

MEMOIR 7

PART I

Montoya and Related Colonial Corals

PART II

Organisms Attached to Montoya Corals

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PLATE SECTION

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STATE BUREAU OF MINES AND MINERAL RESOURCES NEW  
MEXICO INSTITUTE OF MINING AND TECHNOLOGY  
CAMPUS STATION

SOCORRO, NEW MEXICO



# PLATES 1-5 2

## WITH EXPLANATIONS

### EXPLANATORY NOTE

The specimens here figured, unless otherwise indicated, are in the collection of the New Mexico Bureau of Mines and Mineral Resources (NMBM). Other institutions from which material has been obtained include the Sedgewick Museum of Cambridge University (SMC), the United States National Museum (USNM), the American Museum of Natural History (AMNH), and the United States Geological Survey (USGS). Coral colonies are catalogued numerically. In many instances numerous thinsections were made from a single colony; where reference is made to individual slides, such slides are designated by letters following the numbers.

Higher enlargements were photographed with a camera, X 12 to X40, and no difficulty will be found in their interpretation. Lighting problems encountered at lower enlargements were bypassed by placing the slide in a photographic enlarger and exposing a negative. Prints from such negatives, ranging from X 2 to X 5, and occasional greater enlargements made from these negatives, are mirror images of the sections as they appear on the slides. Photography of sections with temporary cover glasses and glycerine, as well as fresh balsam, made it impossible to correct this matter by placing the slides surface down in the enlarger. Such reversal of sections is indicated by the symbol (R) following the explanation of the figure.

In higher enlargements clarity was the main object, but precise control of the enlargement proved impossible. The result is enlargements of such odd sizes as X 13 and X 19. Indications of greater enlargements, X 30 or more, are necessarily approximate.

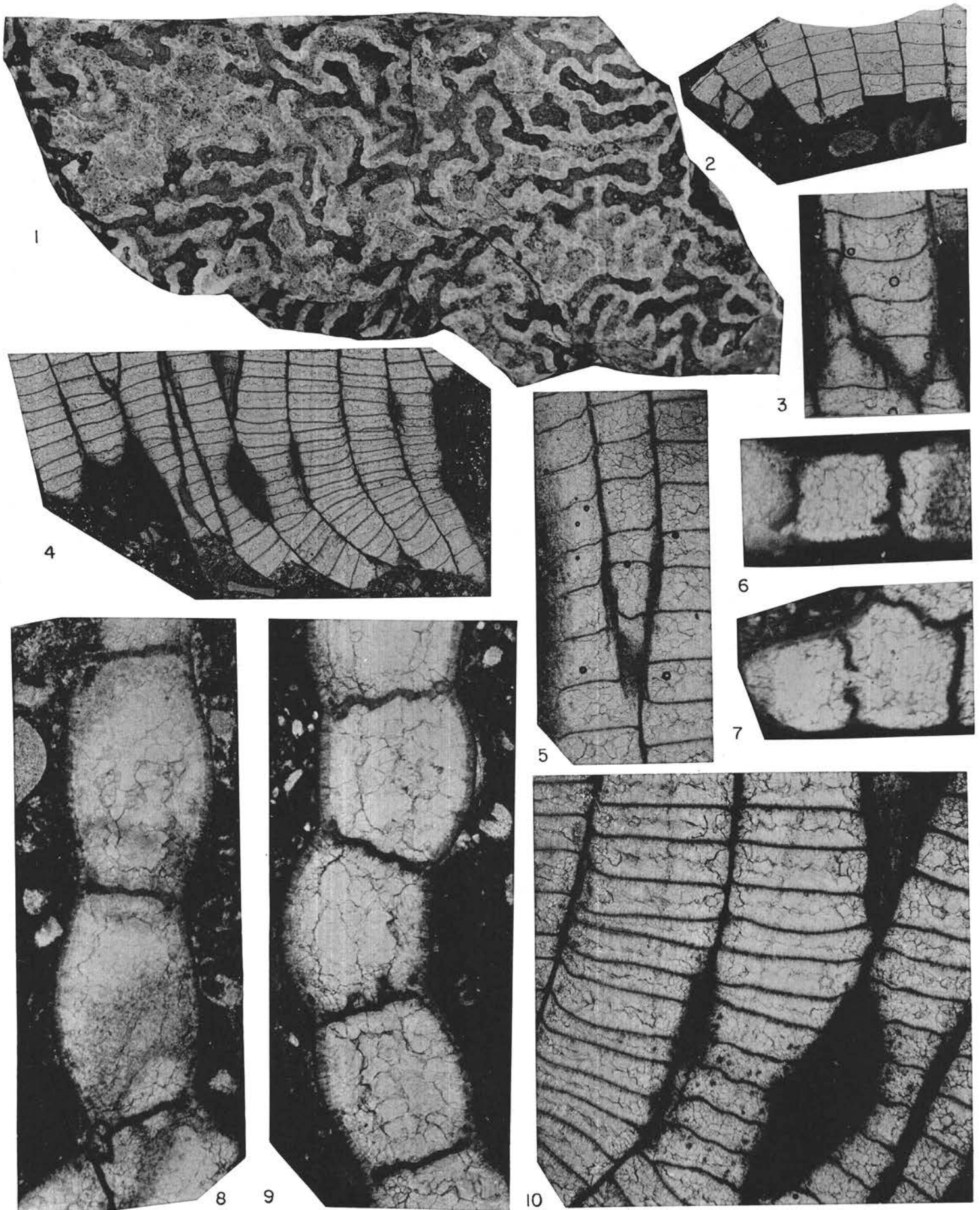
## PLATE 1

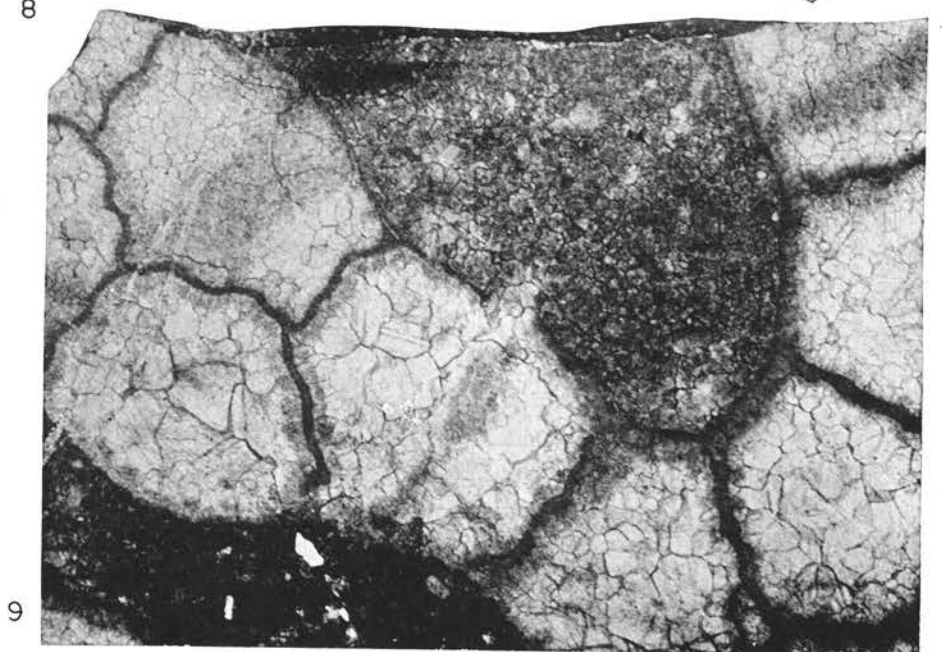
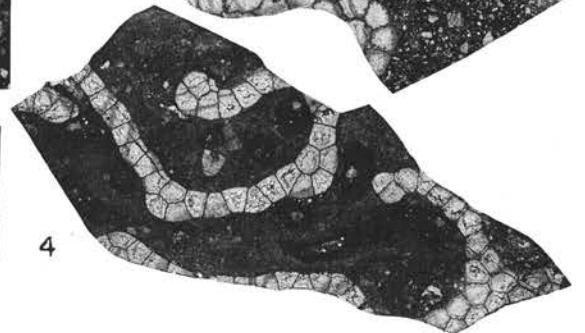
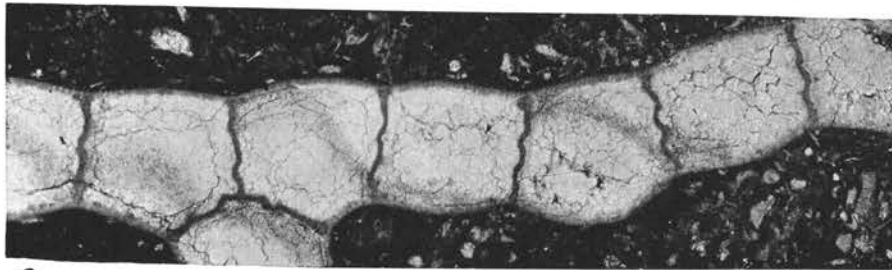
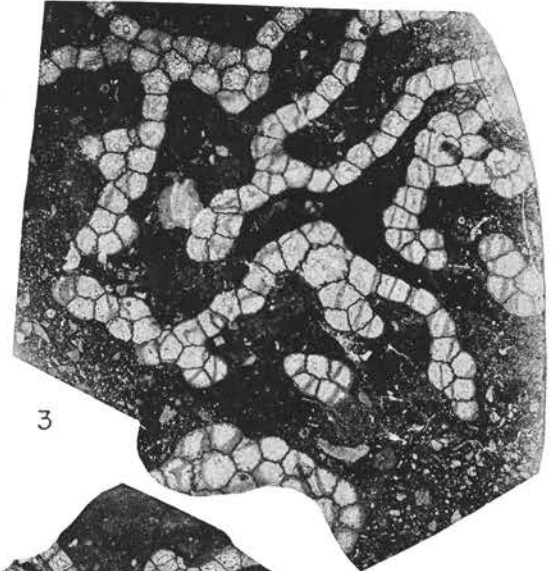
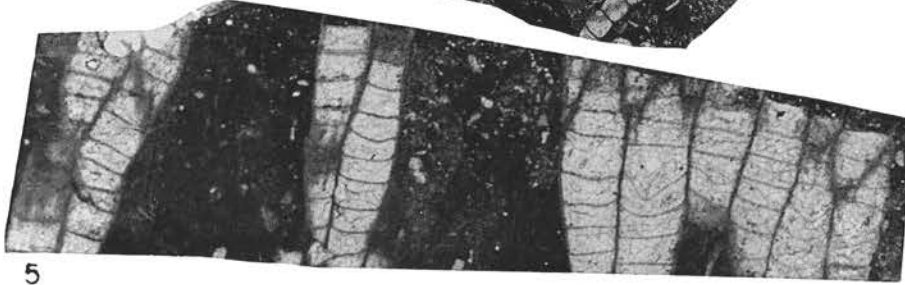
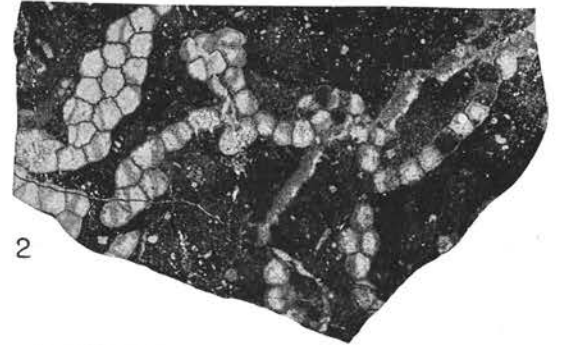
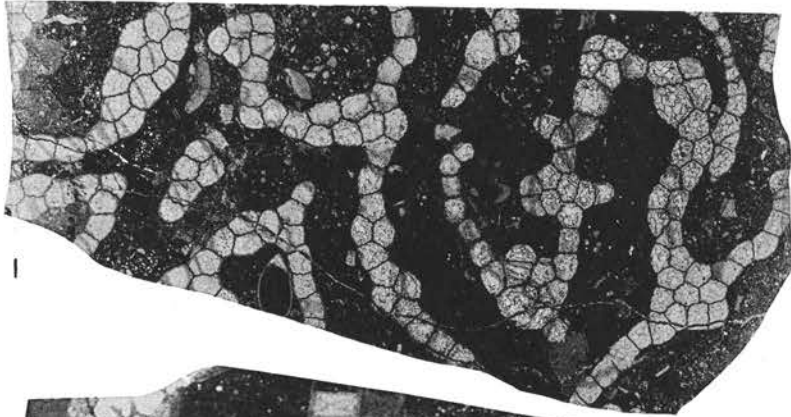
*Manipora magna* Flower, n. sp.

P. 45

- I. Weathered surface of extant part of holotype colony, x I, showing corallite size and closely spaced ranks, generally of single rows of corallites, with agglutinative patches confined to sharp bends or points of division of ranks.
2. Longitudinal section, X4, showing transverse, rather widely spaced tabulae. No. 664a. (R)
3. Vertical section, X 10, slightly oblique to corallite axes, passing through a common wall and showing septal ridges as linear extensions. No. 664b.
4. Vertical section, X 4, showing obscure differentiation of zones of crowded and more widely spaced tabulae. No. 664e. (R)
5. Vertical section, X 10, cutting a common wall at a steeper angle than in fig. 3, with septal ridges showing as linear extensions of the wall. No. 664b.
6. Cross-section, X i6, showing a pore at the lower left, with wall modified into a poral process; the common wall to the right shows a similar process, but the section misses the pore. No. 664g. (R)
7. Cross-section, X 16, showing a pore with poral process in the center rather than at the angle of two adjacent corallites. No. 664g. (R)
8. Cross-section, X20, of unusually elongated corallites, showing fibrous wall, common walls darker than outer walls, and thin, dark, obscure epitheca. No. 664c.
9. Cross-section of shorter, more typical corallites, X20, showing extreme development of septal ridges on common walls; the second from the bottom is extreme and may represent incipient budding individuals; also fibrous walls, with common wall darker than outer wall. No. 6641.
10. Longitudinal section, X 12, with dark areas representing places where plane of section passes outside the corallites. In the lower center the section is nearly tangential to the outer wall, and spheres of poikiloplasm, not elsewhere noted in the species, are developed. No. 664e.

All illustrations from holotype, colony No. 664; Second Value formation, Montoya group, near the crest of the cenic Drive, El Paso, Texas.





## PLATE 2

*Manipora amicarum* Sinclair

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- 1-4. Four cross-sections from same region of the colony, x I.5, showing variation in the form and arrangements of ranks. 1, No. 662a; 2, No. 662e; 3, No. 662b; 4, No. 662g. (R)
5. Longitudinal section, X4, showing rather evenly spaced tabulae, some irregular in form. No. 662c. (R)
8. Cross-section, X 11, portion of a single rank, showing faint development of ridges on common walls, and lighter outer wall. No. 662a.
9. Cross-section, x I 8, showing strong crenulation of common walls, which are fibrous, with pore in lower left, and unusually prominent lining of poikiloplasm. No. 662a.

Hypotype, colony No. 662, from the Second Value formation, from near the crest of the Scenic Drive, El Paso, Texas.

*Manipora magna* Flower, n. sp.

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6. Cross-section, X 11, showing rather strong crenulation of common wall, smooth outer walls. No. 664c. (R)
7. Another portion of the same section, X 10, showing a double rank, with all common walls crenulate; below are single ranks, with outer walls showing characteristic convexity. (R)

Holotype, No. 664 (see pl. 1); all from the Second Value formation, from near the crest of the Scenic Drive, El Paso, Texas.

## PLATE 3

*Manipora amicarum* Sinclair

P.46

- I. Weathered surface of colony, X 1, showing corallite size and characteristic meandering ranks with frequent double rows of corallites and agglutinative patches.
2. Vertical section, slightly oblique to corallite axes, showing fairly uniform spacing of tabulae, X4. No. 662f. (R)
3. Cross-section, X9, showing characteristic slightly oblique common walls in single ranks, variable crenulation of the common walls. A large pore interrupts the common wall at the left; at the right an unusually large corallite shows extreme development of septal ridges; on its left the large pore connects it with two apparent budding individuals. No. 662a. (R)
4. Cross-section, X9, portion of an agglutinative mass of corallites; near the top a conspicuous pore occurs at one of the angles. No. 662b. (R)
5. Cross-section, X9, showing several pores at corallite angles in single ranks, a small budding individual in upper center, and in agglutinative parts, variation in development of septal ridges on common walls. No. 662b. (R)

Hypotype, colony No. 662; from the Second Value formation, from near the crest of the Scenic Drive, El Paso, Texas.

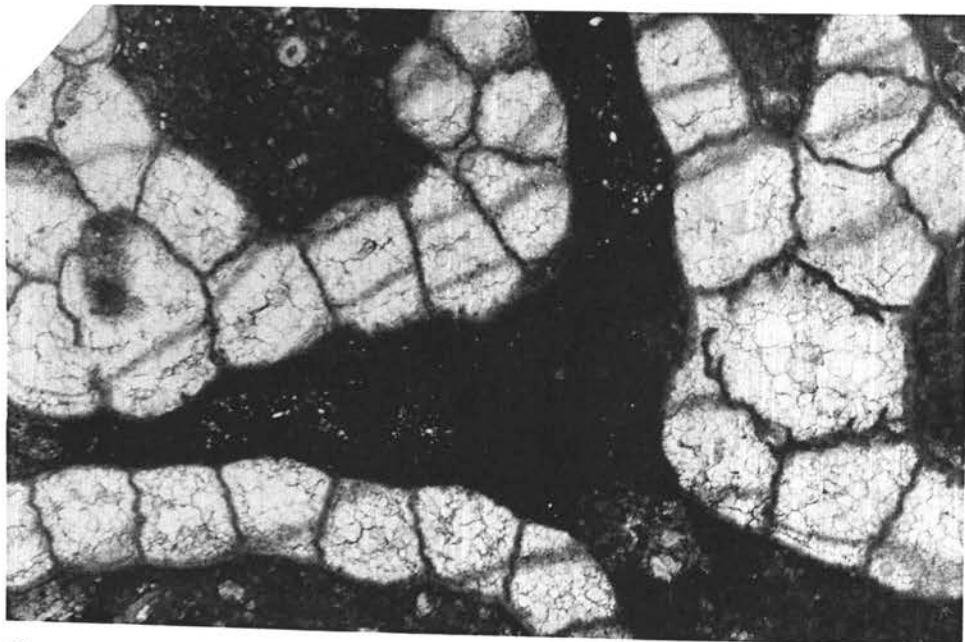




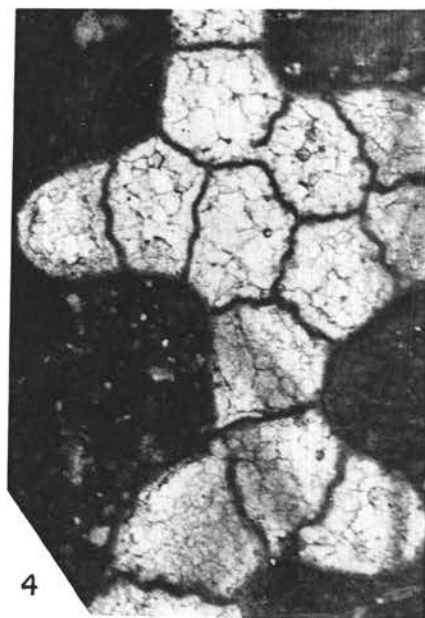
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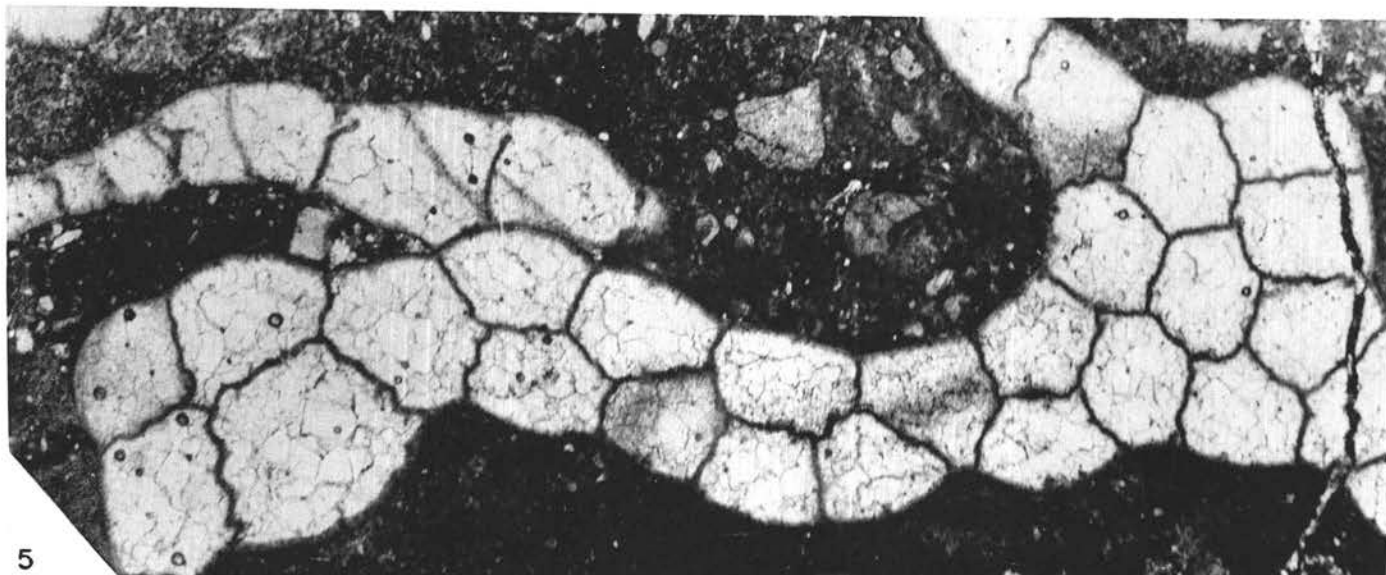
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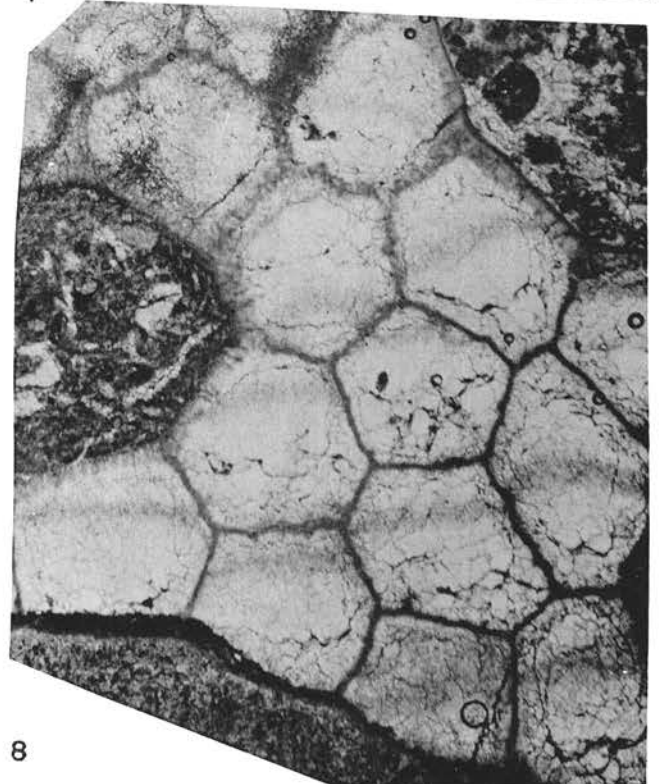
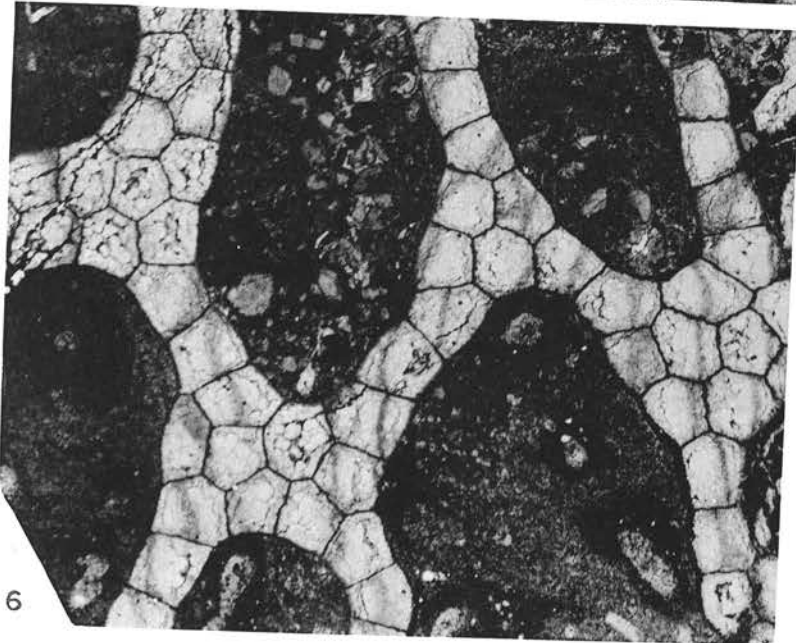
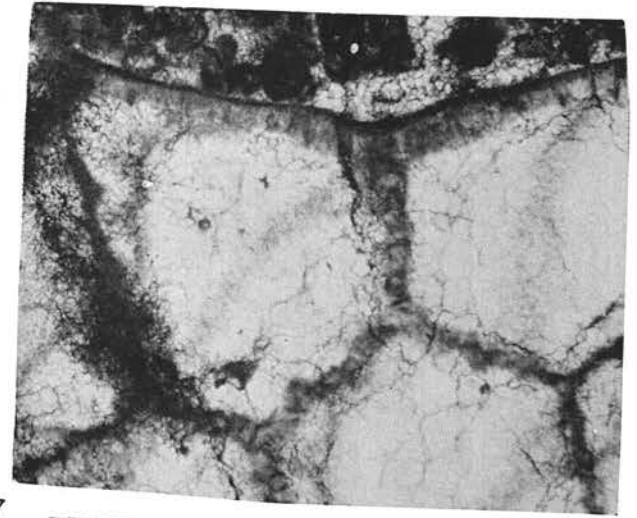
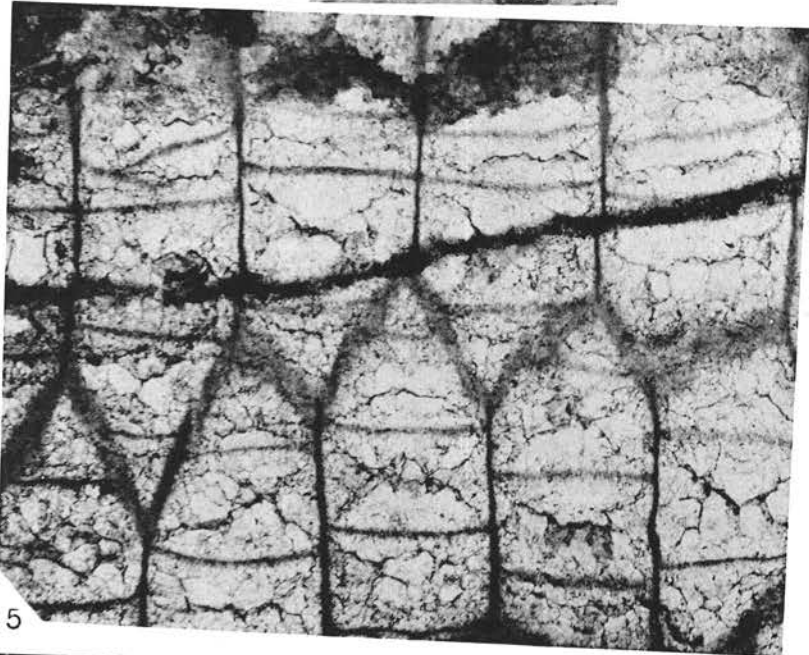
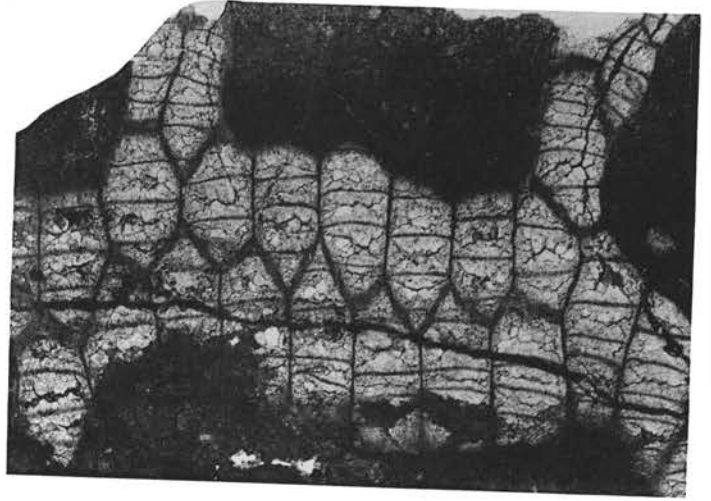
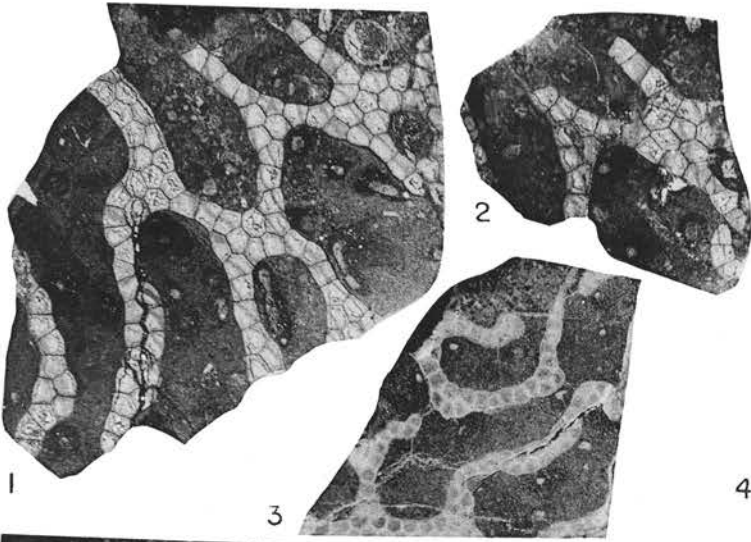
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4



5



## PLATE 4

*Manipora trapezoidalis* Flower, n. sp.

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- 1, 2. Two adjacent cross-sections, X1.5, fig. 2 corresponding to the upper right of fig. 1, showing fairly constant arrangement of ranks. 1, No. 663a; 2, No. 633d. (R)
3. Portion of surface of holotype, X I, showing corallite size and arrangement of ranks; opaque section.
4. Longitudinal section, X4, slightly oblique to axes of corallites, but showing spacing of tabulae. No. 663e. (R)
5. Further enlargement of the same section, X 12, showing the very faint extent to which septal ridges are developed where common walls are cut at a steep angle.
6. Cross-section,  $\times_{4.5}$ , showing variation in crenulation of common walls, double and single ranks. No. 663a. (R)
7. Portion of the same section, X20, showing unusually thick walls, with fibrous structure well displayed.
8. Portion of same section, X II, with wall unusually thickened in upper part, and thinner, darker, more typical, in the lower portion.

Holotype, colony No. 663; from the Second Value formation, from near the crest of the Scenic Drive, El Paso, Texas.

