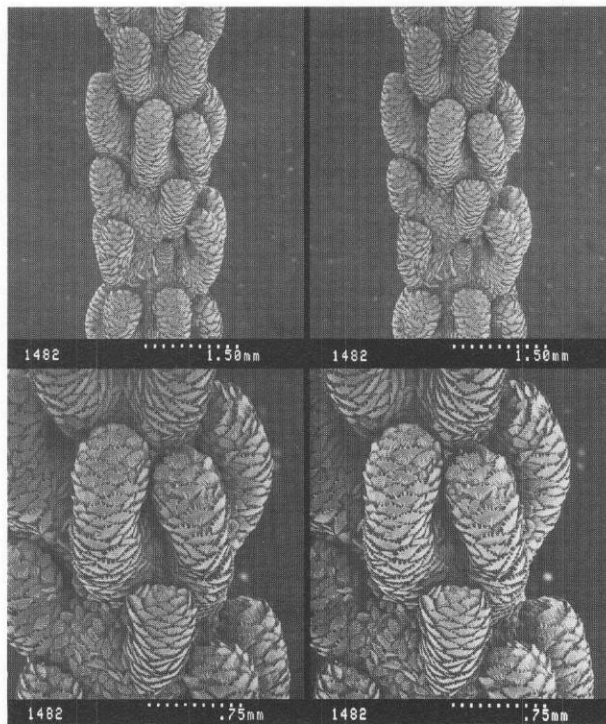


Fig. 52. *Fannyella kuekenthali* (MOLANDER), USNM 83032 from Scotia Sea vicinity of Shag Rocks west of South Georgia. Top, Part of branch showing spiral arrangement of polyps and new polyp among fully developed individuals; Bottom, Abaxial and lateral views of spiraled polyps (SEM 1482). Stereo pairs.

Fannyella nodosa (MOLANDER, 1929)

Fig. 53–61

1929 *Caligorgia nodosa* MOLANDER: 60, figs. 13, 14; pl. 1, fig. 5. (South Georgia.)

1981 *Ascolepis nodosa*, –BAYER: 934, fig. 66, in generic key. (Wrongly attributed to KÜKENTHAL.)

Material: Ross Sea: Moubray Bay east of Cape Hallett: 72°05.8'S, 172°15.2'E, 392 m, USS "Atka" sta. 23, 12 Jan 1958, coll. L. Wilson. 1 small colony attached to bryozoan USNM 82936. –Moubray Bay east of Cape Hallett: 72°08'S, 172°10'E, 237 fathoms (= 433 m), USS "Burton Island" sta. 3, 13 Jan 1958, R.B. Starr, coll. 1 colony USNM 60351. –77°26'S, 169°30'E, 321 m, "Edisto" sta. ED-8, 18 Feb 1956. 3 colonies USNM 58154 (SEM 289, 295, 296, 299, 1496). Figs. 53a, 59–61.

Scotia Sea: Vicinity of South Georgia: 53°51'S, 37°38'W, 97–101 m, "Eltanin" sta. 1535, 7 Feb 1966. 3 colonies, one with holdfast USNM 82937; 1 colony SMF 6990. –Off South Orkney Islands: 60°26.5'S, 46°22.8'W, 102–108 m, R/V "Islas Orcadas", USARP cruise 876 sta. 107, 16 Feb 1976. 1 colony USNM 82941 (SEM 1503, 1507). Figs. 54, 55. –Vicinity of Shag Rocks W. of South Georgia: 53°36'S, 42°06'W, 142–160 m, R/V "Professor Siedlecki", USARP Cruise 601 sta. 8, 30 Nov 1986. 1 colony lacking holdfast USNM 82942. –Vicinity of Black Rock W. of South Georgia: 53°51'S, 41°15'W, 194–200 m, R/V "Professor Siedlecki", USARP Cruise 601 sta. 14, 1 Dec 1986. 5 colonies complete with holdfast, attached to 3 small stones, and 1 colony lacking holdfast USNM 82943. –Off South Georgia: 54°39'S, 37°22'W, 140–150 m, R/V "Professor Siedlecki", USARP Cruise 601 sta. 47, 6 Dec 1986. 2 colonies lacking holdfast USNM 82944 (SEM 1479–1481, 1495). Figs. 57, 58. –Vicinity of Clerke Rocks E. of South Georgia:

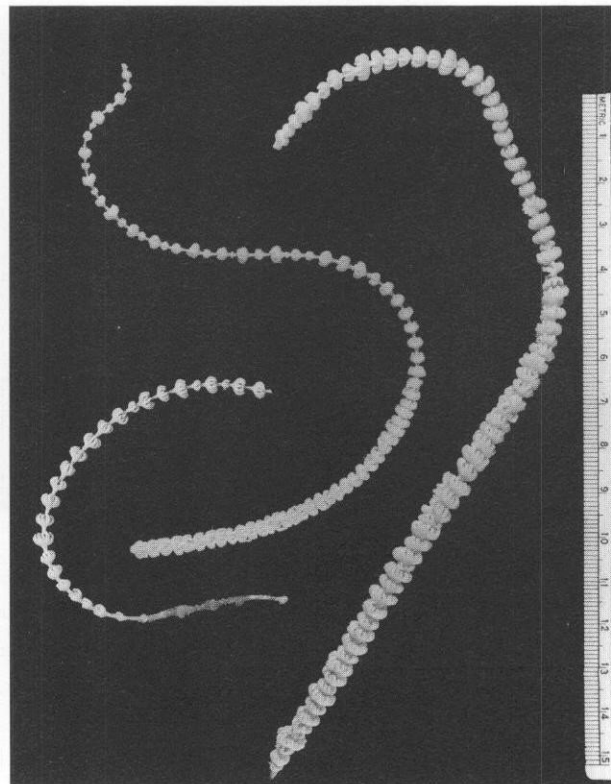


Fig. 53. *Fannyella nodosa* (MOLANDER), colonies. Left, USNM 58154 from Ross Sea. Center, 58155 from Palmer Station. Right, 82940 from Palmer Archipelago off Graham Land, Antarctic Peninsula.

