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# Stony Corals (Cnidaria: Hydrozoa, Scleractinia) of Carrie Bow Cay, Belize

*Stephen D. Cairns*

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## ABSTRACT

Three species of hydrozoan and 42 species of scleractinian corals were identified among 248 specimens collected from maximum depths of 31 m during a survey along the outer edge of the Belizean barrier platform near Carrie Bow Cay and Curlew Bank. This report includes important synonyms, morphological observations, and distributional data, as well as photographs of all species. Diversity of the Carrie Bow Cay coral fauna is high, as compared with adjacent areas of the Caribbean, although not all habitats have yet been equally well searched.

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## Introduction

One of the earliest reports on the Scleractinia off Belize (Boone, 1928) recorded two species of deep-water ahermatypes from off Glover's Reef at a depth of 885 m. More recently, Thorpe and Bregazzi (1960) listed 30 hermatypic species from Rendezvous Cay, two of which are considered to be only forms in this account. Stoddart (1962:19) listed 22 reef corals from three atolls off Belize, and York (1971) discussed and figured 24 hermatypes found off the southern shelf of Belize. These numbers have been revised to be consistent with the systematic concept of this paper. Specific references to the coral fauna and reef zonation of Carrie Bow Cay are found in Stoddart (1963:25-26) and in Rützler and Macintyre (herein: 9).

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## Materials and Methods

Most of the corals were collected in March 1978 during a survey of reefs at Carrie Bow Cay and nearby Curlew Bank to a depth of 31 m. All 248 specimens are deposited in the United States National Museum collection (National Museum of Natural History, Smithsonian Institution). Illustrated specimens were collected at Carrie Bow Cay unless otherwise indicated. In some cases, specimens were dyed and then coated with a fine layer of  $\text{NH}_4\text{Cl}$  in order to improve contrast for photography; these specimens are noted in the figure legends.

Because of inconsistencies in the literature, authors and references are given for all species. Synonymies are restricted to publications in which the species are correctly identified and usefully illustrated. Data on bathymetric ranges apply to the entire geographic range of the species and are taken largely from Goreau and Wells (1967).

## Species List

(\* = ahermatypic)

Class HYDROZOA

Order MILLEPORINA

Family MILLEPORIDAE

*Millepora alcicornis* Linnaeus

*M. complanata* Lamarck

## Order STYLASTERINA

## Family STYLASTERIDAE

\**Stylaster roseus* (Pallas)

## Class ANTHOZOA

## Order SCLERACTINIA

## SUBORDER ASTROCOENIINA

## FAMILY ASTROCOENIIDAE

*Stephanocoenia michelinii* Milne Edwards and Haime

## Family POCILLOPORIDAE

*Madracis decactis* (Lyman)*M. mirabilis* (Duchassaing and Michelotti)\**M. pharensis* forma *pharensis* (Heller)

## Family ACROPORIDAE

*Acropora palmata* (Lamarck)*A. cervicornis* (Lamarck)*A. prolifera* (Lamarck)

## Suborder FUNGIINA

## Family AGARICIIDAE

*Agaricia agaricites* forma *agaricites* (Linnaeus)forma *carinata* Wellsforma *purpurea* (Lesueur)*A. fragilis* forma *fragilis* Dana*A. tenuifolia* Dana*A. lamarcki* Milne Edwards and Haime*Leptoseris cucullata* (Ellis and Solander)

## Family SIDERASTREIDAE

*Siderastrea siderea* (Ellis and Solander)*S. radians* (Pallas)

## Family PORITIDAE

*Porites astreoides* Lamarck*P. porites* forma *porites* (Pallas) [= *P. clavaria* Lamarck]forma *divaricata* Lesueurforma *furcata* Lamarck

## Suborder FAVIINA

## Family FAVIIDAE

*Favia fragum* (Esper)*Diploria clivosa* (Ellis and Solander)*D. strigosa* (Dana)*D. labyrinthiformis* (Linnaeus)*Manicina areolata* forma *areolata* (Linnaeus)forma *mayori* Wells*Colpophyllia natans* (Houttuyn)*Cladocora arbuscula* (Lesueur)*Montastrea annularis* (Ellis and Solander)*M. cavernosa* (Linnaeus)

## Family RHIZANGIIDAE

\**Phyllangia americana* Milne Edwards and Haime\**Astrangia solitaria* (Lesueur)\**Colangia immersa* Poutalès

## Family MEANDRIDAE

*Meandrina meandrites* forma *meandrites* (Linnaeus)forma *danae* (Milne Edwards and Haime)*Dichocoenia stokesi* Milne Edwards and Haime*Dendrogyra cylindrus* Ehrenberg

## Family MUSSIDAE

*Mussa angulosa* (Pallas)*Scolymia lacera* (Pallas)*S. cubensis* (Milne Edwards and Haime)*Isophyllia sinuosa* (Ellis and Solander)*Isophyllastrea rigida* (Dana)*Mycetophyllia lamarckiana* Milne Edwards and Haime*M. aliciae* Wells*M. danaana* Milne Edwards and Haime*M. ferox* Wells

## Suborder CARYOPHYLLIINA

## Family CARYOPHYLLIIDAE

*Eusmilia fastigiata* forma *fastigiata* (Pallas)

## Family FLABELLIDAE

\**Gardineria minor* Wells

## Family MILLEPORIDAE

***Millepora alcicornis* Linnaeus, 1758**

FIGURE 119a; PLATE 5: center left, center right

*Millepora alcicornis*.—Vaughan, 1901:318, pls. 35, 37–38.—Boschma, 1948:18–19, 23–28, 79–81, 86–88, 100, fig. 6, pl. 14: fig. 3.—Squires, 1958:259, pl. 43: figs. 1–2.—Almy and Carrión-Torres, 1963:144, pl. 2a.—Olivares and Leonard, 1971:59, pl. 5: figs. c-d.—Roos, 1971:43–44, pl. 2.—Smith, 1971:95–96.—York, 1971:5, pl. 1: figs. 1–4.—Tresslar, 1974:123–124, pl. 17.—Colin, 1978:137 [color figs.], 146 [figs.], 150.

Encrusting or branching colonies up to 50 cm in width. Branches in bushy arrangement or uniplanar, often anastomosing. Surface covered by pores; each gastropore (0.2 mm in diameter) surrounded by 5–7 smaller dactylopores (0.1 mm in diameter) in an indistinct cyclo-system. Gastrostyles and dactylostyles absent. Orange-yellow or brown.

HABITAT.—Commonly found encrusting dead gorgonians in fore reef (4–30 m) and in lagoon patch reefs (3–6 m).

***Millepora complanata* Lamarck, 1816**

FIGURE 119b–c; PLATE 3: top left

*Millepora complanata*.—Boschma, 1948:20, 34–35, 83–84, 94–95, 103, figs. 2a–b, 11, pl. 7: fig. 2.—Squires, 1958:259, pl. 43: fig. 3.—Almy and Carrión-Torres, 1963:144, pl. 2b.—Roos, 1971:44–45, pl. 3.—York, 1971:5, pl. 1: figs. 5–8.—Colin, 1978:140 [color fig.], 143 [figs.], 150.

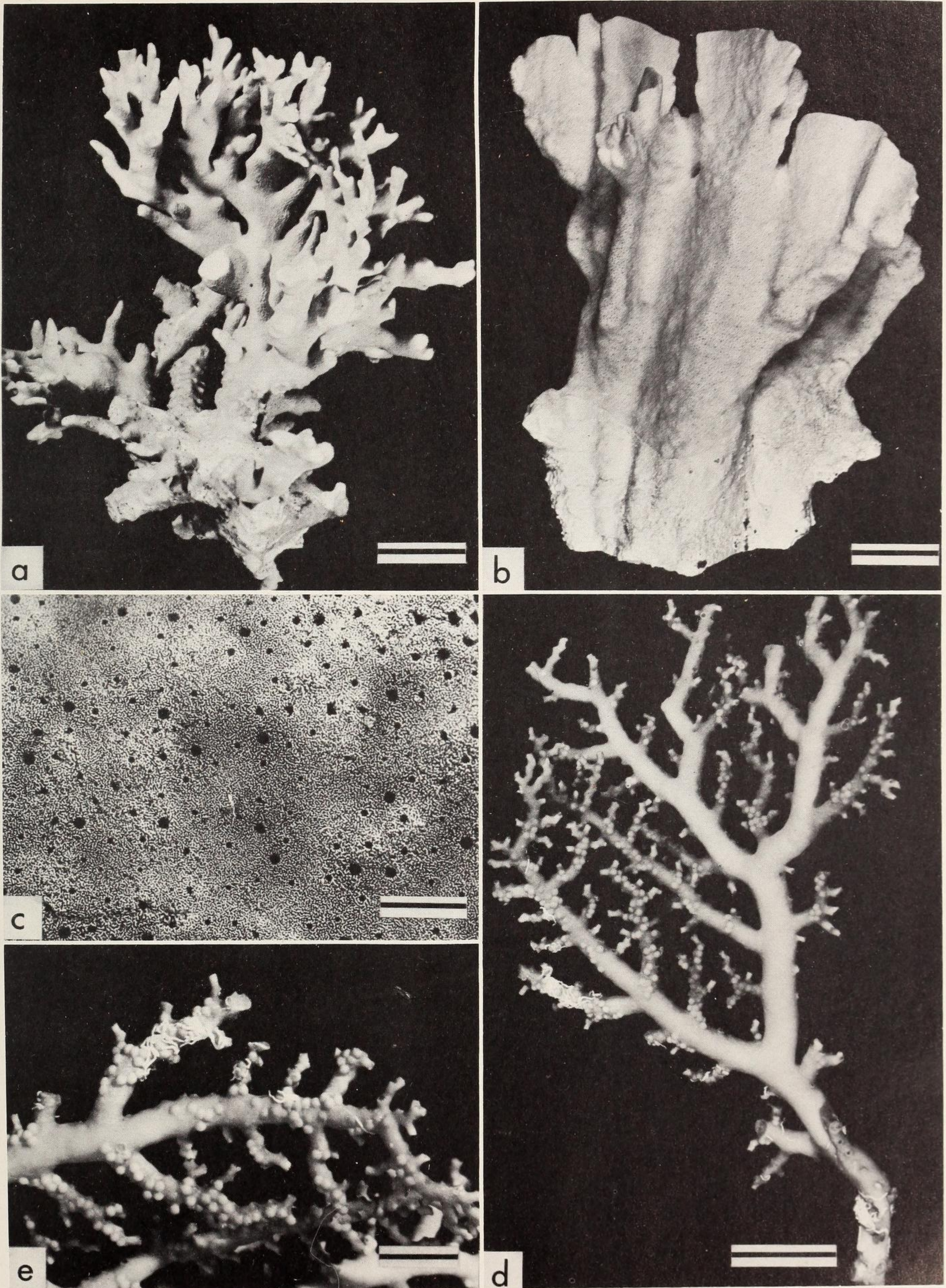


FIGURE 119.—*a*, *Millepora alcicornis*, Bermuda; *b*, *c*, *M. complanata*, reef crest, 0.5 m, specimen in *c* coated with  $\text{NH}_4\text{Cl}$ ; *d*, *e*, *Stylaster roseus*, spur and groove zone. (Scale bars: *a*, *b* = 2 cm; *c* = 0.2 cm; *d* = 1 cm; *e* = 0.5 cm.)

Colony forming thin, smooth, vertical plates united only at their bases. Otherwise, similar to *Millepora alcicornis*.

**HABITAT.**—Major component of reef crest and fore reef spurs (0–8 m).

**DISCUSSION.**—A third western Atlantic species, *Millepora squarrosa* Lamarck, 1816, is characterized by thin, vertical plates with lateral expansions or ridges, which unite with adjacent plates to form a honeycombed complex.

### Family STYLASTERIDAE

#### *Stylaster roseus* (Pallas, 1766)

FIGURE 119d–e

*Stylaster roseus*.—Boschma, 1965:227–247, [4 figs.], pls. 1–3.—Roos, 1971:45, pl. 4: figs. a–b.—Colin, 1978:141 [color fig.], 144 [color fig.], 151.

Small, branching, uniplanar colonies rarely over 10 cm tall. Each gastropore surrounded by 5–15 smaller, slit-like dactylopores opening on to the gastropore. Gastrostyles and dactylostyles present. Small, hemispherical ampullae commonly present, sometimes in crowded arrangement. Purple, red, or pink.

**HABITAT.**—Very common in spur and groove zone (6–8 m) on undersides of, or within cavities produced by *Agaricia tenuifolia*. Also present on fore-reef slope (20–24 m). Ahermatypic. Bathymetric range: 6–30 m.

### Family ASTROCOENIIDAE

#### *Stephanocoenia michelinii* Milne Edwards and Haime, 1848

FIGURE 120a–b

*Plesiastrea goodei* Verrill, 1900:553–554, pl. 67: fig. 1.

*Stephanocoenia michelinii*.—Squires, 1958:246, pl. 32: figs. 1–2.—Smith, 1971:72, pl. 2.—York, 1971:7, pl. 2: figs. 1–4.—Laborel, 1971:175, pl. 1: fig. 4.—Colin, 1978:209 [color fig.], 211.

*Stephanocoenia intersepta*.—Roos, 1971:51, pl. 4: fig. c, pl. 5: figs. a–b.—Tresslar, 1974:118, pl. 1.

Plocoid to cerioid, subhemispherical or encrusting colonies up to 30 cm in diameter. Calices 2–

3 mm in diameter. Twenty-four septa; prominent paliform lobes before first two cycles of septa. Columella large, styliform. Brown.

**HABITAT.**—Only one specimen was collected from the ridge of the outer fore reef (14 m). Bathymetric range: 1–95 m.

**DISCUSSION.**—This species is often mistaken in the field for the more common *Siderastrea siderea* or *S. radians*, which it superficially resembles.

### Family POCILLOPORIDAE

#### *Madracis decactis* (Lyman, 1859)

FIGURE 120c–d; PLATE 4: bottom right

*Madracis decactis*.—Verrill, 1901a:108–109, figs. 2, 2a, pl. 14: fig. 6.—Roos, 1971:52–53, pl. 8: figs. a–b.—Wells, 1973:19 [key].—Tresslar, 1974:120, pl. 2.—Erhardt and Meinel, 1975, fig. 3.—Colin, 1978:211, 212 [color fig.], 214.

*Madracis decatis*.—Smith, 1971:72–73, pl. 1.

Plocoid; nodular, clavate, or thin, encrusting colonies rarely exceeding 15 cm in diameter. Calices about 2 mm in diameter containing 10 septa each. Columella styliform. Noncostate; coenosteum bears rows of short spines surrounding each calice. Brown, green, or purplish.

**HABITAT.**—At Carrie Bow Cay found only on outer fore reef (15–24 m). Bathymetric range: 1–70 m.

#### *Madracis mirabilis* (Duchassaing and Michelotti, 1860)

FIGURE 120e–f

*Madracis asperula*.—Roos, 1971:59, pl. 9: fig. b, pl. 10.

*Madracis mirabilis*.—Wells, 1973:19 [key].—Werding and Erhardt, 1976; pl. 4: fig. 1.—Colin, 1978:212 [color fig.], 214, 215 [fig.].

Plocoid, ramose, bushy colonies up to 2 m in diameter. Branches 5–9 mm in diameter with blunt ends. Calices 1–2 mm in diameter; 10 septa each. Columella styliform. Pale cream to bright yellow.

**HABITAT.**—Found in sand trough of outer fore reef (17–22 m) and spur and groove zone (6–8 m). Bathymetric range: 1–60 m.