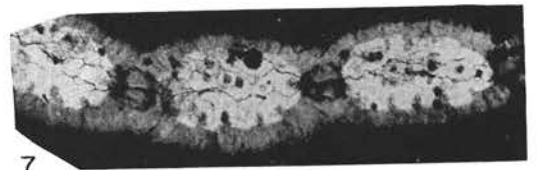
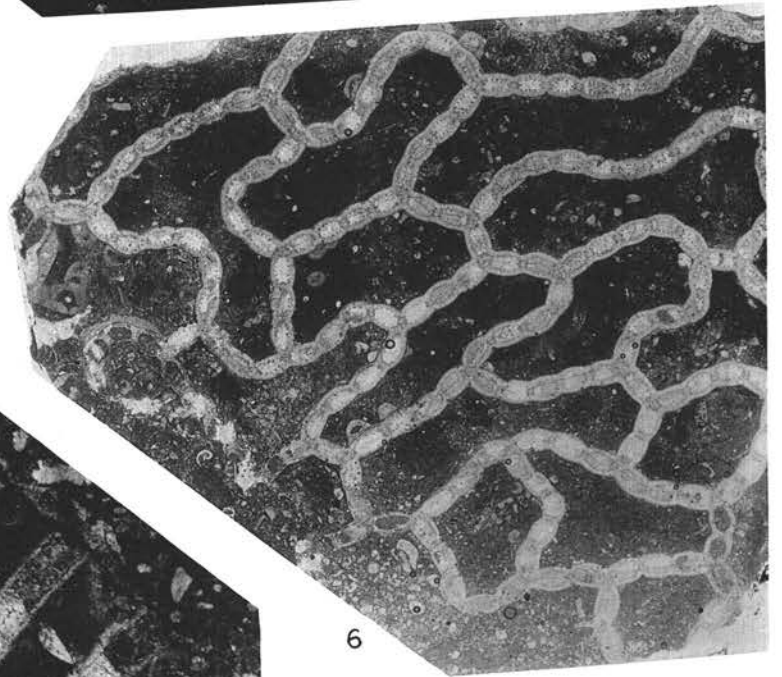
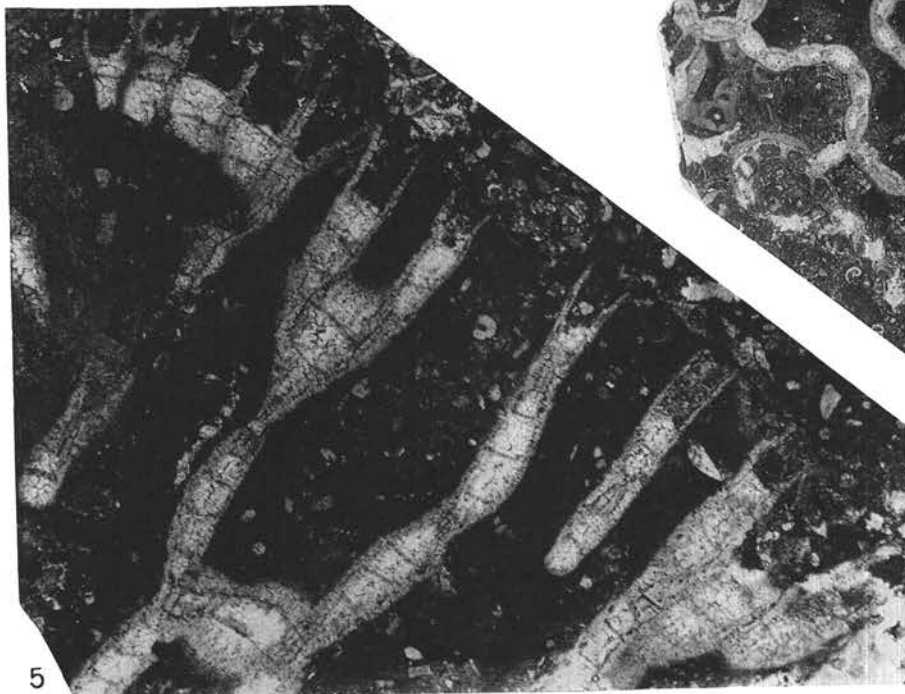
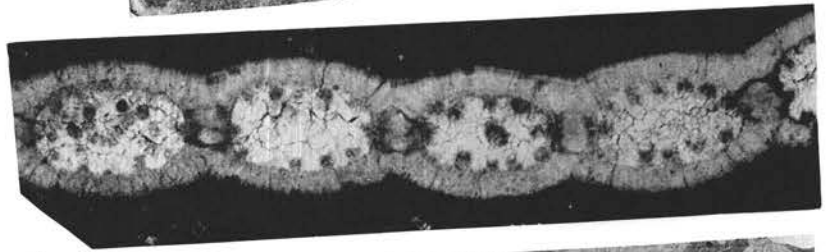
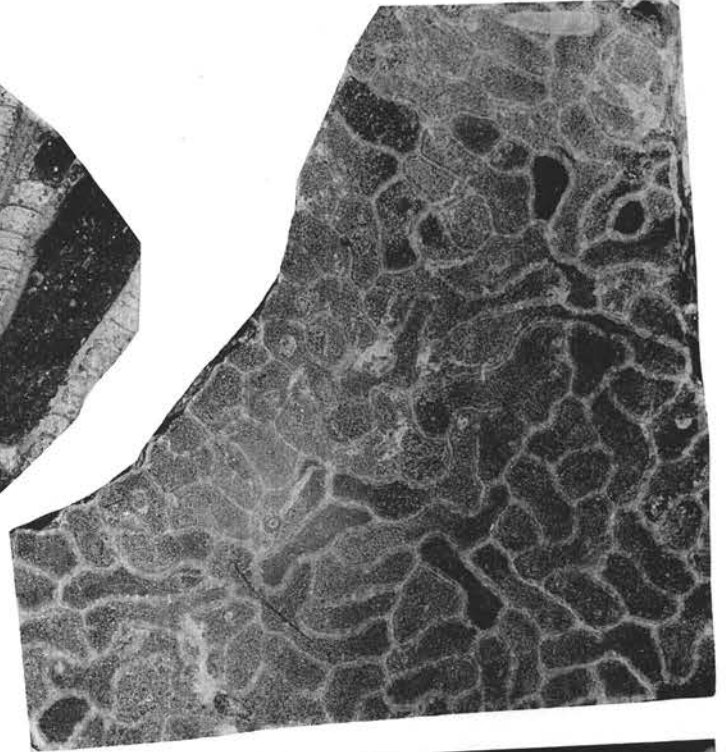
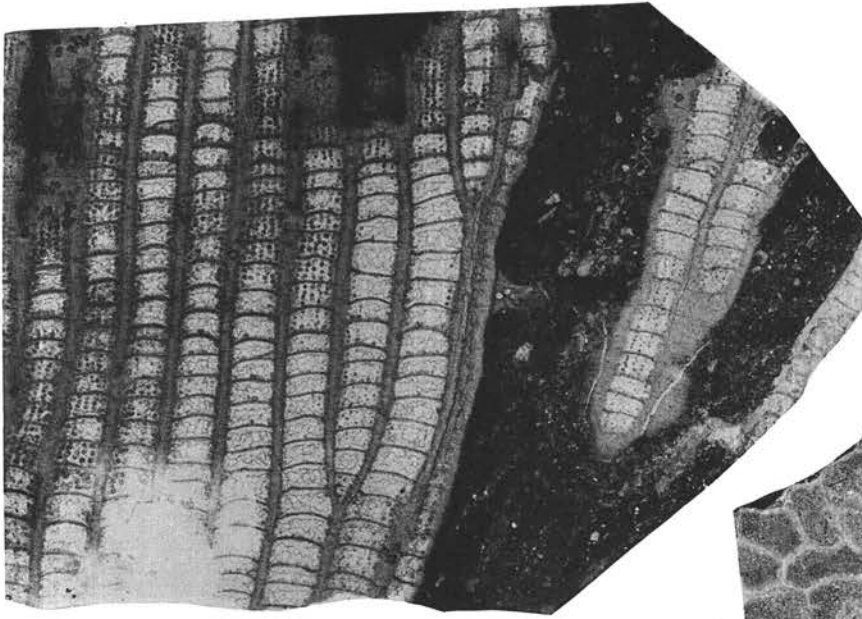
## PLATE 5

*Catenipora workmanae* Flower, n. sp.

P.49

- r. Longitudinal section, X4; spheres of poikiloplasm, replacing septal spines, appear in series of vertical rows where the plane of the section approaches either of the outer walls; elsewhere they are apparent only on lateral regions of corallites; there is no evidence of alternating zones with and without spines. Some spheres also are apparent on the anterior faces of the tabulae. No. 665e. (R)
2. Cross-section, X 1, of holotype, showing size of corallites and arrangement of ranks and lacunae.
3. Longitudinal section, X 1, showing size and appearance of corallites.
4. Cross-section, X15, showing typical form of corallites, poikiloplasm spheres replacing septal spines, the spheres joined by a very thin lining in corallite to right of center; this corallite shows also one large central sphere; several small spheres are developed in the corallite at the extreme left; in both cases the section cuts spheres developed on anterior face of tabulae. No. 665k.
5. Section, X 5.5, cutting corallites at a very steep angle, and passing alternately through corallite cavities and common walls with balken; anteriorly complete calices are shown. No. 667a. (R)
6. Cross-section, X2.5, showing prevalence of poikiloplasm replacing septal spines, and typical aspect of ranks and lacunae. Several attached organisms are shown; group at extreme left is shown in pl. 9, fig. 21; those at the top in pl. 10, fig. 11; others, slightly to left of center, in pl. 10, fig. 7, and pl. 12, fig. 11. No. 665i. (R)
7. Cross-section, X 14, showing scattered spheres of poikiloplasm in rather elongated corallites. No. 665k.

Holotype, No. 665, and paratypes, Nos. 666 and 667; all from the Second Value formation; Nos. 665 and 667 from near crest of Scenic Drive, El Paso, Texas; No. 666 from the Cooks Range, New Mexico.



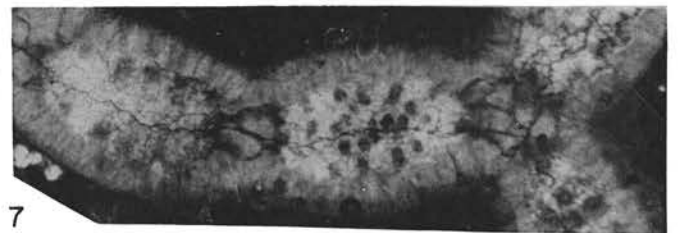
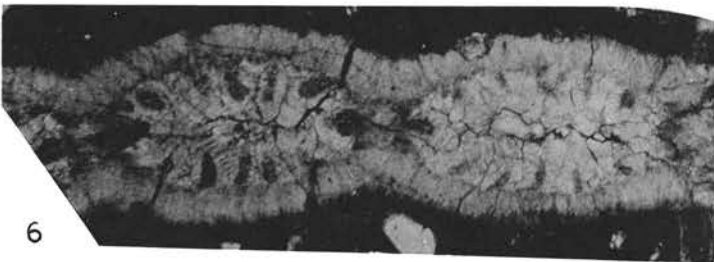
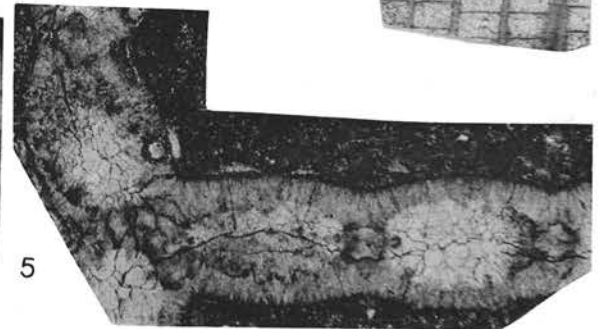
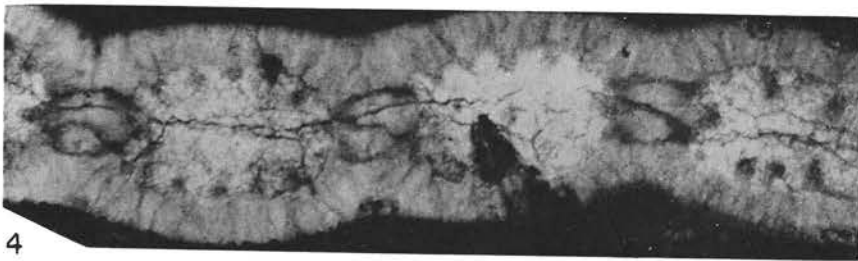
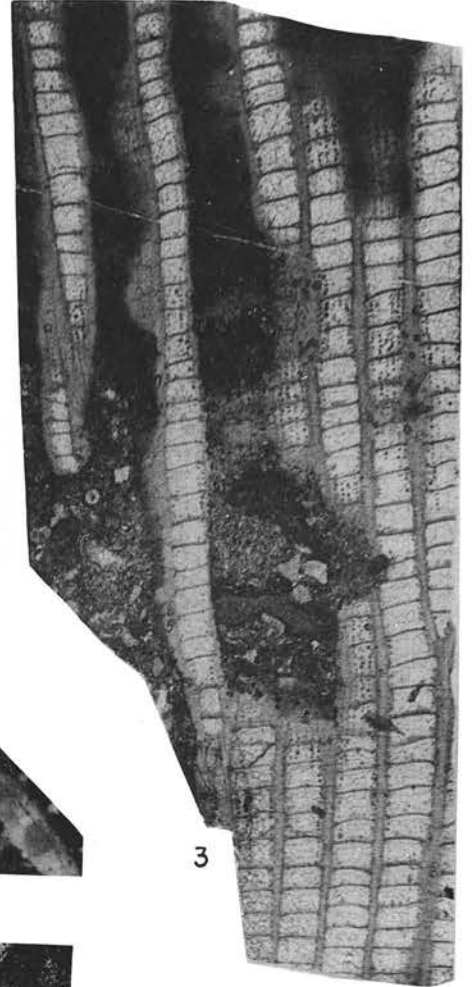
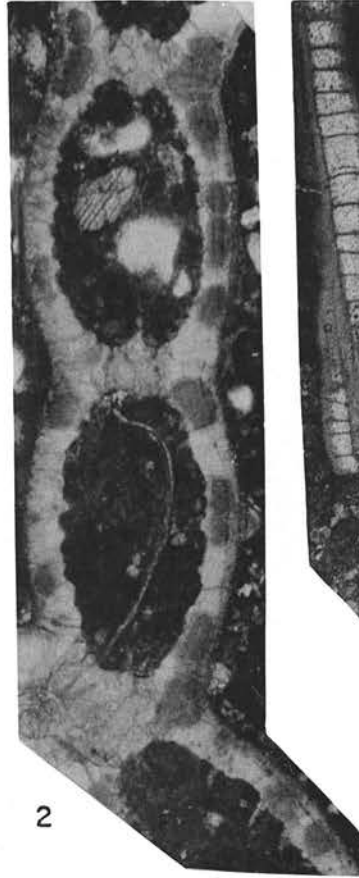
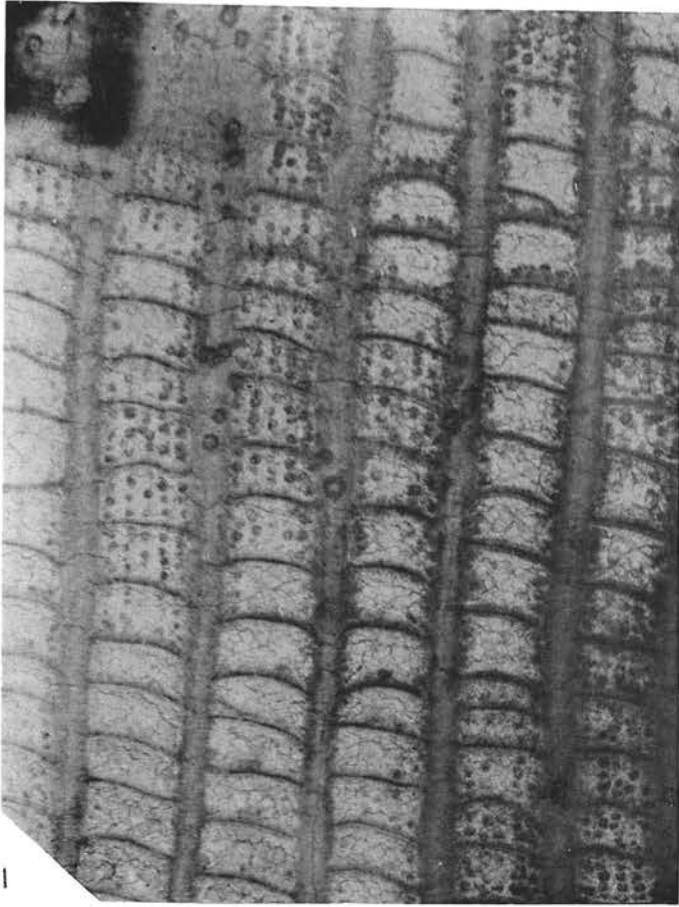


PLATE 6

*Catenipora workmanae* Flower, n. sp.

P. 49

1. Longitudinal section, X 10; further enlargement of part of same section as pl. 5, fig. 1, showing spheres of poikiloplasm in position of septal spines, in vertical rows against walls, and also notably in the upper left quarter, growing on the anterior faces of the tabulae. Round bodies in corallite walls are replacement phenomena. No. 665e.
2. Cross-section, X20, through calicular portion of corallites. Fibrous walls are rather thin, owing to anterior position of sections; dark areas within them are replacement phenomena. Septal spines appear largely as short serrations, and extend as appreciable spines only in the lower right of the figure. No. 666j.
3. Longitudinal section, X 3.5, showing regular alignment of spheres in columns and regular spacing of tabulae. No. 665d. (R)
4. Cross-section, X 22, showing thick fibrous wall, variable aspect of balken, and poikiloplasm bodies, ranging from attached spheres to bodies subquadrate in section. No. 665i.
6. Cross-section, X20, showing extremely long corallites with width increasing markedly from common walls to corallite centers; poikiloplasm spheres here markedly elongated, simulating true septal spines, but larger and thicker. No. 666j.
7. Cross-section, X 14, showing in center numerous spheres apparently free; balken are somewhat altered by recrystallization. No. 665k.
8. Cross-section of a series of corallites, X 22, showing variations in aspect of walls, balken, and poikiloplasm spheres; the spheres in the two central corallites are connected by a very thin lining. No. 665/.

All from the Second Value formation, from the southern end of the Franklin Mountains, near the crest of the Scenic Drive, El Paso, Texas.

*Catenipora cf. workmanae*

P.51

5. Cross-section from a young stage of a colony tentatively identified with this species, X 14, showing slender corallites in which increase of width from common walls to centers of corallites is reduced to a minimum. Several small, light calcitic masses, representing attached bodies, show the dark epitheca beneath and on the outside of the corallites. No. 668a. See also pl. 8, fig. 3-5.

From the Second Value formation; No. 666 from the Cooks Range, New Mexico; others from near crest of Scenic Drive, El Paso, Texas.

## PLATE 7

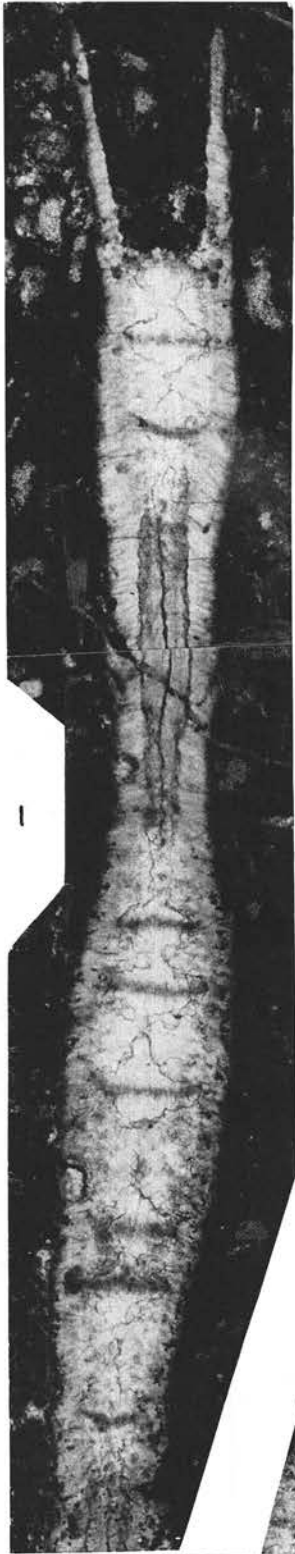
*Catenipora workmanae* Flower, n. sp.

P. 49

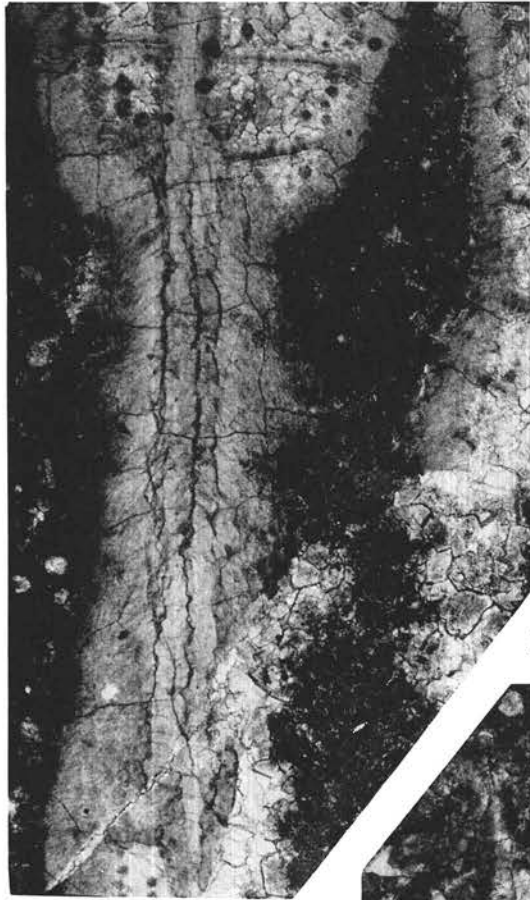
- I. A section slightly oblique to the longitudinal axis of a corallite rank, x 14, showing oblique lamellae of wall, sloping downward peripherally; whereas the outer wall of the calyx is vertical, the inner wall slopes in a direction opposite to that of the lamellae. Where the section cuts the intercorallite spaces, the lamellae arch upward over the center, where the balken are visible as rather irregular, dark longitudinal lines. No. 667c.
2. A longitudinal section, x 14, which passes through the balken, showing the arching lamellae and dark longitudinal lines. The slightly oblique section passes through one corallite below and two above, and is apparently taken at the point of bifurcation of a rank. No. 665o.
3. A longitudinal section, X 14, enough off center that it avoids the balken, showing common walls with fibers forming a V-shaped pattern, fibers of individual corallites sloping obliquely down and outward. In contrast, sections that cut the balken show a reversed pattern of fibers, as shown in fig. x, 2, and 5, as though the common walls had been removed by the development of the balken. Within the corallites are seen spheres of poikiloplasm, several narrowing at their point of attachment on the corallite walls. Similar spheres are developed on the anterior faces of the tabulae, best shown in the lower center. No. 665m.
4. Longitudinal section, X 11, very slightly oblique to axis, through several corallites retaining calices, No. 667a.
5. Longitudinal section, X 14, slightly oblique to axis, showing a section in which one of several corallites expands to a corallite calyx, below which the wall narrows and the section cuts the balken. Normal width of corallites is shown at the left. No. 667c.
6. Longitudinal section, X 10, through a series of corallites retaining calices, and showing essentially the proportionate length of the calices with respect to the width of the corallites. No. 667a. The greater apparent width of the corallites here, in contrast to fig. 4, is due to the position of the section, here essentially parallel to the rank.
7. Cross-section, X 14, showing greatest concentration observed in cross-section of poikiloplasm spheres developed on anterior face of tabulae. No. 665k.

All from the Second Value formation, from the southern end of the Franklin Mountains, near the crest of the Scenic Drive, El Paso, Texas.

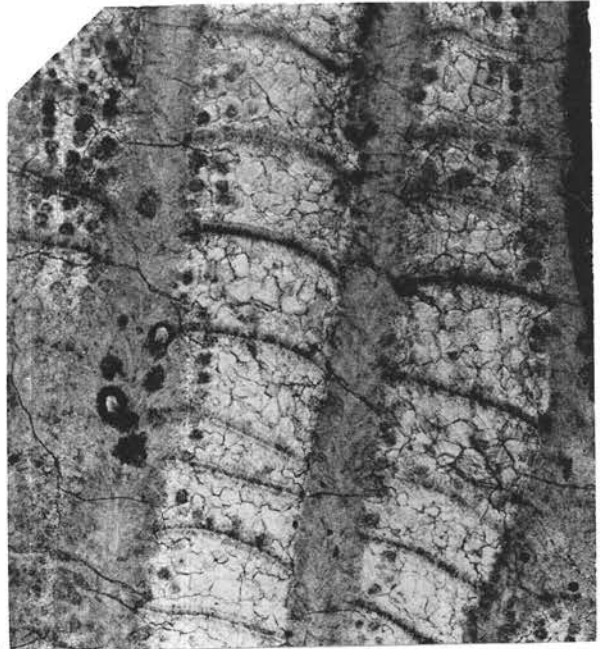




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2



3



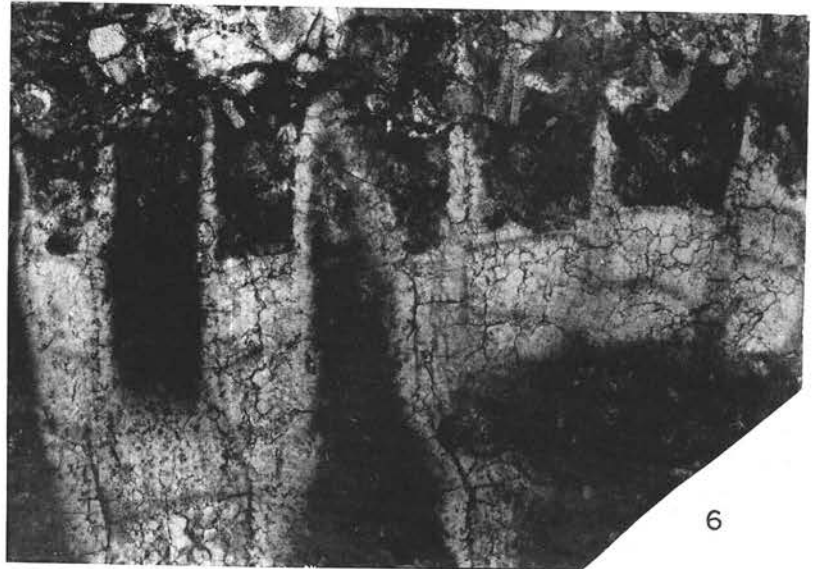
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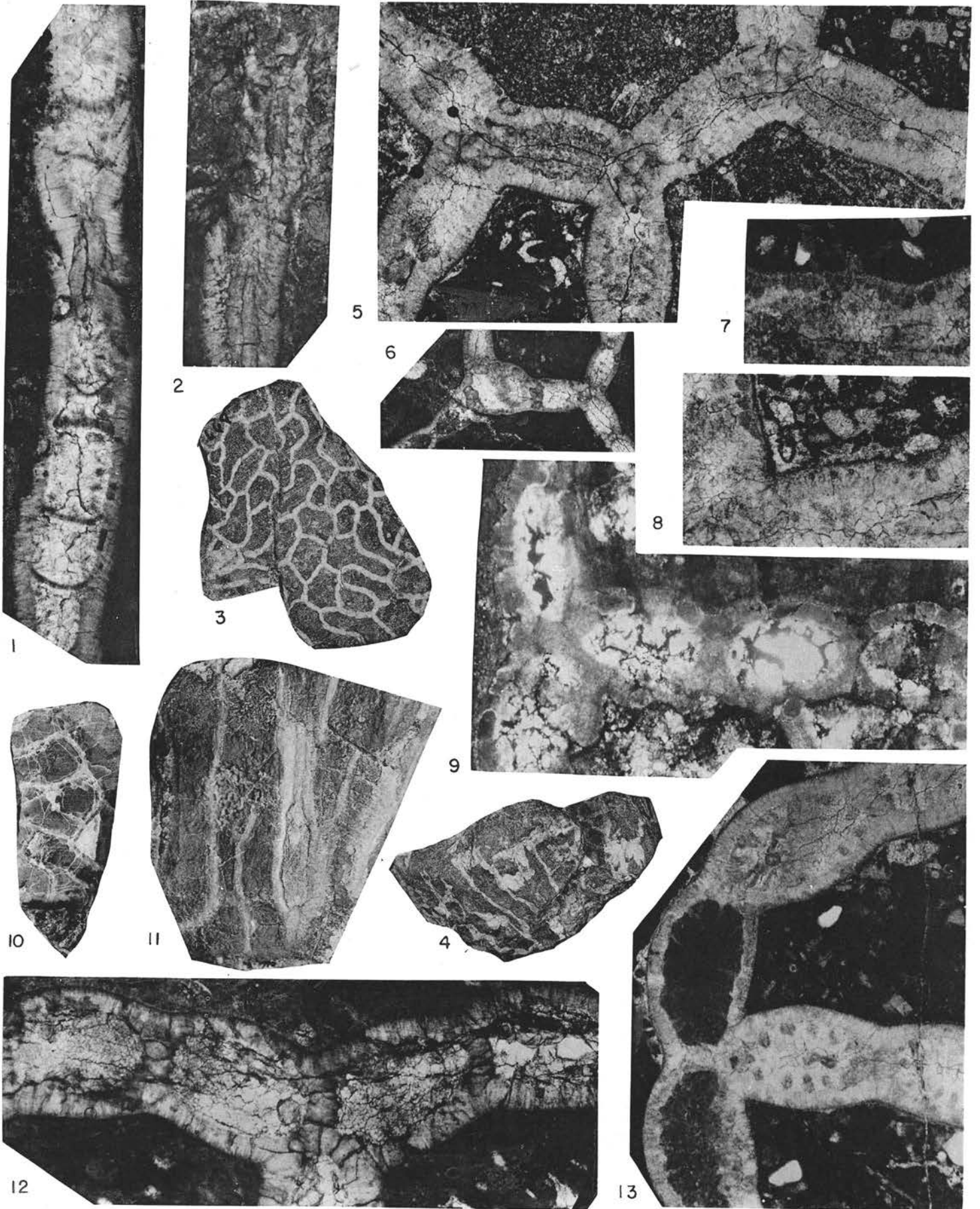
7



5



6



*Catenipora workmanae* Flower, n. sp.

P. 49

1. Longitudinal section, X 15, showing fibers of wall sloping down from inner to outer surface; corallite cavities with tabulae shown at top and bottom, but the section is slightly oblique, passing through a common wall and the balken a little above the center. No. 667c.
2. Longitudinal section, x 14, of a slightly displaced part of a colony; section is vertical, passing through common wall and balken for its entire length, and showing anteriorly the small mesocorallite calyx. No. 667b.
6. Cross-section, X 5.5, showing largest corallite observed. No. 665j.
7. Cross section, X 14, from slide 666f, showing considerable alteration of the fibrous wall, holotheca above, clear below the base of an attached body (*Kruschevia*); below are traces of poikiloplasm in the corallite.
8. Cross section, X 14, from slide 666h, showing unidentified attached bodies, one at the angle, subquadrate, open above, two others represented by coarse calcite to its right. The holotheca is a dark band below these attached bodies.
13. Cross-section, X 14, showing ( ) adjacent corallites cut through calyces, with matrix within and septal spines developed, here unusually long and acicular, and (2) corallites cut through the tabulate portion, with poikiloplasm spheres replacing spines. No. 666e.

Second Value formation; Nos. 665 and 667 from southern end of Franklin Mountains, El Paso, Texas; No. 666 from the Cooks Range, New Mexico.

*Catenipora* cf. *workmanae*P.5<sup>1</sup>

3. Cross-section of anterior end of specimen, X 1, showing ranks and corallite size.
4. Lateral view, X 1, showing convergence of ranks toward a common center at the base.
5. Cross-section, X 18, showing corallites with abnormally slight increase in width from common walls to corallite centers; retained septal spines, best shown in corallite just to the left of the center; and very poor development of poikiloplasm.

A specimen showing the early growth stage of a colony, tentatively retained in the species. No. 668; from the Second Value formation, near crest of Scenic Drive, El Paso, Texas. See also pl. 6, fig. 5.

*Catenipora*, sp. (1)

P.51

9. Cross-section, X 14, from dolomitized specimen, from Hembrillo Canyon, regarded as a form distinct from *C. workmanae*, with broader, more rounded corallites and narrower common walls. No. 786.

*Catenipora*, sp. (z)

P. 52

- o. Cross-section, X 1.
- i. Lateral view, x 1.
12. Cross-section, X 15, showing larger corallites differing from *C. workmanae* in shape, absence of poikiloplasm, and narrow common walls.

Fragment of a colony (No. 669) with considerably larger corallites than *C. workmanae*. Picked up loose on the Upham surface at the nose in front of the crest of the Scenic Drive, El Paso, Texas. The distinct lithology suggests that it came from another horizon, quite possibly from the Aleman formation.

## PLATE 9

*Ivesella adnata* Flower, n. sp. P. 108

1. Holotype section, x 20, showing thick capsule with thickened base. From slide 690a.
2. Paratype section, x18. From slide 691c.
3. Paratype section, x18. From slide 691c.
4. Paratype section, X 18. From slide 691b.
5. Paratype section, X 18; a larger body with only the basal part preserved. From slide 691b.

From colonies of *Paleophyllum thomi*, coral zone of the Aleman formation, Montoya group, Franklin Mountains, New Mexico.

*Tholella* cf. *idiotica* Flower, n. sp. P. 107

6. Section referred to this species, from slide 664o, from a vertical section of *Manipora magna*, Second Value formation, southern Franklin Mountains, near crest of Scenic Drive, El Paso, Texas.

*W arthinites adhaerens* Flower, n. sp. P. 117

7. Holotype, a nearly central section, X 21, attached by a very low spire. From slide 666f.
8. Paratype, X19, a slightly eccentric section, and seemingly a higher spired form, attached by only one side of the spire. From slide 666f.
9. A section, X 20, interpreted as cutting only part of the outer whorl, assigned tentatively to this species. From slide 666f.10
- . A similar section, X35. From slide 666h.

Paratype, X19, showing a low *Liospira*-like spire, broadly attached as in fig. 7. From slide 666/. 12. Paratype, x19, an eccentric section showing only part of the outer whorl. From slide 666/.