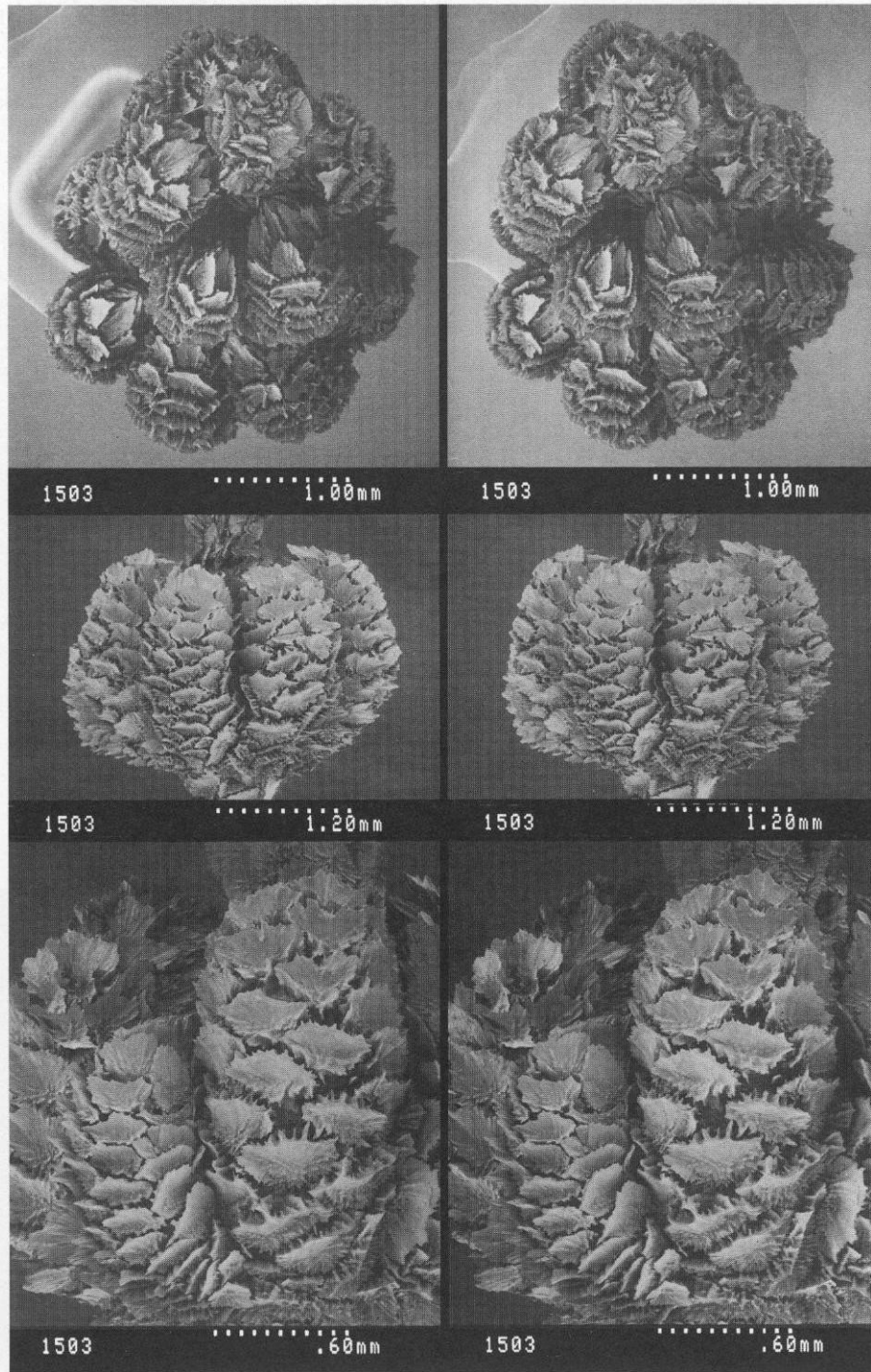


Fig. 54. *Fannyella nodosa* (MOLANDER), USNM 82941 from off South Orkney Is. Top, Distalmost whorls in apical view; Middle, Penultimate whorl in side view; Bottom, Abaxial aspect of fully grown polyp and oblique view of immature individual in penultimate whorl (SEM 1503). Stereo pairs.

54°54'S, 34°30'W, 250–274 m, R/V "Professor Siedlecki", USARP Cruise 601 sta. 76, 10 Dec 1986. Proximal part only of 1 colony broken off at point of attachment of ophiuroid, lacking holdfast USNM 82945 (SEM 1478). Fig. 56.

South Shetland Islands: 63°24'S, 62°14'W, 91–95 m, R/V "Hero" cruise 691 sta. 27, 10 Feb 1969. 3 incomplete specimens and fragments USNM 82939.