**DISCUSSION.**—This species has been confused

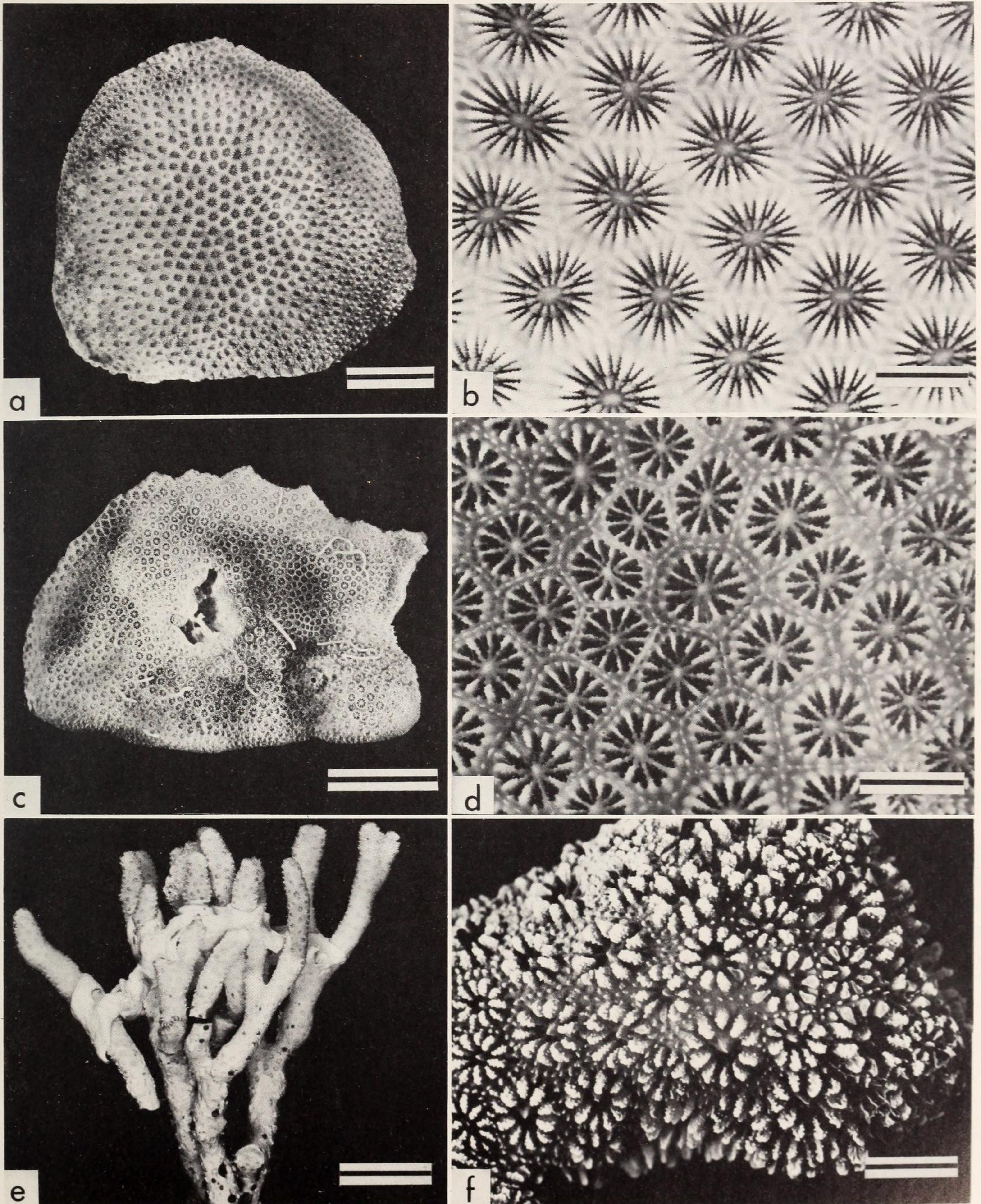


FIGURE 120.—*a, b*, *Stephanocoenia michelinii*, outer ridge, 14 m; *c, d*, *Madracis decactis*, outer ridge, 14 m; *e*, *M. mirabilis*, inner-reef slope, 15–18 m; *f*, *M. mirabilis*, Wee Wee Cay, 1 m, specimen coated with  $\text{NH}_4\text{Cl}$ . (Scale bars: *a, c, e* = 2 cm; *b, d, f* = 0.2 cm.)

with *Madracis asperula* Milne Edwards and Haime. The latter is distinguished by its more slender branches (2–3 mm) and attenuate branch tips; it is ahermatypic and is usually found in deeper water (to 200 m).

***Madracis pharensis* forma *pharensis*  
(Heller, 1868)**

FIGURE 121a

*Madracis pharensis* forma *pharensis*.—Wells, 1973:18 [key].  
*Madracis pharensis*.—Colin, 1978:213 [color fig.], 214.

Thin, encrusting, stolon-like ribbons or small nodular projections. Calices about 1.5 mm in diameter, each with 20 septa: 10 large, 10 small. Columella styliform. Yellow with pinkish polyps.

**HABITAT.**—All Carrie Bow Cay specimens were found on the fore-reef slope (24–28 m) attached to the undersides of platy *Agaricia* spp. Ahermatypic. Bathymetric range: 20–150 m.

**DISCUSSION.**—*Madracis pharensis* forma *luciphila* Wells, 1973, forms thick, encrusting, laminar sheets, similar to *M. decactis*. It is hermatypic and has a shallower bathymetric range (2–95 m).

**Family ACROPORIDAE**

***Acropora palmata* (Lamarck, 1816)**

FIGURE 121b,c; PLATE 3: top right, center left

*Isopora muricata* forma *palmata*.—Vaughan, 1901:313–314, pls. 26–27.

*Acropora palmata*.—Squires, 1958:246–247, pl. 34: fig. 1.—Roos, 1971: 55–56, pl. 12: fig. b.—Smith, 1971: 73–74, pl. 4.—York, 1971: 7, pl. 2: figs. 5–8.—Colin, 1978: 36, 216 [color figs.], 218 [fig.], 219, 222.

Broad, flat, frond-like branches, forming colony meters in diameter. Calices 1.0–1.5 mm in diameter, usually on highly exsert, tubular corallites. No axial corallites. Twelve septa. Wall porous. Yellowish brown.

**HABITAT.**—Very common in turbulent shallow waters. At Carrie Bow Cay common directly seaward and shoreward of the reef crest, and at high spur and groove zone (1–8 m); also common

at Curlew Bank (2–4 m). Sparse in back-reef area (1–2 m). Bathymetric range: 0–17 m.

***Acropora cervicornis* (Lamarck, 1816)**

FIGURE 121d; PLATE 2: center left, PLATE 4: center left, center right

*Isopora muricata*.—Vaughan, 1901:312–313, pl. 21, pl. 22: fig. 2.

*Acropora cervicornis*.—Roos, 1971:54–55, pl. 9: fig. a, pl. 12: fig. a.—Smith, 1971:73, pl. 3.—York, 1971:9, pl. 3: figs. 1–2.—Colin, 1978:216, 217 [color figs.], 222–223.

Cylindrical branches, forming colonies up to 3 m in height. Calices about 1 mm in diameter; axial corallites slightly larger. Tubular corallites usually highly exsert. Twelve septa. Wall porous. Yellowish brown.

**HABITAT.**—Common as dense thickets in sand trough and outer ridge of the outer fore reef (24 m); also present in spur and groove zone, back-reef area (1–2 m), and adjacent patch reefs. Bathymetric range: 0–50 m.

***Acropora prolifera* (Lamarck, 1816)**

FIGURES 121e, 122a; PLATE 3: center left

*Isopora muricata* forma *prolifera*.—Vaughan, 1901:313, pl. 22: fig. 1, pls. 23–25.

*Acropora prolifera*.—Roos, 1971:55, pl. 11.—Smith, 1971:74.—York, 1971:9, pl. 3: figs. 3–4.—Colin, 1978:217 [color fig.], 223, 226.

Very similar to *Acropora cervicornis*, but branches more crowded, often crossing over and fusing, producing flabelliform or reticulate plates. Usually smaller than *A. cervicornis* and not found in dense thickets.

**HABITAT.**—Found on seaward side of reef crest (0.5–2.0 m) in very turbulent waters. Bathymetric range: 0–30 m.

**DISCUSSION.**—All other characters being similar, the three species of *Acropora* are differentiated by growth form: *A. prolifera* is the intermediate, linking the frond-like *A. palmata* and the ramose *A. cervicornis*. Some authors (Gregory, 1895; Vaughan, 1901) have considered them to be three



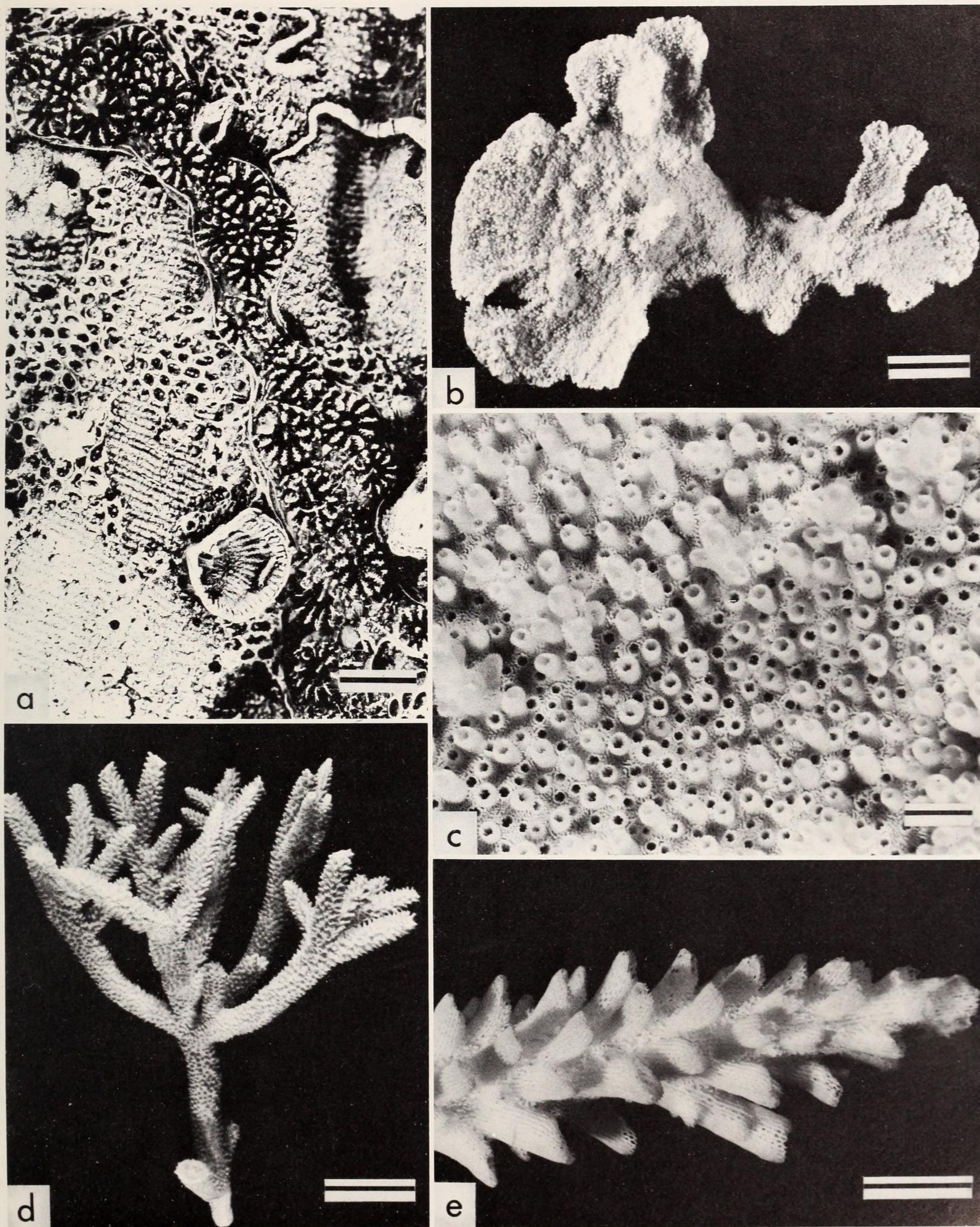


FIGURE 121.—*a*, *Madracis pharensis* f. *pharensis*, fore-reef slope, 24–27 m, on underside of *Agaricia fragilis*, specimen coated with  $\text{NH}_4\text{Cl}$ ; *b*, *c*, *Acropora palmata*, off Cuba; *d*, *A. cervicornis*, exact locality at Carrie Bow Cay unknown; *e*, *A. prolifera*, off Belize, exact locality unknown. (Scale bars: *a* = 0.2 cm; *b*, *d* = 5 cm; *c*, *e* = 0.5 cm.)

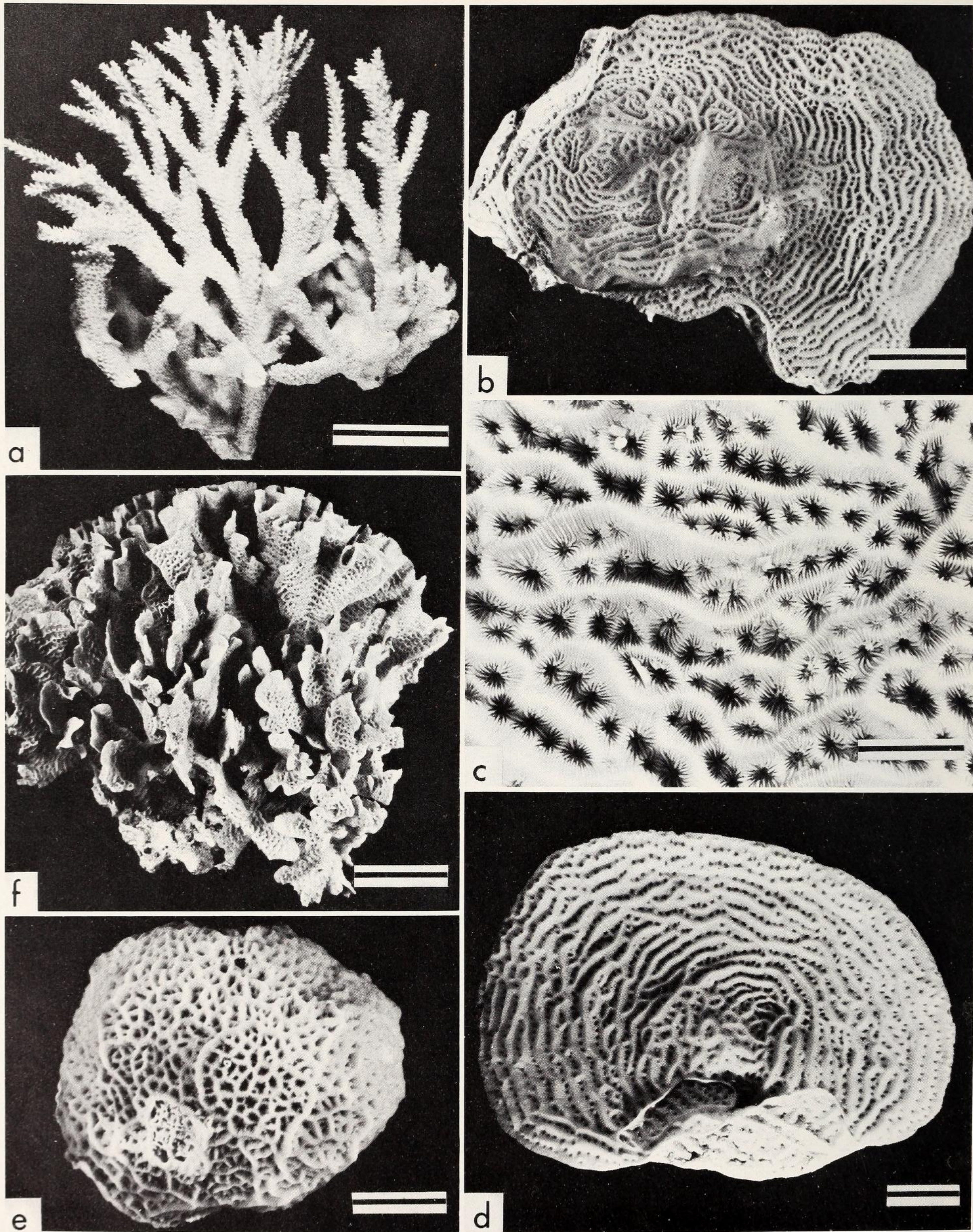


FIGURE 122.—*a*, *Acropora prolifera*, off Belize, exact locality unknown; *b*, *Agaricia agaricites* f. *carinata*, fore-reef slope, 24–27 m; *c*, *d*, *A. agaricites purpurea*, sand trough, 21 m; *e*, *A. agaricites agaricites*, patch reef area, 2–3 m; *f*, *A. tenuifolia*, exact locality at Carrie Bow Cay unknown. (Scale bars: *a*, *b*, *f* = 5 cm; *c* = 0.5 cm; *d*, *e* = 2 cm.)

forms of the same species, whereas others (Smith, 1971; Roos, 1971; Wells, 1973) have retained them as separate species. Discussions of the problem can be found in Vaughan (1901:312-314; 1919:482) and in Roos (1971:54).