*Goldringella Plana* Flower, n. sp. P. 117

13. Holotype, X 20. The section presumably cuts inner whorls filled with calcite. From slide 666g.
14. Paratype, X I 7, a section showing an earlier growth stage of the outer half whorl, interior probably tangential to penultimate whorl. Slide 666i.

Both from colony of *Catenipora*, from the Second Value formation, Cooks Range, New Mexico.

## (Unidentified) P. 119

- r 5. Object suggesting an irregular open and empty capsule, X17. From slide 666g, on a *Catenipora* colony from the Second Value formation, Cooks Range, New Mexico.

*Ampulites vasiformis* Flower, n. sp. P. 115

16. Holotype section on right from slide 666i, x20. Round body on left could be a cross-section of the same form. *Fentonites irregularis* Flower, n. sp. P. I I 7

17. Probably eccentric; section, X 18, showing concave upper side and outer irregularity; paratype. From slide 666h.
19. Section, X 18, holotype on left, paratype on right, showing irregular surface and thick walls. From slide 666h.

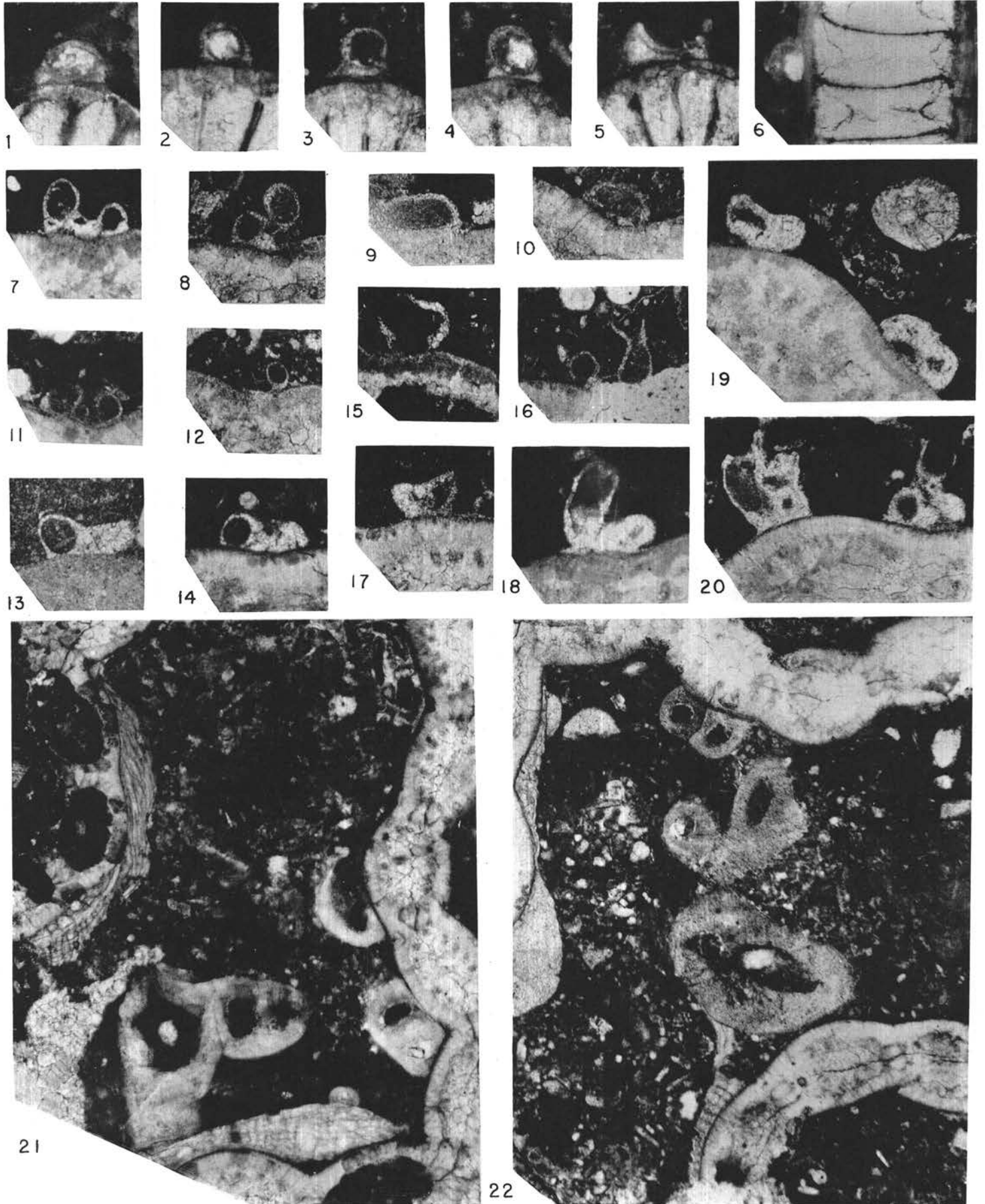
Both from *Catenipora* colony, Second Value formation, Cooks Range, New Mexico.

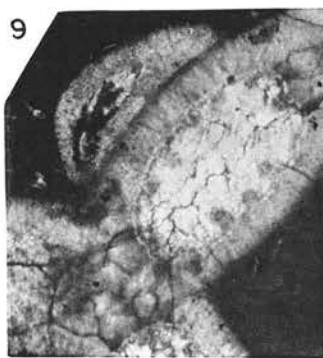
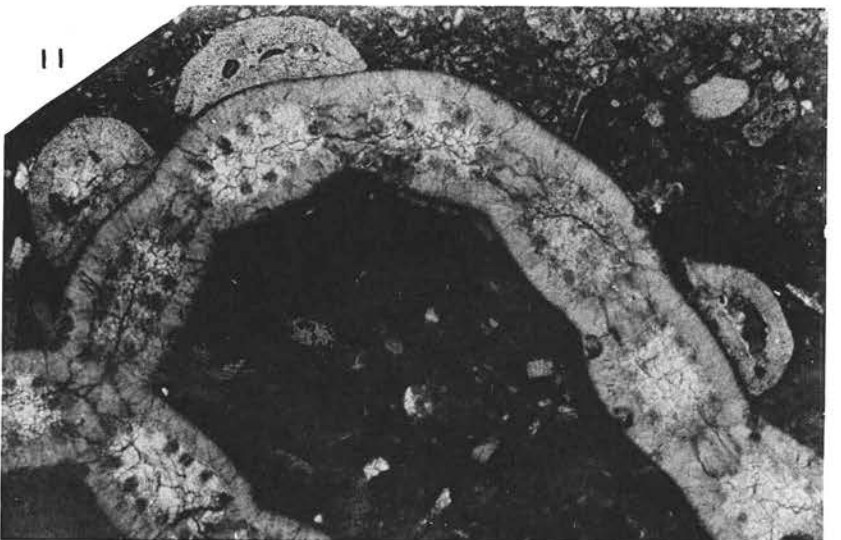
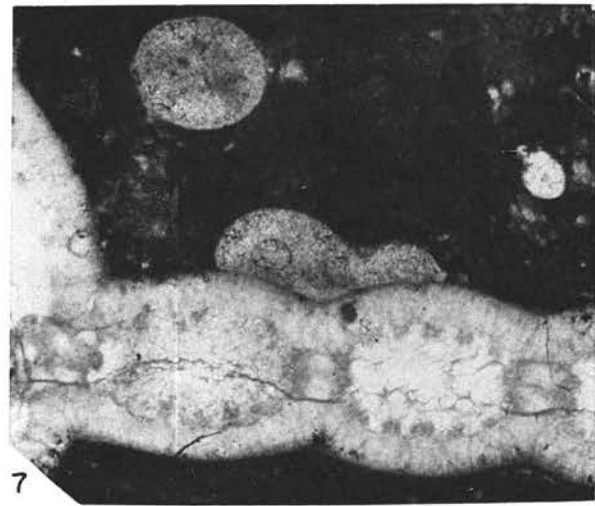
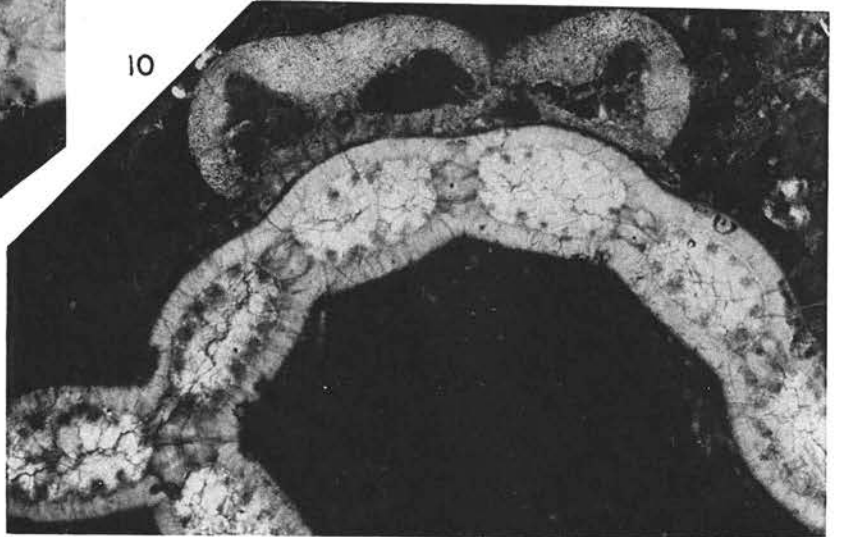
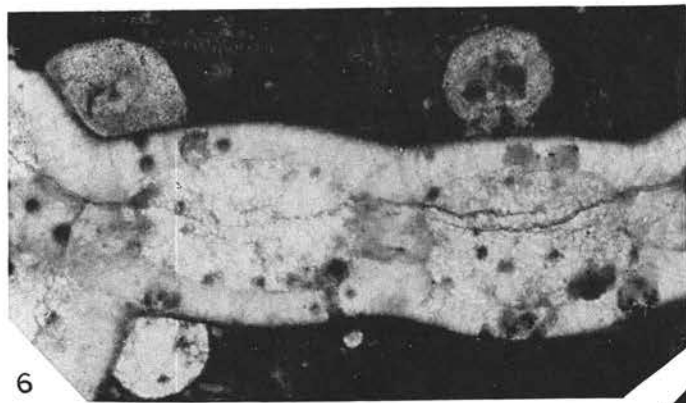
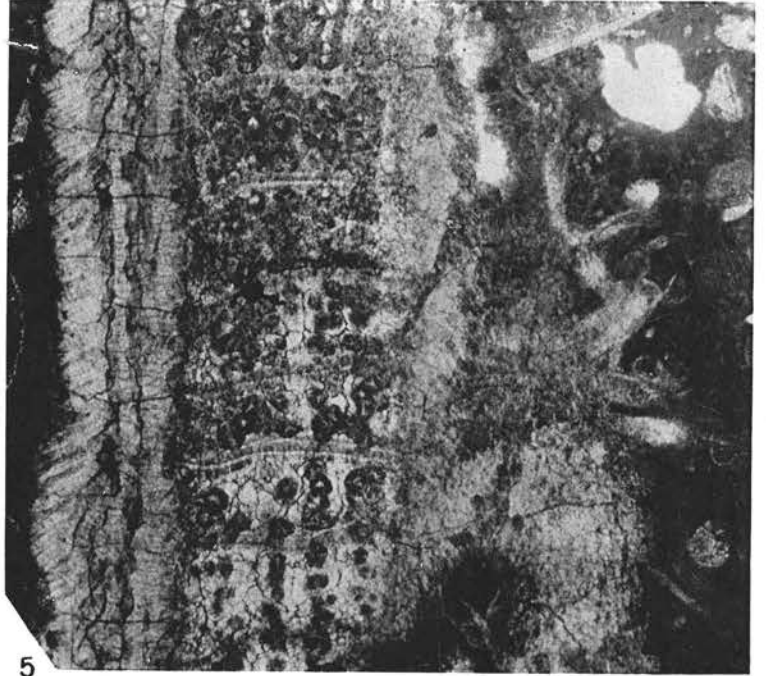
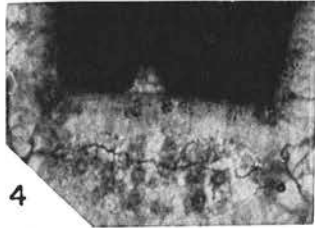
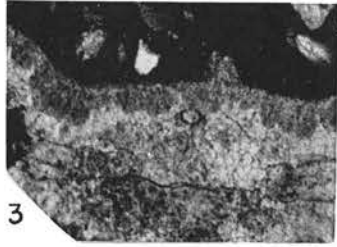
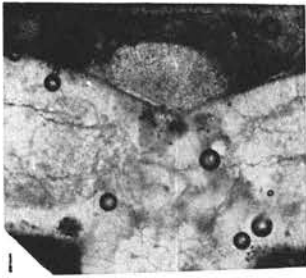
*Ancestrulites tubiformis* Flower, n. sp. P. 117

18. Paratype, X18. From slide 666f.20
- . Section, x18, showing holotype colony on left, paratype on right. From slide 666c.

## Associations of attached bodies P. 110

- 21, 22. Two sections from opposite sides of a single cut, showing a portion of a colony of *Catenipora workmanae* on which encrusting organisms are abundantly developed. Fig. 21, X 10, shows at the left a bryozoanlike mass. In the lower center is a second such colony. Extending up from its left end is a large body with a large irregular central cavity; to its left is attached a similar body with two internal cavities. Size and texture suggest that these are not *Moundia*. On the upper side of the right end of the bryozoan is a small *Mooreopsis*. On the right side, below, is seen a fused pair of bodies, each with a cavity, attributed to *Moundia*; above them is another probable *Moundia*, incomplete on the upper surface. Fig. 22, X 10, is a mirror image of fig. 21, rotated counterclockwise 90 degrees. At the top is seen a fused pair of *Moundia*, corresponding to the individuals in the lower right of fig. 21. In the center are the large bodies shown in the center of fig. 21. At the extreme upper left a small *Mooreopsis* is seen on a bryozoanlike mass; in the center of the right margin is seen part of a solid body composed of distinct plates, regarded as a section through a *Moundia* too eccentric to show the internal cavity. From slides 665i and k, from the Second Value formation, southern Franklin Mountains, El Paso, Texas.





## PLATE 10

*Mooreopsis rotundus* Flower, n. sp.

P. 112

1. Section,  $\times 17$ , showing faint radial arrangement of granules. From slide 665k.
2. A trilobed body,  $\times 17.5$ , with faint dark lines separating low lobes on the sides from the higher, larger central body. From slide 665i.
6. Section,  $\times 20$ , showing a typical body at the upper left, one similar in form on the lower left, and an *Eliasites* on the upper right. From slide 665k.
7. Section,  $\times 18$ , showing two round bodies below, the larger with a small central dark ring; above, a free body of identical texture. From slide 665i.
8. Perfectly hemispherical body of homogeneous texture,  $\times 30$ . From slide 665k.

All from the Second Value formation, southern end of Franklin Mountains, El Paso, Texas.

*Kruschevia verruca* Flower, n. sp.

P. 111

3. Holotype section,  $\times 14$ , from slide 666f, from a *Catenipora* colony from the Second Value formation of the Cooks Range, New Mexico.
4. A paratype, from section 665k, from the same formation of the southern Franklin Mountains at El Paso, Texas.

*Wellerites gracilis* on *Catenipora workmanae*

P. 116

5. Section passes through balken on left, then through corallite, showing spheres of poikiloplasm, some with light centers, suggesting growth on true septal spines not completely resorbed; beyond, outer wall is obscured by calcite of uncertain origin, mingled with which are the tubes of *Wellerites gracilis*. From slide 666k; Second Value formation, Cooks Range, New Mexico.

*Eliasites pedunculatus* Flower, n. sp.

P. 112

6. The holotype, at the right of the figure, from slide 666k,  $\times 20$ , shows thick fibrous walls, with suggestion of divisions into several plates. From a section of *Catenipora*, Second Value formation, Cooks Range, New Mexico.

*Moundia fibrosa* Flower, n. sp.

P. 109

9. Elongate section with cavity in anterior, thick end. Slide 666k,  $\times 19$ .
10. Colony of *Catenipora* with two closely fused bodies, separated from the *Catenipora* by a bryozoan; a third nearly fused body on the left. Slide 665n,  $\times 13$ .
11. Colony of *Catenipora*, showing three specimens of *Moundia fibrosa*. Slide 665i,  $\times 13$ .

The three sections are adjacent and from the same part of a single colony, as shown in text fig. 10; Second Value formation, southern end of Franklin Mountains, near crest of Scenic Drive, El Paso, Texas.

## PLATE 11

*Niccumites ocula.us* Flower, n. sp. P. 113

1. Holotype section,  $\times 40$ , showing large central body with dark central cavity partially enclosed in recrystallized calcite, by which it is attached to the *Catenipora* rank. From slide 666j.
8. Paratype section,  $\times 20$ , showing central body with faintly faceted dark margin. The light area at the top represents a quartz grain entrapped in the coarse calcite. From slide 666j.
9. Paratype,  $\times 32$ , showing oval granular calcitic body; surrounding calcite thin above and attenuated on the left. From slide 666l.

*Cystosphaera rotunda* Flower, n. sp. P. 114

2. Holotype,  $\times 40$ , showing a thin wall composed of numerous plates, secondary thickening in the region of the short neck, broad base of attachment, beneath which the holotheca of *Catenipora* shows as a dark band, and interior occupied by round, thick-walled calcitic bodies, some showing dark centers. From slide 666a.
3. Paratype, a specimen seen in a section sufficiently eccentric that neck and base of attachment are not shown, but thin wall of numerous plates and internal thick-walled, round bodies are retained. From slide 666f.

*Pedicillaria bifurcata* Flower, n. sp. P. 114

4. Holotype section,  $\times 15$ , at low magnification, showing relation in size and texture to the *Catenipora* rank; developed at relatively slight contrast, under which the dark median portion appears as a result of recrystallization. From slide 666a.
5. Same section,  $\times 35$ , developed to show maximum contrast, showing base of small round masses, distal part fibrous, and dark holotheca of the *Catenipora* below the widened base. Darkness of the middle region and of the base of the left fork of the bifurcation is exaggerated, giving here a false impression of discontinuity. From slide 666a.

## Worm tube in matrix P. 119

6. Section,  $\times 12$ , showing alignment of materials around circumference of the tube and traces of the slight, but generally prevalent, calcite on the inner surface, suggesting cementation of particles by an organically secreted material.

*Harjesia anomala* Flower, n. sp. P. 111

7. Holotype,  $\times 20$ , section vertical but possibly slightly eccentric, showing flask-shaped body with a thick calcareous wall, in which are enclosed short rodlike bodies, always with their ends rounded, and a central body of fine-grained calcite. At left is seen a section through *Goldringella plana*. From slide 666f.

*Cheneyella clausa* Flower, n. sp. P. 113

10. Holotype section,  $\times 35$ , showing low-arched body, thick homogeneous wall on right, recrystallized calcite on left, distally convergent fibers within. From slide 666a.

*Warthinites adhaerens* Flower, n. sp. P. 117

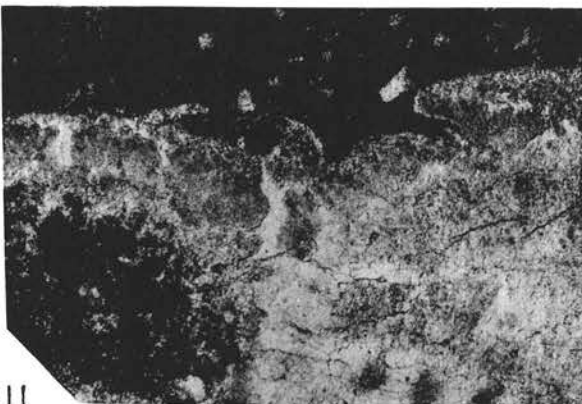
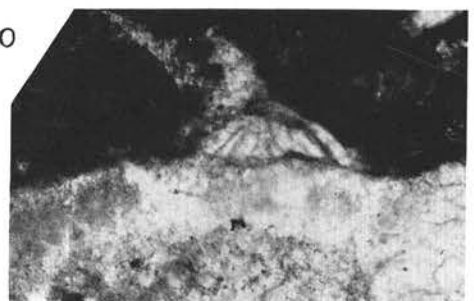
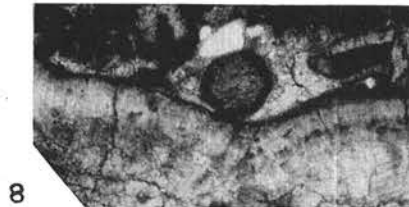
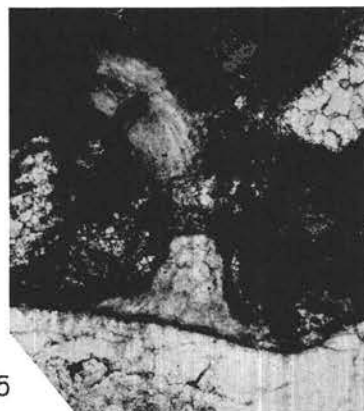
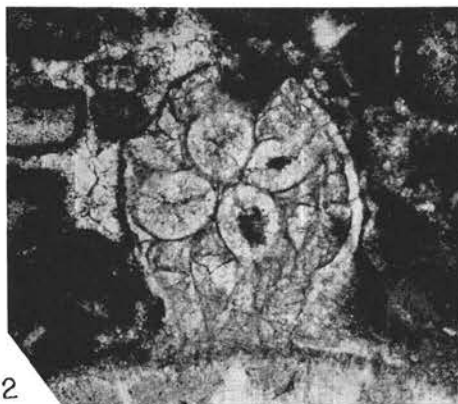
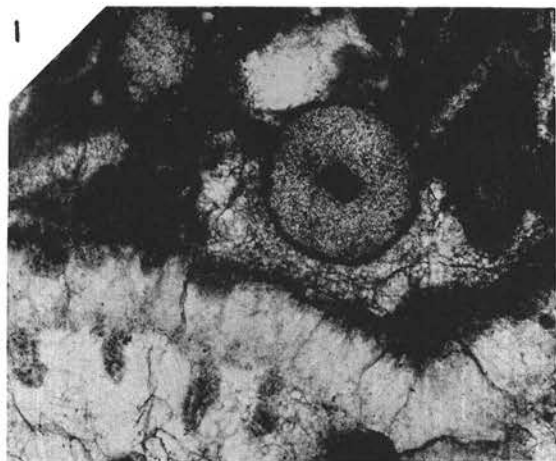
11. Section,  $\times 30$ , showing an eccentric section of an unusually small individual. At the left, the re-entrant in the *Catenipora* rank is abnormal; to the left, the apparent extension of the *Catenipora* is apparently adventitious attached material. The two together suggest that the *Warthinites* occupies an abnormal excavation of the *Catenipora* surface, a condition that is not real.

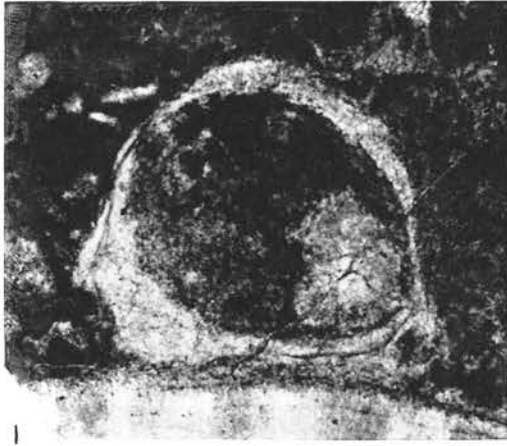
*Kruschevia verruca* Flower, n. sp. P. 111

12. Portion of a rank of *Catenipora*,  $\times 30$ , showing at the extreme right a *Kruschevia* replaced by coarsely crystalline calcite; at center and at left are low-arched bodies of uncertain affinities. From slide 665k.

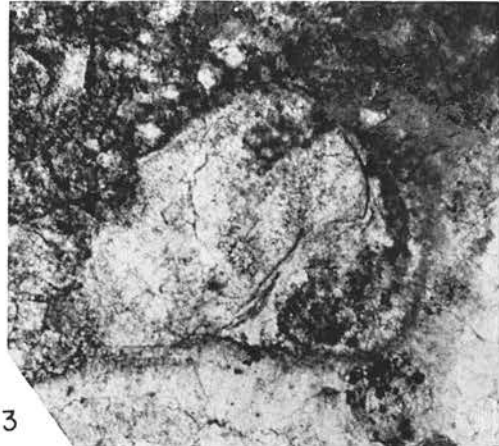
All from colonies of *Catenipora workmanae*, Second Value formation; No. 665 from near crest of Scenic Drive, El Paso, Texas; No. 666 from the Cooks Range, New Mexico.







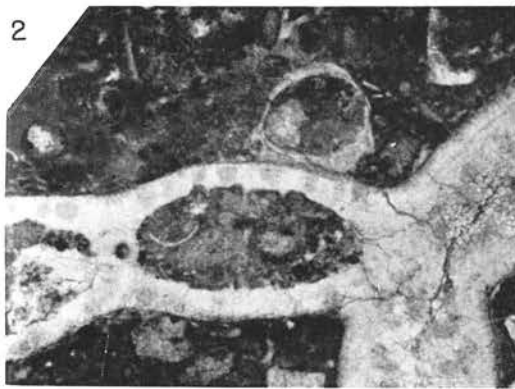
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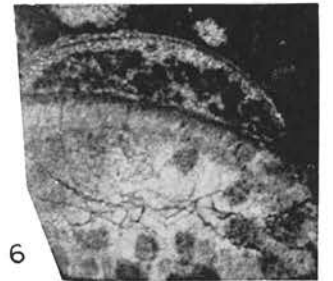
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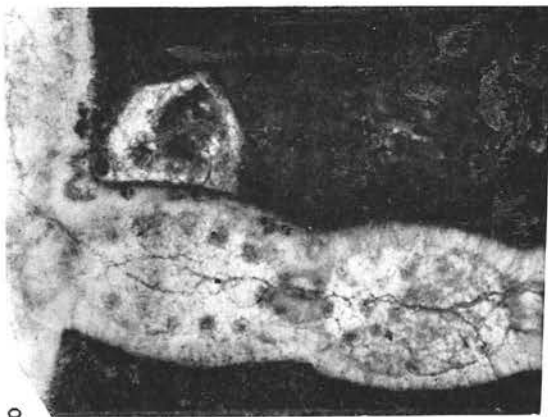
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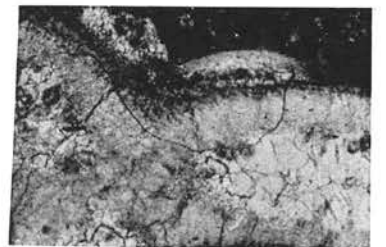
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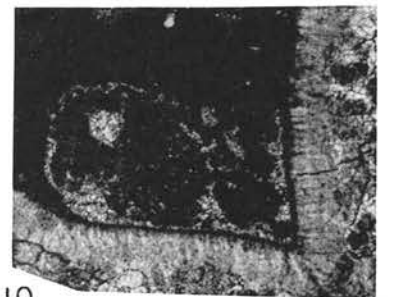
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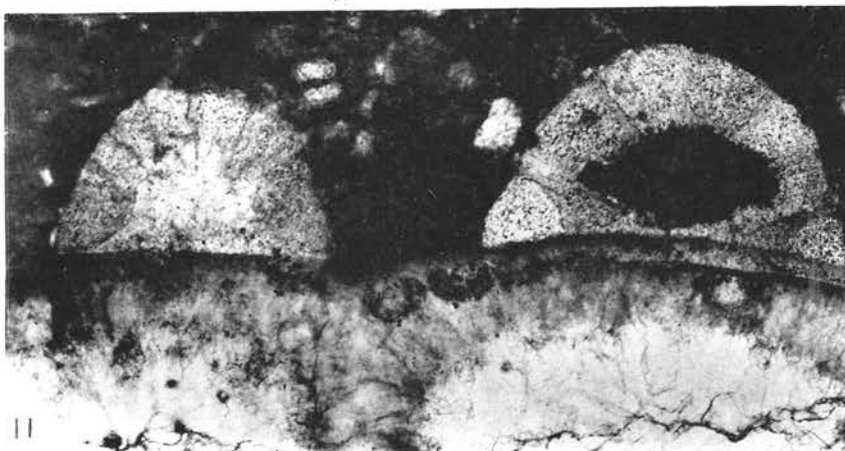
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7



10



11



12

## PLATE 12

*Tholella idiotica* Flower, n. sp.

P. 106

1. Holotype,  $\times 43$ , showing suggestion of fibrous imbricating plates, thickening at top, and small enclosed space at lower right. From slide 666a.
2. Same specimen,  $\times 15$ , showing proportions in relation to the *Catenipora* corallites. (R)
3. Paratype,  $\times 40$ , incomplete on left side, but with large enclosed secondary cavity on right; opening at right of top, permitting entry of matrix. From slide 665h.
4. Paratype,  $\times 31$ , arched body with thicker walls of vertical fibers; individual plates not evident. From slide 665i.
5. Paratype,  $\times 20$ , a smaller individual from a relatively thick section; wall structure obscure. From slide 665i.
8. Paratype,  $\times 18$ , body largely occupied by calcite; small partly enclosed space on lower left. From slide 665g.

*Orbiculoidea*(?), sp.

6. Section,  $\times 18$ , showing flat lower valve; arched upper valve with some inorganic calcite on the interior. From slide 666i.
7. Section of a smaller individual,  $\times 22$ , probably near the shell edges. From slide 666f.

From colony of *Catenipora workmanae*, Second Value formation, Cooks Range, New Mexico.

Unnamed body

P. 119

9. Section,  $\times 35$ , suggestive, except for extension on the left, of an eccentric section through a coiled shell. From slide 666l; Second Value formation, Cooks Range, New Mexico.

*Slocomia quadrata* Flower, n. sp.

P. 111

10. Holotype section,  $\times 20$ . From slide 666f; Second Value formation, Cooks Range, New Mexico.

*Moundia fibrosa* Flower, n. sp.

P. 110

11. Two paratype individuals,  $\times 35$ ; from symmetry, both sections appear to be transverse rather than longitudinal; plates unusually distinct. From slide 665i.
12. Holotype,  $\times 40$ , same specimen as that on the right of pl. 10, fig. 11. From same slide. Second Value formation, southern end of Franklin Mountains, El Paso, Texas.