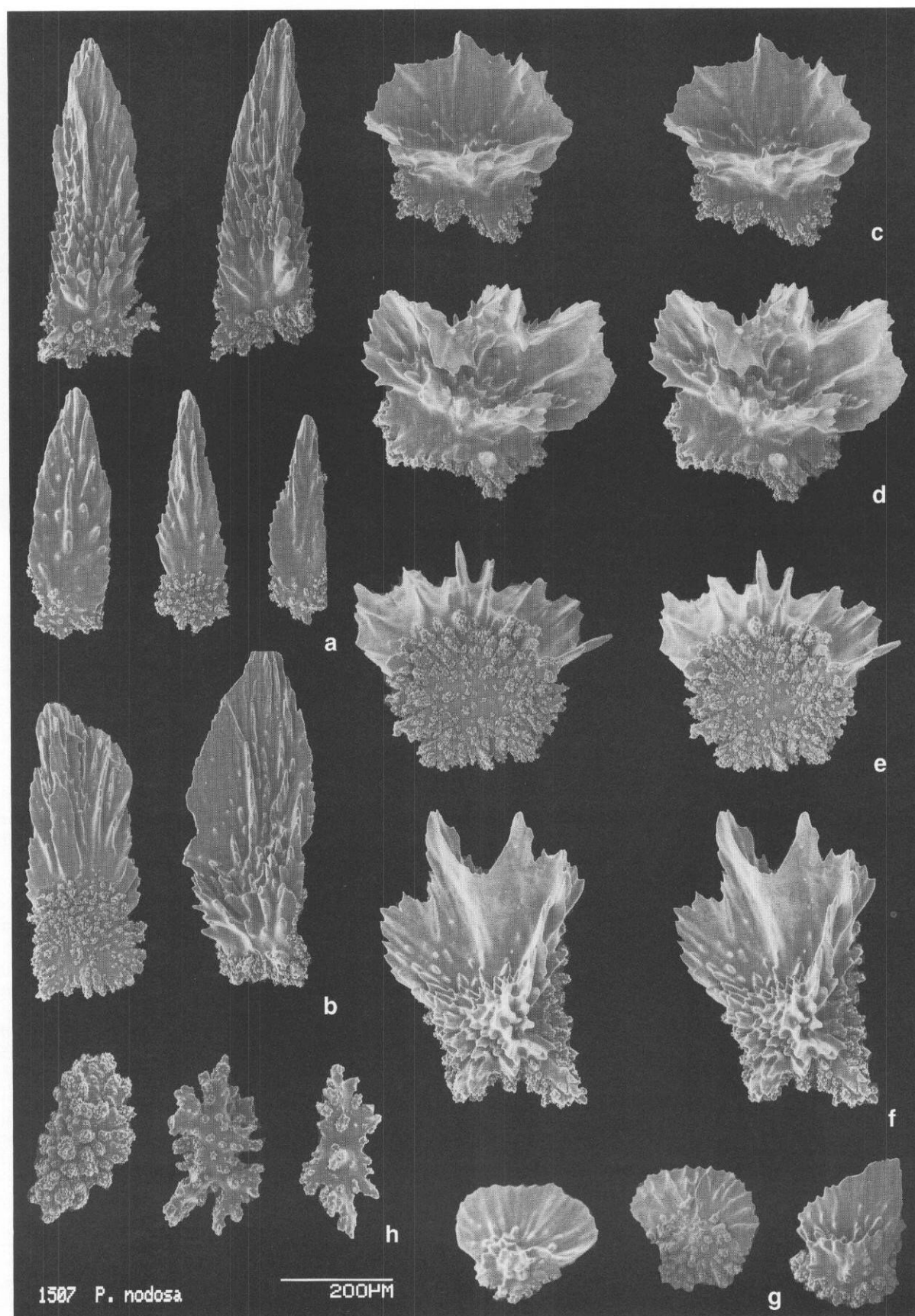


Fig. 55. *Fannyella nodosa* (MOLANDER), USNM 82941 from off South Orkney Is., sclerites (SEM 1507). a) Operculars; b) Circumoperculars; c, d) Outer surface of distal ascus-sclerites in stereoscopic view; e) Inner surface of distal ascus-sclerite in stereoscopic view; f) Outer surface of proximal ascus-sclerite in stereoscopic view; g) Small body scales; h) Tuberculate bodies from longitudinal canal walls.

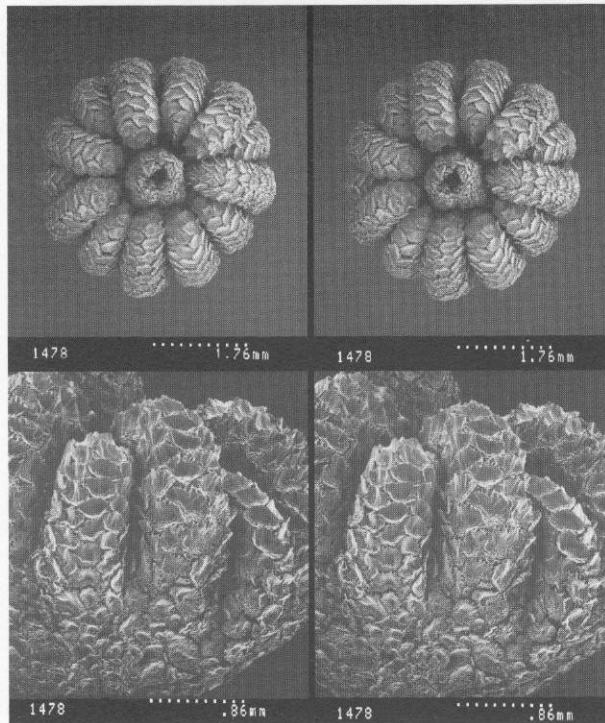


Fig. 56. *Fannyella nodosa* (MOLANDER), USNM 82945 from off South Georgia. Top, Apical view of mature whorl; Bottom, Side view of part of same (SEM 1478). Stereo pairs.

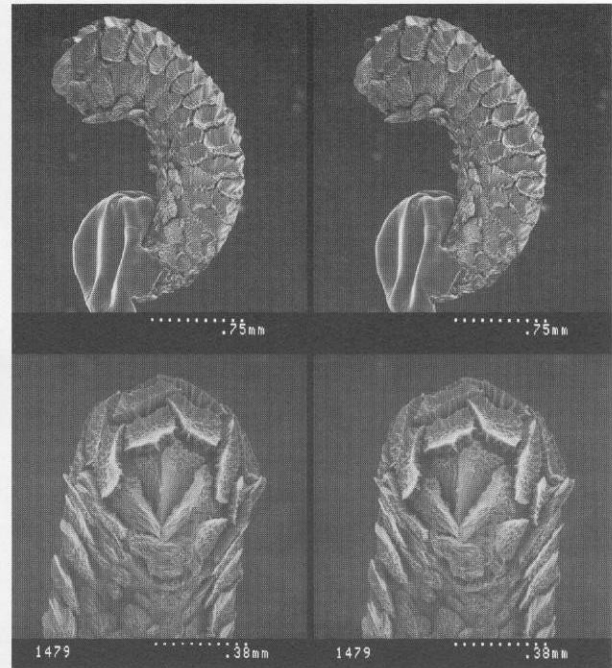


Fig. 57. *Fannyella nodosa* (MOLANDER), USNM 82944 from off South Georgia. Lateral and opercular views of isolated polyp (SEM 1479). Stereo pairs.