### Family AGARICIIDAE

#### *Agaricia agaricites* (Linnaeus, 1758)

FIGURE 122b-e

*Agaricia agaricites*.—Verrill, 1901a:146-149 [in part, not variety e], figs. 5-7, pl. 26: figs. 2-3, pl. 27: figs. 1-3, 5-7.—Squires, 1958:247-248, pl. 32: fig. 3, pl. 33: figs. 1-3.—Roos, 1971:56-58, pl. 14: figs. a-b.—Smith, 1971:74-75, pls. 5-6.—York, 1971:11, 13 [in part, pl. 4: figs. 3-8, pl. 5: figs. 1-6].—Wells, 1973:25, fig. 6a [not *A. a. fragilis*].—Tresslar, 1974:120, pl. 4.—Colin, 1978:220, 221 [color fig.], 226, 231.

*Agaricia crassa* Verrill, 1901a:145, pl. 30: fig. 6, pl. 34: fig. 2.  
*Agaricia purpurea*.—Verrill, 1901a:149-150, pl. 27: figs. 4a-b.

Colonies massive and encrusting; thick and flat, attached by pedicel; or flat with thick imbricated, vertical, bifacial lobes. Up to 1 m in diameter. Cerioid to meandroid. Calices 1.5-3.0 mm in diameter, arranged in reticulate pattern or in rows of up to 20; 3-7 calices/cm. Columella small. Chocolate to purplish brown.

**HABITAT.**—*Agaricia agaricites* forma *agaricites* is most common in back-reef and patch reef areas (0.5-2.0 m); *A. a.* forma *purpurea* (Lesueur, 1821) is common in the spur and groove zone and outer fore reef (7-30 m); and *A. a.* forma *carinata* Wells, 1973, was collected only from the fore-reef slope (18-30 m). Bathymetric range: 1-70 m.

**DISCUSSION.**—At least five growth forms have been described and named for this variable species and several more forms could be described on the basis of similar criteria. The most common form at Carrie Bow Cay is *purpurea*, a large (up to 1 m), thick, flat colony with 5-6 calices/cm and long valleys having up to 20 calices. Each valley is bordered by prominent collines. Forma *agaricites* is smaller, hemispherical or encrusting, with larger calices arranged in a discontinuous or reticulate pattern and only 3-5 calices/cm. Forma *carinata* is like *purpurea* but has scattered, low (2-3

cm), thick, bifacial crests. The remaining two forms have not been collected at Carrie Bow Cay: forma *humilis* Verrill has small (1.5 mm in diameter), pinched calices in a crowded, reticulate arrangement; and forma *danai* Milne Edwards and Haime is massive with tall, erect, imbricated lobes.

#### *Agaricia fragilis* forma *fragilis* Dana, 1848

FIGURE 123a-b

*Agaricia fragilis*.—Verrill, 1901a: 142-145, pl. 26: fig. 1a-d.—Smith, 1971:75, pl. 8.—Wells, 1973:24 [not fig. 6a].—Colin, 1978:224 [color fig.], 234.

Pedicelled or encrusting, very thin, unifacial fronds, either flat or vase-shaped. Usually less than 15 cm in diameter. Calices about 1.0 mm in diameter, 5-7/cm. Very low or no collines. Chocolate or purplish brown.

**HABITAT.**—Common on fore-reef slope (18-27 m). Bathymetric range: 3-40 m.

**DISCUSSION.**—*Agaricia fragilis* is similar to *A. agaricites* forma *purpurea*, but is distinguished by its thinner, more delicate corallum and its lack of or very small collines. Roos (1971) considered *A. fragilis* a variety of *A. agaricites*.

#### *Agaricia tenuifolia* Dana, 1848

FIGURE 122f; PLATE 3: center left, bottom left

*Agaricia agaricites*.—York, 1971:9, pl. 3: figs. 5-6.

*Agaricia tenuifolia*.—Wells, 1973:25 [key], fig. 13.—Erhardt and Meinel, 1975, fig. 5.—Werdling and Erhardt, 1976, pl. 1: fig. 1.—Colin, 1978:224 [color fig.], 227 [fig.], 231.

Large, bushy colonies up to several meters in size, composed of thin, vertical, dissected fronds. Corallum bifacial. Valleys short, sometimes reticulate. Collines prominent. Columella small. Brownish.

**HABITAT.**—At Carrie Bow Cay this species is ubiquitous: it is common in the back-reef area (2-4 m) and is the major component of the buttresses and spurs in the spur and groove zone of the inner and fore reef (5-8 m). It is also found in the sand trough and fore-reef slope (20-27 m). Bathymetric range: 2-27 m.

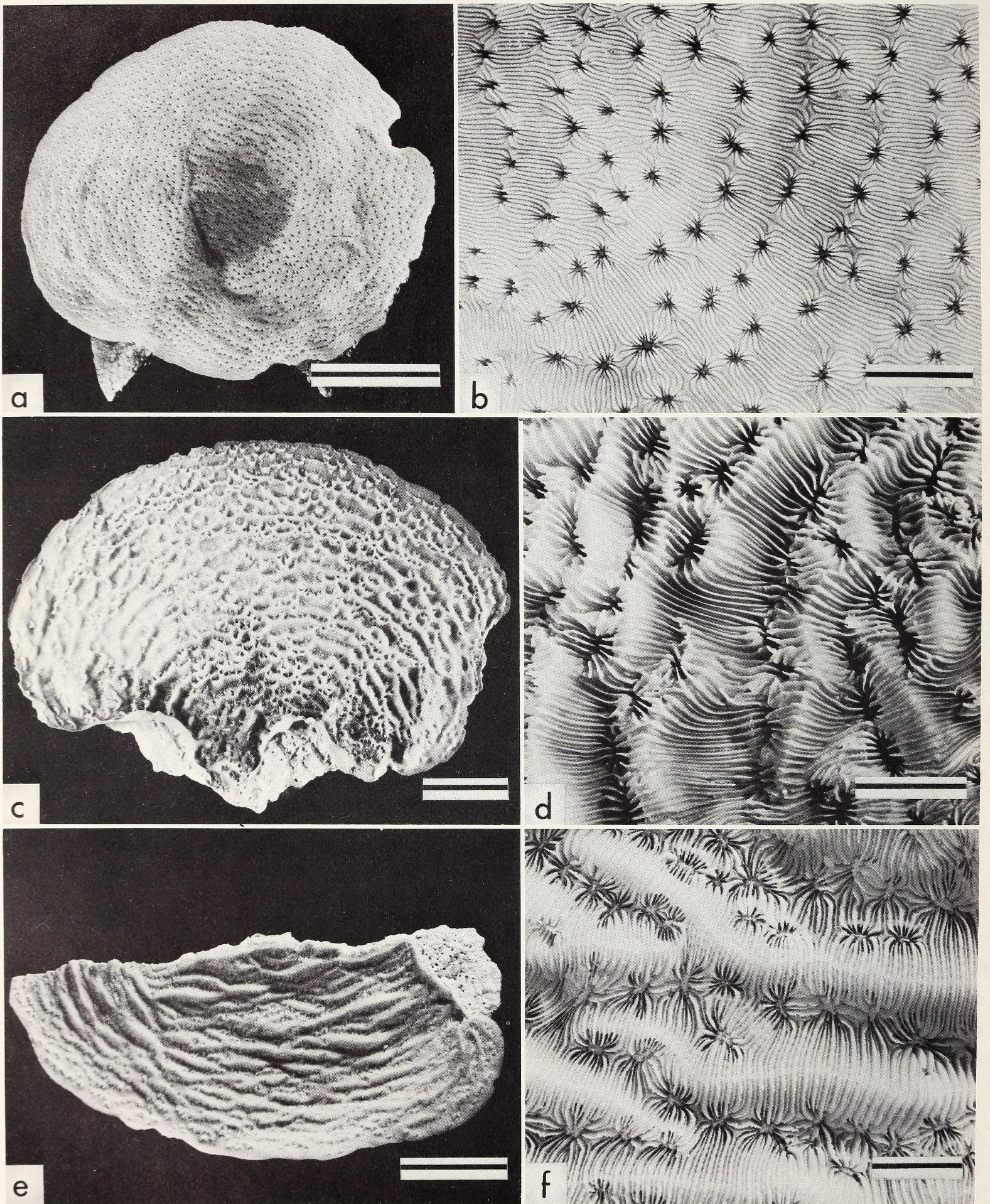


FIGURE 123.—*a, b*, *Agaricia fragilis* f. *fragilis*, fore-reef slope, 24–27 m; *c, d*, *Leptoseris cucullata*, inner reef slope, 15–18 m; *e, f*, *A. larmarcki*, fore-reef slope, 24–27 m. (Scale bars: *a, c* = 5 cm; *b, f* = 0.5 cm; *d* = 1 cm; *e* = 2 cm.)

***Agaricia lamarcki* Milne Edwards and Haime,  
1851**

FIGURE 123e-f

*Agaricia lamarcki*.—Wells, 1973:26–28, figs. 8–10.—Colin, 1978:234.

Thin, unifacial, centrally attached fronds up to 2 m in diameter. Calices about 2 mm in diameter, 3–5/cm along valley. Valleys long, 4–6 mm wide. Septa thinner than interspaces, alternating in height and thickness. Collines prominent and thick. Columella large.

HABITAT.—Collected only on fore-reef slope (25–27 m). Bathymetric range: 4–46 m.

DISCUSSION.—Distinguished from *Agaricia grahamae* Wells, 1973, by its thinner septa, which alternate in size, and its wider valleys.

***Leptoseris cucullata* (Ellis and Solander, 1786)**

FIGURE 123c-d

*Agaricia nobilis* Verrill, 1901a:150–151, pl. 28: figs. 1–2.—Smith, 1971:75–76, pl. 7.

*Agaricia agaricites*.—Roos, 1971:56–58 pl. 15.

*Helioseris cucullata*.—Wells, 1973:25 [key], figs. 14, 33.—Colin, 1978:229, 232 [color figs.], 234–235.

*Helioeris cucullata*.—Tresslar, 1974:121, pl. 6.

*Leptoseris cucullata*.—Dinesen, 1980:187–188, pl. 1: figs. 1–3.

Very thin, unifacial, pedicelled fronds up to 40 cm in diameter. Underside costate. Calices about 3 mm in diameter, each of which is bordered by a prominent, crescent-shaped hood, which is strongly inclined toward the edge of the frond. Adjacent “hoods” eventually unite, forming a long colline. No columella. Green polyps on brown background.

HABITAT.—Very common on fore-reef slope (25–28 m), particularly in slightly recessed cavities. Also present in sand trough (22 m), inner-reef slope (14–16 m), and high spur and groove zone (6–9 m). Bathymetric range: 3–90 m.

**Family SIDERASTREIDAE**

***Siderastrea siderea* (Ellis and Solander, 1786)**

FIGURE 124c; PLATE 5: center left

*Siderastrea siderea*.—Vaughan, 1919:443–447, pl. 114: figs. 2–

3, pl. 122: figs. 1–3.—Roos, 1971:62–63, pl. 13.—Smith, 1971:76–77, pl. 10.—York, 1971:15, pl. 6: figs. 1–2.—Tresslar, 1974:121, pl. 7.—Colin, 1978:232 [color fig.], 235.

Ceriod; encrusting or hemispherical boulders up to 2 m in diameter. Calices 4–5 mm in diameter. Usually more than 48 septa. Inner edges of septa slope gently (about 45°) toward columella, resulting in a wide fossa. Theca fenestrate. Light reddish brown.

HABITAT.—Most common in the shallow back-reef area (0.5–2.0 m). Also found on inner-reef slope and patch reefs (Curlew Bank, 6 m). Bathymetric range: 0.5–70.0 m.

***Siderastrea radians* (Pallas, 1766)**

FIGURE 124a-b

*Siderastrea radians*.—Vaughan, 1919:439, pl. 114: fig. 1.—Roos, 1971:62–63, pls. 20–21.—Smith, 1971:76, pl. 9.—York, 1971:15, pl. 6: figs. 3–6.—Werding and Erhardt, 1976, pl. 3: fig. 2.—Colin, 1978:233 [color fig.], 235, 238.

Ceriod; encrusting, hemispherical, or unattached spheroidal colonies rarely exceeding 30 cm in diameter. Unattached coralla with calices covering entire surface. Calices about 3 mm in diameter, 24–40 septa/calice. Inner edges of septa almost vertical, producing a narrow fossa. Theca fenestrate. Greenish or greyish brown.

HABITAT.—Most common in the back-reef area (0–20 m), but also collected from the outer fore reef (28 m). Bathymetric range: 0–33 m.

DISCUSSION.—Distinguished from *S. siderea* by its smaller size, fewer septa, and vertical, inner septal edges. *S. radians* forma *stellata* Verrill, a form with a tendency toward deeper calices in a meandriform arrangement, was not collected at Carrie Bow Cay.