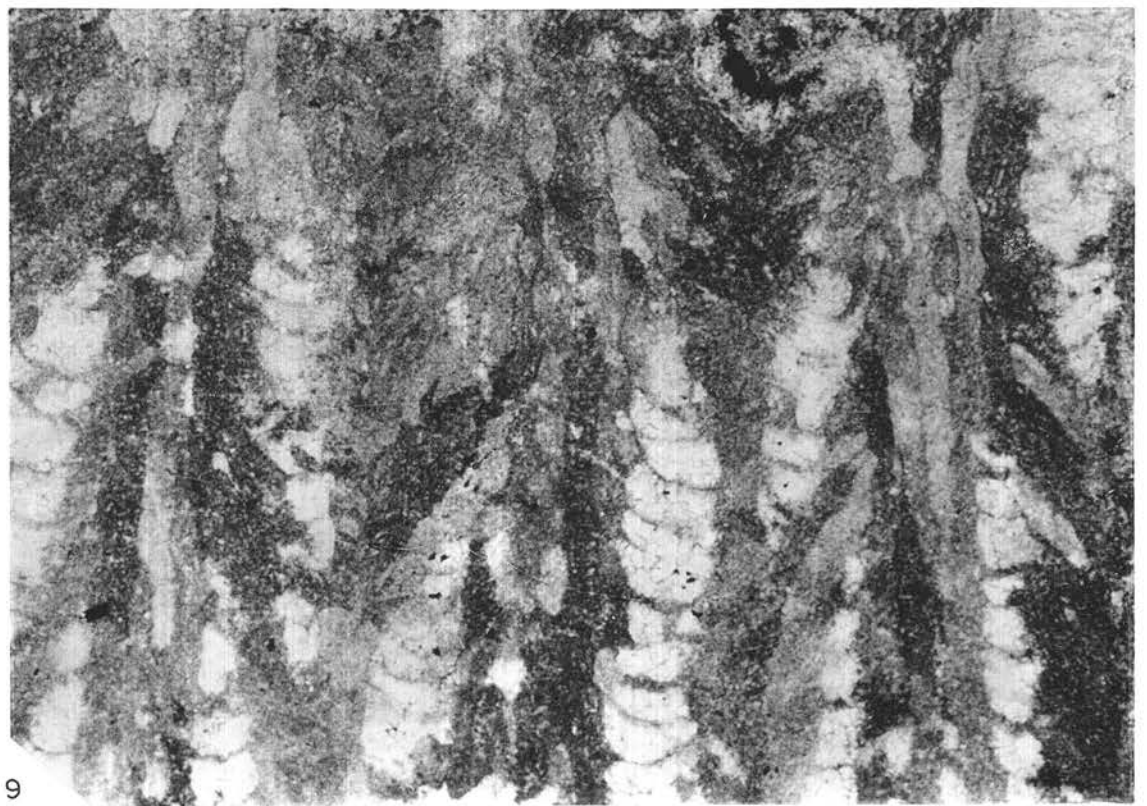
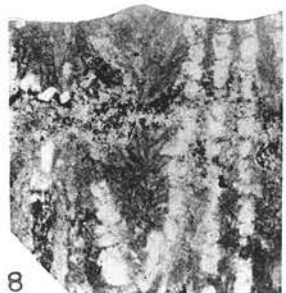
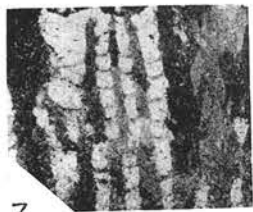
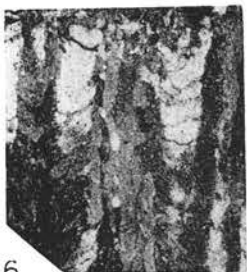
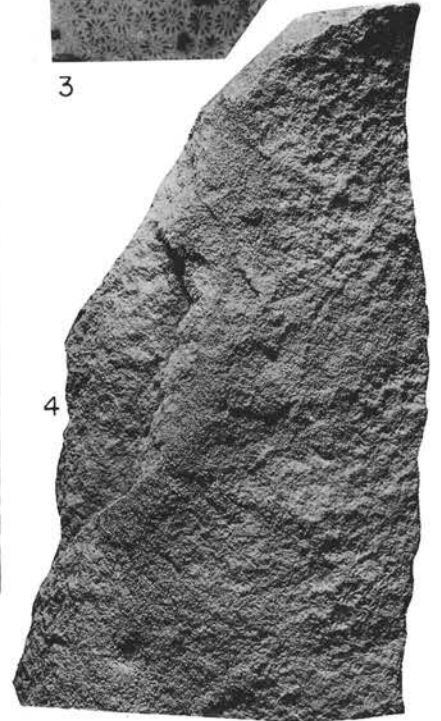
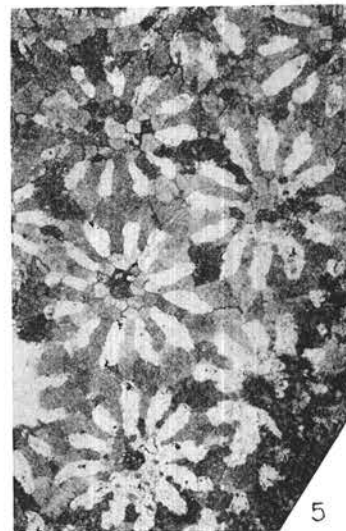
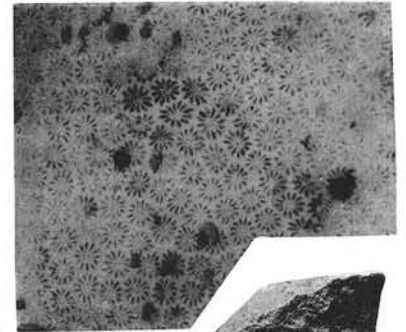
## PLATE 13

*Protrochiscolithus magnus* (Whiteaves)

P. 55

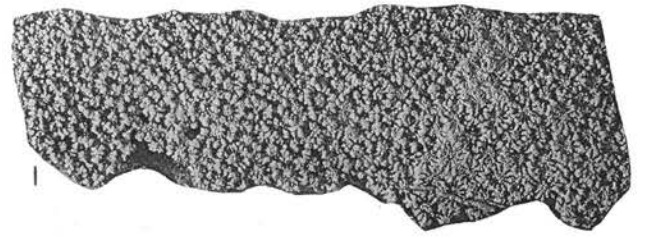
- 1-2. Portions of vertical section  $\times 40$  and  $\times 14$ , showing on left a nearly median longitudinal section through a septum, in which oblique bacular elements are evident; those below bend forward strongly and join the columella; the anterior baculi truncated by the columella. On the right, V-shaped trabeculae forming a septum show poorly defined boundaries. No. 733c.
3. Opaque cross-section,  $\times 2$ , showing dark radial lines, which are interspaces between septa, which join the light columellae at corallite centers.
4. Weathered surface,  $\times 2$ , showing prominent raised corallite walls and slight elevation of columellae.
5. Cross-section,  $\times 14$ , showing bacular elements forming walls and septa, small polygonal baculi of columella, and light interseptal spaces. No. 733f.
6. Portion of a longitudinal section,  $\times 14$ , showing columella of vertical rods in center, flanked by interseptal spaces with transverse, slightly concave tabulae; below, the plane of the section passes into the septa. No. 733b3.
7. Longitudinal section,  $\times 14$ , off center of a corallite, cutting several septa and interseptal spaces, the latter with tabulae; common walls shown at the sides. No. 733b2.
8. Longitudinal section,  $\times 14$ , showing, in the center, a common wall with V-shaped trabecular structure. No. 733b2.
9. Longitudinal section,  $\times 40$ , showing columnar baculi at upper left and upper right, and less clearly, at center; elsewhere there are clear interseptal spaces traversed by tabulae. The section cuts the septa at various angles, showing V-shaped trabecular structure of varying clarity, but with baculi not well developed nor clearly outlined. Small light spots occur in the septa, but are not properly pores. No. 733g.

Hypotype, No. 733; from the Selkirk limestone, Tyndall quarries, Manitoba.





2



3



4



5

## PLATE 14

*Protochisolithus hembrilloense* Flower, n. sp.

P. 56

1. Holotype,  $\times 2$ , an etched silicified colony, showing the surface; for further enlargement, see pl. 16, fig. 2. No. 734; from Second Value formation, Hembrillo Canyon, San Andres Mountains, New Mexico.

*Protochisolithus magnus* (Whiteaves)

P. 55

2. Section,  $\times 14$ , very slightly oblique to the vertical plane, with interseptal spaces widening where plane of section is eccentric, converging as section approaches the center, and showing columella of bacular rods where center is attained. No. 733b.
3. Vertical section,  $\times 14$ , showing trabecular septa verging upon condition in which baculi are discrete and well bounded; septa trabecular at midheight at extreme left; in upper center the section cuts essentially the axis of a septum, here showing oblique baculi, some of which become vertical and join the columella, this part being shown in greater enlargement in fig. 4. No. 733a.
4. Further enlargement,  $\times 32$ , showing oblique baculi of septum, some of which become vertical and join the columella.
5. Cross-section, about  $\times 40$ , showing small polygonal baculi of columella, with septa and common walls trabecular, and showing variation in the clarity of the boundaries of the baculi. No. 733g.

No. 733; from the Selkirk limestone, Tyndall quarries, Manitoba.

## PLATE 15

*Pragnellia delicatula* Flower, n. sp.

P. 52

- 1-7. Seven syntypes, all  $\times 3$ , showing variation of form of fragments, with corallites uniform in size but variable in spacing, some being contiguous, others widely separated. Figs. 4 and 6 represent flattened branches; others are essentially round in cross-section. No. 732; from the coral bed of the Aleman dolomite, from slopes just east of mouth of McKelligon Canyon, El Paso, Texas.

*Protrochicolithus alemanensis* Flower, n. sp.

P. 56

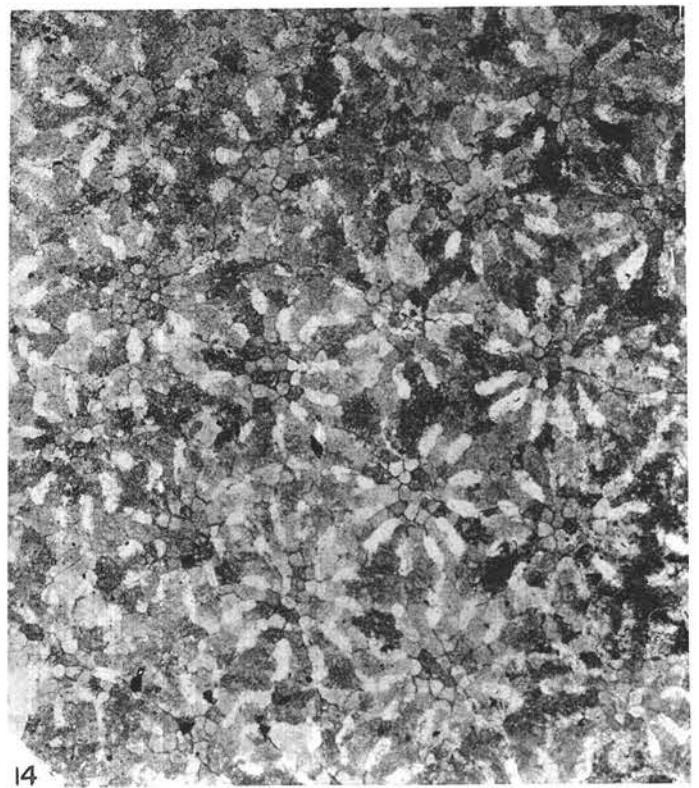
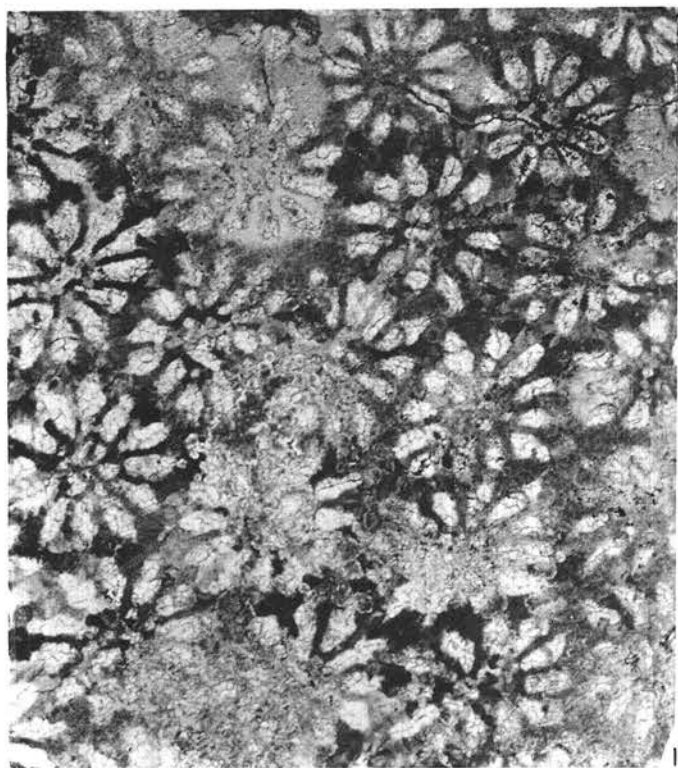
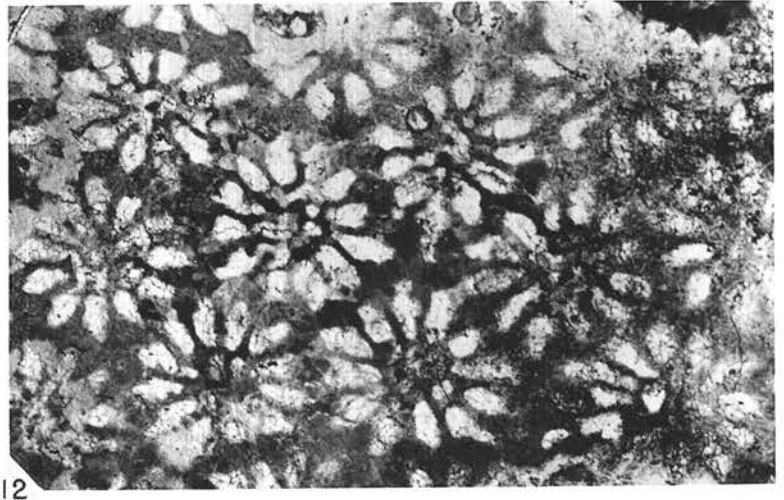
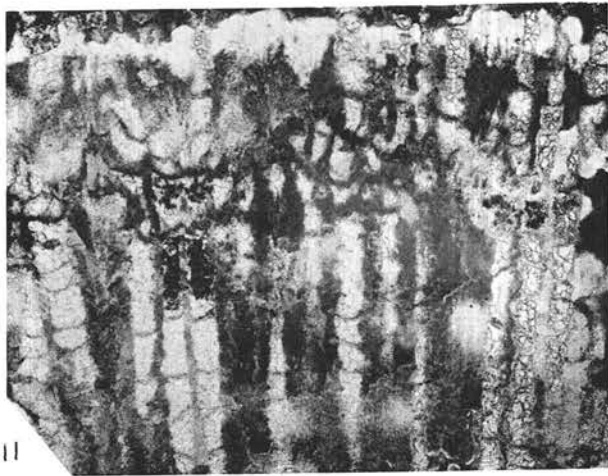
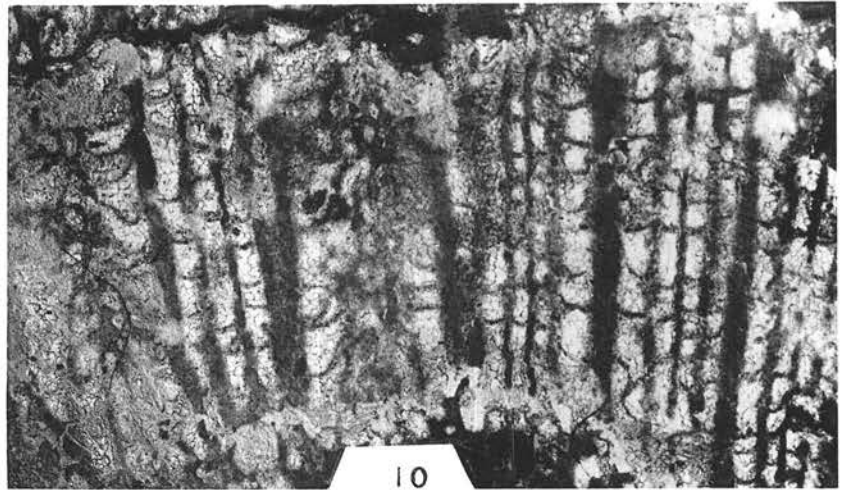
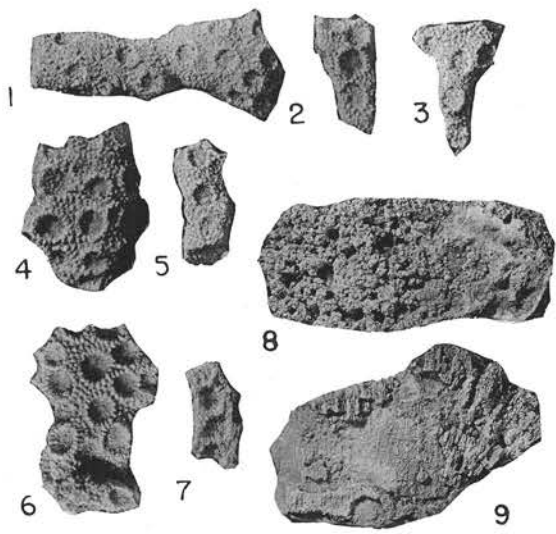
- 8, 9. Top and side views of the holotype colony,  $\times 1$ , prior to sectioning.
10. Longitudinal section,  $\times 13.5$ ; at extreme left, and again just to left of center, the section cuts the vesicular columellae; elsewhere the section intersects corallites off center, showing thick common walls, thin septa, and rather broad interseptal spaces with traversing tabulae.
11. Portion of another longitudinal section,  $\times 13$ , with some common walls showing traces of V-shaped structures, which are, for the most part, lost by replacement.
- 12, 13. Two cross-sections,  $\times 14$ , showing thick common walls, thin septa, broad interseptal spaces, and rather large vesicular columellae.
- USGS; from the Aleman formation, probably the coral zone, Hueco Mountains, New Mexico.

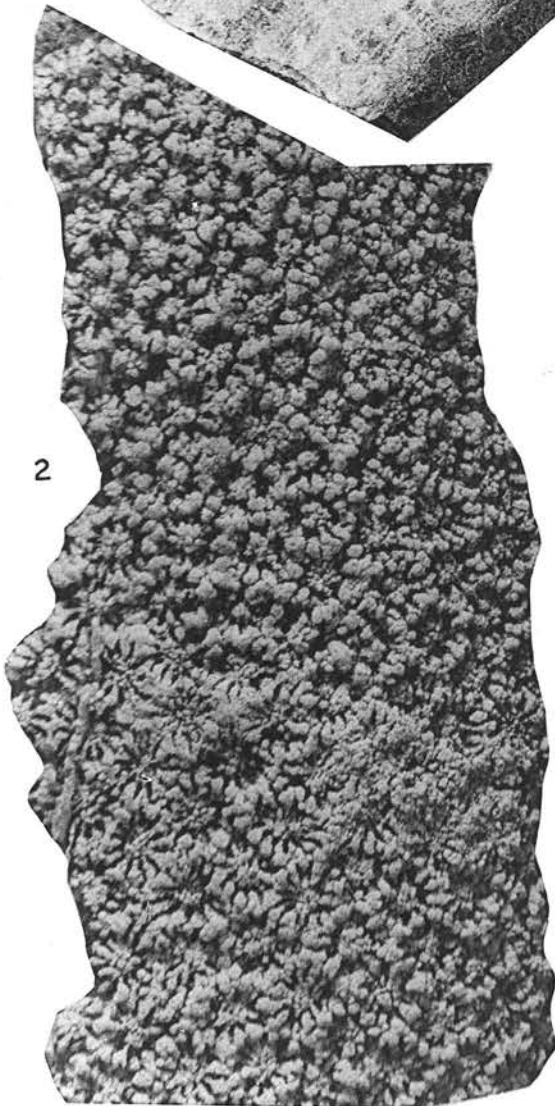
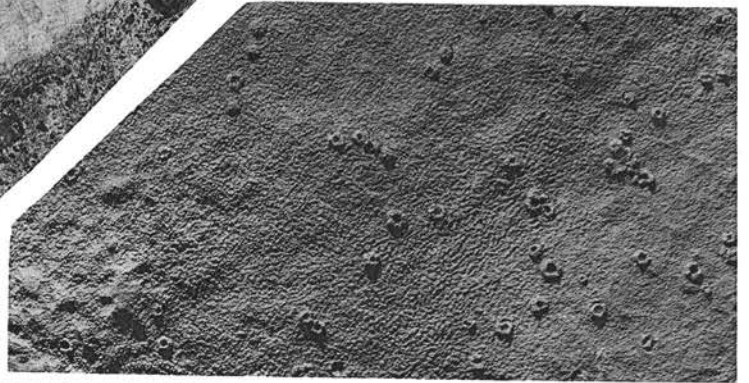
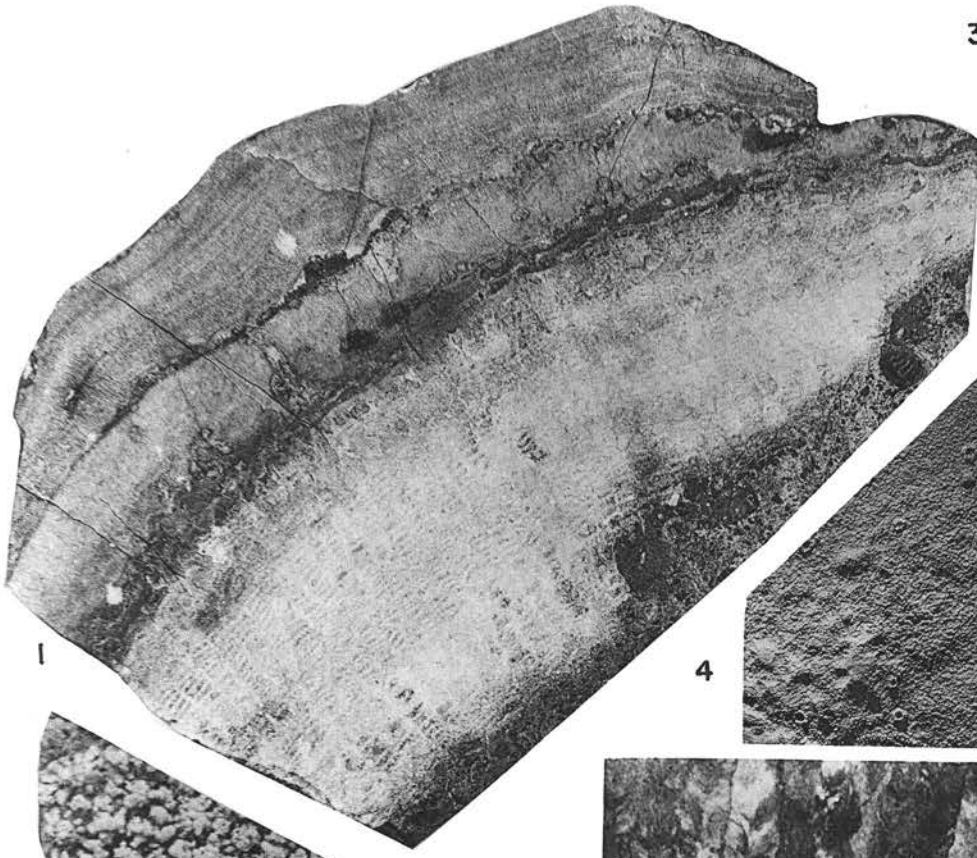
*Protrochicolithus magnus*

P. 55

14. Cross-section at same enlargement as figs. 12 and 13, showing different size of corallites, large columella of baculi, and much thicker septa, which broaden and merge into the common walls. No. 733c; from the Selkirk limestone, Tyndall quarries, Manitoba.







## PLATE 16

*Coccoseris astomata* and *Crenulites duncanae* Flower, n. sp.

Pp. 56, 84

1. Vertical section,  $\times 1$ , through holotype of *Coccoseris astomata* growing on holotype of *Crenulites duncanae*. Nos. 670 and 671 respectively; Second Value formation, Scenic Drive crest, El Paso, Texas.

*Protochiscolithus hembrilloensis* Flower, n. sp.

P. 56

2. Enlargement of holotype surface,  $\times 5$ , showing variation in relief of the corallites, from the relatively flat surfaces shown in the lower third to corallites with well-elevated walls; the trabecular units raised and rounded, septa lower, and columella definitely elevated. See pl. 14, fig. 1. No. 734; Upham dolomite, Hembrillo Canyon, San Andres Mountains, New Mexico.

*Coccoseris astomata* Flower, n. sp.

P. 56

- 3, 4. Enlargements of portion of colony surface. Fig. 3, detail,  $\times 15$ , showing pitted surface with several *Lichenocrinus*. Fig. 4, a large area,  $\times 2.5$ , showing granular aspect at lower magnification, absence of definite corallite areas, and numerous attached *Lichenocrinus*. No. 670.
5. Vertical section from distal part of colony,  $\times 15$ , showing subparallel baculi; alteration produces variations, but the margins are uniformly clear, and within there are varying aspects of original V-shaped structures, essentially monacanthine trabeculae. No. 670a.

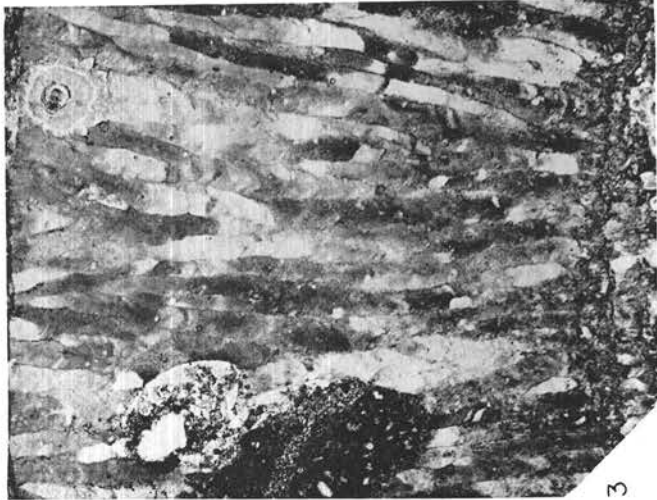
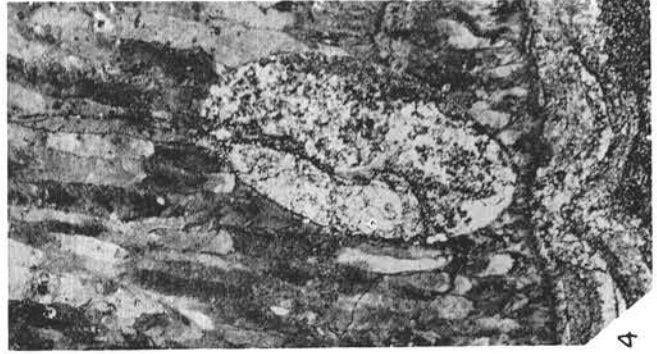
## PLATE 17

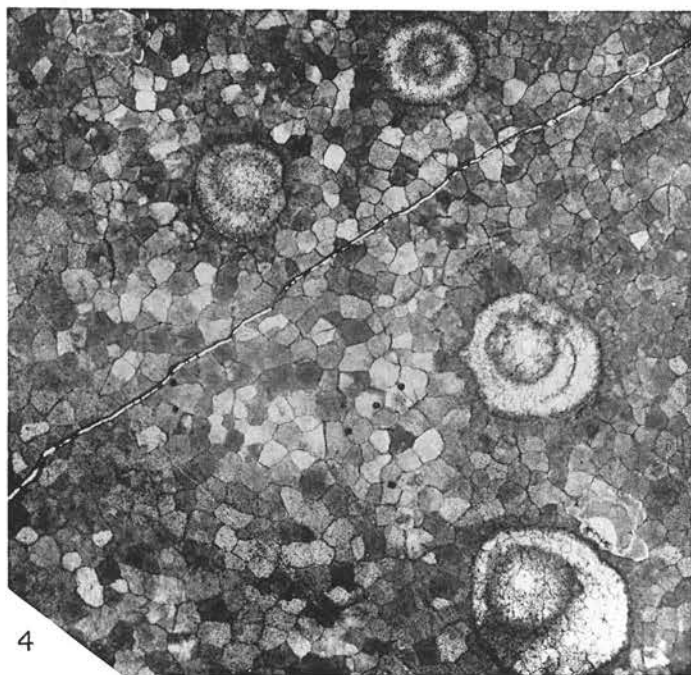
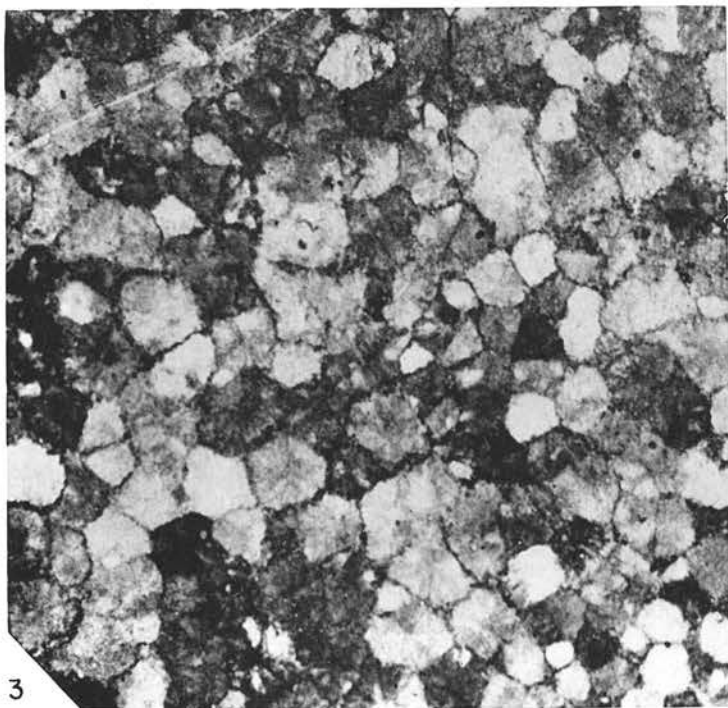
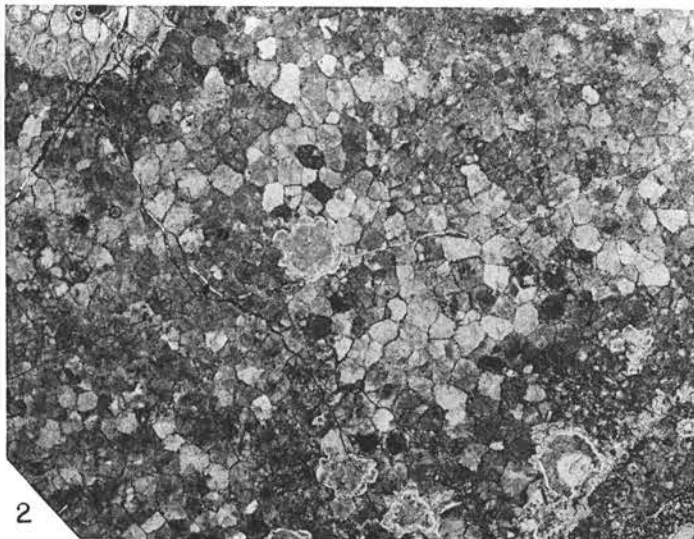
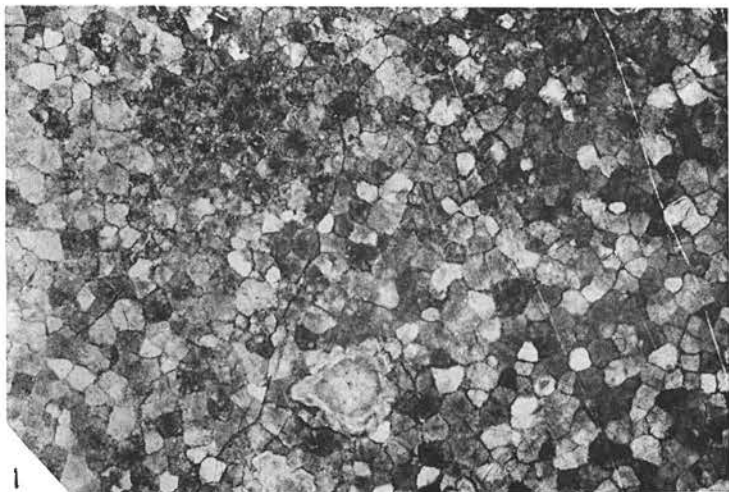
*Coccoseris astomata* Flower, n. sp.

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1. Vertical section,  $\times 22$ , showing one of the very rare examples of baculi, some of which are slightly oblique and suggestive of those which, in other species, occupy the corallites; here, however, no definite corallites can be recognized. Embedded body at the top of the section is presumably a *Lichenocrinus*, similar to those seen on the surface. No. 670a.
2. Vertical section,  $\times 11$ , showing interruptions of growth in a series of largely regular subparallel baculi; on the surface are some *Lichenocrinus*. No. 670e.
3. Vertical section,  $\times 11$ , showing, at extreme left, a black cavity; another cavity to its upper right, with lighter colored detrital material within; some baculi divergent from center; embedded *Lichenocrinus* at the upper right. No. 670a.
4. Vertical section,  $\times 11$ , showing small portion of colony base; undulate layers of possibly algal material below; in the center, an oval matrix-filled cavity. No. 670f.

Holotype, No. 670; Second Value formation, near crest of Scenic Drive, El Paso, Texas.





## PLATE 18

*Coccoseris astomata* Flower, n. sp.

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1. Cross-section,  $\times 11$ , showing polygonal baculi and some embedded *Lichenocrinus*.
2. Cross-section,  $\times 10$ , showing obscure arrangement of some baculi in groups suggestive of corallites; the body in the extreme upper left is an embedded bryozoan colony.
3. Cross-section,  $\times 40$ , showing baculi in greater detail; some retain centers of deposition and fine radial markings; others have lost this structure. No. 670c.
4. Cross-section,  $\times 11$ , showing uniform baculi and enclosed foreign bodies, probably *Lichenocrinus*. No. 670d.
5. Portion of surface, about  $\times 7$ . The relatively smooth area in the lower left is elevated above the remainder, suggesting that this may be the surface of the colony; if so, it must have been abraded smooth prior to burial; clearly, the granular structure in the remainder is the result of gentle etching by weathering, outlining the baculi and exposing several *Lichenocrinus*.
6. Cross-section taken at basal part of colony, showing clearly the closely packed baculi; at the left, the margin of the colony is lobate, but fails to suggest identity of individual corallites.

Holotype, No. 670; Second Value formation, Scenic Drive, El Paso, Texas.