Antarctic Peninsula: Palmer Archipelago off Graham Land: 64°46'28"S, 63°26.5'W, 100–150 m, USARP R/V "Hero" cruise 731 sta. 1944, 11 Mar 1973. 1 colony lacking holdfast USNM 82940. (Fig. 53c). – 64°46'S, 64°04'W, 38 m, University of Connecticut USS "Glacier" cruise 1 sta. PAL-II-38m, by SCUBA diving, 18 Mar 1968. 2 colonies USNM 82938, 1 colony SMF 6991. – Melchior Harbor off Gamma Island: 64°19.24'S, 62°59.18'W, 25 fath. (= 46 m), mud and sand. USS "Staten Island", coll. W.L. Schmitt sta. 32–63, 6 Feb 1963. Apical part of one colony USNM 82946. – Palmer Station: 64°46'36"S, 64°03'29"W, 27 m, Oregon State University AH4-90, 26 Jan 1969. 2 colonies USNM 58155. (Fig. 53b.) – Palmer Station: 64°46'36"S, 64°03'29"W, 31 m, collected by SCUBA diving, Oregon State University AH4-100, 27 Jan 1969. 3 colonies USNM 58386 (SEM 1414). – Palmer Station: 64°46'36"S, 64°03'29"W, 22 m, Oregon State University AH4-70, 28 Jan 1969. 2 colonies in alcohol USNM 59494.

Description: See MOLANDER 1929: 60.

Remarks: This species was established by MOLANDER (1929) on the basis of a specimen thought to be a twig from a larger colony. Among the essentially topotypic specimens now reported are several still attached to the stones that were their substrate, demonstrating that the species is normally unbranched.

There can be little doubt that this material represents MOLANDER's species. Examination by SEM shows the body sclerites to be deeply concave, obliquely chalice-shaped scales (Figs. 55c, d; 58c–e; 61d, e) as illustrated by MOLANDER (1929: Fig. 14b). The marginal (i.e., "circumopercular") scales fold inward over the opercular scales (Figs. 57, bottom; 60, top),

excluding the species from *Callogorgia* as defined by VERSLUYS (1906: 55), KÜKENTHAL (1919: 362; 1924: 267) and BAYER (1982: 119), in which the marginal scales do not fold over the operculars to form a "circumoperculum".

The scales of the abaxial and lateral rows are longitudinally aligned in all but the basalmost part of the body (Figs. 55, 56, 58) and the circumopercular scales overreach the operculars, which are smaller, narrower, and sometimes furnished with a longitudinal keel on the inner surface; they decrease in size toward the adaxial side of the polyp, where the adaxials may be only half the size of the abaxials.

The unbranched, flagelliform colonies (Fig. 53) superficially resemble those of *Primnoella* GRAY and *Convexella* BAYER, in both of which the marginal scales do fold over the operculars as a circumoperculum (BAYER 1996: 165, 171). However, in *Primnoella* the polyps adaxially are almost unarmed or completely naked, whereas in *C. nodosa* the adaxial surface of the polyps is covered by scales, albeit in rows shorter and more or less irregular than those of the abaxial surface. Although the polyps of *Convexella* are covered by scales adaxially, they do not curve strongly inward toward the axis as is the case in *nodosa*, and the polyps without exception are smooth and glossy.

Colonies of *Ophidiogorgia* BAYER also are flagelliform, with verticillate incurved polyps, but in that genus the opercular and circumopercular scales are only slightly differentiated from the body scales, which tend to be arranged in an irregular manner, and the body scales show no hint of development as ascus-scales.