**Family PORITIDAE**

***Porites astreoides* Lamarck, 1816**

FIGURE 124d; PLATE 2: center right, bottom left, bottom right

*Porites astreoides*.—Vaughan, 1901:317–318, pls. 32–34.—Verrill, 1901a:160–161, pl. 31: fig. 4.—Squires, 1958:250–

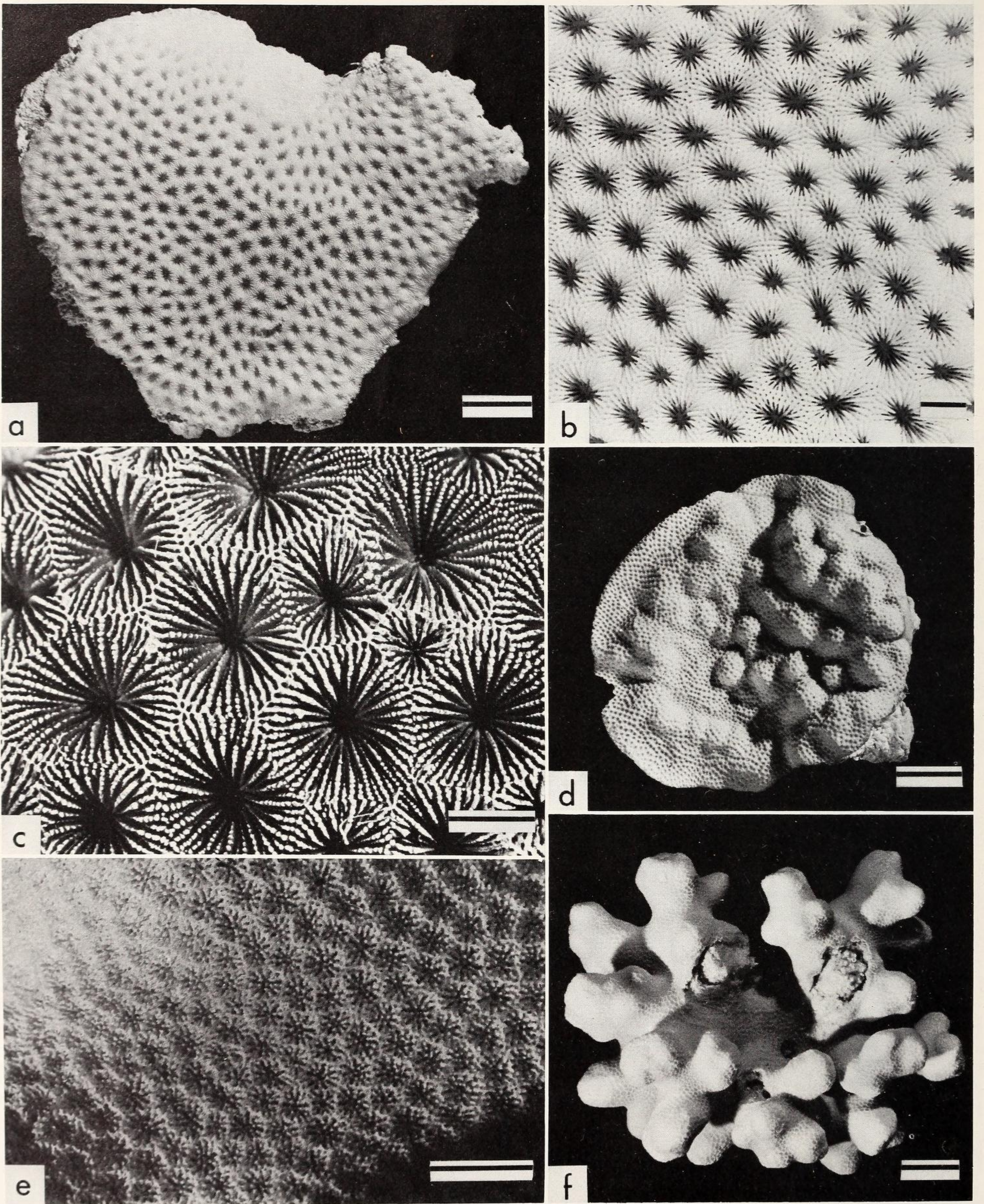


FIGURE 124.—*a, b*, *Siderastrea radians*, exact locality at Carrie Bow Cay unknown; *c*, *S. siderea*, patch reef area, 1 m, specimen coated with  $\text{NH}_4\text{Cl}$ ; *d*, *Porites astreoides*, fore-reef slope, 18 m; *e*, *P. porites* f. *porites*, exact locality at Carrie Bow Cay unknown; *f*, *P. porites* f. *porites*, patch reef area, 2–3 m. (Scale bars: *a* = 1 cm; *b, c* = 0.2 cm; *d, f* = 2 cm; *e* = 0.5 cm).

251, pl. 39: figs. 2-3.—Laborel, 1971:187-188, pl. 3: figs. 4-6.—Roos, 1971:61-62, pl. 18: fig. a, pl. 19: fig. a.—Smith, 1971:77, pl. 15.—York, 1971:21, pl. 9: figs. 1-6.—Tresslar, 1974:121, pl. 8.—Erhardt and Meinel, 1975, fig. 1.

*Porites asteroides*.—Colin, 1978:237, 240 [color figs], 242, 243 [fig.].

Ceriod; encrusting, flat, or hemispherical colonies rarely exceeding 60 cm in diameter. Surface of colony usually bumpy in shallow-water specimens, flat in deeper-water specimens. Calices 1.25-1.50 mm in diameter, each with 12 septa. Columella small. Bright green or yellowish brown.

**HABITAT.**—Found in all reef environments: back reef (1-2 m), spur and groove zone (6-8 m), sand trough (22 m), and fore-reef slope (18-28+ m). Also known from muddy back reefs and mangrove areas (Roos, 1971). Bathymetric range: 0.2-70.0 m.

### *Porites porites* (Pallas, 1766)

FIGURES 124e-f, 125a-c; PLATE 2: top right

*Porites porites*.—Vaughan, 1901:314-316, pl. 2: fig. 4, pls. 28-31.—Squires, 1958:251-253, pl. 38: figs. 1-3, pl. 39: fig. 1.—Roos, 1971:58-60, pls. 16-17.—Smith, 1971:78-79, pls. 13-14.—York, 1971:17, 19, pl. 7: figs. 1-6, pl. 8: figs. 1-5.—Erhardt and Meinel, 1975, fig. 2.—Colin, 1978:236, 237, 239, 243 [color figs].

*Porites polymorpha*.—Verrill, 1901a:158-159, pl. 31: fig. 3.

*Porites*.—Bernard, 1906:5-12, pls. 9-16.

*Porites divaricata*.—Smith, 1971:78.—Colin, 1978:236 [color fig.], 239.

*Porites furcata*.—Smith, 1971:78, pl. 12.—Tresslar, 1974:121, pl. 9.—Colin, 1978:233 [color fig.], 238.

Ceriod, ramose colonies up to 50 cm tall and several meters wide. Branch diameters range from a delicate 5 mm to a massive 25+ mm. Branch tips clubbed or cylindrical, bifurcated or unbranched. Theca porous. Calices 1.5-2.0 mm in diameter, 12 septa/calice. Five-six small pali. Yellow, grey, or buff brown.

**HABITAT.**—*Porites porites* forma *furcata* Lamarck, 1816, is the most common form at Carrie Bow Cay, being found in all reef environments, includ-

ing the lagoon and back reef (1-3 m), the spur and groove zone (7 m), the sand trough (21 m), and the fore-reef slope (27 m). Forma *porites* was observed only in shallow (1-2 m) back-reef areas. Forma *divaricata* Lesueur, 1821, was collected unattached at nearby Twin Cays in a shallow back-reef environment, but not at Carrie Bow Cay. Bathymetric range: 0.5-50 m.

**DISCUSSION.**—There has been continued disagreement on whether the three phenotypes of *Porites porites* are distinct species or simply forms of the same species. Discussions of the problem are found in Vaughan (1901), Bernard (1906), and Roos (1971). This study treats them as formae, owing to the almost continuous range of growth forms shown by the Carrie Bow Cay and other USNM specimens. Traditionally the typical form (sometimes called *P. clavaria* Lamarck, 1816) has thick branches (over 10 mm in diameter) and clavate branch tips; forma *furcata* has branches about 10 mm in diameter, without swollen branch tips; and forma *divaricata* has thin branches (5-6 mm in diameter), which often bifurcate near the tip.

## Family FAVIIDAE

### *Favia fragum* (Esper, 1797)

FIGURE 125d

*Favia fragum*.—Vaughan, 1901:303-304, pl. 8.—Squires, 1958:253, pl. 42: fig. 2.—Roos, 1971:68-69, pls. 26-27, pl. 28: fig. a.—Smith, 1971:79-80, pls. 16-17.—York, 1971:21, pl. 9: figs. 7-8.—Colin, 1978:240, 241 [color fig.], 242, 247.

Small, plocoid, encrusting or hemispherical colonies usually less than 10 cm in diameter. Calices round or irregular in outline; mono-, di-, or tri-centric; 5-6 mm in diameter; 36-40 septa/calice. Costae dentate. Columella spongy. Brown or yellow.

**HABITAT.**—Common in shallow lagoonal and back-reef areas (0.5-1 m). Bathymetric range: 0.2-30.0 m.

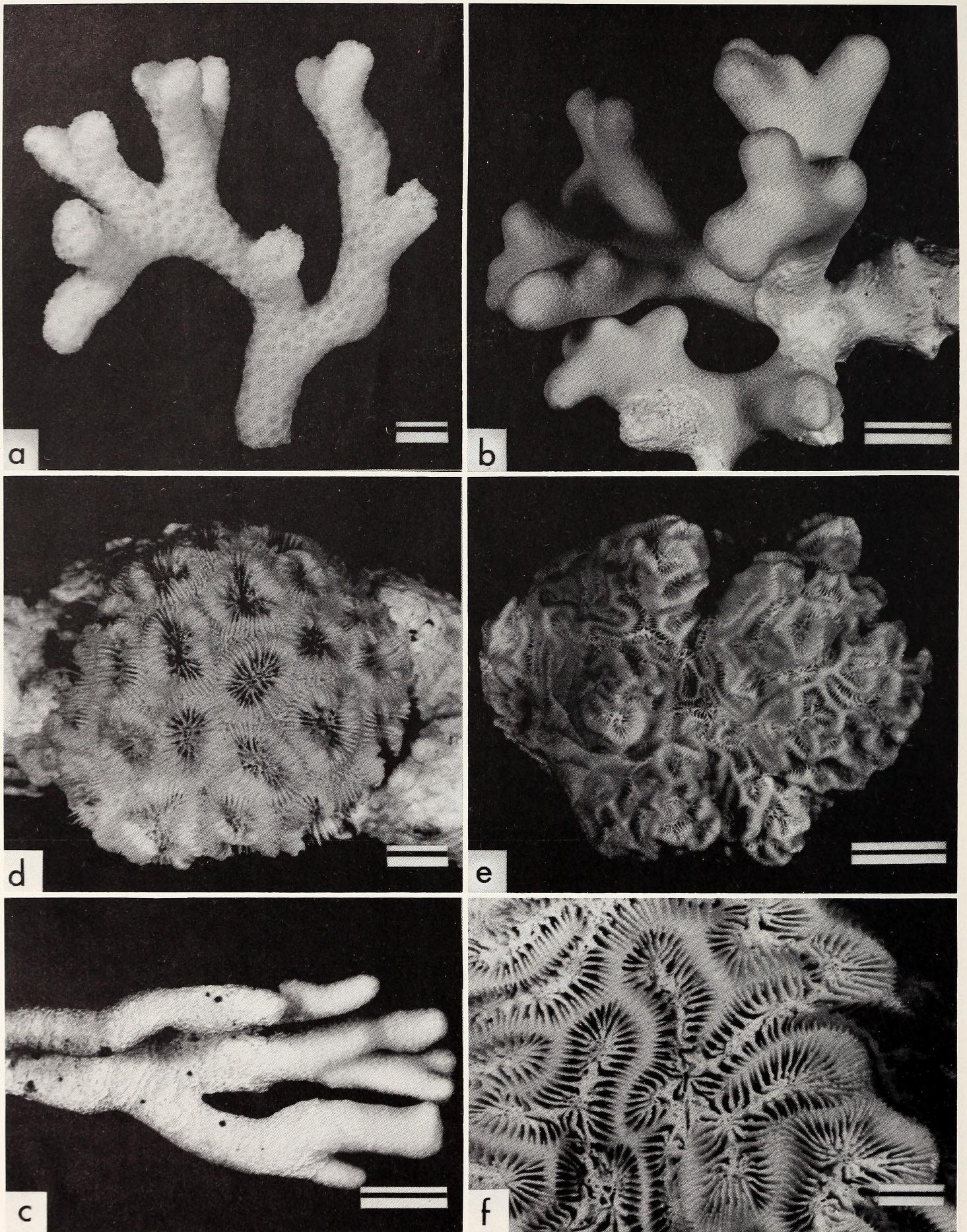


FIGURE 125.—*a*, *Porites porites* f. *divaricata*, Twin Cays, 0.7 m; *b*, *P. porites porites*, same specimen as Figure 124*e*; *c*, *P. porites furcata*, exact locality at Carrie Bow Cay unknown; *d*, *Favia fragum*, reef crest, 0.5 m; *e*, *f*, *Diploria clivosa*, exact locality at Carrie Bow Cay unknown. (Scale bars: *a*, *d*, *f* = 0.5 cm; *b*, *c*, *e* = 2 cm.)



***Diploria clivosa* (Ellis and Solander, 1786)**

FIGURE 125e-f

*Maeandrina clivosa*.—Matthai, 1928:71–76.*Diploria clivosa*.—Squires, 1958:253, pl. 42: fig. 2.—Roos, 1971:69–70, pl. 28: fig. b, pls. 30–31.—Smith, 1971:80–81, pls. 19–20.—York, 1971:23, pl. 10: figs. 1–2.—Olivares and Leonard, 1971:56, pl. 3: figs. A–B.—Colin, 1978:244 [color figs.], 250.

Meandroid; encrusting or hemispherical, knobby colonies up to 1 m in diameter. Valleys narrow (3.5–6.0 mm across) and variable in length: usually long but sometimes very short, even monocentric. Septa thin, in two alternate series; 25–38 septa/cm along valley. Principal septa have paliform lobes. Columella spongy. Color variable: yellow, green, bluish, or grey.

HABITAT.—Common in lagoon and back-reef areas (0.5–2.0 m). Also present in spur and groove zone (6 m). Bathymetric range: 0–15 m.

***Diploria strigosa* (Dana, 1848)**

FIGURE 126a-b

*Platygyra viridis*.—Vaughan, 1901:306–308, pls. 9–13.*Maeandrina cerebrum*.—Verrill, 1901a:74–78, pl. 10: fig. 1, pl. 12: fig. 4, pl. 14: figs. 4–5.—Matthai, 1928:55–63.*Diploria strigosa*.—Squires, 1958:253–254, pl. 42: fig. 1.—Roos, 1971:70–71, pl. 29.—York, 1971:23, pl. 23: figs. 7–8.—Olivares and Leonard, 1971:56, pl. 3: figs. C–D.—Erhardt, 1974, fig. 1c.—Tresslar, 1974:122, pl. 10.—Colin, 1978:241 [color fig.], 246 [figs.], 247, 250.

Meandroid; large, hemispherical, evenly convex colonies up to 2 m in diameter. Valleys 6–9 mm across and usually continuous, not short; 15–20 septa/cm, most of which reach columella through paliform lobes. Columella spongy. Dull yellow or greenish brown.

HABITAT.—Common in back-reef area (0–2 m) and found once in sand trough of outer fore reef (28 m). Bathymetric range: 0–40 m.

DISCUSSION.—*Diploria strigosa* is often confused with *D. clivosa*. The former is distinguished by its even convexity of corallum shape; longer, deeper, and wider valleys; and less numerous septa/cm.

***Diploria labyrinthiformis* (Linnaeus, 1758)**

FIGURE 126c-d

*Meandra labyrinthiformis*.—Verrill, 1901a:70–73, pl. 10: figs. 1, 3.*Maeandrina labyrinthiformis*.—Matthai, 1928:63–71.*Diploria labyrinthiformis*: Roos, 1971:71, pl. 32.—Smith, 1971:81, pl. 21.—York, 1971:23, pl. 10: figs. 3–6.—Erhardt and Meinel, 1975, fig. 6.—Werdling and Erhardt, 1976, pl. 2: fig. 1.—Colin, 1978:245 [color figs.], 250–251.

Meandroid; large, hemispherical, evenly convex colonies up to 2 m in diameter. Valleys 5–8 mm across and continuous. Collines grooved by distinct ambulacra. 14–17 septa/cm, most of which reach columella through paliform lobes. Columella spongy. Orange-yellow or brownish yellow.

HABITAT.—Common in back-reef area (0.5–2.0 m). Bathymetric range: 0–43 m.