## PLATE 19

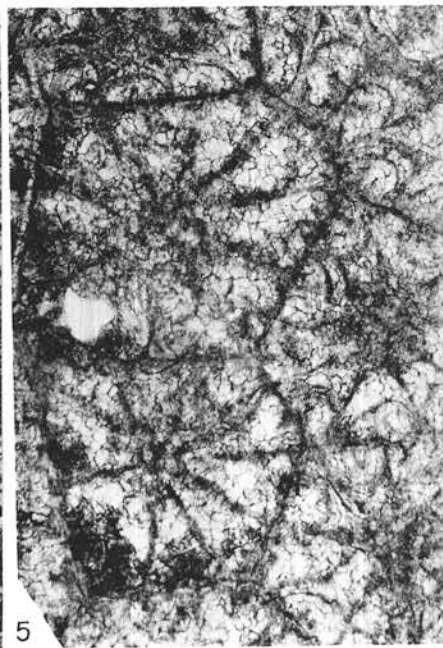
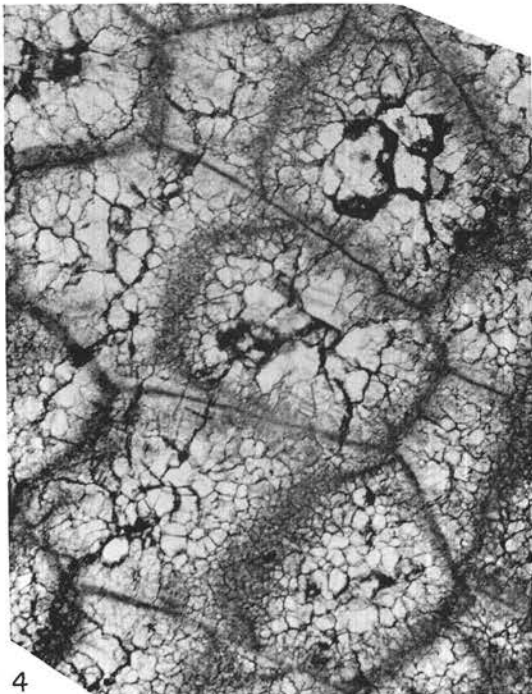
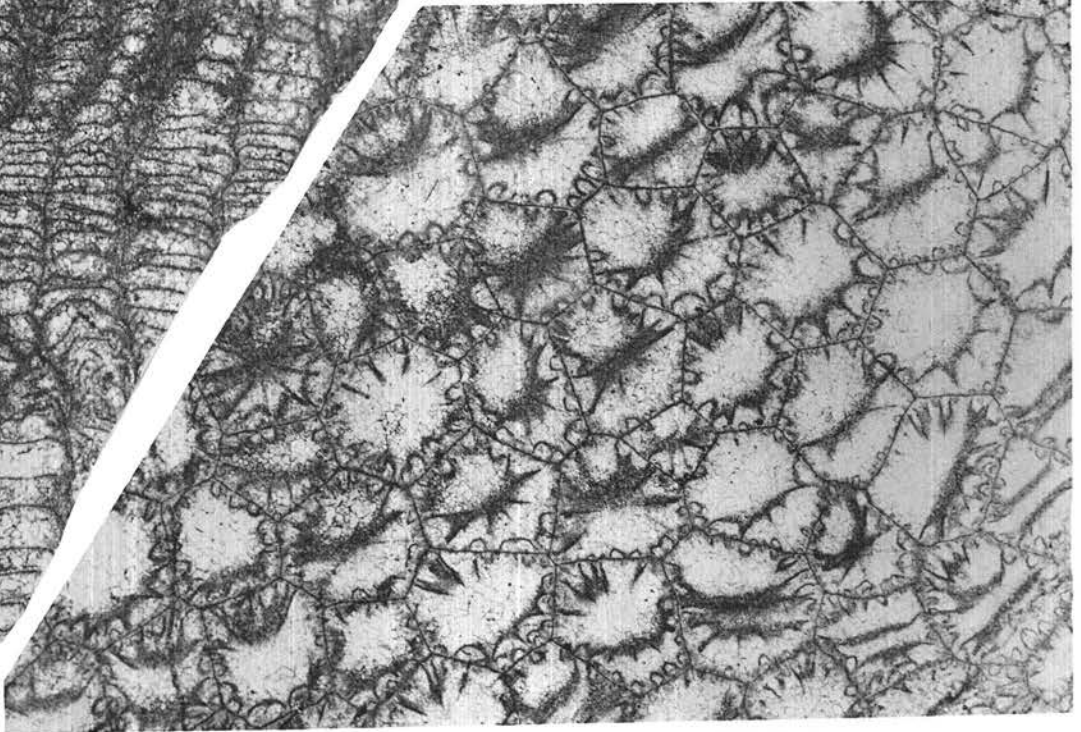
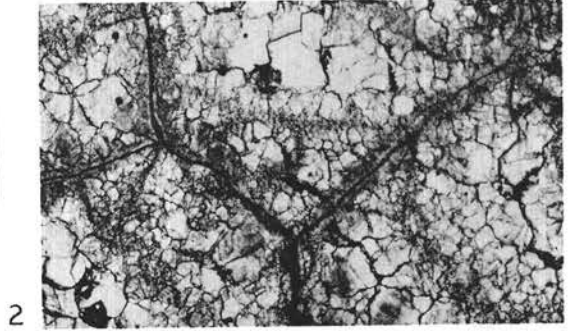
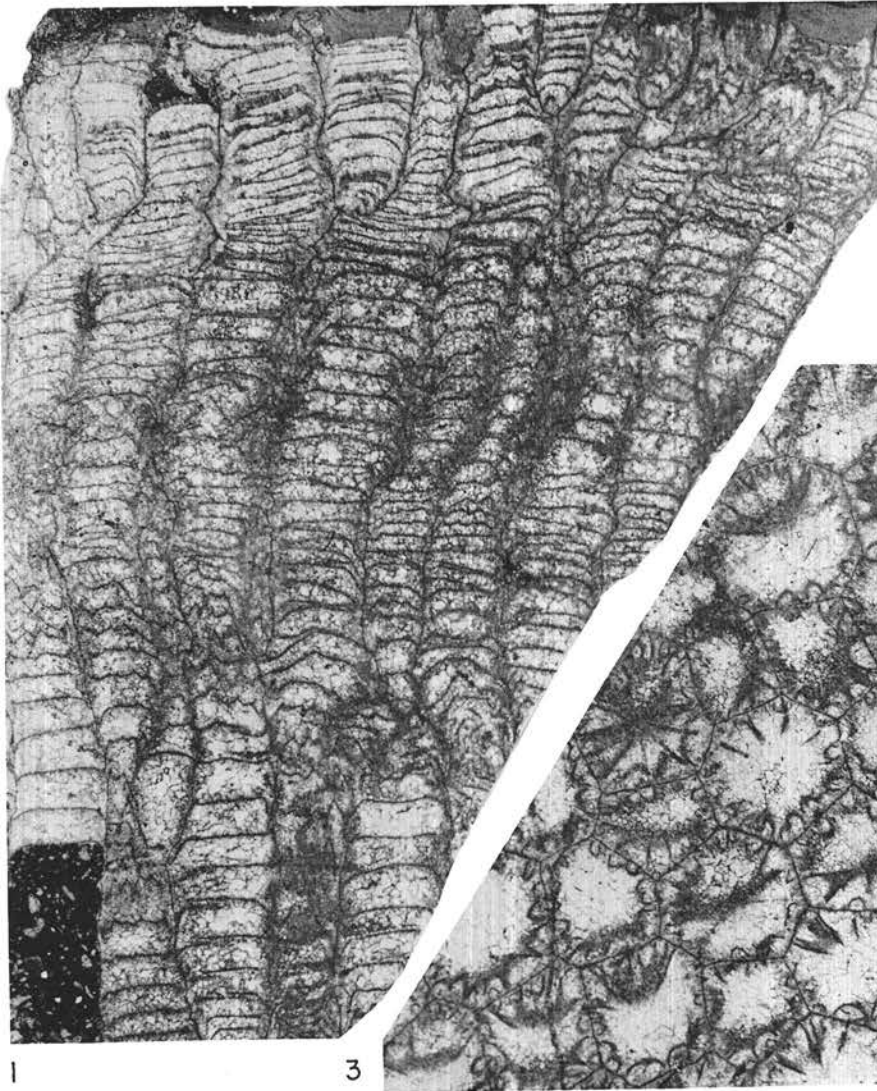
*Crenulites duncanæ* Flower, n. sp.

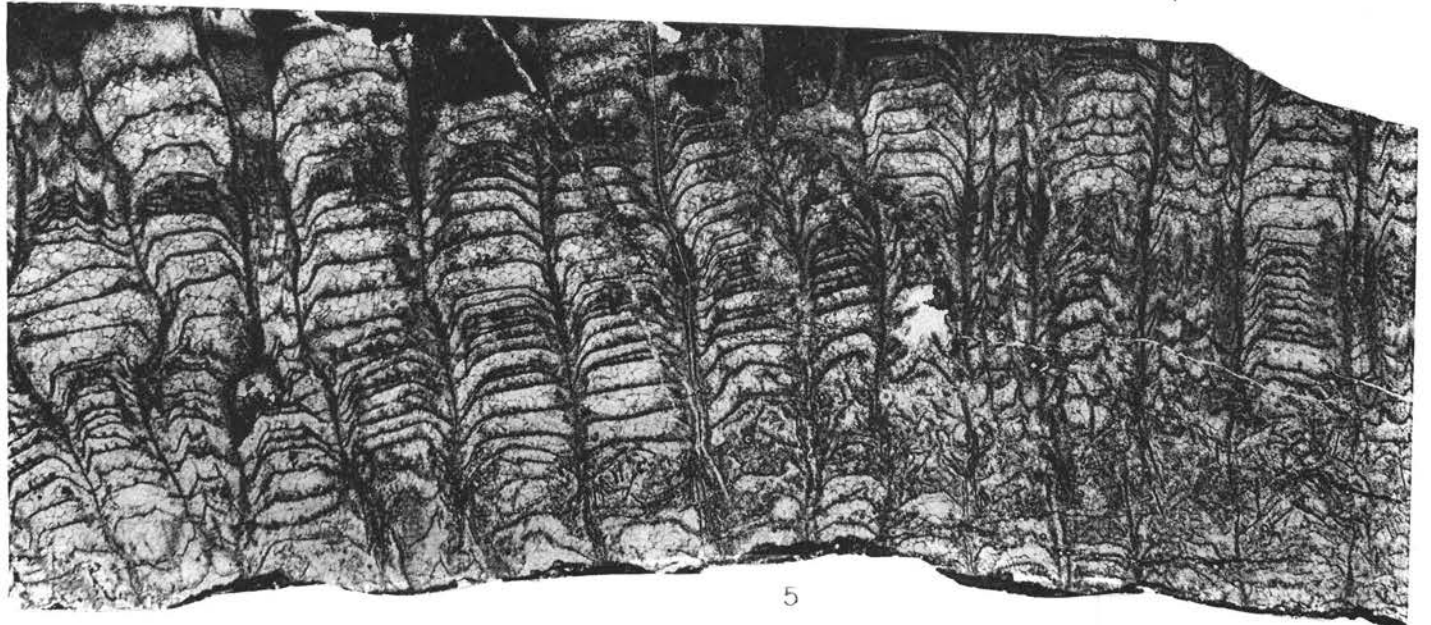
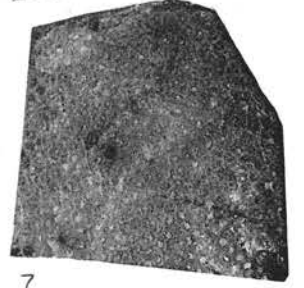
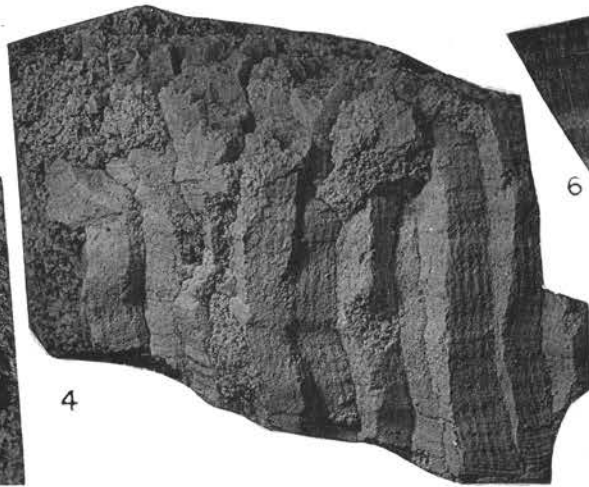
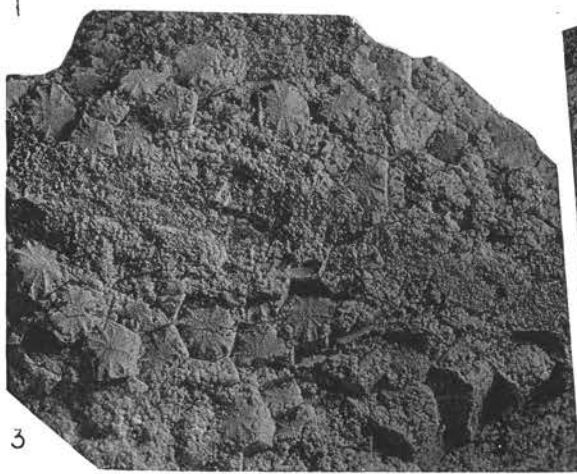
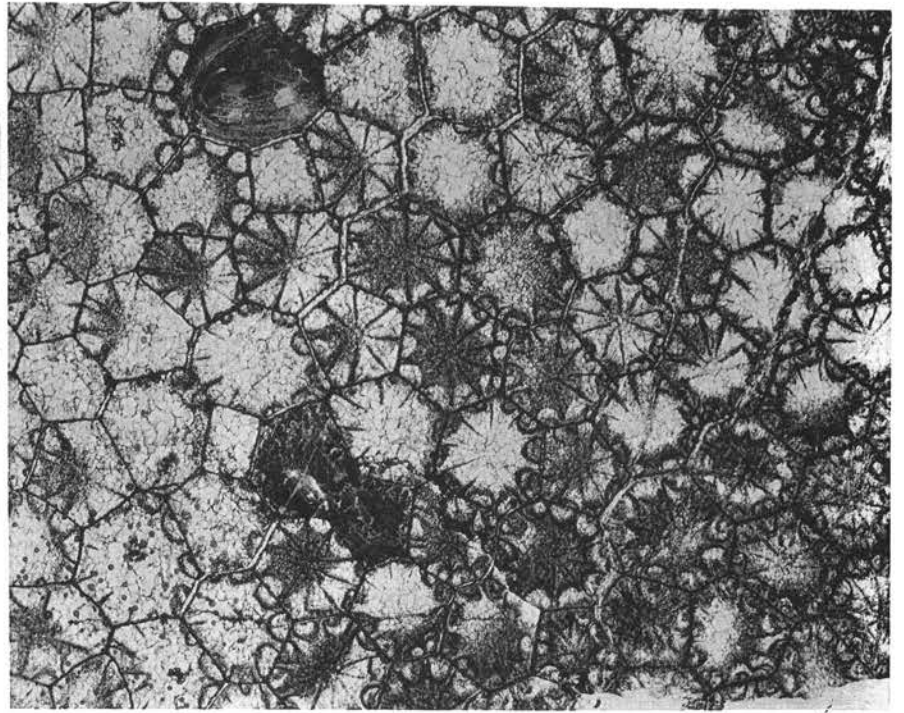
P. 84

1. Longitudinal section,  $\times 4$ , showing typical aspect of tabulae—transverse with down-turned edges in central sections, zigzag in eccentric sections; also wider spacing of tabulae in early portion of colony. No. 671a.
2. Portion of a cross-section,  $\times 40$ , showing thin, dark common wall, which is double at the extreme left. No. 672c.
3. Cross-section,  $\times 5$ , showing amplexoid septa and strong development of crenulate tabular edges. No. 671g.
4. Slightly oblique cross-section,  $\times 40$ , showing continuous common wall, obscure sclerenchyme and tabulae. No. 673d.
5. Cross-section,  $\times 40$ , showing a group of rather small corallites, with scollops of tabulae at upper right; long amplexoid septa in corallites to left of center. No. 672e.
6. Another part of the same section,  $\times 40$ , showing septa that appear to be extensions of the common wall rather than of the sclerenchyme, an effect of preservation.

Holotype, No. 671, and paratypes, Nos. 672 and 673; Second Value formation, near Scenic Drive crest, El Paso, Texas.







## PLATE 20

*Crenulites duncanæ* Flower, n. sp.

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1. Portion of weathered surface of paratype,  $\times 1$ , showing size of corallites; weathering has exposed the septa in many corallites. No. 672.
2. Cross-section,  $\times 5$ , showing wide variation in aspect of corallites, depending on relation of plane of section to tabulae and amplexoid septa. Major septa vary in number from 8 to 12; crenulate edges of tabulae show as scollops around the corallite circumferences. No. 672f. (R)
3. Adoral view,  $\times 3$ , of portion of a broken colony in which weathering produced separation along tabulae, here seen with downturned edges; the septa appear as faint ridges on the anterior surfaces. No. 673.
4. Lateral view of the same piece, showing faintly undulate walls, longitudinal markings indicating position of the septa, fainter transverse markings, and transverse undulations.
5. Longitudinal section,  $\times 5$ , showing wide variation in aspect of tabulae—transverse with downturned edges where section is central, developing amplexoid septa as extensions on anterior faces of tabulae where section is slightly eccentric, but showing zigzag crenulations of tabulae with amplexoid septa extensions of the upward directed angles in the most eccentric sections. No. 672b. (R)

Holotype, No. 671, and paratypes, Nos. 672 and 673; Second Value formation, near crest of Scenic Drive, El Paso, Texas.

*Nyctopora mutabilis* Flower, n. sp.

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6. Longitudinal section of portion of holotype colony,  $\times 1$ .
7. Transverse section of part of holotype colony,  $\times 1$ , showing size and gross aspect of corallites.

Holotype, No. 676; Second Value formation, near crest of Scenic Drive, El Paso, Texas.

## PLATE 21

*Nyctopora mutabilis* Flower, n. sp.

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1. Cross-section,  $\times 14$ , showing unusually thick walls with septal ridges short, unusually broad, their tips commonly rounded. Major and minor septa vary from those showing appreciable differences in length to others that are subequal. Concentric bands in corallites represent sections through curved tabulae. No. 676d.
2. Another cross-section from the same colony,  $\times 12$ , showing variation from thick-walled corallites with long major septa, their tips rounded or truncated, to thinner walled corallites with acicular septa. Commonly septa extending from opposite sides of the wall alternate in position, but some are opposed, as shown in the upper left. No. 678a.
3. Longitudinal section,  $\times 12$ , slightly oblique to corallite axes, passing through several walls and showing septa as linear extensions, without evidence of serration of their tips. Variation in form and spacing of tabulae is typical. No. 676b.
4. Longitudinal section, essentially parallel to corallite axes, showing variation in spacing and curvature of tabulae; at the upper right, the section encounters a corallite wall, and trabecular units are outlined, though recrystallization has obscured the original arrangement of the fibers. No. 676a.

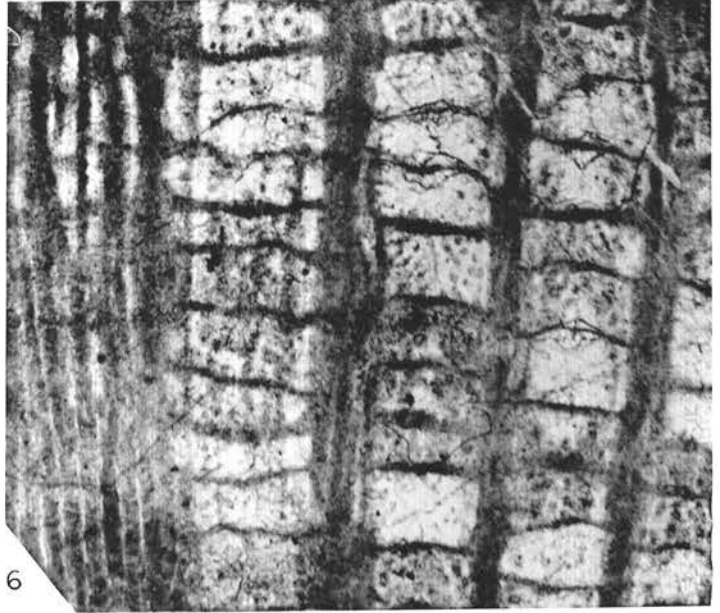
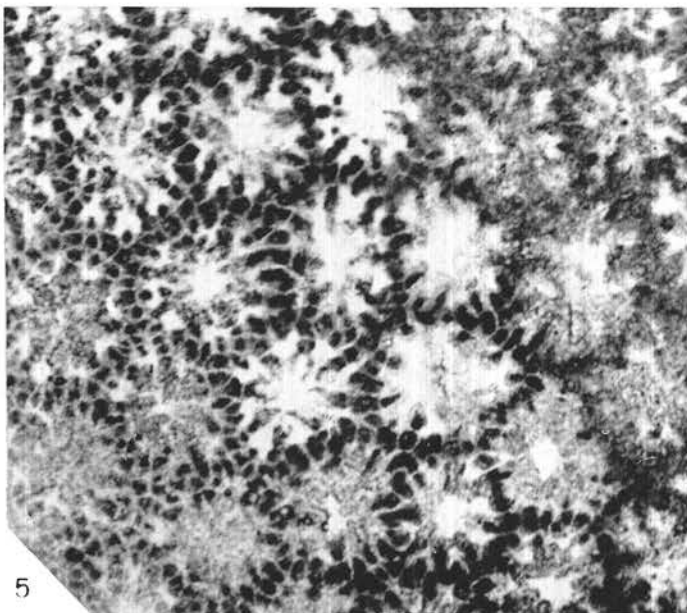
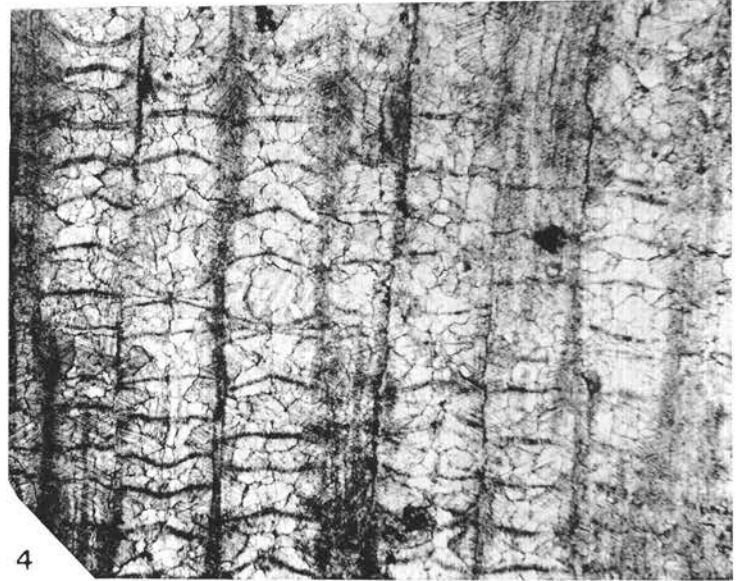
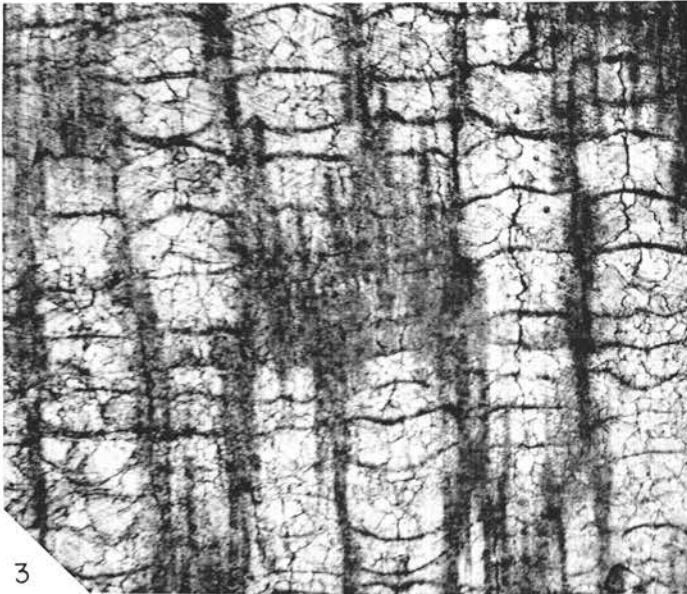
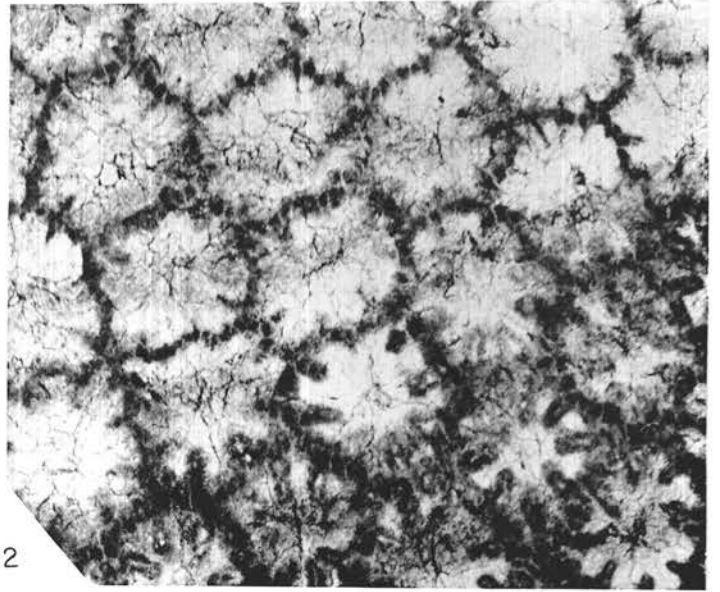
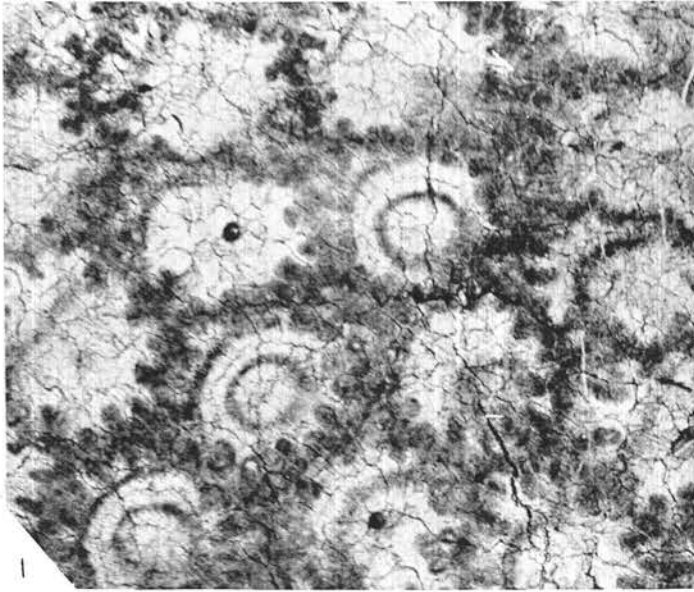
Holotype, No. 676, and paratype, No. 678; Second Value formation, near crest of Scenic Drive, El Paso, Texas.

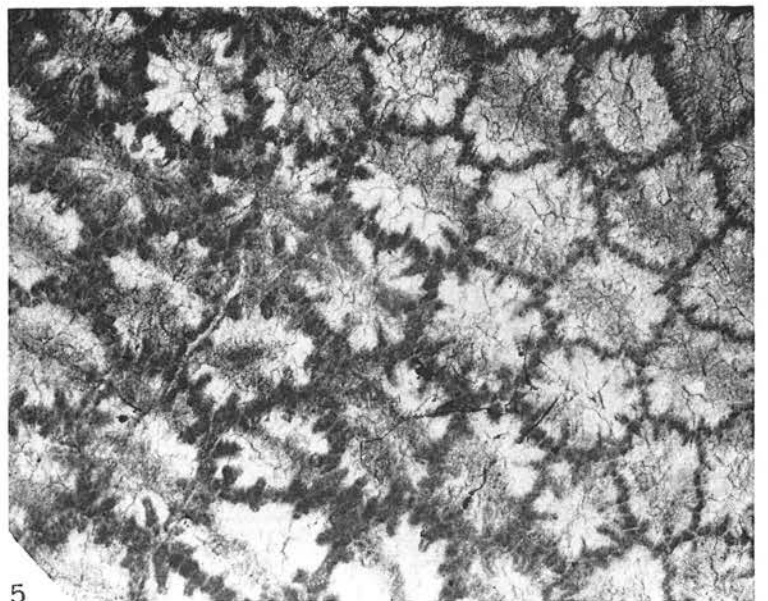
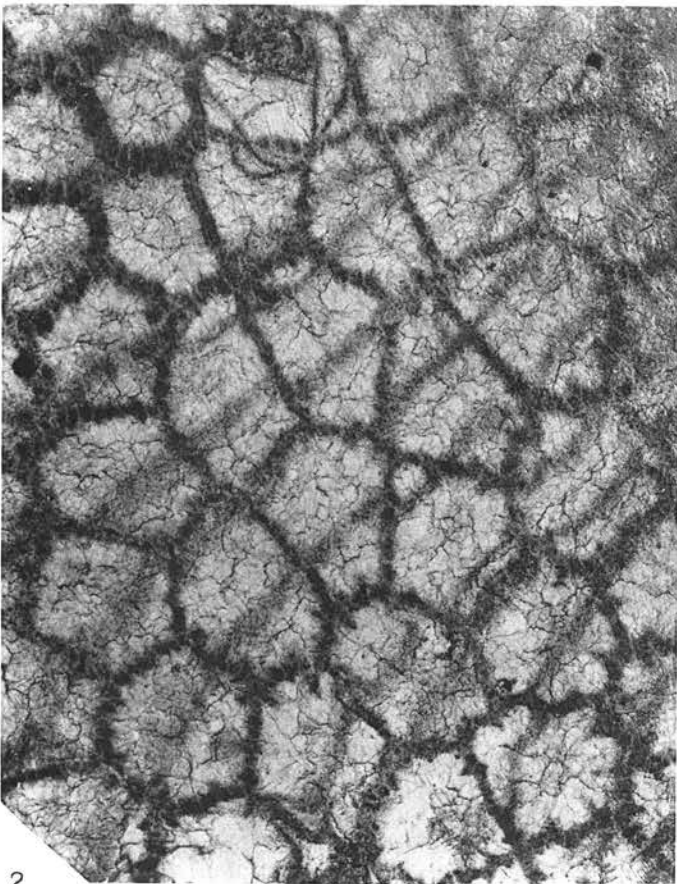
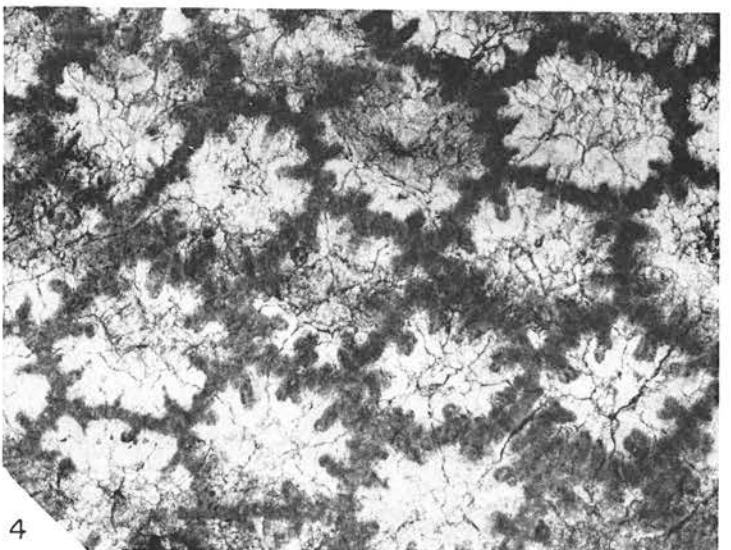
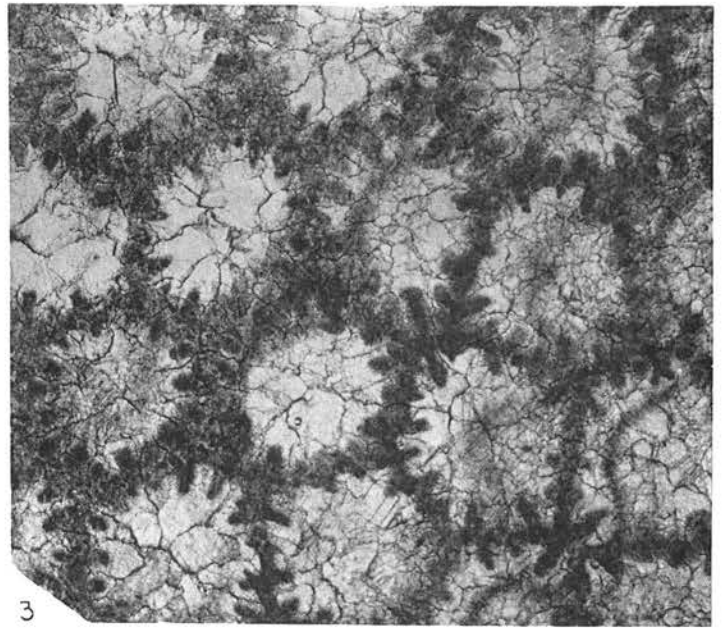
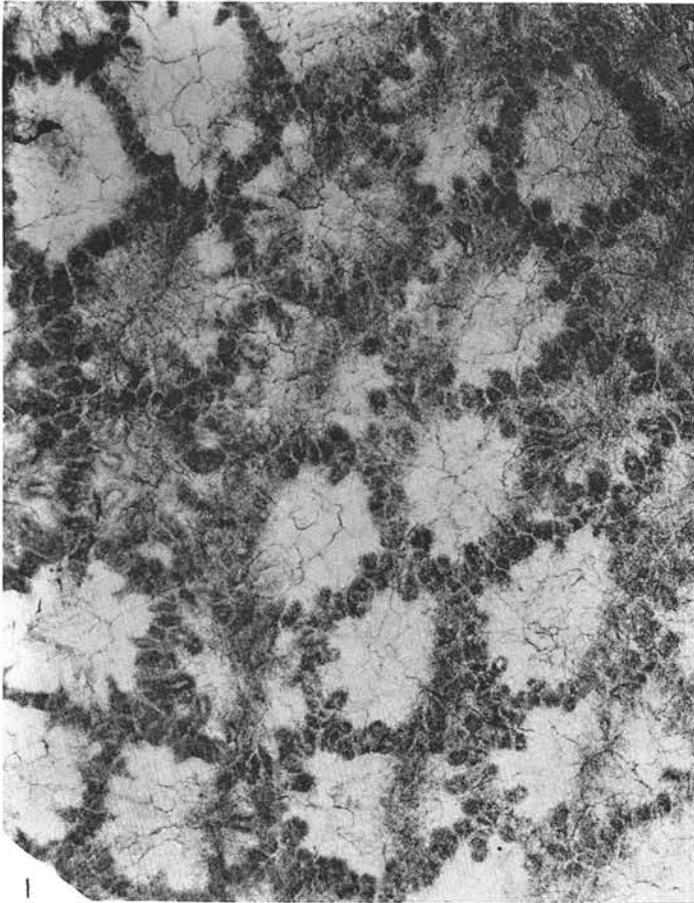
*Nyctopora(?)* sp.