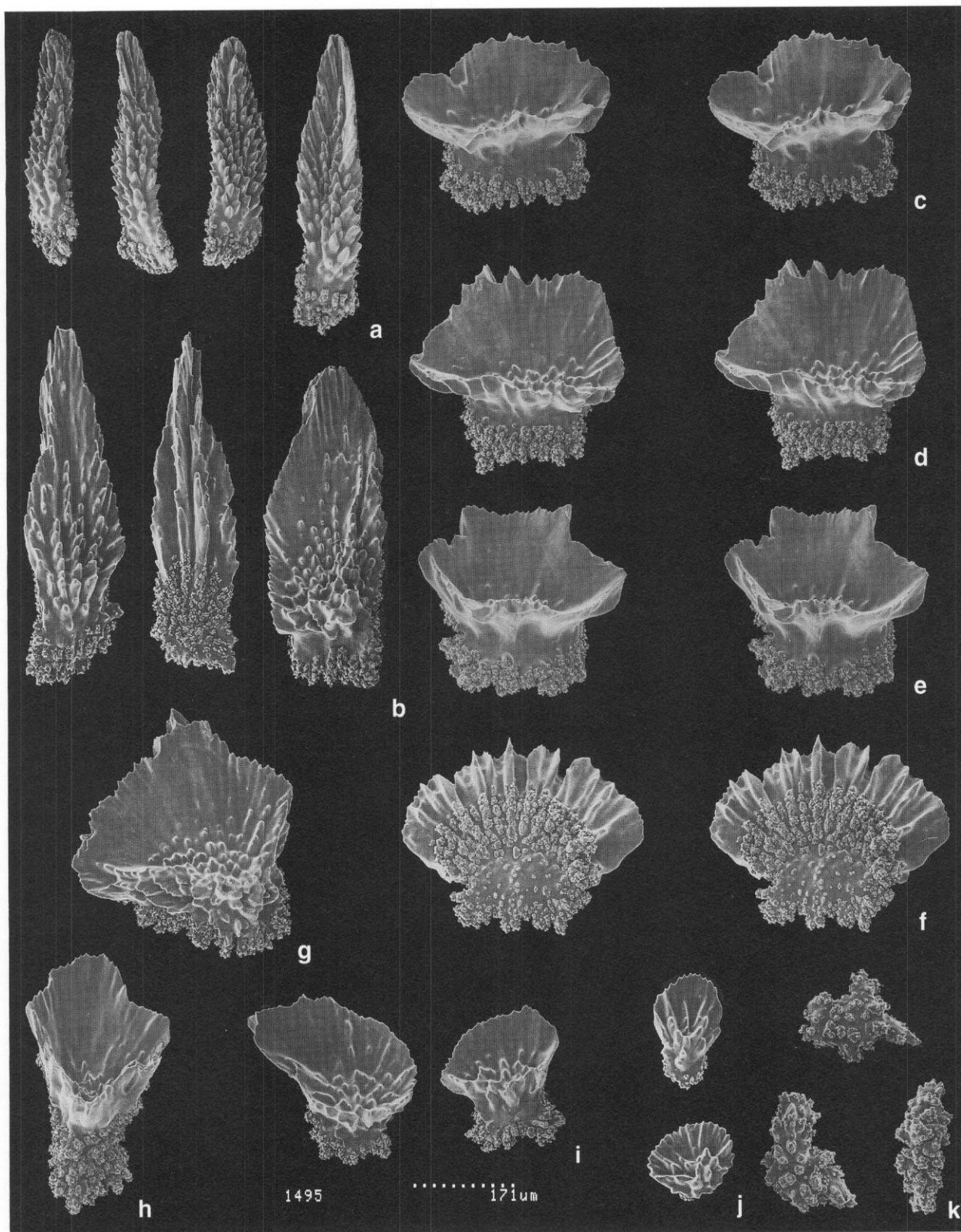


Fig. 58. *Fannyella nodosa* (MOLANDER), USNM 82944 from off South Georgia, sclerites (SEM 1495). a) Operculars; b) Circumoperculars; c-e) Outer surface of ascus-scales in stereoscopic view; f) Inner surface of ascus-scale in stereoscopic view; g, h) Proximal body scales; i-k) Coenenchymal sclerites.

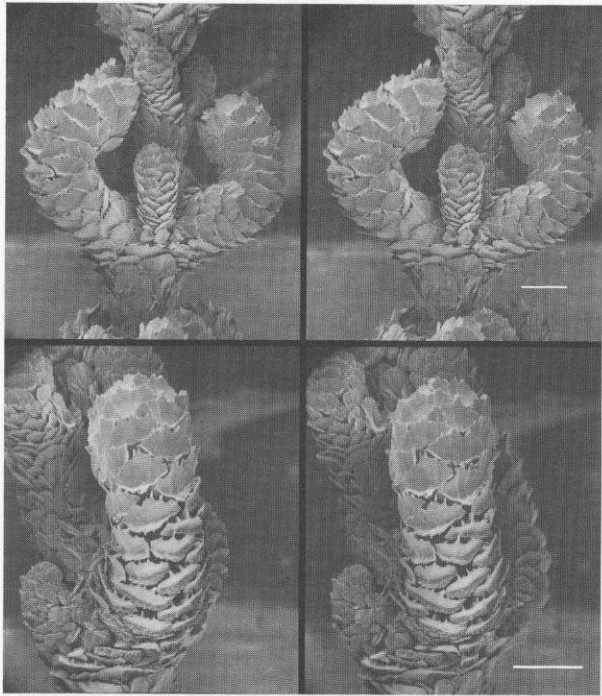


Fig. 59. *Fannyella nodosa* (MOLANDER), USNM 58154 from Ross Sea. Stereoscopic views of rapidly growing part of colony showing oblique and abaxial aspects of mature polyps, insertion of new whorl between old, and addition of new polyp within whorl of mature individuals (SEM 289). Scale bars represent 0.5 mm.

Although the flagelliform colonies differ conspicuously from the repeatedly branched, flabellate colonies of *Fannyella*, their combination of taxonomic characters excludes them from the predominantly flagelliform genera *Primnoella*, *Convexella*, and *Ophidiogorgia*. Their morphological character array conforms most closely with that of *Fannyella*, to which they are here assigned, recognizing that further study using newly developed methods of genetic and molecular analysis may require reevaluation.