***Manicina areolata* (Linnaeus, 1758)**

FIGURE 126e-f

*Manicina areolata*.—Vaughan, 1901:305, pl. 4: figs. 2–3.—Matthai, 1928:80–91.—Squires, 1958:254–255, pl. 37: figs. 1–3.—Almy and Carrión-Torres, 1963:152–153, pl. 11b.—Roos, 1971:72 pl. 35.—Smith, 1971:83, pls. 25–27.—York, 1971:27, pl. 12: figs. 1–3.—Werdling and Erhardt, 1976, pl. 4: fig. 2.—Colin, 1978:248 [color figs.], 251, 254.*Meandra areolata*.—Verrill, 1901a:81–84, pl. 11: figs. 1–2, pl. 12: figs. 1–3.*Manicina gyrosa*.—Matthai, 1928:91–95.*Manicina mayori*.—Smith, 1971:83–84.—York, 1971:27, pl. 12: figs. 4–5.

Meandroid colonies consisting of one continuous central valley with numerous side valleys, or a discontinuous series of sinuous valleys. Corallum usually unattached, with a short pedicel or flat base. Collines bear 12–18 septa/cm. Principal septa have large paliform lobes. Columella large and spongy. Yellow to brown, grey, or green.

HABITAT.—Forma *areolata* is common in shallow back and patch reefs (York, 1971); however, it was most abundant at Carrie Bow Cay on the outer fore reef (16–27 m). One specimen of forma *mayori* Wells, 1936, was collected from the spur and groove zone (10 m). Bathymetric range: 0–65 m.

DISCUSSION.—Two forms of this species are rec-

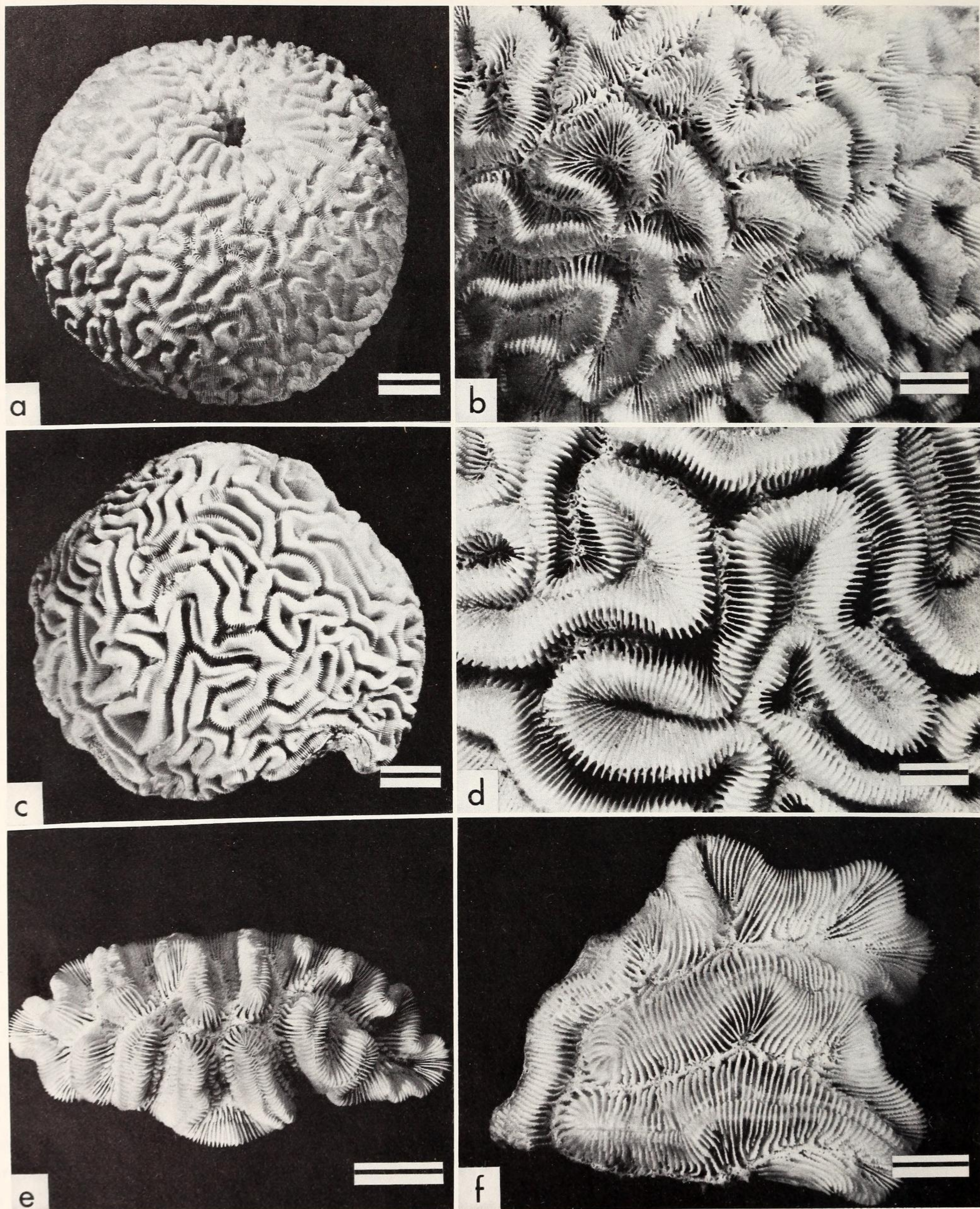


FIGURE 126.—*a, b, Diploria strigosa*, exact locality at Carrie Bow Cay unknown; *c, d, D. labyrinthiformis*, off Andros, Bahamas; *e, Manicina areolata* f. *areolata*, Twin Cays, 1 m; *f, M. areolata mayori*, spur and groove zone. (Scale bars: *a, c, e* = 2 cm; *b, d, f* = 1 cm.)

ognized (Wells, 1973). *Manicina areolata* forma *areolata* is the smaller form, rarely longer than 15 cm, with one continuous central valley, several side valleys, and generally a short central stalk. Forma *mayori* occurs as large (up to 30 cm in diameter), hemispherical boulders, with many sinuous, disconnected valleys and a flat base.

### *Colpophyllia natans* (Houttuyn, 1772)

FIGURE 127a-b

*Colpophyllia natans*.—Matthai, 1928:101–107 [not pl. 71: fig. 9, = *C. breviserialis*].—Roos, 1971:73, pl. 33.—Smith, 1971:82–83, pl. 23.—Wells, 1973, fig. 15.—Colin, 1978:249 [color figs.], 254. [Not York, 1971:25, pl. 11, = *C. breviserialis*.]

Large but light-weight, meandroid colonies up to 1 m in diameter. Valleys long and sinuous, 15–20 mm wide, 10–12 mm deep. Collines bear 8–9 septa/cm. Collines always have two thin parallel ridges. Rudimentary lamellar columella. Green, brown, or yellow.

**HABITAT.**—Common at Carrie Bow Cay: found in back reef (1–2 m), sand trough (22 m), and fore-reef slope (18–27 m). Bathymetric range: 0.5–55.0 m.

**DISCUSSION.**—*Colpophyllia amaranthus* (Houttuyn, 1772) may be a form of *C. natans*. It has been characterized as a smaller, stalked colony with shorter, straight valleys and more septa/cm.

### *Cladocora arbuscula* (Lesueur, 1821)

FIGURE 128a

*Cladocora arbuscula*.—Roos, 1971:65, pl. 22: figs. a–b.—Smith, 1971:84, pl. 28.—York, 1971:27 pl. 12: figs. 6–8.—Olivares, 1971:75, pl. 1: figs. A–B.—Colin, 1978:252 [color fig.], 255.

Ramose, bushy, unattached colonies up to 30 cm in diameter. Calices only at ends of branches. Corallites cylindrical, branch and calicular diameters 3–4 mm. Branches distinctly costate. About 36 septa/calice. Columella small and papillose. Brown.

**HABITAT.**—Found only in shallow back-reef *Thalassia* zone (0.5–2.0 m). Bathymetric range: 0.5–21.0 m.

### *Montastrea annularis* (Ellis and Solander, 1786)

FIGURE 127c-d; PLATE 4: center left, bottom left, bottom right

*Orbicella acropora*.—Vaughan, 1901:301–302, pls. 6–7.

*Orbicella annularis*.—Verrill, 1901a:94–96, pl. 15: figs. 1–2.—Vaughan, 1919:364–375.

*Orbicella hispidula* Verrill, 1901a:96, pl. 15: figs. 3a–b.

*Montastrea annularis*.—Squires, 1958:256, pl. 40: fig. 3, pl. 41: figs. 1–2.—Roos, 1971:65–66, pl. 24: fig. b, pl. 25: fig. b.—Smith, 1971:85–86, pls. 31–32.—York, 1971:29, pl. 13: figs. 1–8.—Tresslar, 1974:122 pl. 13.—Colin, 1978:230, 243, 253 [color figs.], 258–259.

Massive, plocoid colonies up to 2 m in height or diameter. Shape variable: hemispherical, flat encrusting, platy, or columnar (see Graus and Macintyre, herein: 441). Calices 2–4 mm in diameter; 24 septa/calice, 12 of which reach the well-developed, trabecular columella. Yellowish brown or green.

**HABITAT.**—Very common in all reef environments: back reef (0.3–2.0 m), spur and groove zone (10–18 m), and outer fore reef (16–25 m). Bathymetric range: 0.3–80.0 m.

### *Montastrea cavernosa* (Linnaeus, 1767)

FIGURE 127e-f

*Orbicella cavernosa*.—Verrill, 1901a:102–103.—Vaughan, 1919:380–384.

*Montastrea cavernosa*.—Squires, 1958:255–256, pl. 40: figs. 1–2.—Roos, 1971:66–67, pl. 22: fig. c, pl. 23.—Smith, 1971:86–87, pl. 33.—York, 1971:31, pl. 14: figs. 1–4.—Laborel, 1971:198–200, pl. 5: figs. 2–4.—Tresslar, 1974:122, pl. 14.—Colin, 1978:8 [fig.], 256 [color figs.], 259, 262.

*Montastrea braziliana*.—Smith, 1971:86.

Massive, plocoid colonies up to 2 m in diameter. Hemispherical, flat, or encrusting in shape; often with small, irregular knobs. Calices 5–11 mm in diameter; 48 septa/calice, 24 of which reach the well-developed, trabecular columella. Columellar trabeculae usually swirled in clockwise direction. Brown, green, olive, or red.

**HABITAT.**—Common in spur and groove zone (16–20 m) and entire outer fore reef (16–26+ m). Bathymetric range: 0.5–95 m.

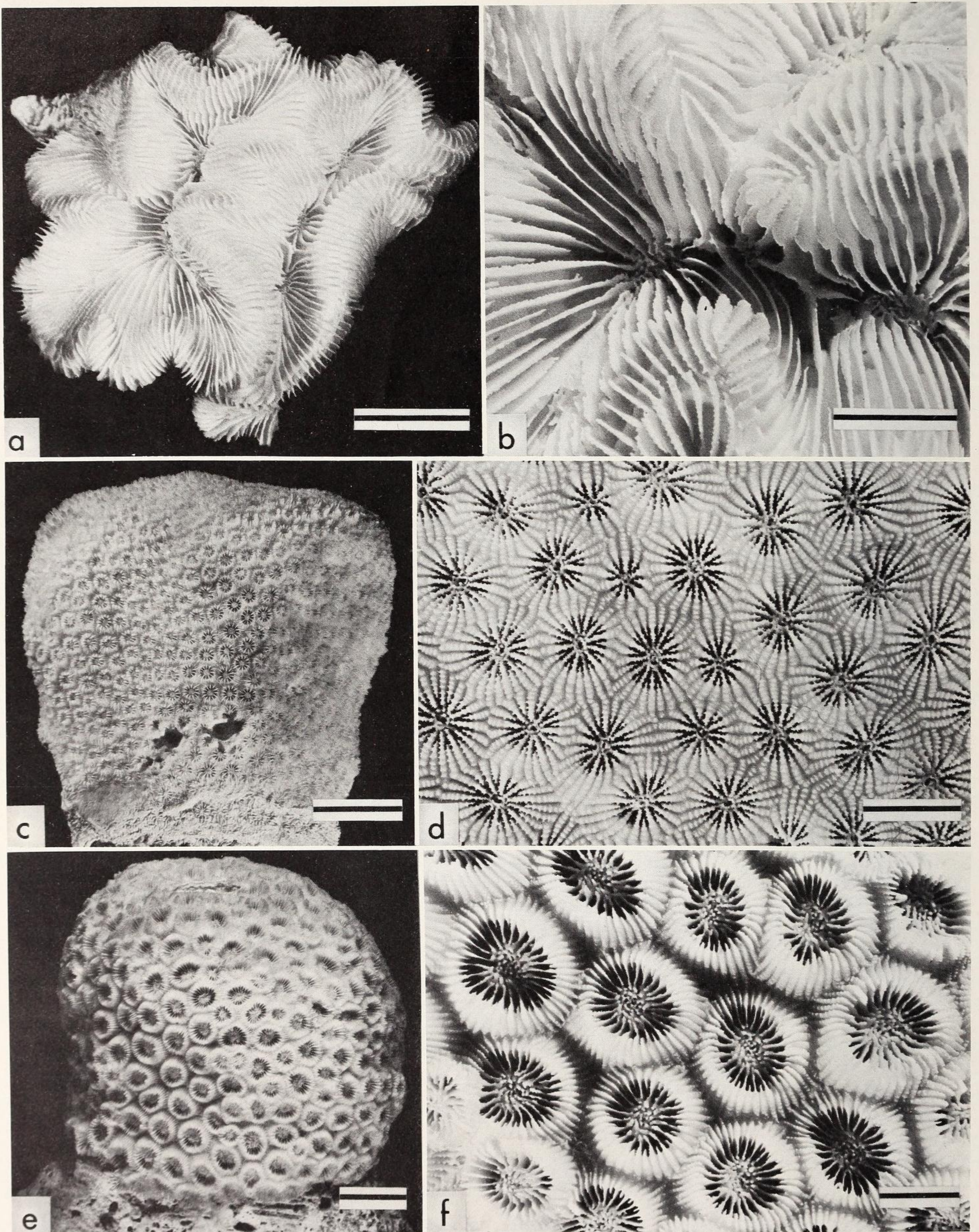


FIGURE 127.—*a, b, Colpophyllia natans*, exact locality at Carrie Bow Cay unknown; *c, Montastrea annularis*, exact locality at Carrie Bow Cay unknown; *d, M. annularis*, fore-reef slope, 24–27 m; *e, f, M. cavernosa*, exact locality at Carrie Bow Cay unknown. (Scale bars: *a, c, e* = 2 cm; *b* = 1 cm; *d, f* = 0.5 cm.)