P. 63

5. Cross-section,  $\times 20$ , showing walls and septa; particularly at the lower left, septa and walls are divided into several trabecular units, outlined by clearer calcite, in the width of the wall and in the length of the septa. Material within the corallites, lighter and granular, represents largely spheres of poikiloplasm. No. 745a.
6. Longitudinal section from the same colony,  $\times 20$ ; at the left, trabeculae form linear bands in the wall, lighter longitudinally continuous bands separating them; elsewhere the section cuts corallite cavities and shows small spheres of poikiloplasm arranged in obscure vertical and horizontal rows, but showing in some a curious oblique alignment. Such spheres are presumably attached to edges of septa. No. 745b.

A colony from the Burnam limestone, central Texas, differing from typical *Nyctopora* in the composition of walls and septa of more numerous trabecular units, and showing unusual development of poikiloplasm.





## PLATE 22

*Nyctopora mutabilis* Flower, n. sp.

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1. Cross-section,  $\times 14$ , showing variation in thickness and aspect of spines and walls. Throughout much of the section trabeculae are distinct, with narrow light passages between them; also, some show light central or axial regions. No. 676c.
2. Portion of colony shown in transverse section,  $\times 14$ , showing extremely thin walls, irregular corallites, and poor development of the septa. Section is slightly oblique, cutting tabulae. No. 676e.
3. Cross-section,  $\times 14$ , showing rather thick walls, wedge-shaped septa verging into others more elongated and with truncated tips; in much of the section, the distinction between major and minor septa is greatly reduced; walls here show maximum thickness observed. No. 676d.
4. Cross-section,  $\times 14$ , showing marked contrast in length of major and minor septa, and wide variation in shape of tips of septa. No. 678b.
5. Section,  $\times 12$ , showing rapid lateral transition from moderately thick walls and prominent septa at lower left, to thin walls in which septa are mere thickenings, often of convexities in the crenulate walls. Structure remains trabecular, and individual units can be discerned even where the gross features approach those of *Saffordophyllum*. No. 676f.

Holotype, No. 676, and paratypes, Nos. 677 and 678; Second Value formation, near crest of Scenic Drive, El Paso, Texas.

## PLATE 23

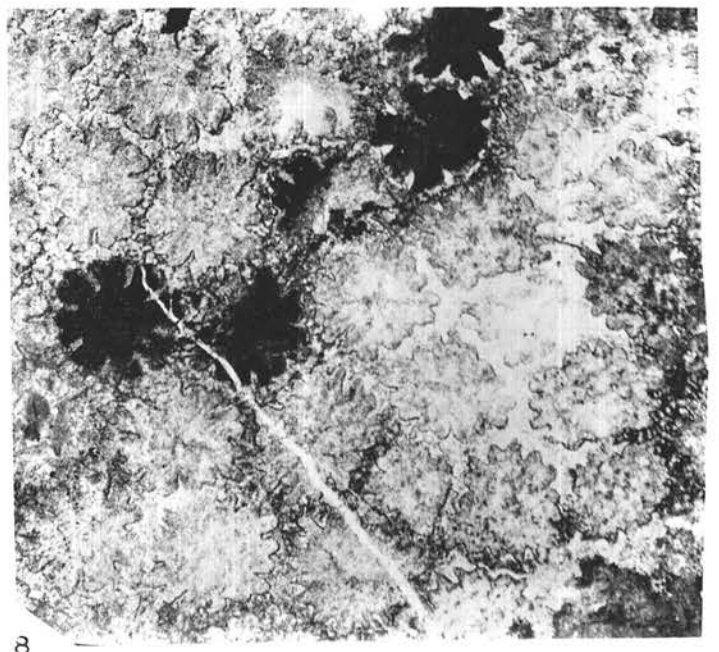
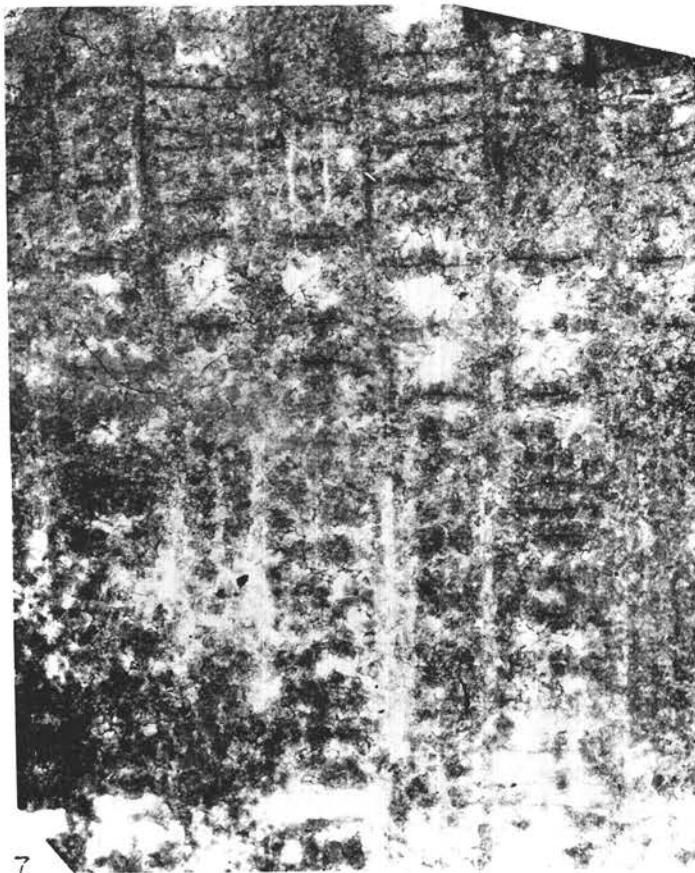
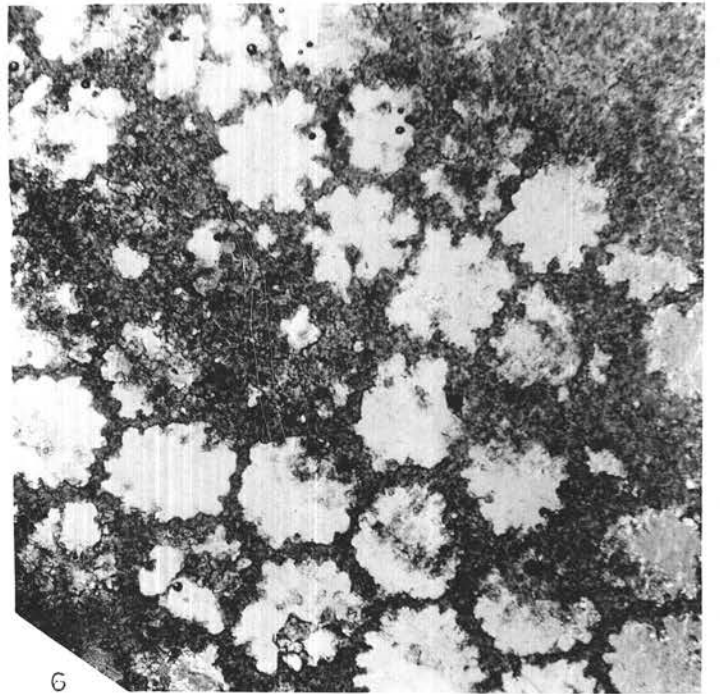
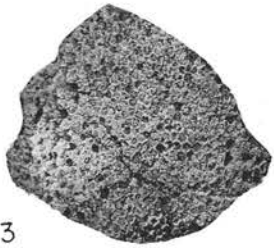
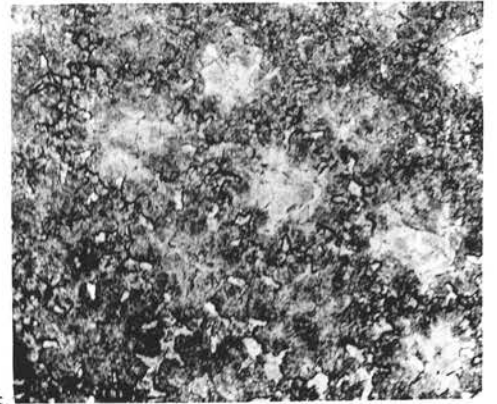
*Nyctopora nondescripta* Flower, n. sp.

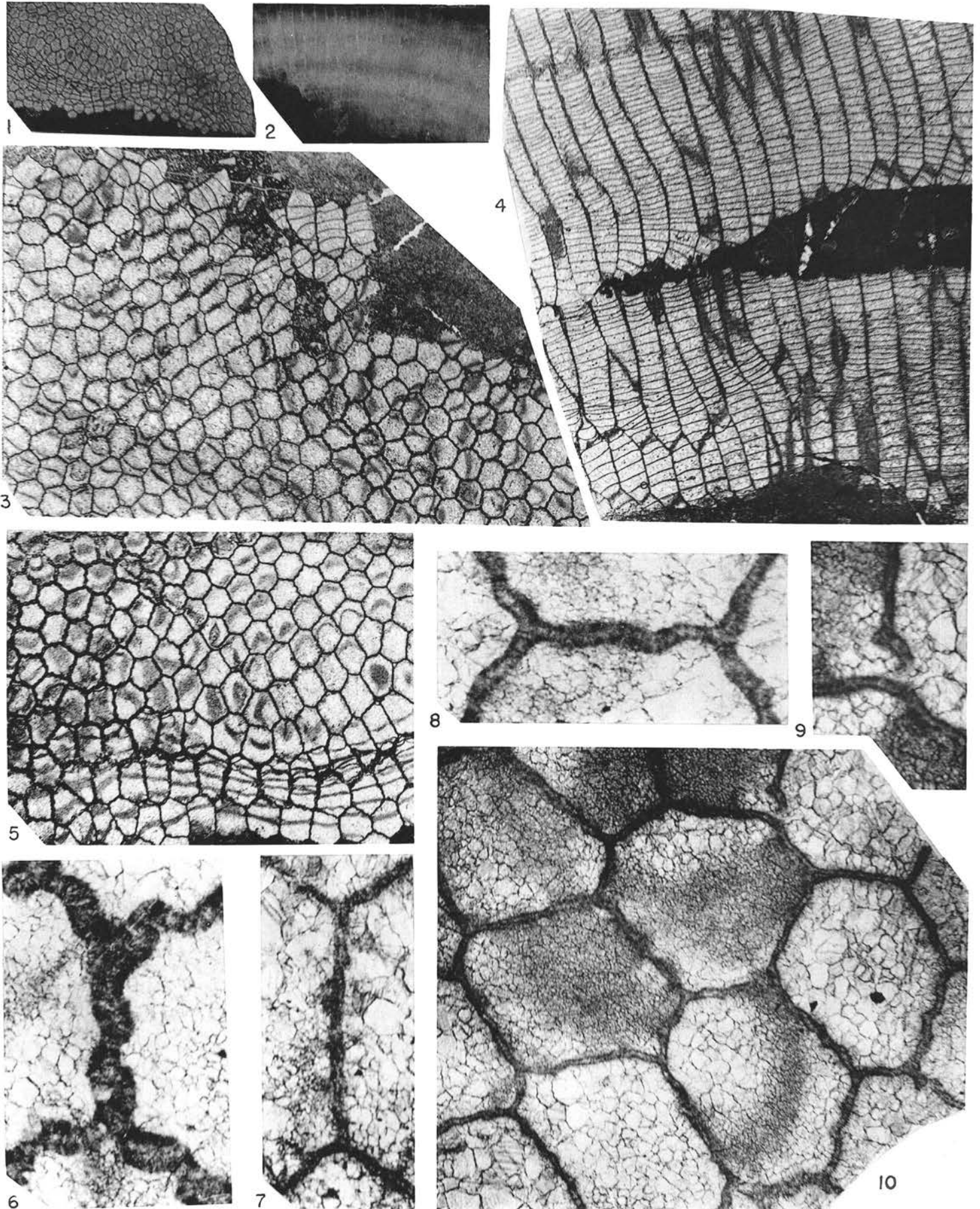
P. 64

1. Lateral view,  $\times 1$ , of an appreciable part of the colony.
2. Adoral view,  $\times 1$ ; textural variation is largely the result of replacement.
- 3, 4. Lateral and surface views,  $\times 1$ , of another fragment, showing more faithfully the original texture, with preservation of the septa, in the corallite.
5. Cross-section,  $\times 12$ , of a considerably replaced portion, but one showing clearly the width of the corallite walls and wedge-shaped sections of the septal ridges. No. 750a.
6. Cross-section,  $\times 12$ , showing a portion of the colony in which major and minor septa are essentially equal in length and thickness. No. 750c.
7. Longitudinal section,  $\times 12$ , showing spacing of tabulae. Spherical bodies are suggestive of poikiloplasm, but in view of extensive replacement, may be inorganic. No. 750c.
8. Cross-section,  $\times 12$ , showing in adjacent corallites wide variation between corallites with obscure minor septa, and long major septa, and those in which major septa are shorter and major and minor septa subequal in length.

Holotype, No. 750; coral zone of the Aleman formation, from the slopes just east of the mouth of McKelligon Canyon, El Paso, Texas.







## PLATE 24

*Saffordophyllum newcombae* Flower, n. sp.

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1. Cross-section,  $\times 1$ , showing size of corallites and relative thickness of walls.
2. Longitudinal section,  $\times 1$ .
3. Cross-section,  $\times 3$ , showing wide variation in the thickness and extent of crenulation of the walls. No. 675b. (R)
4. Longitudinal section, showing variation in spacing and occasional irregularities in form of the tabulae; at several points the walls are cut at steep angles, showing absence of serrations in the septal ridges. Variation in thickness of corallite walls is shown, particularly in the lower part of the figure. No. 675c. (R)
5. Cross-section,  $\times 3$ , showing in lower part the greatest extreme of wall thickening observed. No. 675a. (R)
- 6-8. Enlargements of the walls,  $\times 30$ , showing wide variation in thickness; normal fibrous texture is shown, particularly in figs. 6 and 8; the fibers of the two fused walls meet centrally, where a faint and indefinite light line can be seen. No. 675b.
9. Enlargement of a pore at the corallite angle,  $\times 30$ , from upper part of fig. 10.
10. Cross-section,  $\times 11$ , showing three pores; one, at the right of the center top, is enlarged in fig. 9; almost directly below, at the lower right of the next lower corallite, is another, slightly obscured by the darker calcite of a tabula; a third is seen at the lower right, above and the right of the numeral "10," but the section evidently cuts this pore nearly at its margin, for it is much smaller. No. 675.

All figures are from the holotype, No. 675; Second Value formation, near crest of Scenic Drive, El Paso, Texas.

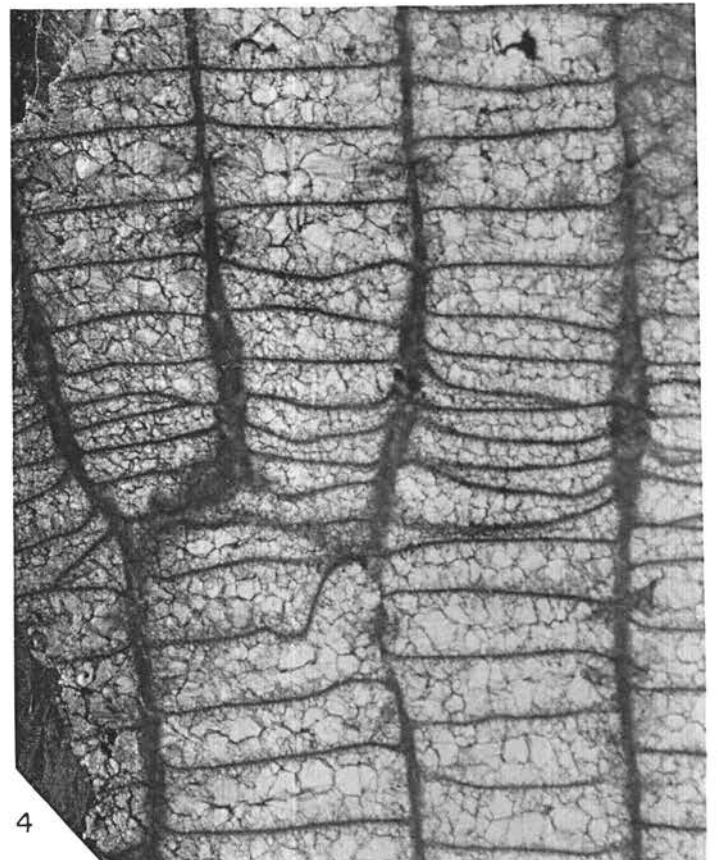
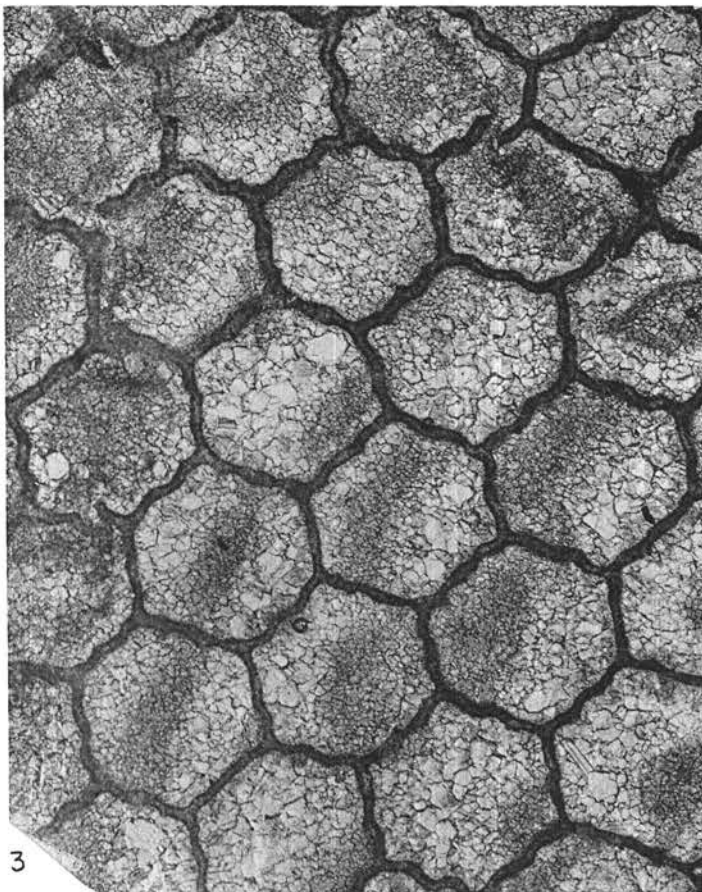
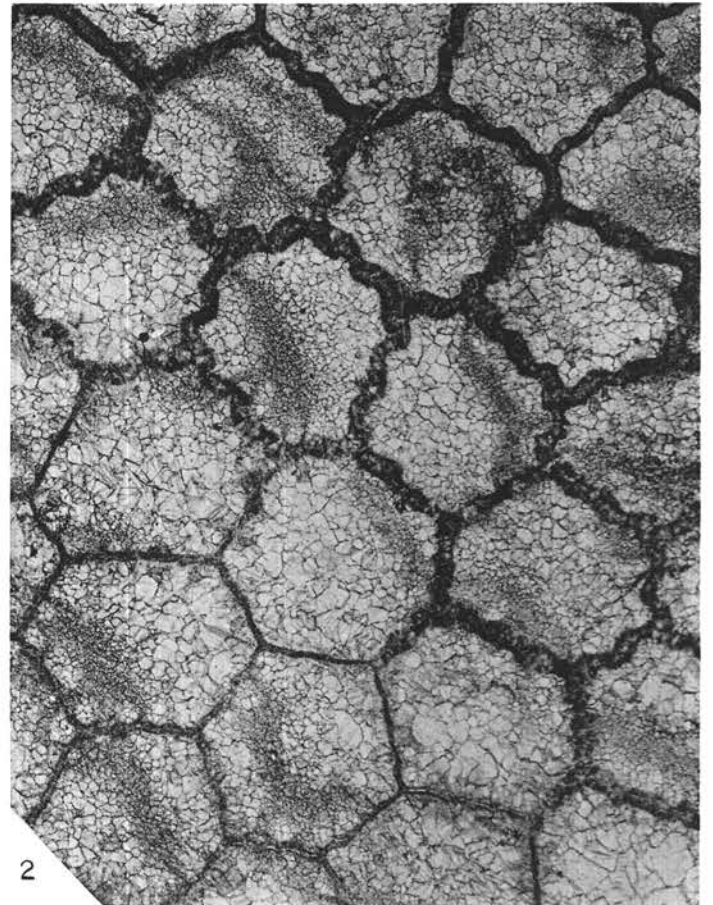
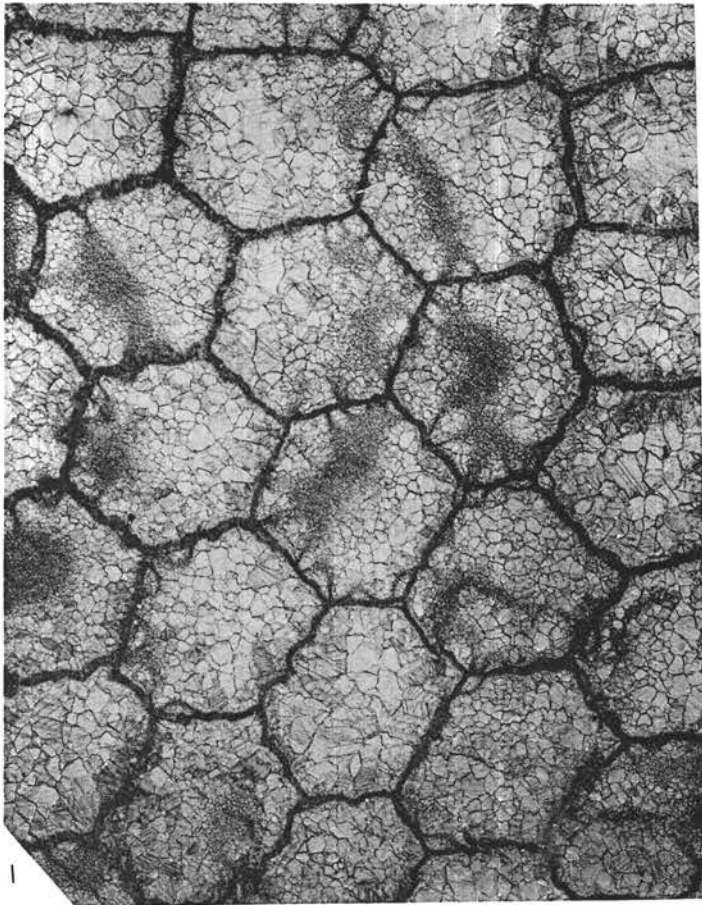
## PLATE 25

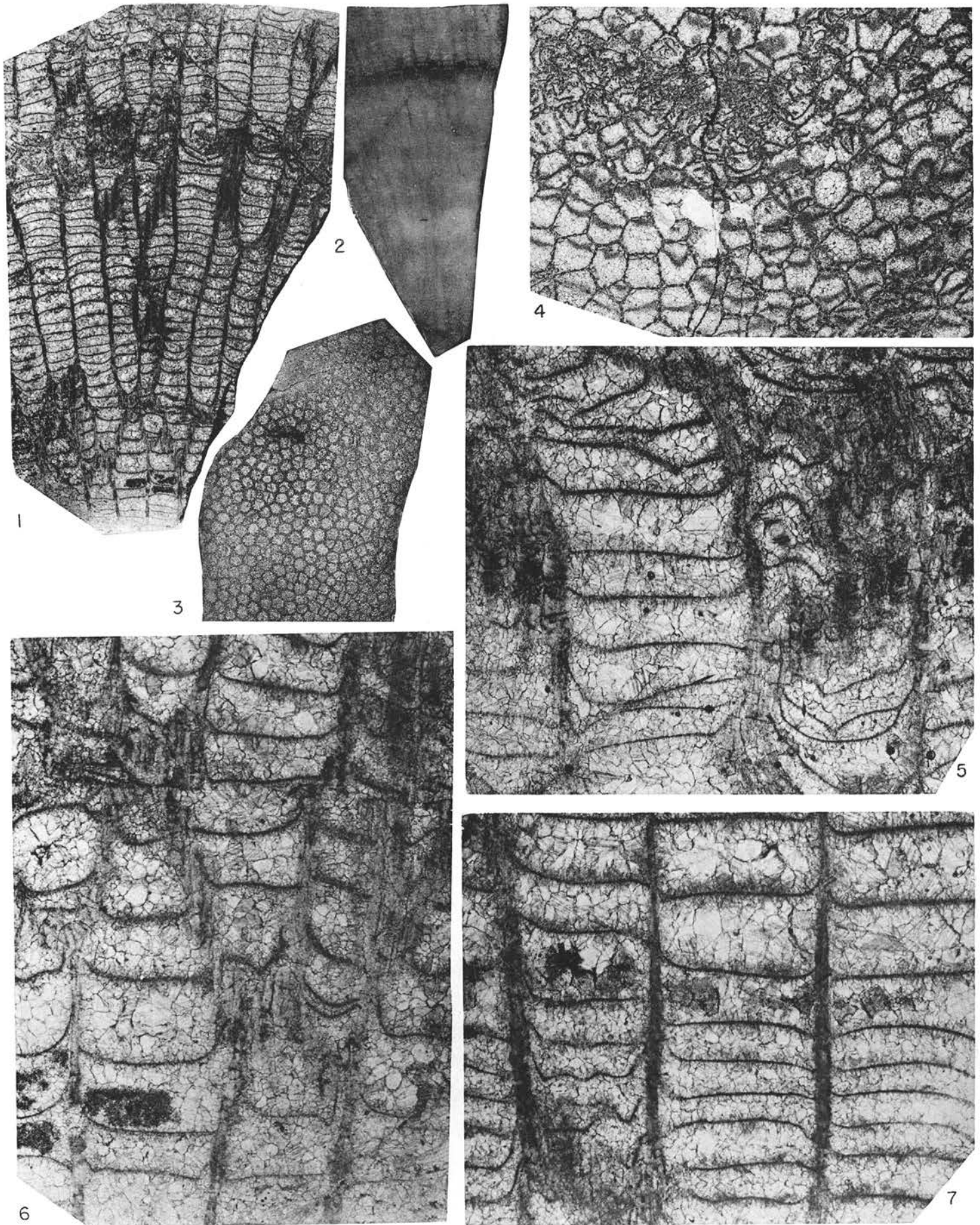
*Saffordophyllum newcombae* Flower, n. sp.

P. 60

1. Cross-section,  $\times 14$ , showing a group of moderately thin-walled coral-lites, with crenulations only faintly developed; tabulae are shown exhibiting faint crenulations of their edges. No. 675.
2. Cross-section,  $\times 14$ ; another part of the same section, showing marked contrast in the wall thickness caused by the slightly oblique position of the section, which passes in the upper part of the figure into one of the narrow zones of thickening of the wall. No. 675.
3. Cross-section, showing moderately thick walls with fibrous structure. The breaks in the wall, several of which are shown here, may involve some true pores, but are in large part the result of crushing. No. 675.
4. Longitudinal section,  $\times 16$ , showing one of the narrow zones of thickening of the wall, which exhibits, though obscurely, the oblique slope of the fibers, the two fused walls having fibers meeting in a shallow V-shaped pattern. No. 675f.

All figures are from the holotype, No. 675f; Second Value formation, near crest of Scenic Drive, El Paso, Texas.





## PLATE 26

*Trabeculites keithae* Flower, n. sp.

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1. Longitudinal section,  $\times 3$ , showing form and spacing of tabulae, with elongated sections through trabeculae where the section cuts corallite walls at steep angles. No. 764a. (R)
2. Longitudinal section,  $\times 1$ , showing general aspect of corallites at natural size.
3. Cross-section, showing general appearance of corallites at natural size.
4. Cross-section,  $\times 2.5$ , showing general aspect of thin corallite walls, within which can be seen dark spots, marking trabeculae, with tabulae variously cut and showing different aspects. No. 674c. (R)
5. Longitudinal section,  $\times 14$ ; at two points the section cuts corallite walls tangentially, and sections show trabeculae with chevronlike patterns of fibers. No. 674f.
6. Longitudinal section, again cutting trabeculae at very steep angles, showing common upturned edges of tabulae, and light and dark areas in common walls, as the section passes from the trabeculae (dark) to the marginal (light) regions between them. The section is an enlargement of the lower part of fig. 1. No. 674a.
7. Longitudinal section, showing at left zigzag course of upturned tabular edges, the section here being nearly marginal; characteristic appearance of tabulae and walls.

Holotype, No. 764; Second Value formation, near crest of Scenic Drive, El Paso, Texas.