The colonies show a considerable amount of variation in respect to the concavity and sculpturing of the ascus-scales, and in the number of abaxial scale rows. In some colonies, the body scales are only moderately concave, in others deeply so; in some the margins of the "chalice" are strongly serrate (Figs. 60, 61), in others only moderately so; in some colonies the abaxial surface of the polyps is almost completely covered by two longitudinal rows of large ascus-scales which partially hide the two outer-lateral rows in abaxial view, but in others the scales of the outer-lateral rows are almost completely visible.

The largest specimen in the present collection (USNM 82940, Fig. 61c) is 24 cm long, with 6 whorls in 2 cm of length and 15–24 polyps per whorl. USNM 58154 includes two nearly complete colonies and some fragments; one specimen still attached to a pebble (Fig. 61a) is 14 cm long lacking a small portion of the distal tip, and has 5 whorls in 2 cm of length except near the tip where there are six owing to the insertion of new whorls, with 9 polyps per whorl. The other colony is 13.2 cm long without holdfast and lacking a small apical portion; it, too, has 5 whorls of 9 polyps in 2 cm.

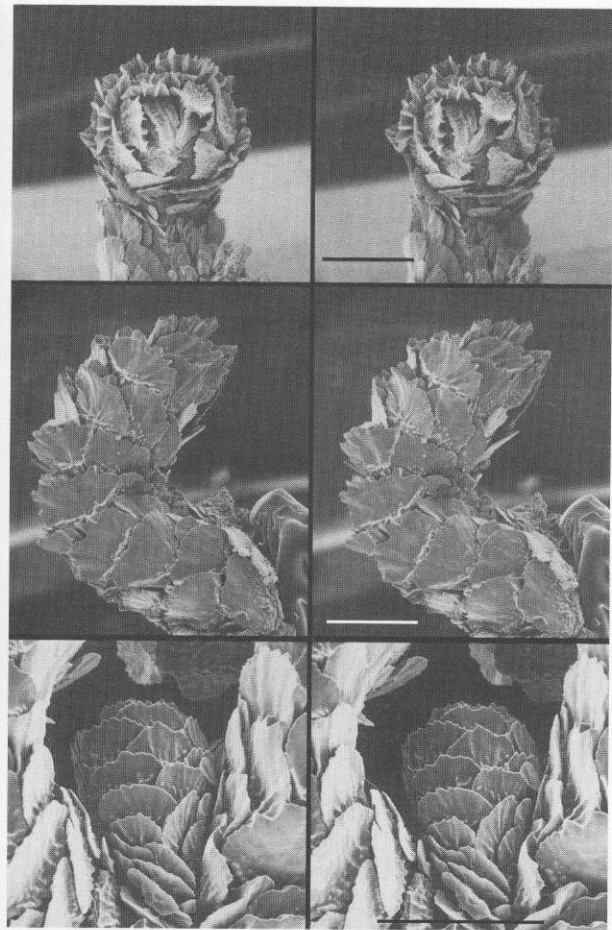


Fig. 60. *Fannyella nodosa* (MOLANDER), USNM 58154 from Ross Sea. Top, Opercular view of polyp (SEM 295); Middle, Lateral view of polyp (SEM 295); Bottom, Abaxial view of young polyp originating between mature polyps within a whorl (SEM 296). Stereoscopic pairs. Scale bars represent 0.5 mm.

Two colonies from South Georgia (USNM 82944) differ in color, one white, the other brownish. In addition, the body scales of the brownish specimen are more deeply concave, and the polyps tend to bend inward more strongly and in some cases are bent nearly or quite double. Preparation of polyps for scanning showed that both colonies have ripe or nearly ripe gonads, apparently female.

The lot from off Black Rock west of South Georgia (USNM 82943) is of particular interest. One of the colonies is still attached to a stone along with a colony of *Primnoella scotiae* THOMSON & RITCHIE and a colony of *Primnois* sp.; a second colony is attached to a small stone with its holdfast almost in contact with that of a colony of *Primnoella scotiae*. Two small colonies attached to one stone are evidently immature; one of them is 3.9 cm long, in a length of 2 cm having 6 fully developed whorls of polyps with 4 new whorls regularly alternating with the 5 lower large whorls.