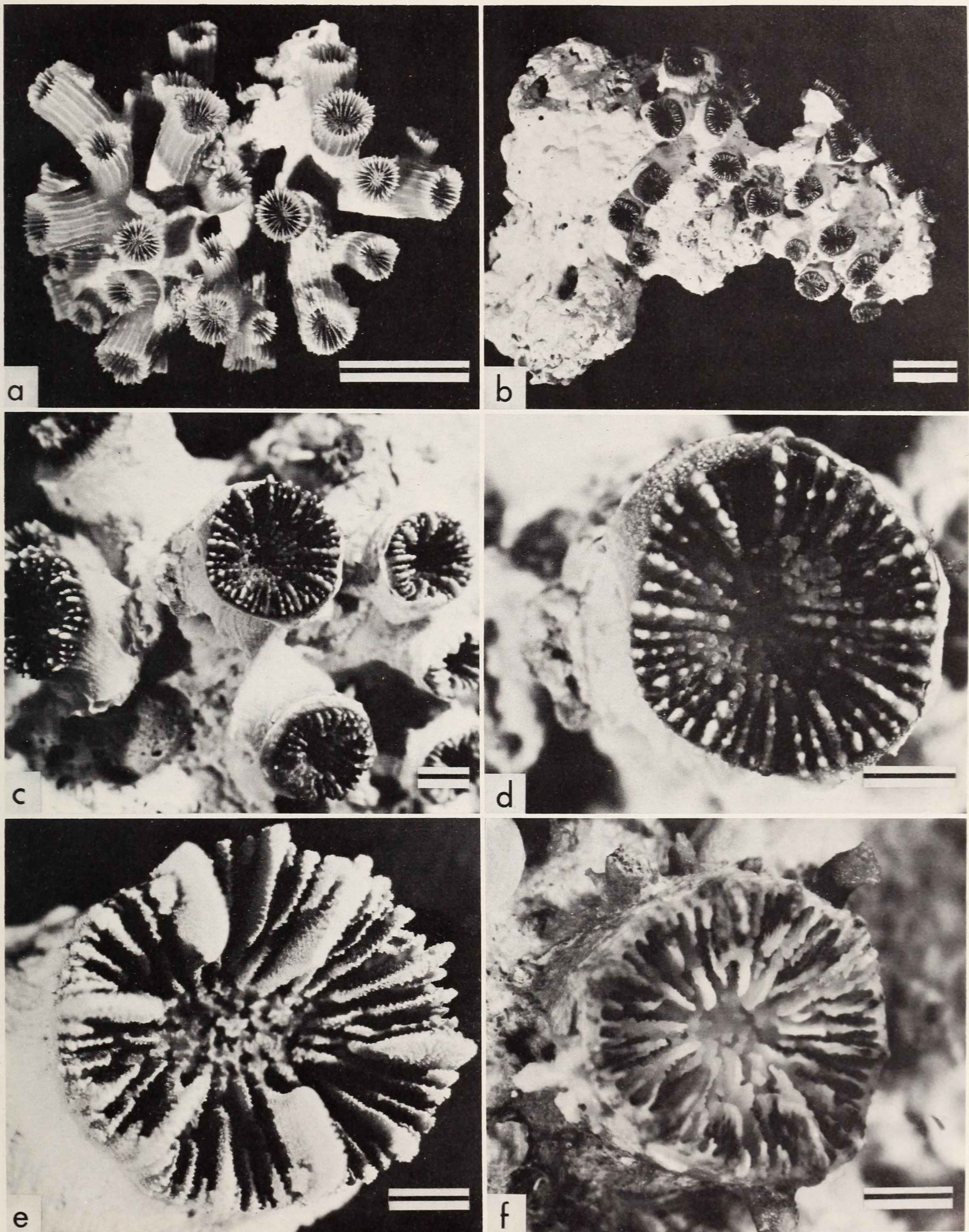


FIGURE 128.—*a*, *Cladocora arbuscula*, *Thalassia* area, 1 m; *b-d*, *Astrangia solitaria*, Curlew Bank, 6 m; *e*, *Phyllangia americana*, Twin Cays, on a mangrove root, 0.5 m, specimen coated with  $\text{NH}_4\text{Cl}$ ; *f*, *Colangia immersa*, inner reef slope, 16 m. (Scale bars: *a*, *b* = 1 cm; *c-f* = 0.2 cm.)

## Family RHIZANGIIDAE

*Phyllangia americana* Milne Edwards and Haime, 1849b

FIGURE 128e

*Phyllangia americana*.—Roos, 1971:74, pl. 36.—Smith, 1971:87–88.—Olivares and Leonard, 1971:64, pl. 8: figs. c–d.—Calin, 1978:257 [color fig.], 262–263.

Small, encrusting colonies that increase by extratentacular budding from edge zone. Corallites cylindrical, about 10 mm in calicular diameter and 10 mm tall. Calices have 36–48 septa with 6–7 highly exsert primaries. Paliform lobes often present on S<sub>3</sub>. Columella rudimentary, spongy. Color of corallum brown.

HABITAT.—Not found at Carrie Bow Cay, but present at Twin Cays (4 km NW of Carrie Bow Cay), encrusting a living *Strombus* gastropod and a mangrove root (0.5–1.0 m). Ahermatypic. Bathymetric range: 0.3–17 m.

*Astrangia solitaria* (Lesueur, 1817)

FIGURE 128b–d

*Astrangia solitaria*.—Roos, 1971:74, pl. 34.—Smith, 1971:87.—Wells, 1972:2–4, figs. 1–5.—Colin, 1978:257 [color fig.], 262.

Encrusting colonies that increase by extratentacular budding from basal stolons. Stolons often subsequently obscured, giving the appearance of solitary corallites. Corallites cylindrical, measuring 3–6 mm in calicular diameter, up to 20 mm tall. Calices have 36–48 septa; the fourth cycle is rarely complete. Narrow, multiple paliform teeth on inner edges of all but last cycle of septa. Columella rudimentary, papillose. Corallum brown.

HABITAT.—Cryptic. Found in crevices and on undersides of platy corals or overhangs. Common at Curlew Bank (6 m) and buttress zone (6 m). Ahermatypic. Bathymetric range: 0.2–43 m.

*Colangia immersa* Pourtalès, 1871

FIGURE 128f

Encrusting colonies that increase by extratentacular budding from edge zone. Coenosteum between corallites often obscured, which gives them the appearance of solitary corallites. Corallites cylindrical, measuring 6–8 mm in calicular diameter and up to 10 mm tall. Calices have 36–48 septa with six highly exsert primaries. Well-developed paliform lobes on S<sub>3</sub>. Columella papillose or lamellar. Polyp light green with colorless tentacles. Corallum white, speckled with brown.

HABITAT.—Cryptic. Found rarely on undersides of platy corals on inner reef slope (17 m) and fore-reef slope (26 m). Ahermatypic. Bathymetric range: 3–95 m.

## Family MEANDRINIDAE

*Meandrina meandrites* (Linnaeus, 1758)

FIGURE 129a–c

*Meandrina braziliensis*.—Verrill, 1901b:190–192, fig. 14, pl. 34: fig. 1.—Smith, 1971:89–90, pl. 36.

*Meandrina meandrites*.—Vaughan, 1901:296–297, pl. 3, pl. 4: fig. 1, pl. 5.—Roos, 1971:76, pl. 40.—Smith, 1971:89, pl. 35.—Erhardt, 1974, figs. 2–3.—Colin, 1978:261 [color figs.], 263, 264 [color fig.], 266.

*Pectinia maeandrites*.—Matthai, 1928:161–166.

*Pectinia brasiliensis*.—Matthai, 1928:167–169.

*Meandrina braziliensis*.—Laborel, 1971:201–207, figs. 2–5, pl. 6: figs. 3–4.

*Meandrina danae*.—Smith, 1971:90.

This species occurs in three forms. Forma *meandrites* produces massive, meandroid, flat or convex colonies up to 1 m in diameter. The sinuous valleys are long, about 10 mm wide, and continuous. Forma *danae* (Milne Edwards and Haime, 1848), is much smaller (up to 15 cm long), and usually unattached. It has one long, continuous valley, which usually bifurcates at both ends, and smaller, paired valleys projecting perpendicular to the main valley. Forma *brasiliensis* (Milne Edwards and Haime, 1848), is similar to the former but does not have bifurcated valley tips. It is most

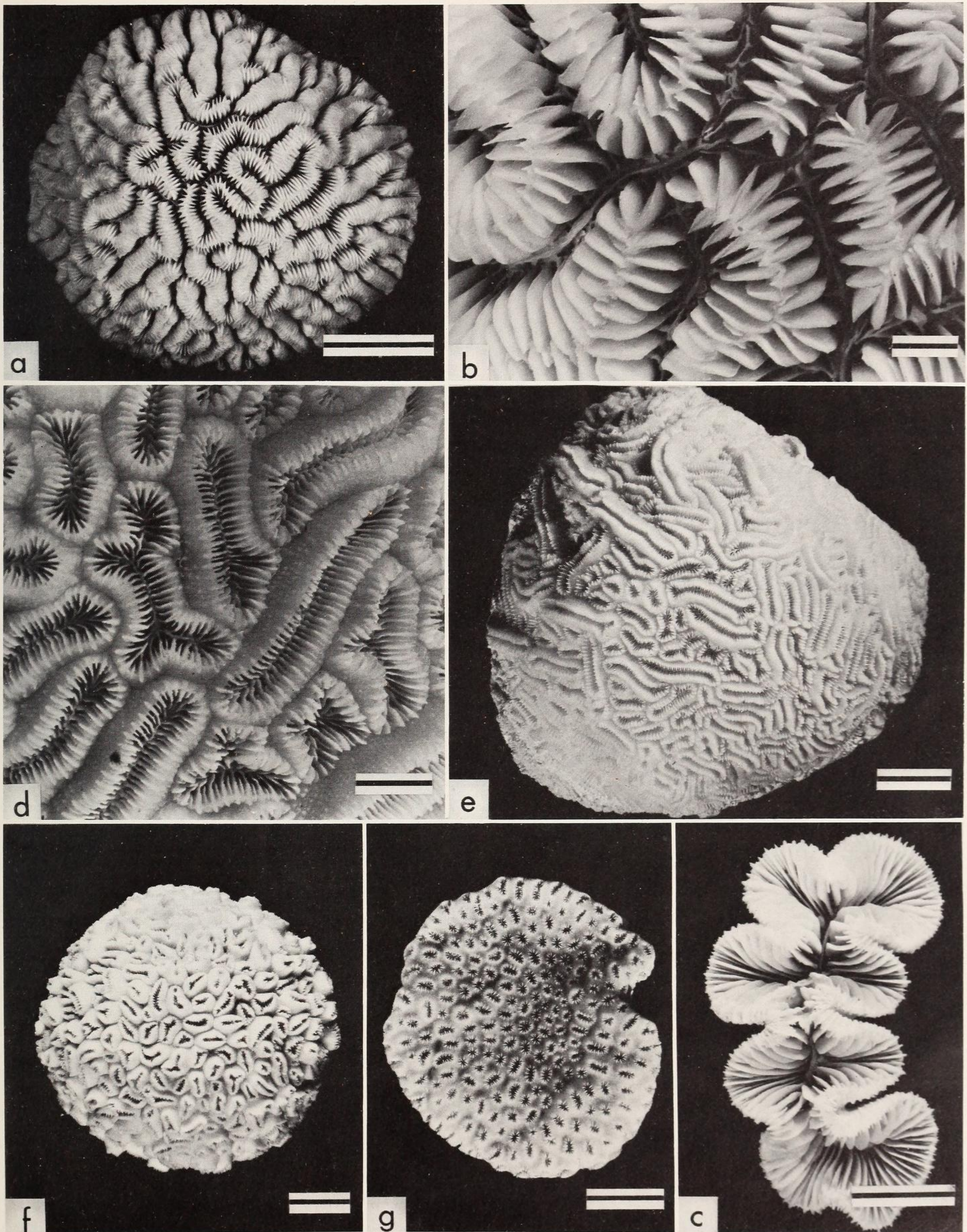


FIGURE 129.—*a, b*, *Meandrina meandrites* f. *meandrites*, exact locality at Carrie Bow Cay unknown; *c*, *M. meandrites* f. *danae*, Wee Wee Cay, 5–6 m; *d, e*, *Dichocoenia stokesi*, patch reef area, 7 m; *f*, *D. stokesi*, exact locality at Carrie Bow Cay unknown, protuberant short calices, “*stellaris*” form; *g*, *D. stokesi*, fore-reef slope, 30 m, “*stellaris*” form. (Scale bars: *a* = 5 cm; *b, e* = 0.5 cm; *c–g* = 2 cm.)

common off Brazil. All forms have 6–8 wide primary septa per cm alternating with smaller septa. Columella lamellar. Brown to yellow.

**HABITAT.**—Forma *meandrites* is very common on the outer fore reef, especially the fore-reef slope (22–40 m). It also occurs in the spur and groove zone (6–8 m) and at adjacent patch reefs (7 m). Forma *danae* was not seen at Carrie Bow Cay but was collected at Wee Wee Cay (11 km SW of Carrie Bow Cay) in a *Thalassia* area (4–6 m). Forma *brasiliensis* was not collected at Carrie Bow Cay. Bathymetric range 0.5–80 m.

**DISCUSSION.**—*Meandrites meandrites* forma *danae* bears the same morphological relationship to the typical form as *Manicina areolata* forma *areolata* bears to *M. areolata* forma *majori*. The three forms of *M. meandrites* are often considered as separate species.

### ***Dichocoenia stokesi* Milne Edwards and Haime, 1848**

FIGURE 129d–g

*Dichocoenia stokesii*.—Matthai, 1928:198–201.—Squires, 1958: 257, pl. 34: fig. 4.—Roos, 1971:77–78, pls. 41–43.

*Dichocoenia stellaris*.—Matthai, 1928:201, pl. 63: fig. 2.—Wells, 1973:45–47, figs. 31–33.—Colin, 1978:267, 268 [color fig.].

*Dichocoenia stokesi*.—York, 1971:33, pl. 15: figs. 1–4.—Wells, 1973:44–45, figs. 29–30.—Colin, 1978: 265 [color figs.], 266–267, 268 [color fig.].

Plocoid to meandroid, flat or convex colonies up to 50 cm in diameter. Calices monocentric or polycentric in valleys up to 50 mm long, 3–5 mm wide. Costae absent or very short; intercalicular surface spinose. Small paliform lobes commonly present on principal septa. Columella rudimentary, varying from spongy to lamellar. Yellow, brown, or green.

**HABITAT.**—Common in most reef environments: patch reefs (5–7 m), spur and groove zone (9–10 m), and outer fore reef (18–31 m). Bathymetric range: 2–72 m.

**DISCUSSION.**—*Dichocoenia stellaris* Milne Edwards and Haime, 1848, is considered a distinct species by some authors on the basis of its flat growth form and short, nonmeandrine calices.

My examination of the Carrie Bow Cay specimens and additional specimens in the USNM collection and at the University of Miami revealed all intergrades of corallum shape (flat to spherical) and valley length. I see no reason for maintaining them as separate species based on skeletal characters.

### ***Dendrogyra cylindrus* Ehrenberg, 1834**

FIGURE 130a–b

*Dendrogyra cylindrus*.—Matthai, 1928:170–171.—Roos, 1971: 76–77, pls. 38–39.—Smith, 1971:90–91, pls. 38–39.—York, 1971:33, pl. 15: figs. 5–8.—Colin, 1978: 269 [color figs.], 270, 271 [fig.], 274 [fig.].

Meandroid colonies forming vertical pillars up to 3 m tall. Valleys sinuous, narrow (3–4 mm), and discontinuous. Collines have 7–10 thick, non-dentate septa/cm. Collines broad with grooved ambulacra; ambulacrum rudimentary or absent toward top of pillar. Columella lamellar and discontinuous. Dark brown.

**HABITAT.**—Rare at Carrie Bow Cay. Collected only in spur and groove zone (14 m) and back reef (1 m). Bathymetric range: 1–20 m.

### **Family MUSSIDAE**

#### ***Mussa angulosa* (Pallas, 1766)**

FIGURE 130c–d

*Mussa angulosa*.—Matthai, 1928:204–208 [not pl. 64: fig. 2, pl. 68: fig. 2].—Roos, 1971:79–80, pls. 45–46.—Smith, 1971:92, pl. 42 [not pl. 41].—Tresslar, 1974:123, pl. 15.—Colin, 1978:270, 272 [color figs.], 275.