## PLATE 27

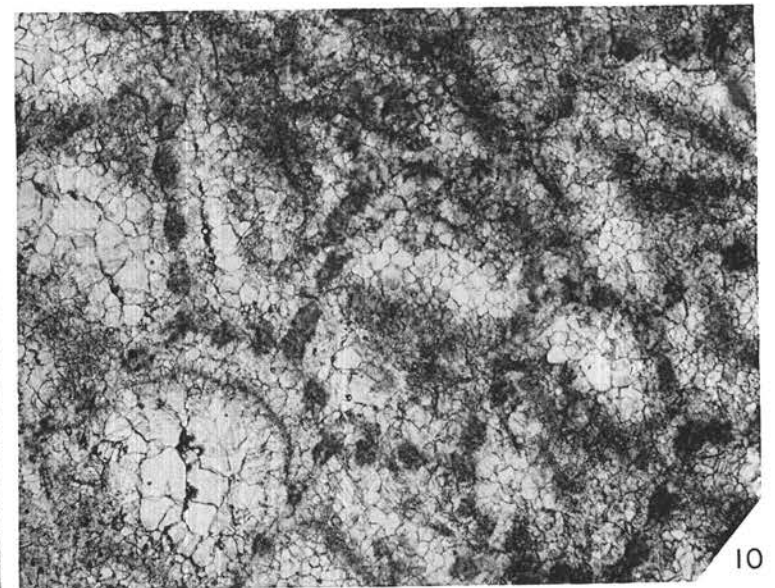
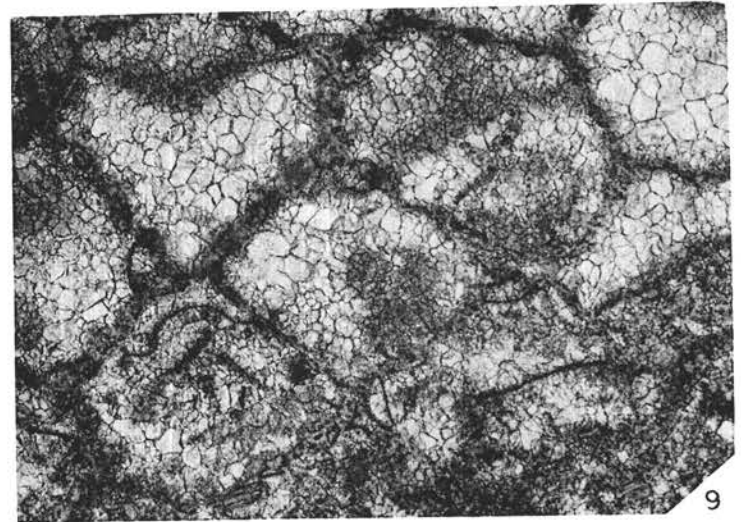
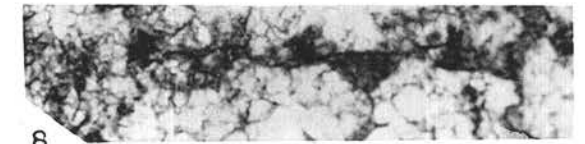
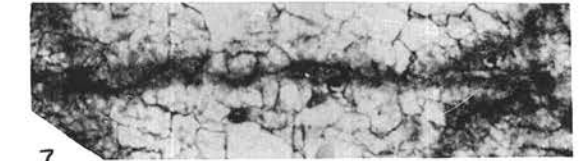
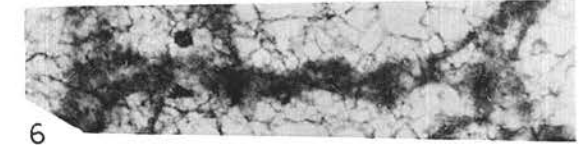
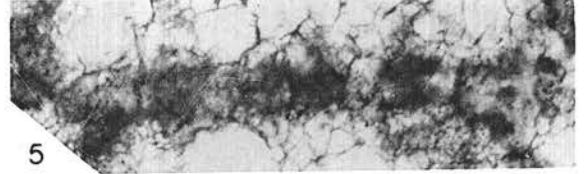
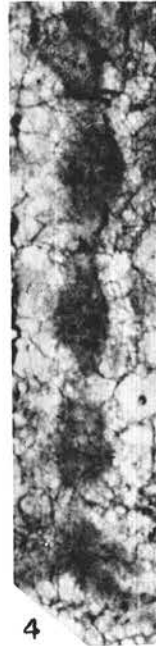
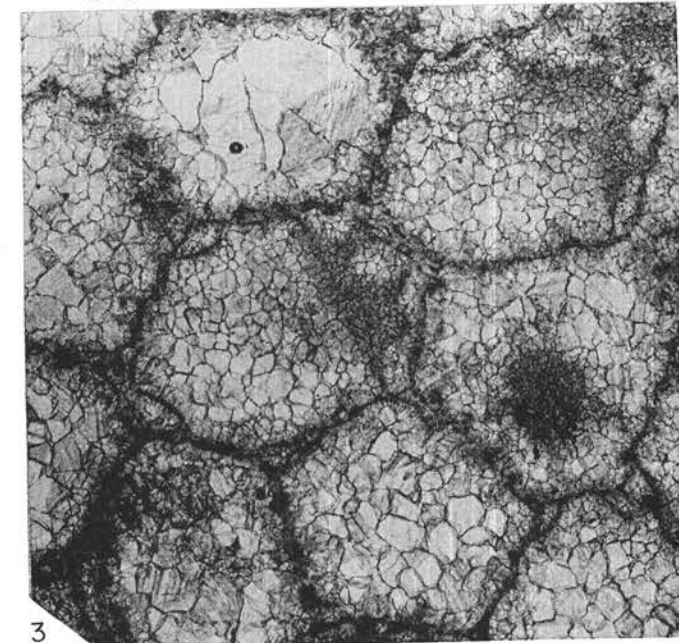
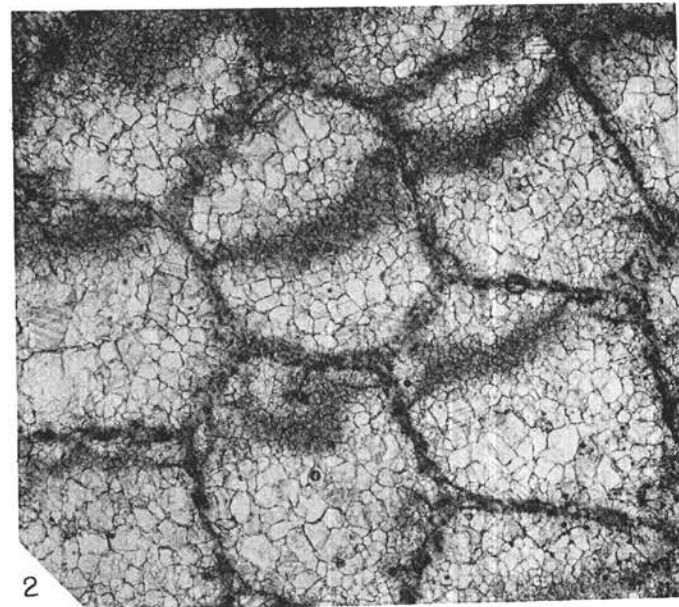
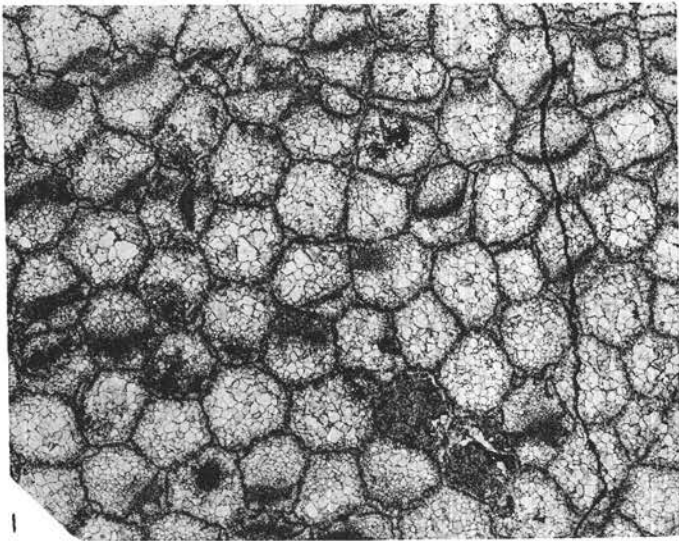
*Trabeculites keithae* Flower, n. sp.

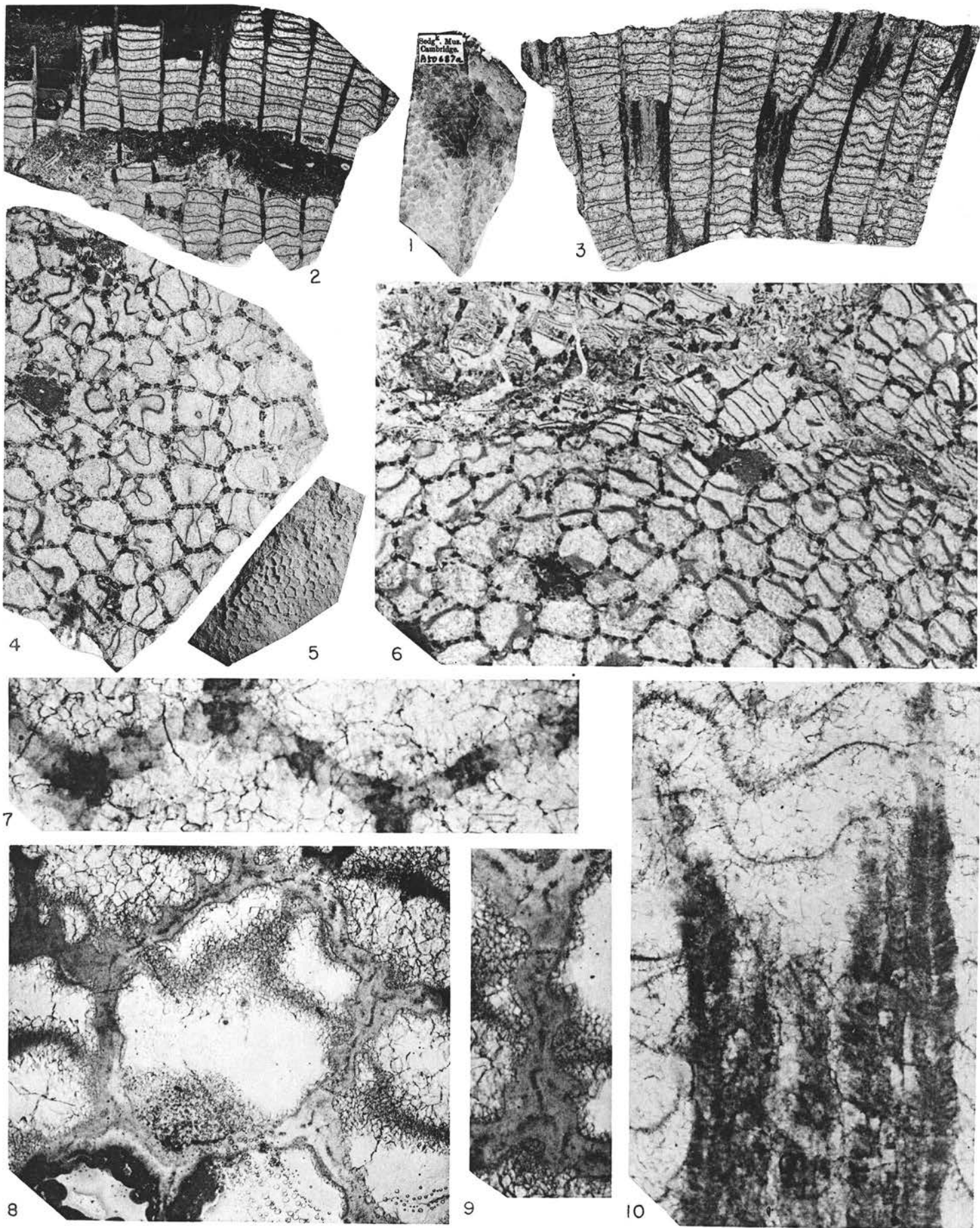
P. 61

1. Cross-section,  $\times 4$ , showing thinsection in gross aspect, with corallite walls generally thin and composed of alternate thick dark and thin light regions. No. 674b. (R)
2. Enlargement,  $\times 14$ , showing rather thin walls, with evident continuity, of discrete thickened columnar elements; tabulae are crossed; at the lower left is shown the edge of one tabula that is minutely crenulate.
3. Enlargement,  $\times 14$ , of a cross-section showing variation from trabeculae, wedge-shaped and continuous, to almost linear walls, and, below, some dark regions in the wall seemingly discrete. Some edges of tabulae are finely crenulate. No. 674b.
4. Enlargement,  $\times 30$ , of part of wall, from left of fig. 10, showing oval cross-section of dark trabeculae, with light areas between poorly differentiated from matrix. No. 674c.
5. Enlargement,  $\times 30$ , of a relatively thick wall in which light intertrabecular regions are distinct from matrix, but recrystallization leaves the pattern of fine structure somewhat altered. No. 674c.
- 6-8. Three rather thinner walls,  $\times 30$ , showing further variation; fig. 6 shows faintly wedge-shaped trabeculae, clearly contiguous; fig. 7 shows the most nearly uniform linear wall observed; fig. 8 shows trabeculae most definitely wedge-shaped in section, projecting on alternate sides of the wall. Nos. 674b and 674c.
9. Cross-section,  $\times 14$ , showing rather thick walls; tabulae irregular and apparently partly broken. No. 674c.
10. Cross-section,  $\times 14$ , showing trabeculae as dark enlarged regions of walls, some seemingly distinct, the lighter areas between not always clearly differentiated from the matrix. No. 674c.

Holotype, No. 674; Second Value formation, near crest of Scenic Drive, El Paso, Texas.







## PLATE 28

*Trabeculites maculatus* Flower, n. sp.

P. 62

1. Cross-section,  $\times 1$ , showing characteristic corallite size. Holotype, No. A50687(SMC).
2. Longitudinal section,  $\times 4$ , showing form and spacing of tabulae. Paratype, No. A50684(SMC). (R)
3. Longitudinal section,  $\times 4$ , showing tabulae more irregular in form and spacing; section cuts the corallite walls tangentially or nearly so at a number of points. Holotype, No. A50687c(SMC).
4. Cross-section,  $\times 4$ , showing characteristic appearance of walls. Paratype, No. A50686c(SMC). (R)
5. Weathered surface of an unsectioned individual,  $\times 1$ , showing corallite size and aspect upon weathering. Paratype, No. A50685(SMC).
6. Cross-section,  $\times 4$ ; corallites at the top are shown in somewhat oblique section, and those at the top are broken. Holotype, No. A50687b(SMC). (R)
7. Part of cross-section,  $\times 30$ , showing alternation of light yellowish calcite and darker gray calcite, the latter more nearly retaining original fibrous texture. Paratype, No. A50684f(SMC).
8. Cross-section,  $\times 20$ , showing a corallite replaced by silica; replacement is fine, and though fibrous structure is lost, the axes of the fibers, here short discontinuous vertical planes, are well shown. Paratype, No. A50684f(SMC).
9. Further enlargement,  $\times 30$ , of part of the same section.
10. Longitudinal section,  $\times 30$ , of part of the same section shown in fig. 3; here most of the corallite wall is cut in the section, and the dark-gray fibers, here retaining original fine structure, are V-shaped, showing the units arranged radially around the walls to be essentially monacanthine trabeculae; trabeculae centered around short planes instead of linear axes are not indicated here.

Holotype, No. A50687(SMC), and paratypes, Nos. A50684-6(SMC); from an elevation of 325 feet at the Harp Burn, Akpatok Island, Ungava Bay. See also pl. 31 and 45.

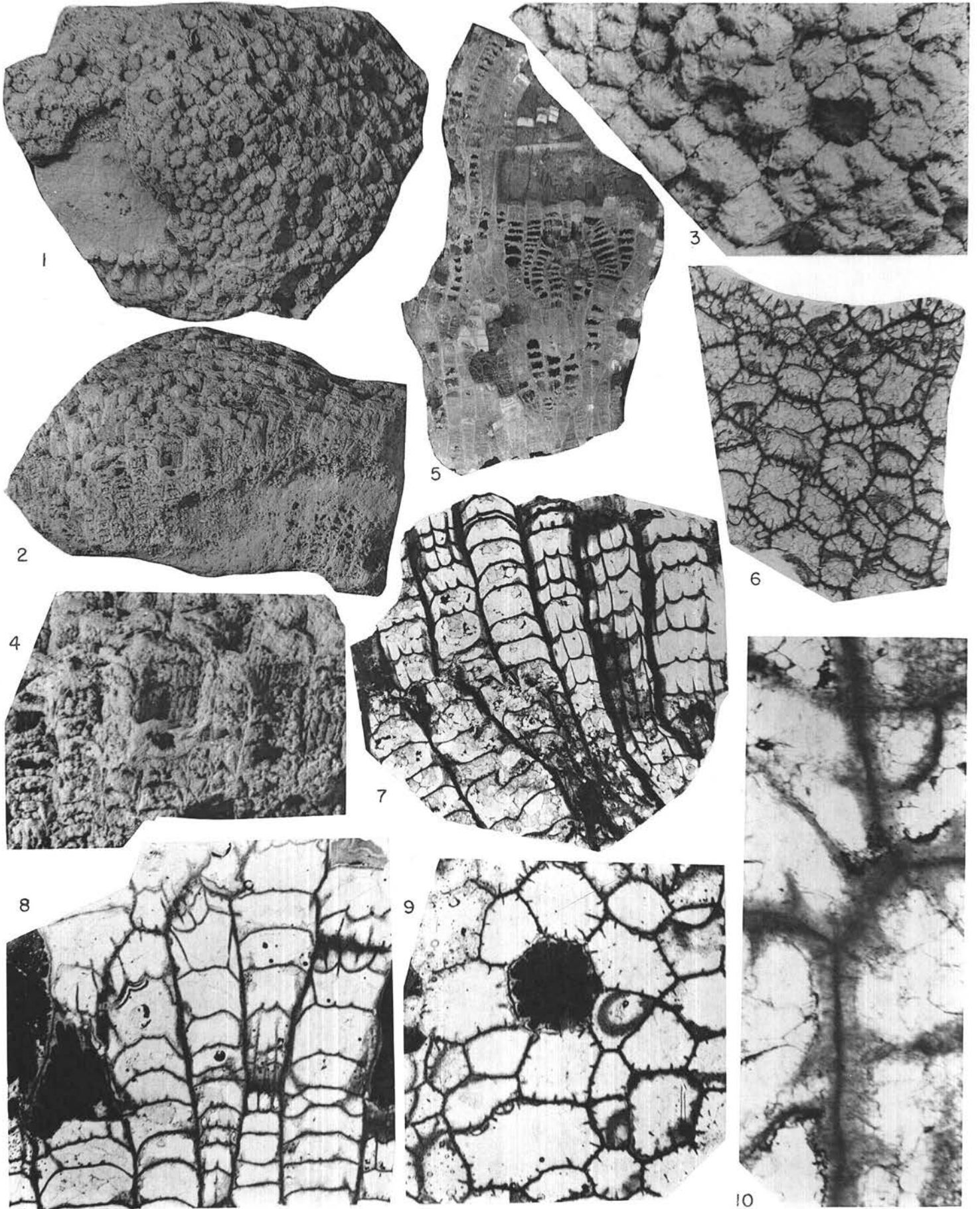
## PLATE 29

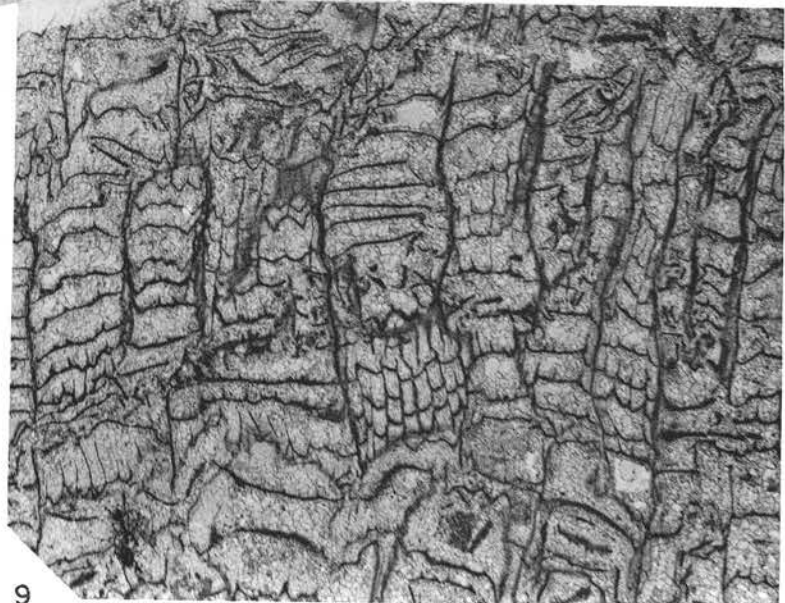
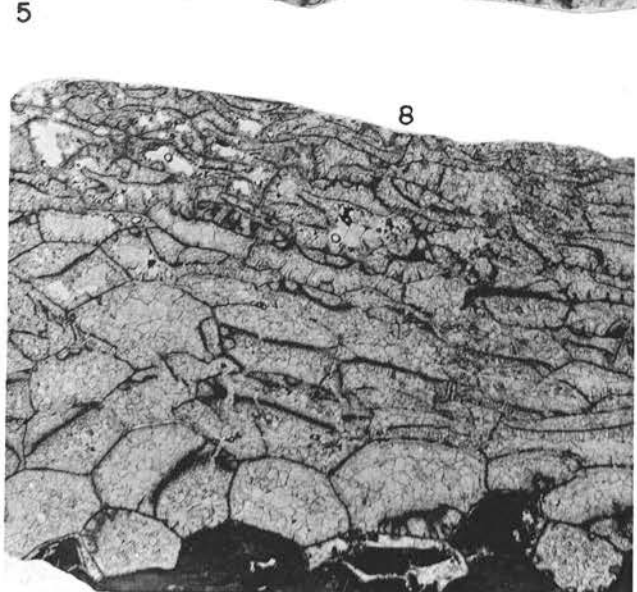
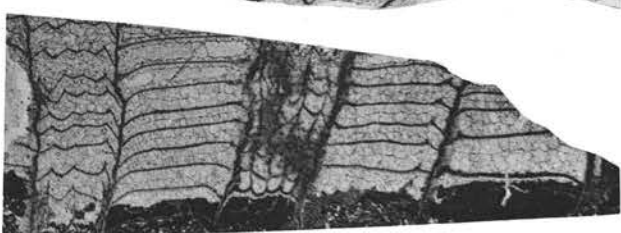
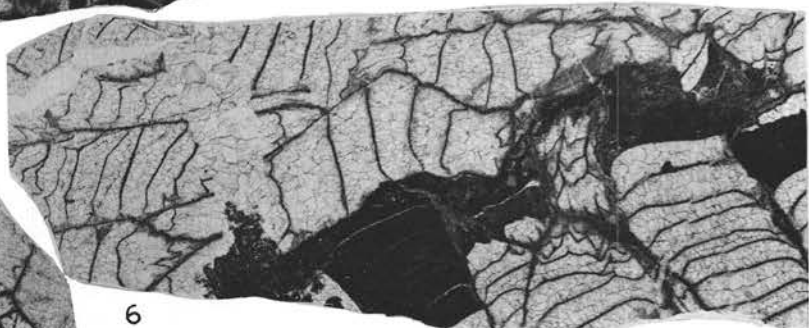
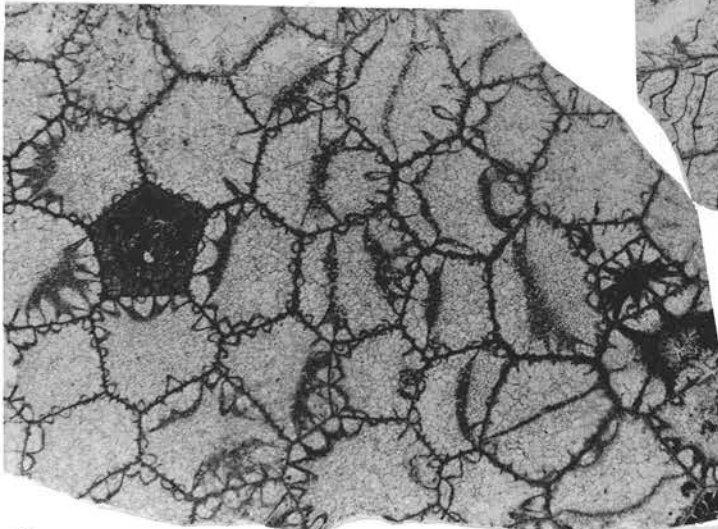
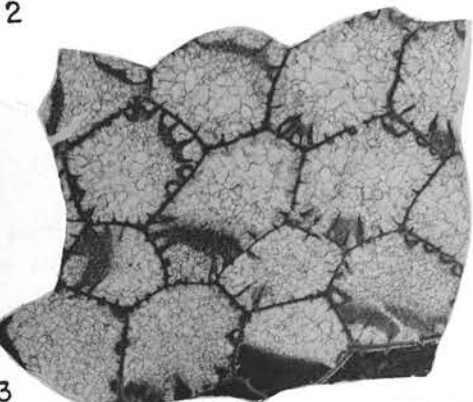
*Crenulites rigidus* (Billings)

P. 85

- 1, 2. Top and side views of colony,  $\times 1$ , showing general aspect. No. 81976a(USNM). (USNM).
3. Enlargement of part of fig. 1,  $\times 4$ , showing downturned crenulate edges of tabulae and amplexoid major septa.
4. Enlargement of part of fig. 2,  $\times 3$ , showing etched tabulae and longitudinal markings on walls corresponding to septal insertions.
5. Longitudinal section,  $\times 1$ , showing spacing and arching of tabulae. No. 81976b (USNM).
6. Cross-section,  $\times 4$ , showing crenulations of tabular edges and amplexoid septa. No. 81976a(USNM). (R)
7. Longitudinal section from the same specimen,  $\times 4$ , showing downturned edges of tabulae; septa not apparent in central sections, but showing progressively increased length as the plane of the section becomes more eccentric. (R)
8. Longitudinal section,  $\times 5$ , showing more distant septa; where section is oblique, septa appear as short spines reminiscent of *Foersteophyllum vacuum*. No. 81976b (USNM). (R)
9. Cross-section from the same colony, taken where tabulae are distant; sections are largely well anterior to tabulae and show short septa suggestive of *Foersteophyllum*.
10. Cross-section from part of fig. 6,  $\times 40$ , showing narrow dark wall, thick fibrous sclerenchyme, of which septa are extensions; to the right of the upper center, the curved band represents a section through the crenulate edge of a tabula; part of two other tabulae extend to the right and left margins in the lower half of the figure.

Two colonies, No. 81976(USNM); from the "Richmond" of Snake Island, Lake St. John, Quebec.





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## PLATE 30

*Crenulites akpatokensis* Flower, n. sp.

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1. Lateral view,  $\times 1$ , of portion of colony, somewhat crushed, showing the broader dimension of corallites, transverse rugose curved growth lines, and a few faintly arched tabulae. No. A50679a(SMC).
2. Lateral view of another specimen,  $\times 1$ , showing corallite walls with normal relief; also with curved transverse rugose markings. No. A50675a(SMC).
3. Cross-section,  $\times 4$ , showing slightly elongated corallites, small marginal scallops of tabulae, and amplexoid septa, long at anterior end of tabulae, shortening rapidly when traced forward, and disappearing before the next tabula is reached. No. 92079(USNM). (R)
4. Oblique section,  $\times 4$ , showing downturned edges of tabulae, septa appearing as short spines on the walls in some places and, rarely, as slight anterior prolongations of elevated parts of tabulae. No. A50675c(SMC). (R)
5. Cross-section,  $\times 4$ , showing, with fig. 3, wide variation in aspect of cross-sections owing to crenulated tabular margins and amplexoid septa; at the right is one small corallite, the only one observed, showing septa apparently extending to the center, but centrally their edges are merged with the tabula. No. A50678c(SMC). (R)
6. Section through another colony,  $\times 4$ , showing irregularly arranged corallites, largely in longitudinal section, with widely spaced tabulae; unlike *C. magnus*, tabulae are normal to the course of the corallites. No. A50674c(SMC). (R)
7. Longitudinal section,  $\times 4$ , through a series of parallel regular corallites, showing regular, extremely closely spaced tabulae. No. A50678d(SMC). (R)
8. Cross-section from anterior end of same specimen as fig. 1,  $\times 4$ ; below, transversely elongated corallites; above, corallites crushed, a common condition in the species. No. A50679b(SMC). (R)
9. Longitudinal section of the same specimen,  $\times 4$ , taken through somewhat crushed corallites; maximum corallite width is shown here; tabulae vary in aspect with position of section, being transverse with scarcely downturned edges centrally, but as sections become more eccentric, amplexoid septa appear and lengthen, and the tabulae become zigzag; in the lower center, septa are continuous near the corallite margin, and tabulae are slightly displaced where they intersect the septa. No. A50679c(SMC). (R)

Syntypes; Ordovician beds, Akpatok Island, Ungava Bay. No. 90279(USNM); without precise locality or horizon data. No. A50674(SMC); locality B, no precise horizon data.\* No. A50675(SMC); locality 93, at sea level. No. A50678(SMC); locality 2/4, no horizon data.\* No. A50679(SMC); locality 208, at sea level. No. A50680(SMC); locality 200, no precise horizon data.\*

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\* Cox suggests that these forms may have been brought into camp by various members of the party who did not note elevation.

## PLATE 31

*Foerstephyllum minutum* Flower, n. sp.

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1. The only good weathered surface,  $\times 1$ , showing a weathered longitudinal section of the colony. Holotype, No. A50682(SMC).
2. Cross-section from the same specimen,  $\times 4$ . Radial arrangement suggests that the center of the colony is at the left center; corallites in this region show rather thick walls, and spines are commonly seen; at the right, in a later growth stage, walls are thin, spines become sparse and scarce, and pores are more common. In part, the greater thickness of corallite walls at the left is exaggerated, for the section is slightly thicker at that end. (R)
3. Longitudinal section,  $\times 4$ , from the same colony, showing maximum corallite width and irregular tabulae. (R)
4. Longitudinal section from a paratype,  $\times 4$ ; few sections show maximum corallite width; tabulae are more crowded. No. A50683(SMC). (R)

Holotype, No. A50682(SMC), and paratype, No. A50683(SMC); from 800-foot elevation on Akpatok Island, Ungava Bay.

*Trabeculites maculatus* Flower, n. sp.

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5. Portion of cross-section of wall,  $\times 30$ , showing extremely long axes of fibers, the most extreme case observed, in which light axes are clear in the darker, unreplaced portions of the wall, but most obscure in the lighter regions; here the structure suggests an approach to the condition of *Saffordophyllum* and *Lichenaria*, in which the axes of the fibers are continuous throughout the length of a segment of the wall. No. A50687b(SMC).
6. Another portion of a cross-section,  $\times 30$ , showing the wall broken up into trabecular units; alternate light and dark regions, in some of which the axes of the fibers appear as short lines. No. A50689f(SMC).

Ordovician beds, 325 feet above sea level, Akpatok Island, Ungava Bay. See also pl. 28.