It is odd that the similarity of MOLANDER's (1929) fig. 14b to one of the sclerites in THOMSON & RENNERT's (1931) plate 11 fig. 6 has gone unnoticed. MOLANDER (1929:16) commented upon the similarity of the "comet-like" (tütenähnlich) body

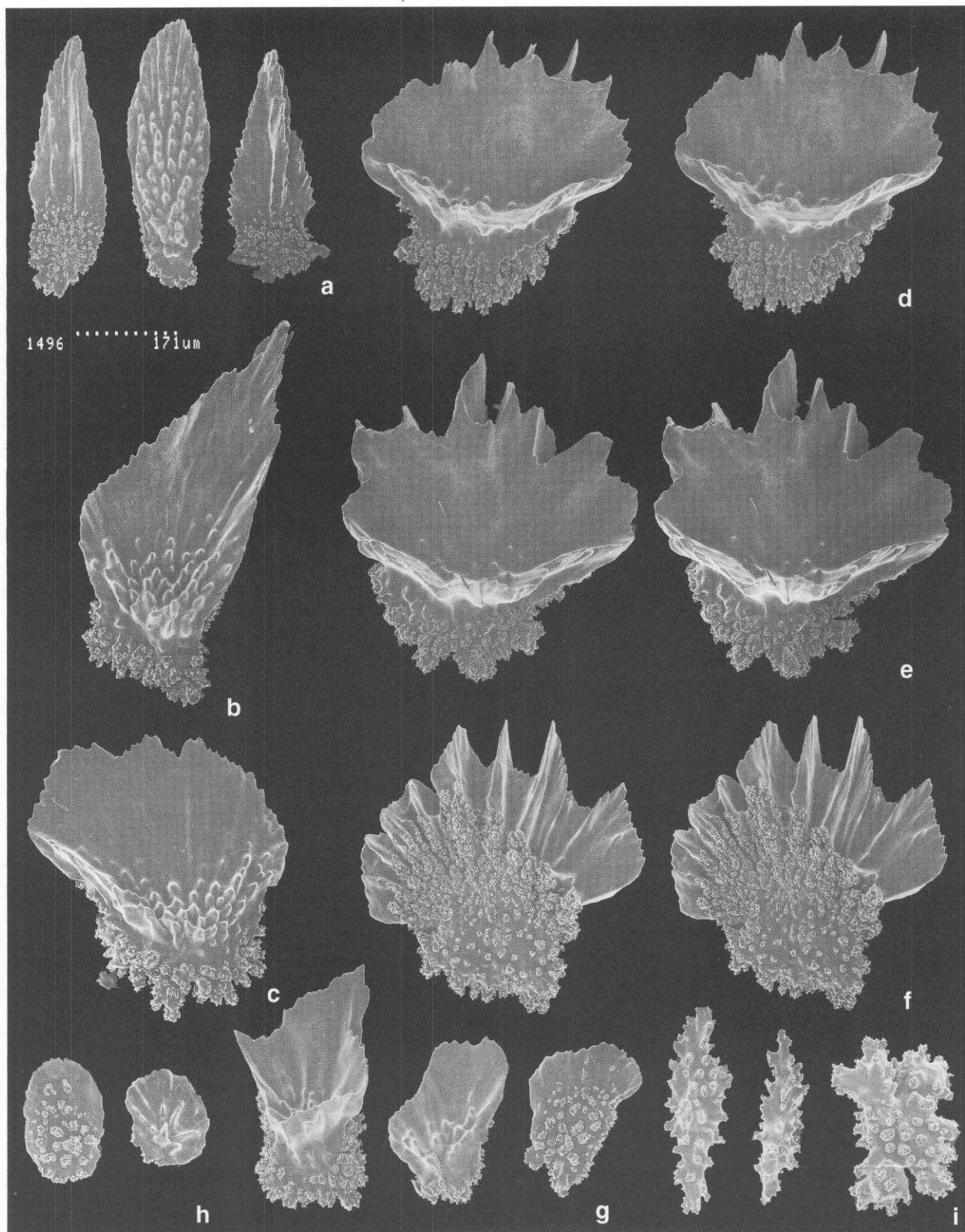


Fig. 61. *Fannyella nodosa* (MOLANDER), USNM 58154 from Ross Sea, sclerites (SEM 1496): a) Operculars; b) Circumopercular; c) Lateral body scale; d, e) Outer surface of of abaxial ascus-scales in stereoscopic view; f) Inner surface of ascus-scale in stereoscopic view; g) Small ascus-scales from coenenchyme and base of polyps; h) Adaxial body scales; i) Tuberculate sclerites from inner coenenchyme and canal walls.

scales of his *nodosa* to those of *C. ventilabrum* sensu GRAVIER, but subsequently no one has noticed the similarity of both to the "ascus-like" sclerites shown in THOMSON & RENNET's illustration (1931 pl. 11, fig. 6).

KÜKENTHAL's (1912: pl. 21, fig. 7) photograph of a specimen of *Primnoella vanhoeffeni* from the Gauss-Station very strongly resembles colonies of *F. nodosa*, and the salient points in his description are well within the limits of *nodosa*. Unfortunately, the drawings that accompany the text are inadequate to demonstrate whether or not the species is the same as *nodosa*.

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