Large, phaceloid to meandroid-phaceloid colonies with branch diameters up to 5 cm. Calices occur at ends of branches; mono- to polycentric (up to four centers) with trabecular linkage. Costae dentate near calice, often forming long, thin, raised ridges toward base. Septa coarsely dentate. Trabecular columella well developed. Large, fleshy polyps; pink, purple, brown, or green.

**HABITAT.**—Rare at Carrie Bow Cay. Found on inner-reef slope (21 m) and fore-reef slope (17–26 m). Bathymetric range: 1.5–59 m.



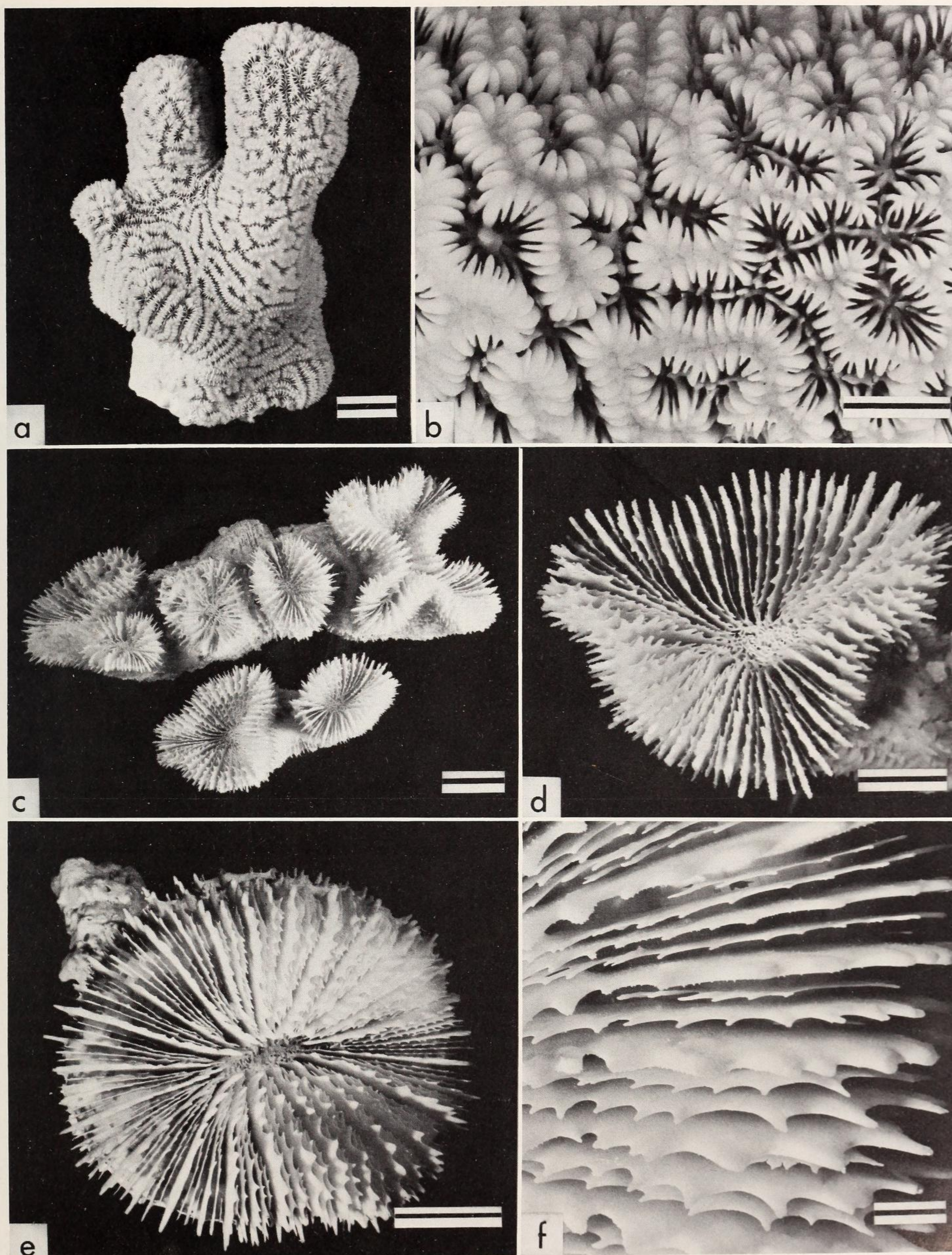


FIGURE 130.—*a, b*, *Dendrogyra cylindrus*, 14 m; *c, d*, *Mussa angulosa*, inner reef slope, 21 m; *e, f*, *Scolymia lacera*, fore-reef slope, 20–28 m. (Scale bars: *a, c, e* = 2 cm; *b, d* = 1 cm; *f* = 0.5 cm.)

***Scolymia lacera* (Pallas, 1766)**

FIGURE 130e-f

*Scolymia lacera*.—Wells, 1964:381–382, pl. 22: figs. 5–6.—Roos, 1971:78–79, pl. 44.—Smith, 1971:92, pl. 41.—Lang, 1971:952–957, figs. 1–2.—Wells, 1971:960–963, figs. 1, 2, 4, 6.—Laborel, 1971:220, pl. 7: fig. 6.—Colin, 1978:273–274 [figs.], 275, 278.

Solitary, subcylindrical, firmly attached coralla up to 15 cm in diameter (but more often 5–6 cm). Calice round to elliptical in outline. Up to six cycles of septa; last cycle usually incomplete. Septa of first three cycles larger and more exsert than others. Septa coarsely dentate, less than five triangular teeth/cm. Costae dentate like septa. Columella large, elongate, trabecular. Polyps large and fleshy; green, brown, or red.

HABITAT.—Common on the fore-reef slope (14–40 m) and sand trough of outer fore-reef (21 m). Bathymetric range: 14–80 m.

***Scolymia cubensis* (Milne Edwards and Haime, 1849a)**

FIGURE 131a-b

*Scolymia cubensis*.—Lang, 1971:952–957, 2 figs.—Wells, 1971:960–963, figs. 1, 3, 5, 7.—Tresslar, 1974:123, pl. 16.—Colin, 1978:273, 276 [color figs.], 278.

Solitary, subcylindrical, firmly attached coralla up to 10 cm in diameter. Up to six cycles of septa, last cycle incomplete. Septa finely dentate with at least five tall, attenuated teeth/cm. Costae also dentate. Columella large, trabecular. Dark brown.

HABITAT.—Found only on fore-reef slope (30–40 m). Bathymetric range: 20–80 m.

DISCUSSION.—*Scolymia cubensis* is distinguished from the very similar *S. lacera* by its finer septal dentition and its less exsert and thinner  $S_{1-3}$ . A third similar species, *S. wellsii* Laborel, 1967, is distinguished by its very tall, lacinate septal dentition. Small coralla (smaller than 3 cm) of all three species are difficult to distinguish.

***Isophyllia sinuosa* (Ellis and Solander, 1786)**

FIGURE 131c-d

*Isophyllia dipsacea*.—Verrill, 1901a:118–121, pl. 18: fig. 2, pl. 19: figs. 2, 3, pl. 20: fig. 2.

*Isophyllia fragilis*.—Verrill, 1901a: 121–125, pl. 16: figs. 1, 2, pl. 17: figs. 1–7, pl. 18: fig. 1, pl. 19: figs. 1, 4, 5.

*Isophyllia sinuosa*.—Matthai, 1928:237–247.—Squires, 1958: 257–258, pl. 40: fig. 4.—Roos, 1971:81, pls. 48, 50.—Smith, 1971:94, pl. 46.—York, 1971:39, pl. 18: figs. 1–3.—Colin, 1978:276–277 [color figs.], 279.

Medium size, meandroid colonies up to 20 cm in diameter. Valleys short (monocentric) or long and sinuous; 20–25 mm across. Collines tall and narrow, often ridged. About 7–9 septa/cm, the 4–5 principal septa reaching the columella. Septa bear sharp, attenuated teeth. Columella and calicular linkages trabecular. Variegated, lavender, brown, green, yellow.

HABITAT.—Very common in back reef (1–2 m); also found in sand trough of outer fore reef (28 m). Previously known bathymetric range: 1–10 m.

DISCUSSION.—*Isophyllia multiflora* Verrill, 1901a, has been considered a distinct species by some authors because of its (1) smaller corallum, (2) narrower valleys, and (3) larger number of septa/cm. I consider these characteristics to be within the range of variation of *I. sinuosa*, therefore *I. multiflora* was not distinguished in this report.

***Isophyllastrea rigida* (Dana, 1848)**

FIGURE 131e-f

*Mussa rigida*.—Verrill, 1901a:127–128, pl. 25: figs. 2–3, pl. 33: fig. 4.

*Isophyllastrea rigida*.—Matthai, 1928:263–268, pl. 54: fig. 3, pl. 57, figs. 2–3.—Squires, 1958:258, pl. 41: fig. 3.—Roos, 1971:80–81, pl. 47.—Smith, 1971:92–93, pl. 43.—York, 1971:35, pl. 16: figs. 1–6.—Colin, 1978:279, 280 [color fig.], 282.

Ceriod, attached, flat to hemispherical colonies up to 15 cm in diameter. Calices mono-, di-, or tricentric; polygonal or irregular in shape. A monocentric calice about 10 mm in diameter contains 25–30 septa. Coarsely dentate septa. Ru-

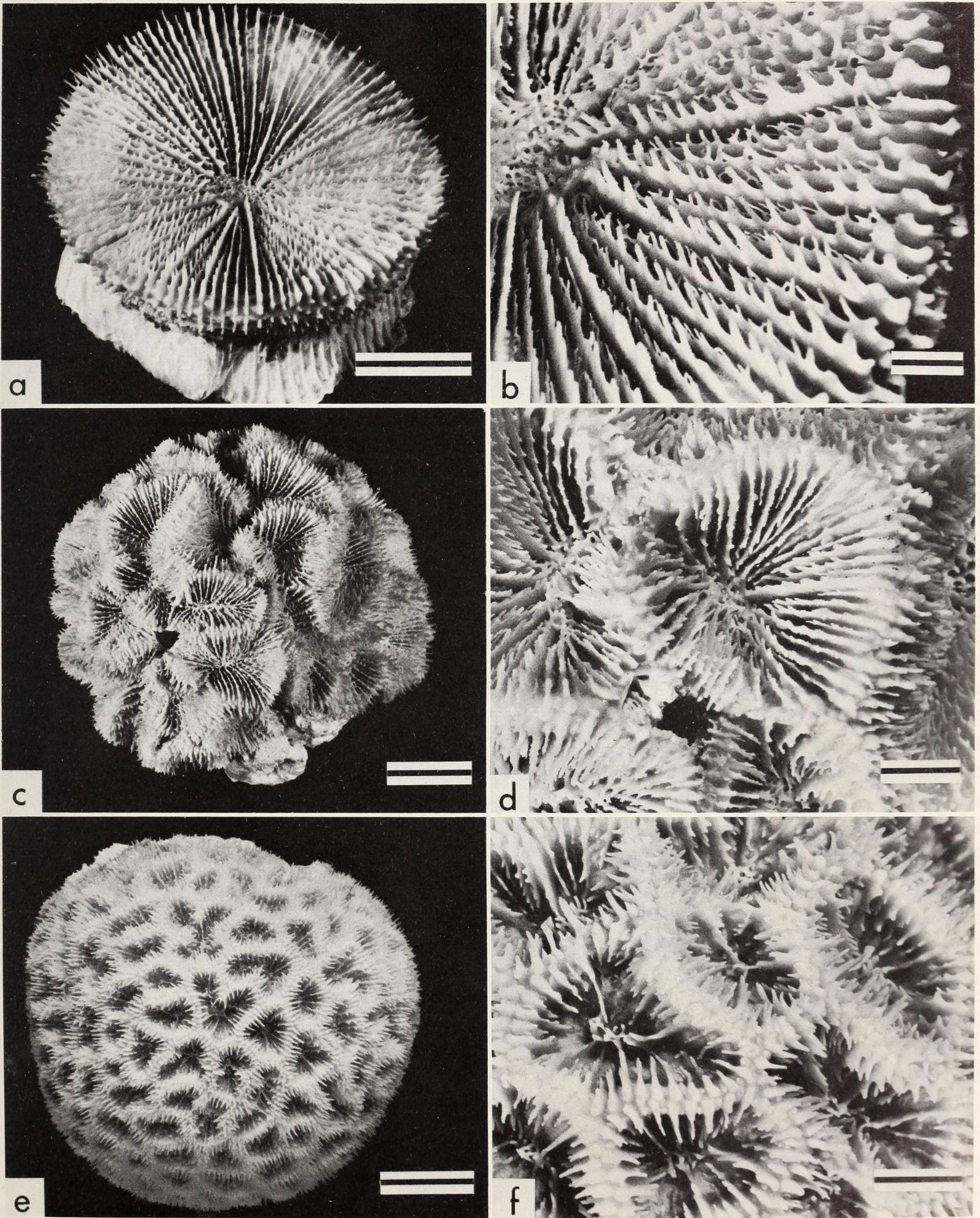


FIGURE 131.—*a, b, Scolymia cubensis*, fore-reef slope, 39 m; *c, d, Isophyllia sinuosa*, 2 m; *e, f, Isophyllastrea rigida*, upper spur and groove zone, 6 m. (Scale bars: *a, c, e* = 2 cm; *b, d, f* = 0.5 cm.)

dimentary columella, composed of loose trabeculae. Green, pinkish, or purple.

**HABITAT.**—Common in spur and groove zone (6–8 m). Also found in back reef (2 m) and fore-reef slope (20 m). Bathymetric range: 1–20 m.

### *Mycetophyllia lamarckiana* Milne Edwards and Haime, 1848

FIGURE 132e

*Mycetophyllia lamarckiana*.—Matthai, 1928:250–255 [in part].—Smith, 1971:93–94, pl. 44 [not pl. 45 = *M. ferox*].—Wells, 1973:38, fig. 16.—Colin, 1978:280–281 [color figs.], 282.

Not *Mycetophyllia lamarckiana*.—Roos, 1971:82, pls. 49, 51 [= *M. ferox*].—York, 1971:37, pl. 17: figs. 1–7 [= *M. ferox* and ?*M. danaana*].

Medium size (up to 12 cm in diameter), weakly attached, often turbinate colonies with a nearly circular calicular surface. The central, founder polyp is surrounded by a ring of 7–10 polyps budded circumorally. Subsequently each marginal polyp forms a chain of polyps intramurally, a colline forming between each chain. A chain may split, in which case a new colline is added. Continuous valleys, 10–20 mm wide, all radiate from the central polyp. Septa coarsely dentate. Direct lamellar linkage. Rudimentary columella. Green, brown, or grey.

**HABITAT.**—Not common at Carrie Bow Cay: found in spur and groove zone (6–8 m) and fore-reef slope (27 m). Bathymetric range: 3–60 m.

**DISCUSSION.**—Several specimens kept alive for several days revealed a complete absence of polyp tentacles but a distinct submarginal row of tentacles, one corresponding to each septum. These short tentacles, recessed in a continuous groove 3–5 mm from the edge of the corallum, immobilized and transferred prey to the oral surface (coenosarc) where it was then transported to an adjacent stomodeum. Lack of polyp tentacles has been reported for *Mycetophyllia reesi* Wells, 1973, but this is the first report of a ring of submarginal tentacles for Scleractinia.

### *Mycetophyllia aliciae* Wells, 1973

FIGURES 132f, 133a–b

*Mycetophyllia aliciae* Wells, 1973:41–43, figs. 25–28.—Colin, 1978:283 [figs.], 285 [color figs.], 286 [fig.], 287, 290.

Thin, platy, weakly attached colonies forming nearly circular calicular surfaces up to 30 cm in diameter. Circumoral budding followed by intramural budding. Radiating, low collines, often discontinuous, flanking wide valleys (20–80 mm) of 1–5 rows of calices. Collines may be absent. Thick, coarsely dentate septa; 7–12/calice. Inner edges of septa usually elevated adjacent to calicular fossa. Direct lamellar linkage. Columella absent. Greyish brown, greenish brown, or green.

**HABITAT.**—Collected only on fore-reef slope (25 m). Bathymetric range: 18–75 m.

**DISCUSSION.**—*Mycetophyllia aliciae* resembles *M. lamarckiana* in its similar mode of intratentacular budding. The former is distinguished by its thicker septa, wider valleys, larger corallum, and lack of columella.

### *Mycetophyllia danaana* Milne Edwards and Haime, 1849a

FIGURE 132a–c

?*Mycetophyllia lamarckiana*.—York, 1971:37, pl. 17: figs. 1–4.

*Mycetophyllia danaana*.—Wells, 1973:38, figs. 17–18.—Colin, 1978:281 [color fig.], 287.

Massive, weakly attached, irregularly-shaped, meandroid colonies up to 35 cm in diameter. Founder polyp (calice) usually not apparent. Sinuous valleys long and continuous, 8–17 mm wide. Valleys usually deep (10–15 mm) but may be shallow (4 mm). Coarsely dentate septa. Collines sometimes discontinuous or hydno-phoroid. Direct lamellar linkage. Columella rudimentary or absent. Variable in color; often dark green valleys with reddish brown collines. Also pale green, grey, and brownish yellow.

**HABITAT.**—Very common in all areas of outer fore reef (16–27 m); also collected from spur and groove zone (6–8 m). Bathymetric range: 3–30 m.

**DISCUSSION.**—*Mycetophyllia danaana* can easily be

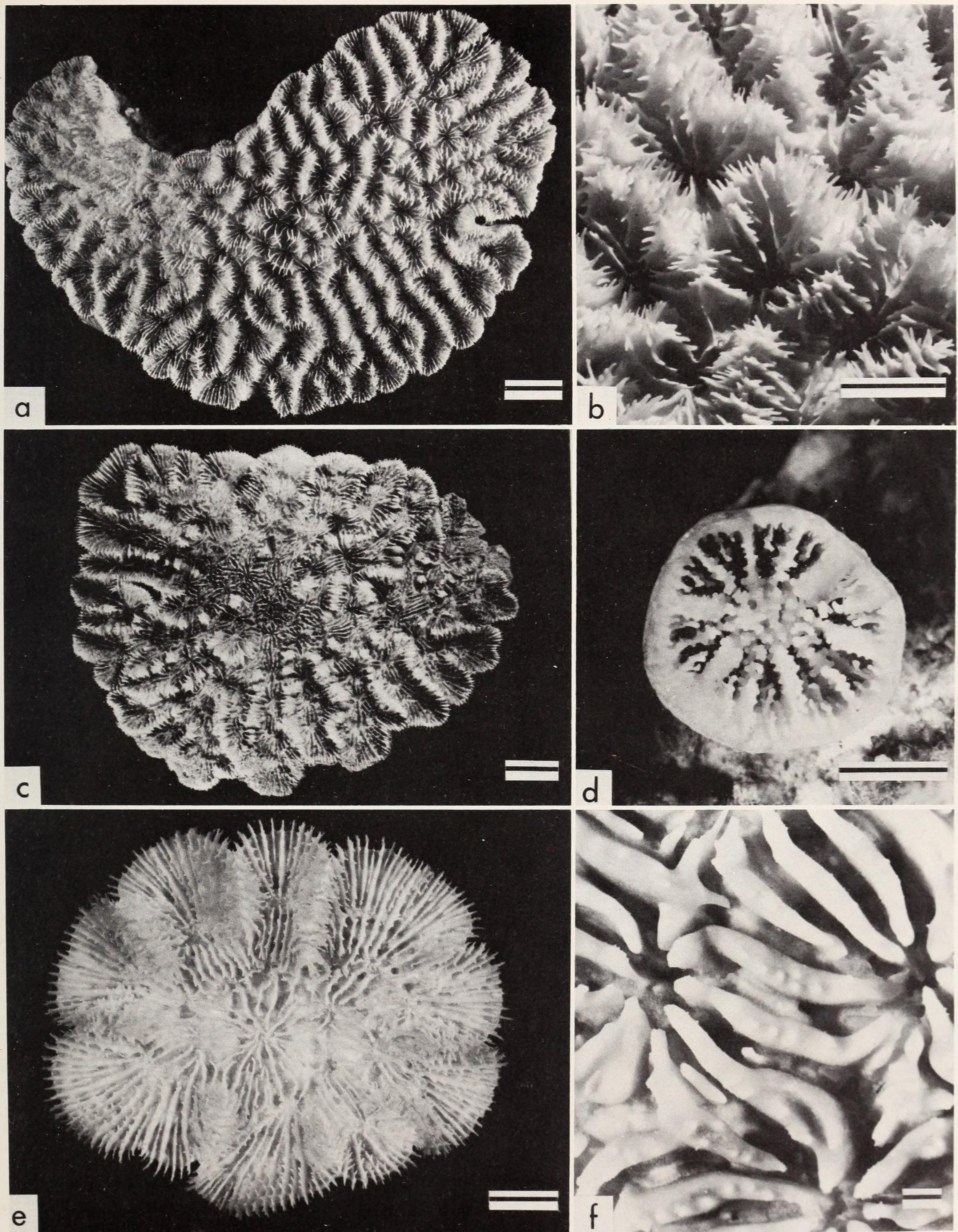


FIGURE 132.—*a, b, Mycetophyllia danaana*, fore-reef slope, 24–27 m; *c, M. danaana*, fore-reef slope, 16 m, hydnochoroid specimen; *d, Gardineria minor*, fore-reef slope; *e, M. lamarckiana*, fore-reef slope, 24–27 m; *f, M. aliciae*, fore-reef slope, 20–28 m. (Scale bars: *a, c* = 2 cm; *b, e* = 1 cm; *d, f* = 0.2 cm.)

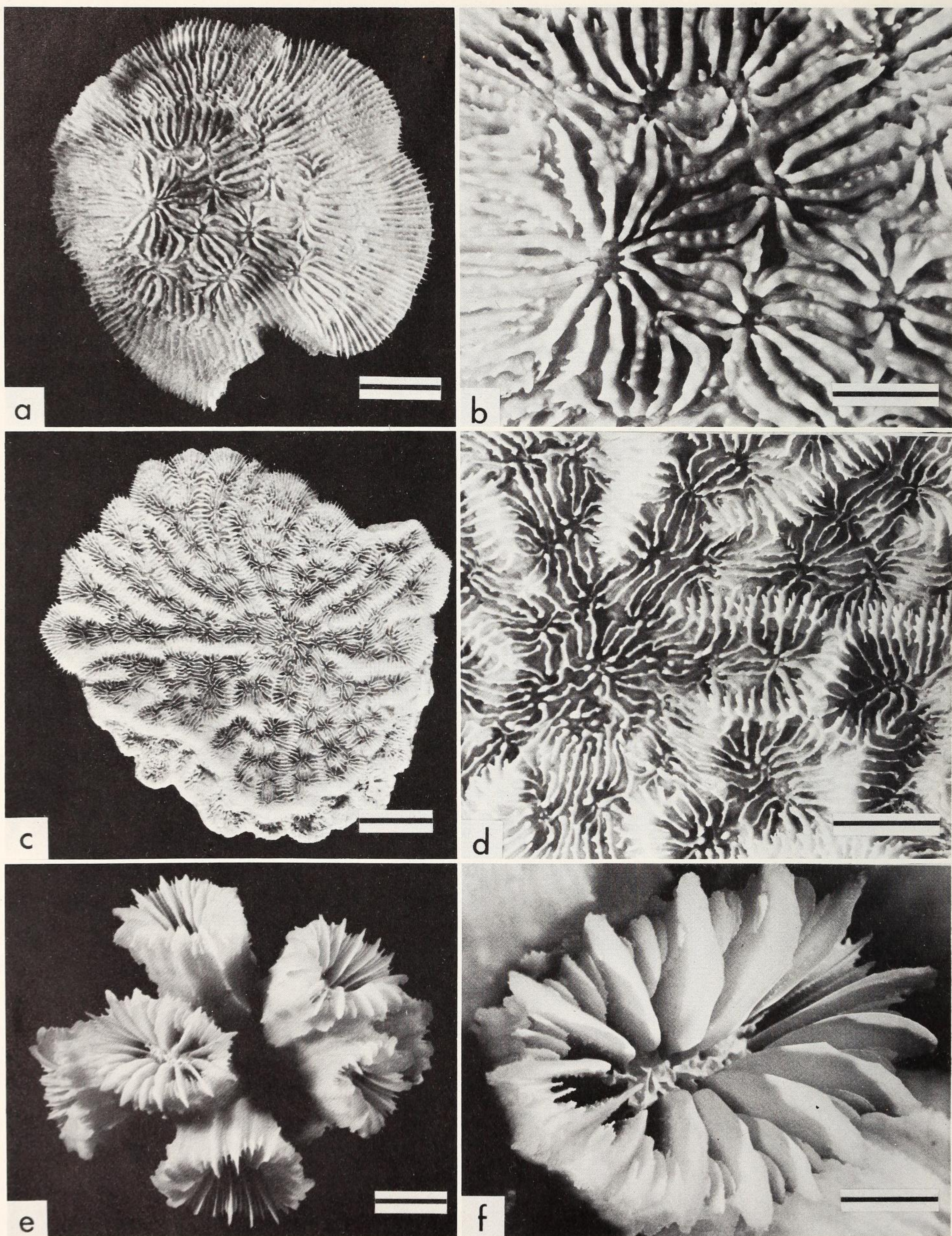


FIGURE 133.—*a, b*, *Mycetophyllia aliciae*, same specimen as Figure 132 *f*; *c, d*, *M. ferox*, fore-reef slope, 17 m; *e, f*, *Eusmilia fastagiata*, spur and groove zone, 10 m. (Scale bars: *a, c* = 2 cm; *b, d, e* = 1 cm; *f* = 0.5 cm.)

confused with *M. ferox*, especially the shallow valley forms of *M. danaana*. It is distinguished by its continuous, wider valleys and its more widely spaced calices (usually more than 10 mm apart). The characters of valley depth and number of septa/calice (see Wells, 1973:38) are not reliable to distinguish the species.

### *Mycetophyllia ferox* Wells, 1973

FIGURE 133c-d

*Mycetophyllia lamarckiana*.—Roos, 1971:82, pls. 49, 51.—York, 1971: 37, pl. 17, figs. 5-7.

*Mycetophyllia lamarckiana*.—Smith, 1971: 93-94, pl. 45.

*Mycetophyllia ferox* Wells, 1973:40-41, figs. 22-24.—Werding and Erhardt, 1976, pl. 3: fig. 1.—Colin, 1978:284 [color fig.], 286 [fig.], 287.

Meandroid, weakly attached colonies nearly circular in outline and up to 35 cm in width. Founder polyp (calice) usually not evident. Valleys shallow, usually less than 10 mm in width, and sometimes discontinuous: short segments completely enclosed by collines. Septa coarsely dentate. Direct lamellar linkage. Columella rudimentary or absent. Brown or green.

**HABITAT.**—Rare at Carrie Bow Cay: one specimen collected from fore-reef slope (17-18 m). Bathymetric range: 10-35 m.

**DISCUSSION.**—See discussion of *M. danaana*.

Small colonies of *Mycetophyllia* are generally difficult to identify because the pattern of their intratentacular budding is not yet established. More specimens and analyses are necessary in order to distinguish the valid species and/or drop the current species to the status of forma. Characteristics of the soft parts, such as tentacle arrangement, may be of taxonomic value. Color does not seem to be a reliable character.

### Family CARYOPHYLLIIDAE

#### *Eusmilia fastigiata* forma *fastigiata* (Pallas, 1766)

FIGURE 133e-f

*Eusmilia fastigiata*.—Matthai, 1928:190-196.—Roos, 1971: 83, pl. 52.—Smith, 1971:95, pl. 48.—York, 1971:41, pl.

19: figs. 1-6.—Wells, 1973:49, fig. 34a.—Colin, 1978:289 [color fig.], 291, 292 [color figs.].

Phaceloid to phaceloflabellate, bushy colonies up to 50 cm in diameter. Corallites usually mono-, di-, or tricentric but may produce even longer, polycentric series up to 15 cm long. Calices terminal. An average monocentric calice measures 13 × 19 mm in calicular diameter with 72 septa, 14 much larger and more exsert than the others. Ridged costae correspond to the exsert septa. Septal edges smooth. Columella large, composed of twisted trabeculae. Brown, green, or yellow.

**HABITAT.**—Most common in spur and groove zone (6-10 m) but also found on sand trough of outer fore reef (21 m). Bathymetric range: 1-65 m.

**DISCUSSION.**—Forma *flabellata* Wells, 1973, distinguished by its long, polycentric series, which produce flabellate branches, was not found at Carrie Bow Cay.

### Family FLABELLIDAE

#### *Gardineria minor* Wells, 1973

FIGURE 132d

*Gardineria minor* Wells, 1973:49-53, fig. 36a-g.

Solitary, subcylindrical, firmly attached. Calices round, 4-7 mm in diameter. Theca smooth, no costae. Four complete cycles of septa. Inner edges of S<sub>1</sub> smooth; higher cycle septa dentate to lacinate. Paliform lobes usually present before S<sub>2</sub>. Columella papillose.

**HABITAT.**—Cryptic, but common on undersides of platy corals (for example, *Agaricia*) on fore-reef slope (18-27 m). Ahermatypic. Bathymetric range: 2-241 m.

### Conclusions

Thirty-seven species of hermatypic Scleractinia are reported in this paper. In addition, five ahermatypic species found at Carrie Bow Cay bring the total number of Scleractinia for this cay to 42. In comparison, species records of hermatypic corals from other areas of the Caribbean include

46 from Jamaica (Wells, 1973), 41 from Panama (Porter, 1972), 40 from Bonaire (Scatterday, 1974), 38 from Ceycen Island, Colombia (Erhardt and Meinel, 1975), and 37 from Bahia Concha, Colombia (Erhardt, 1974). (These totals have been revised in accord with the systematic approach of this paper.)

The known distribution of corals in western Atlantic reefs suggests that habitats not sampled in the study area may support other species. For example, *Mycetophyllia reesi* Wells, 1973, and at least two species of *Agaricia* may exist in the deeper fore-reef slope (30–70 m), while more intensive collecting in shallow depths may disclose the presence of *Porites branneri* Rathbun, 1888. In fact, two species of hermatypes known previously from Belize were not collected in this study: *Colpophyllia breviserialis* Milne Edwards and Haime, 1849a (reported as *C. natans* by York,

1971, pl. 11: figs. 4–6) and *Oculina diffusa* Lamarck, 1816 (unreported record in USNM collections), bringing the total to 39 hermatypes known from Belize. In addition to the five ahermatypes known from Carrie Bow Cay, five more have been reported from Belize: *Oculina valenciennesi* Milne Edwards and Haime (reported by York, 1971); *Caryophyllia ambrosia* Alcock and *Deltocyathus agassizii* Pourtalès (= *Deltocyathus italicus* Michelotti) (reported by Boone, 1928); *Deltocyathus moseleyi* Cairns and *Javania cailleti* (Duchassaing and Michelotti) (reported by Cairns, 1979). Thus, the scleractinian fauna of Belize totals 49 species, of which 39 are hermatypic and 10 are ahermatypic.

Calcified hydrozoans, commonly listed as part of a stony coral fauna, were also found during this study: two species of Milleporina and one representative of Stylasterina.

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