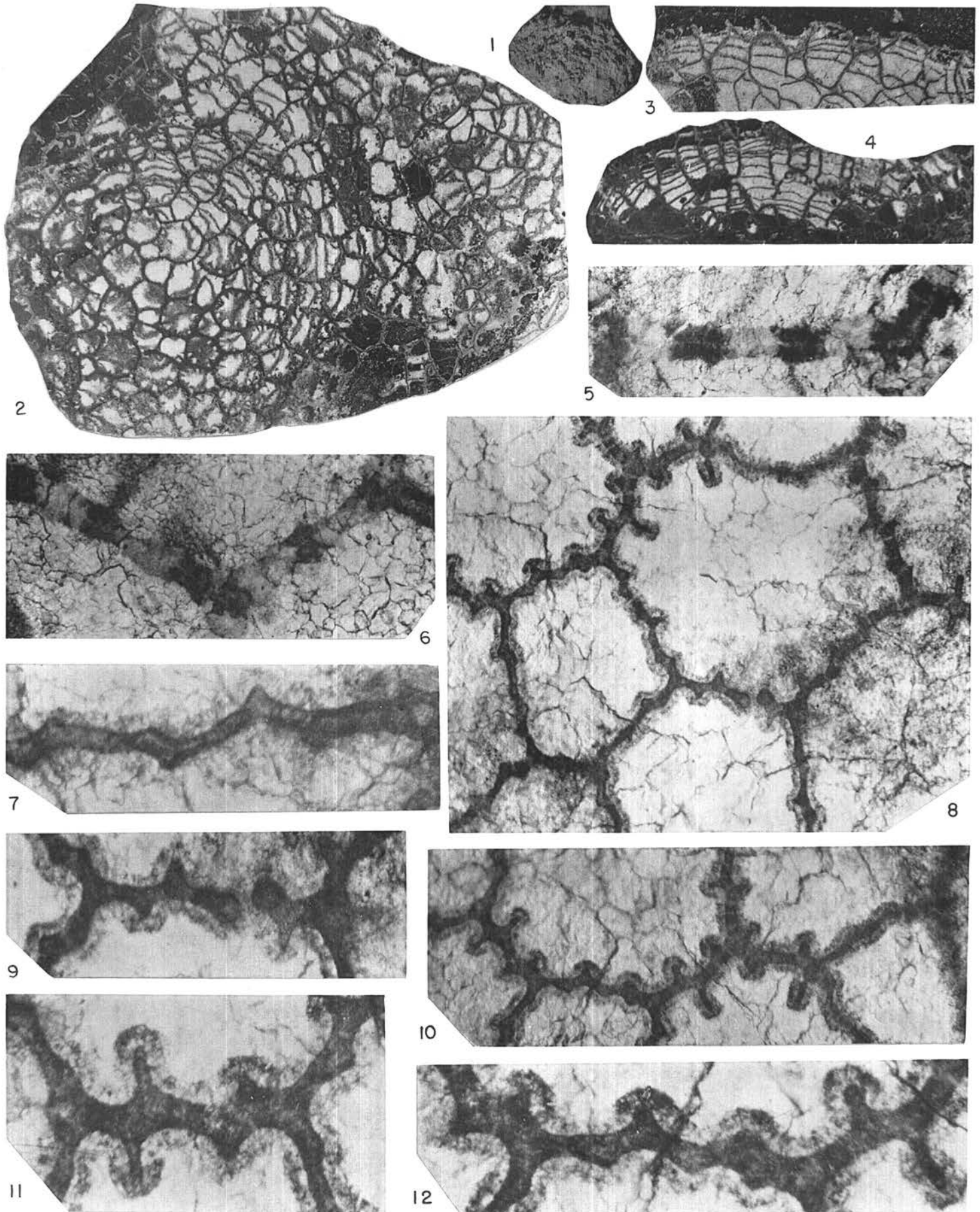
*Saffordophyllum crenulatum* (Bassler)

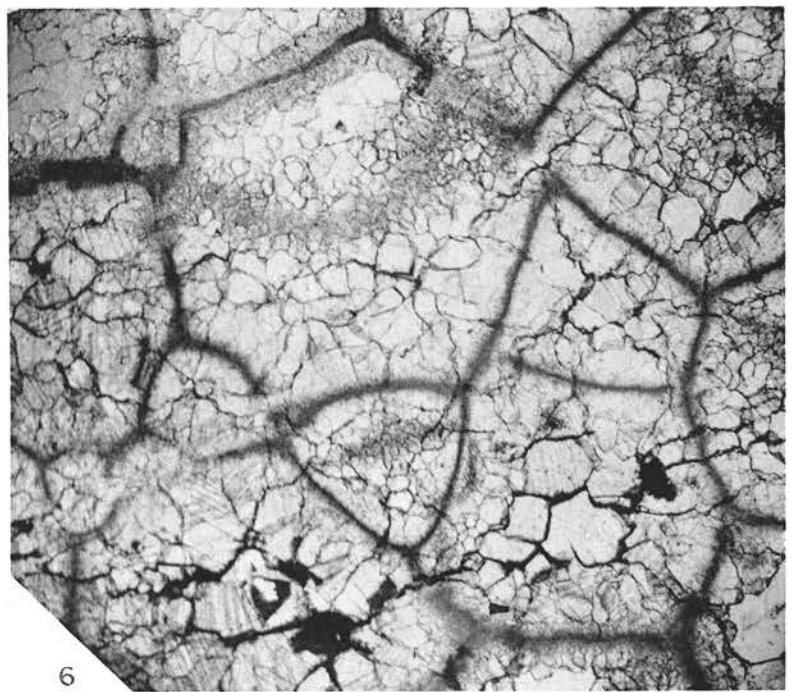
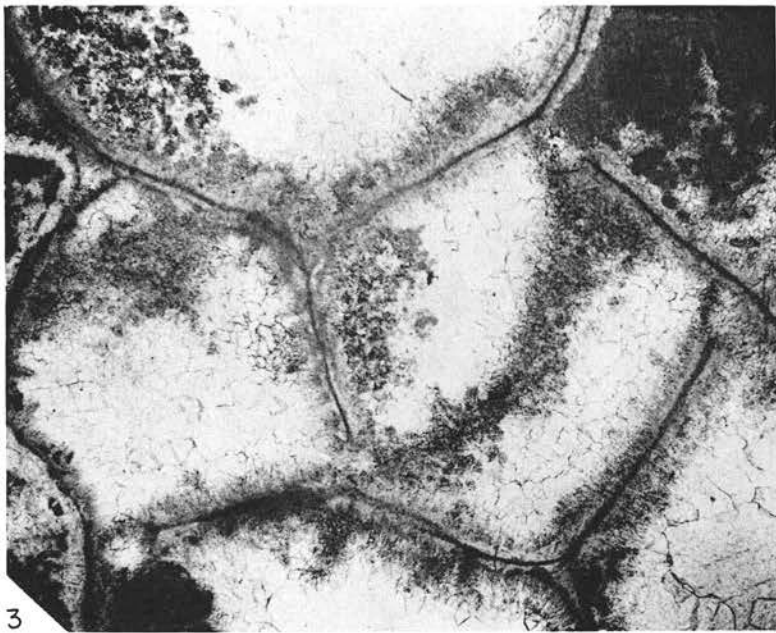
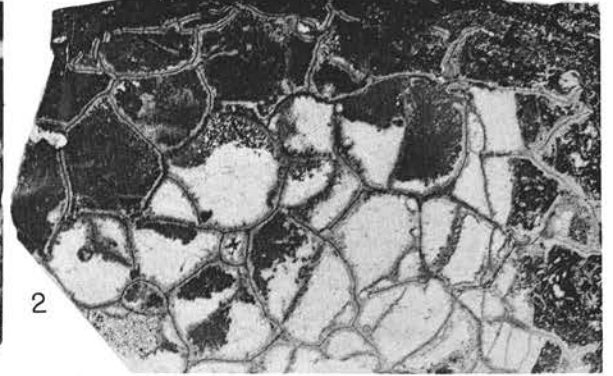
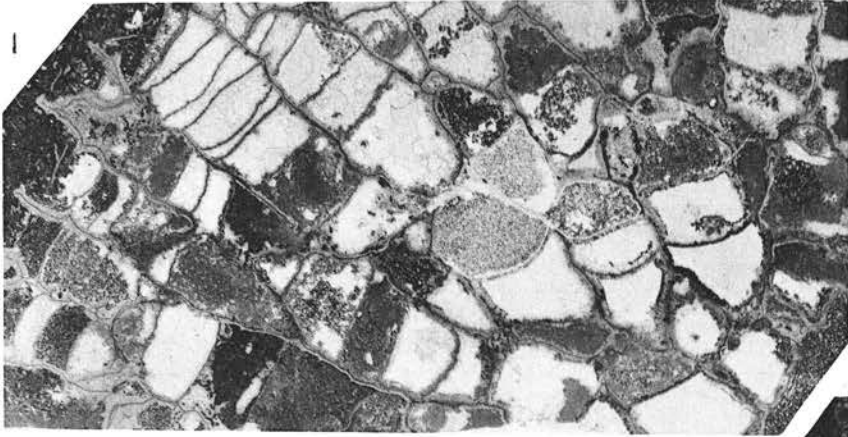
P. 59

7. Portion of wall in cross-section, about  $\times 40$ , showing the typical crenulate wall of *Saffordophyllum*, surrounded by calcite only slightly darker than that of the matrix.
8. Portion of cross-section,  $\times 40$ , exhibiting poikiloplasm well differentiated from light calcite of the matrix, and forming a lining in the corallites. To the right of the lower center is a clearly defined pore; another, more obscure pore is shown at the upper right.
9. Enlargement of part of fig. 8, about  $\times 120$ , showing the pore in greater enlargement; also contrast between fibrous wall and granular poikiloplasm.
10. Another portion of the same section,  $\times 40$ , in which poikiloplasm is darker and thicker where it is extended over the convexities of the crenulate walls. A pore is shown at the extreme right.
- 11, 12. Enlargements, about  $\times 120$ , showing fuller details of the top-shaped concentrations of poikiloplasm over the septal ridges; the fine structure is granular but suggests locally faint radial grouping of the granules, though still contrasting strongly with the fibrous walls in texture.

No. 78234(USNM); from the Hermitage limestone, 4 miles north of Carthage, Tennessee.







## PLATE 32

*Foerstephyllum porosum* Flower, n. sp.

P. 70

1. Longitudinal section,  $\times 4$ , showing undulate walls and irregular tabulae; tabulae in the early stages widely spaced and downcurved. (R)
2. Cross-section,  $\times 4$ , showing varied sizes of corallites, curved walls, and pores. (R)
3. Enlargement of part of fig. 2,  $\times 21$ , showing pores that in some cases are covered with sclerenchyme, which occasionally extends into septal spines.
4. Enlargement of another part of the same section,  $\times 19$ , showing sclerenchyme occasionally extended into septal spines.

Holotype, No. A50676(SMC); from 800-foot elevation on Akpatok Island, Ungava Bay.

*Paleofavosites sparsus* Flower, n. sp.

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5. Enlargement of part of longitudinal section,  $\times 20$ , showing undulate walls, sclerenchyme on axial plane, and a large pore near the center of the figure.
6. Enlargement of part of cross-section,  $\times 20$ . Slight curvature of walls is shown. Openings of small corallites are not demonstrably pores, but may be connections between budding and parent individuals; two large pores are shown at the upper center and right; the one to the center is traversed by sclerenchyme, which is well differentiated from calcite in the matrix at the top of the figure, but only poorly differentiated below.

Holotype, No. 679; Second Value formation, near crest of Scenic Drive, El Paso, Texas. See also pl. 33, figs. 7-9.

## PLATE 33

*Crenulites magnus* Flower, n. sp.

P. 85

1. Cross-section,  $\times 3$ , showing typical crenulate tabulae and amplexoid septa. Holotype. No. 787a. (R)
2. Longitudinal section from the same colony,  $\times 3$ , showing closely spaced subparallel tabulae. Holotype, No. 787b. (R)
3. Longitudinal section,  $\times 1$ , showing curving corallites and subparallel tabulae. Presumably the top of the colony is oriented to the left of the figure. Paratype, No. 789.
4. Cross-section,  $\times 1$ , showing corallite size and aspect. Paratype, No. 788.
5. Cross section,  $\times 3$ , showing elongation of corallites; top traverses a zone of crowded tabulae. Holotype, No. 787c. (R)

Holotype, No. 787, and paratypes, Nos. 788 and 789, all from the Second Value formation, near crest of Scenic Drive, El Paso, Texas.

*Calapoecia cf. ungava* Cox

P. 68

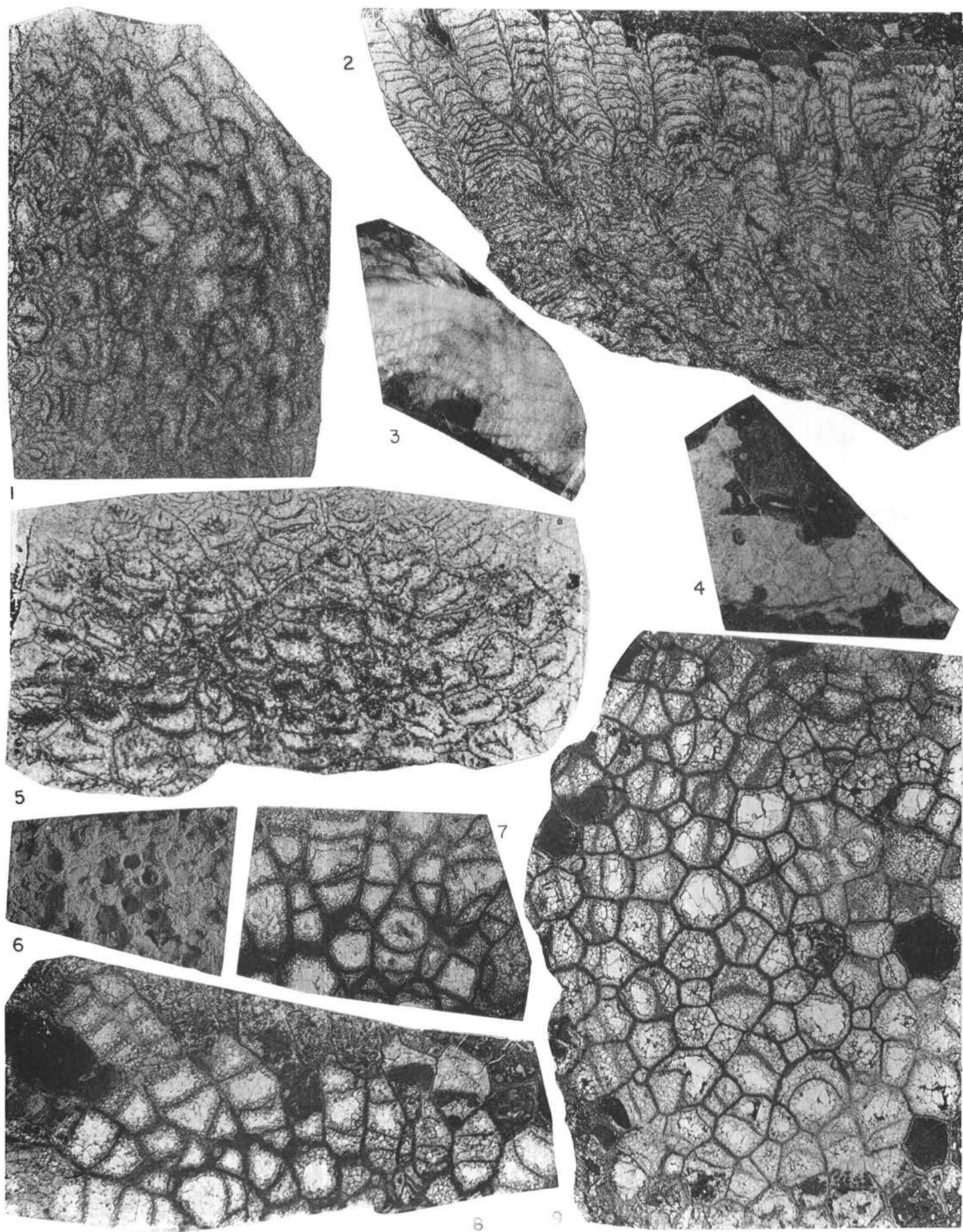
6. Surface of a small silicified colony,  $\times 2$ . No. 791; coral zone of Aleman formation, northern Franklin Mountains, Texas.

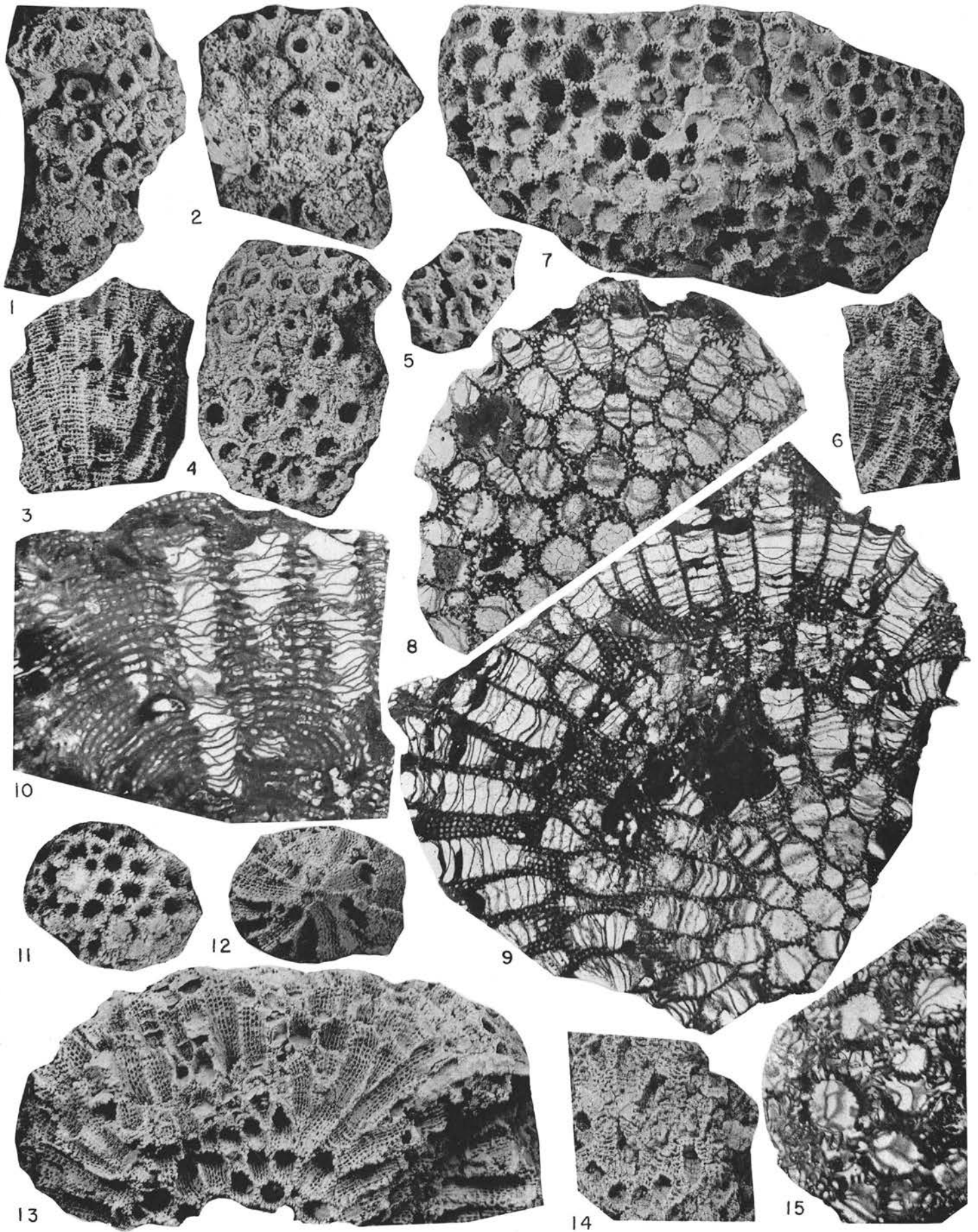
*Paleofavosites sparsus* Flower, n. sp.

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7. Portion of longitudinal section,  $\times 5$ , showing characteristic curved, rather lax tabulae. (R)
8. Portion of longitudinal section,  $\times 5$ , showing undulate walls, apparent pores, and common curved and irregular tabulae. (R)
9. Cross-section,  $\times 5.2$ , showing wide variation in corallite size, walls which are commonly curved, and a few apparent pores. (R)

Holotype, No. 679; Second Value formation, near crest of Scenic Drive, El Paso, Texas. See also pl. 32, fig. 5 and 6.





## PLATE 34

*Calapoecia* cf. *anticostiensis* Billings

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- 1, 2, Various parts of the surface of a silicified colony, all  $\times 2$ , showing variation in elevation and spacing of corallites in coenenchyme. Fig. 5 is slightly oblique, showing exceptionally discrete and well-elevated corallite rims.
- 3, 6, 14. Side views of broken corallites, all  $\times 2$ , showing regular arrangement of pores in corallite walls, and striations in which transverse ridges exceed longitudinal ridges in strength and prominence; pores tend to be slightly transverse. Fig. 14 shows the path of the pores through the rather thick coenenchyme. Throughout, only fragments of the tabulae remain within the corallites.

No. 806; Second Value formation, Hembrillo Canyon, San Andres Mountains, New Mexico.

*Calapoecia coxi* Bassler

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7. Surface view of a typical colony,  $\times 2$ , showing variations in wall thickness, and corallites varying from obscurely polygonal to circular. Columns of septal spines are seen in the corallites. No. 809.
8. Transverse section,  $\times 3$ , showing corallite walls with spines commonly present and apparent in nearly every individual; septal spines with broad bases, relatively thin coenenchyme containing several small round tubes ("disruptive canals"). No. 808a. (R)
9. Longitudinal section,  $\times 3$ , from the same colony, showing spacing of anastomosing tabulae, continuous with thicker and more regular horizontal partitions between rows of pores in coenenchyme; pores separated by vertical trabecular elements. No. 808b. (R)
- 11, 12. Surface and basal view of a small colony,  $\times 2$ , showing small corallites of early growth stage and, at the base, attaining close to the point of origin of the colony. No. 807.
13. Side view of a broken colony,  $\times 2$ , showing regular arrangement of slightly elongated pores, separated by prominent longitudinal septa-bearing ridges. No. 809.

All from the Cutter formation, Tank Canyon, about 12 miles northeast of Hillsboro, New Mexico.

*Calapoecia* cf. *anticostiensis* Billings

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10. Vertical section,  $\times 3$ , of portion of a colony, showing anastomosing irregular tabulae of corallite; thicker, more prominent intersecting horizontal and vertical bands in coenenchyme enclosing pores.
15. Cross-section,  $\times 3$ , of the same colony, showing distant rounded, thick-rimmed corallites; occasionally the section cuts the level of septal spines and pores; typical aspect of coenenchyme, with costae radiating from corallites but joining in the coenenchyme in a vague and highly variable way.

No. 805; Selkirk limestone, Garson, Manitoba.

## PLATE 35

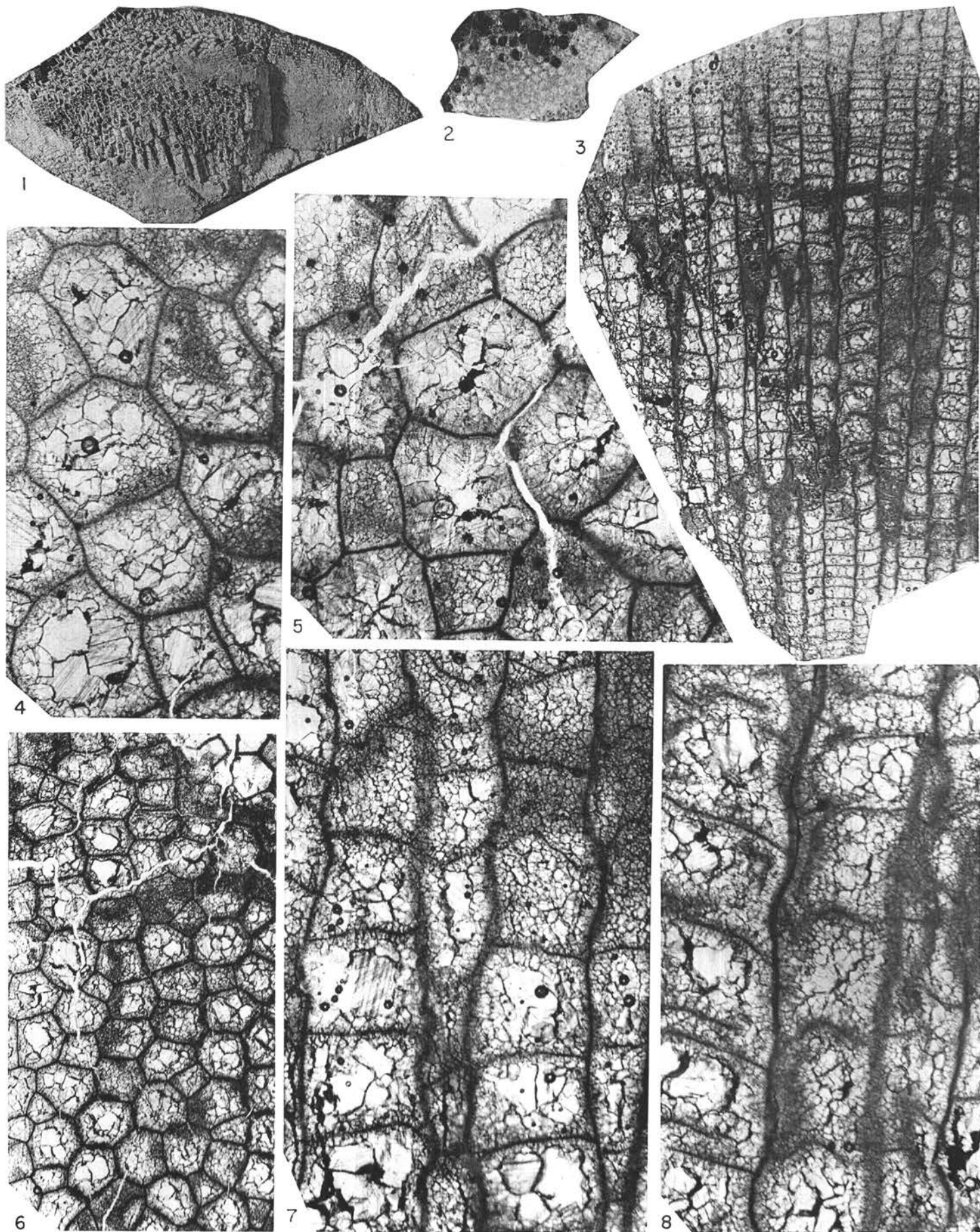
*Paleofavosites prayi* Flower, n. sp.

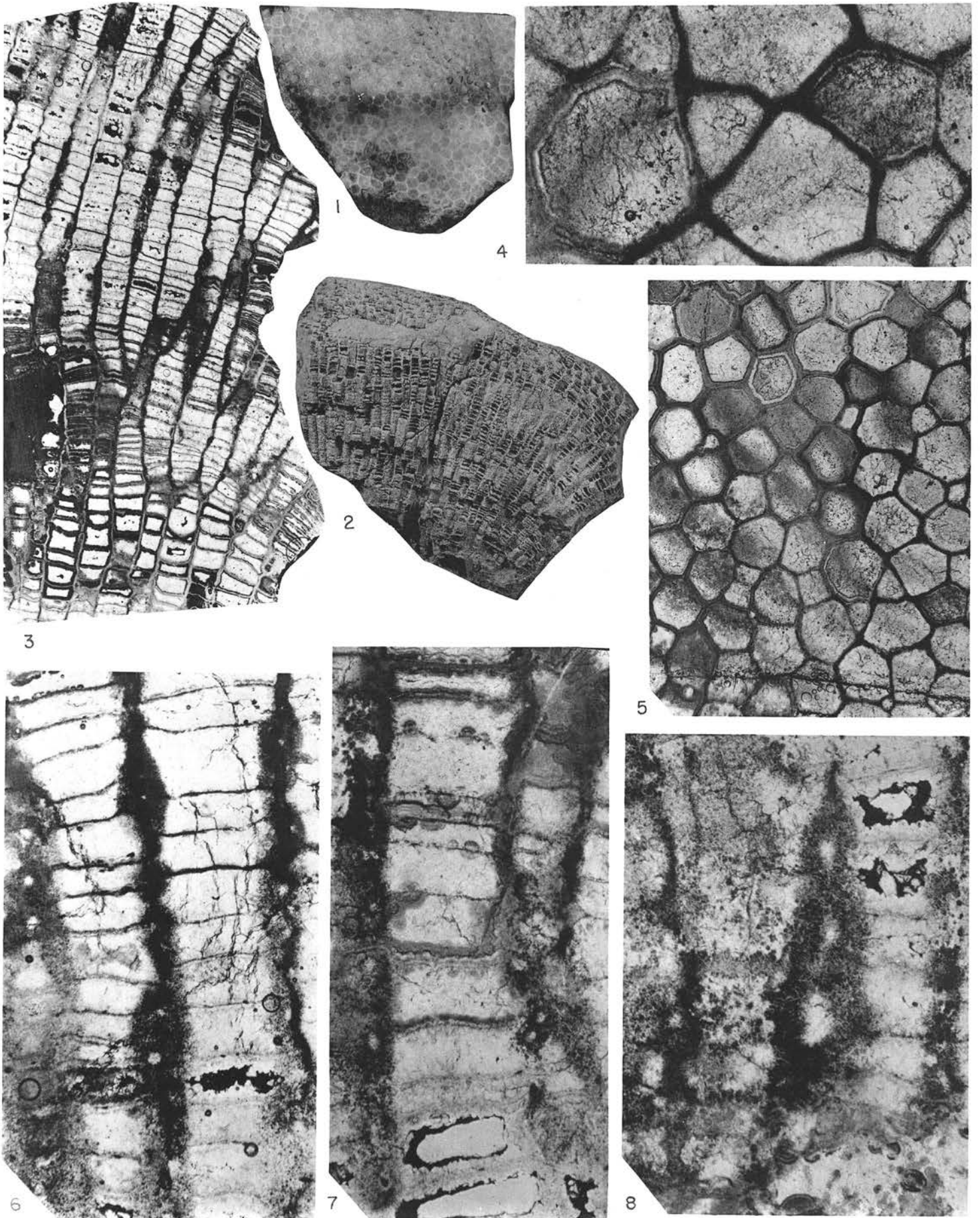
P. 74

1. Lateral view of part of holotype,  $\times 1$ , showing aspect of weathered corallites.
2. Cross-section,  $\times 1$ , showing size and aspect of corallites.
3. Vertical section,  $\times 3$ , showing undulate walls, and form and spacing of tabulae, which are more crowded in the mature portion. No. 685a. (R)
4. Portion of cross-section,  $\times 14$ , showing obscure sclerenchyme merging with calcite of matrix. No. 685c.
5. Another portion of a cross-section,  $\times 14$ ; in the lower left, one of the rare pores observed in such sections. No. 685f.
6. Portion of cross-section,  $\times 5$ , showing variation in form and size of corallites commonly encountered. No. 685c. (R)
7. Longitudinal section,  $\times 14$ , showing undulate walls; wall structure here is considerably altered. No. 685b.
8. Longitudinal section,  $\times 14$ , showing differentiation of axial plate and sclerenchyme. No. 685b.

Holotype, No. 685; Aleman formation, northern Franklin Mountains, Texas.







## PLATE 36

*Paleofavosites kuellmeri* Flower, n. sp.

P. 74

1. Cross-section,  $\times 1$ , showing corallite size.
2. Lateral weathered surface,  $\times 1$ .
3. Longitudinal section,  $\times 3$ , showing form and spacing of tabulae; at the base, advanced silicification thickens and alters the structures; at the top, some pores are clearly shown. No. 686b. (R)
4. Portion of cross-section,  $\times 14$ , showing aspect of corallite walls, here evidently altered by replacement.
5. Portion of cross-section,  $\times 5$ , showing general aspect of corallites; wall variation is due to replacement phenomena. (R)
6. Longitudinal section,  $\times 14$ , from anterior end of fig. 1, showing undulations of walls where the section cuts corallite corners, and true pores. No. 686b.
7. Longitudinal section,  $\times 14$ , from the same section, showing regular spacing of pores on the left, but two close together at the lower right.
8. Longitudinal section,  $\times 14$ ; the section is close to corallite corners, but what appear as large pores represent the plane of the section cutting the undulate walls close to corallite angles; true pores are smaller but would occupy essentially the position of the undulations. No. 686c.

Holotype, No. 686; coral zone of the Aleman formation, northern Franklin Mountains, Texas.

## PLATE 37

*Paleofavosites cf. prayi* Flower

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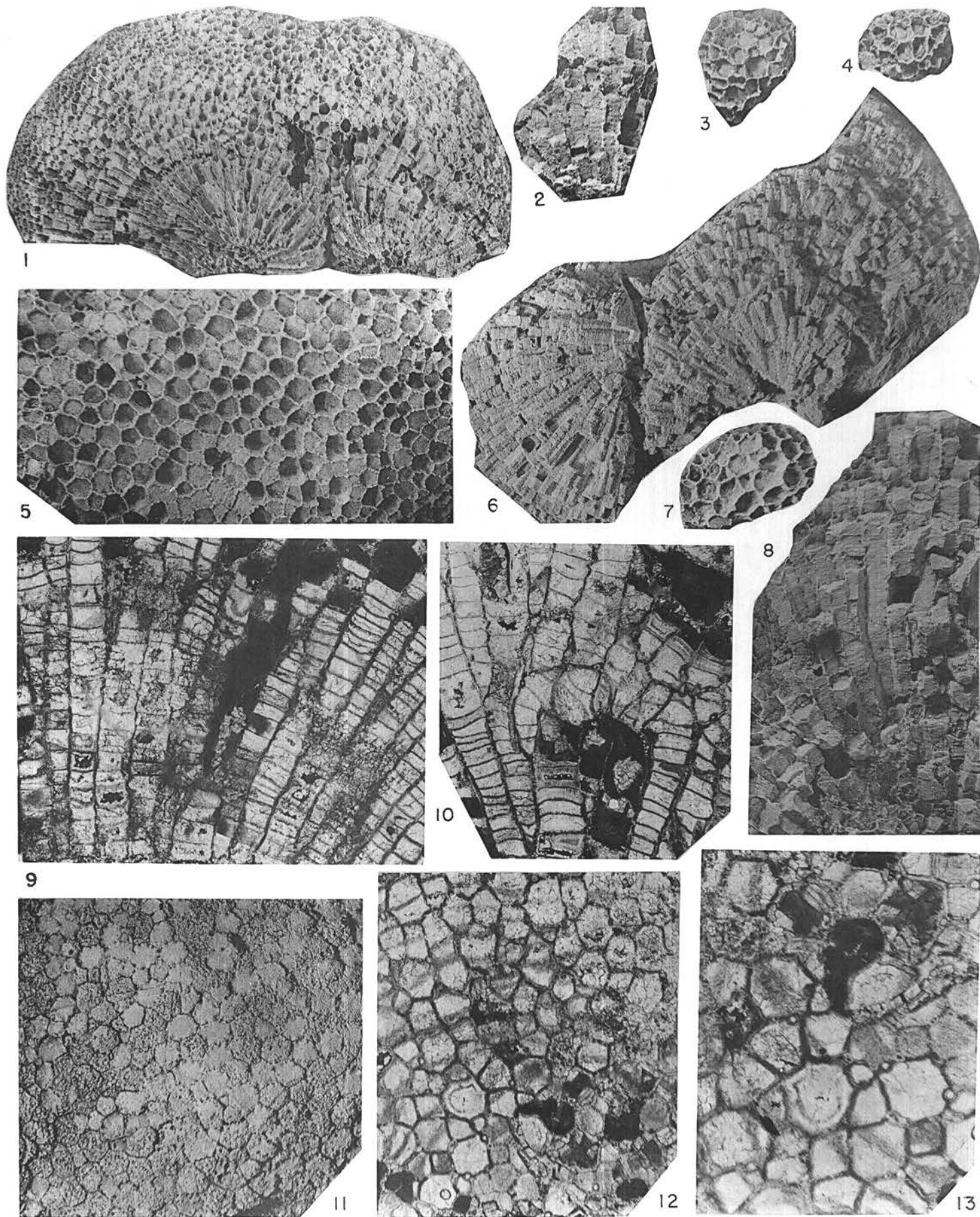
1. Lateral view,  $\times 1$ , of a large colony. No. 796.
3. Surface view of an immature colony,  $\times 2$ . No. 798.
4. Surface view of a still younger colony,  $\times 2$ , showing rapid expansion of corallites. No. 799.
5. Surface of colony shown in fig. 1,  $\times 2$ , showing some small tubes and size of mature corallites; crenulation of edges of walls is a preservation phenomenon; clearly, anterior ends of calyces are not preserved so close to tabulae. No. 796.

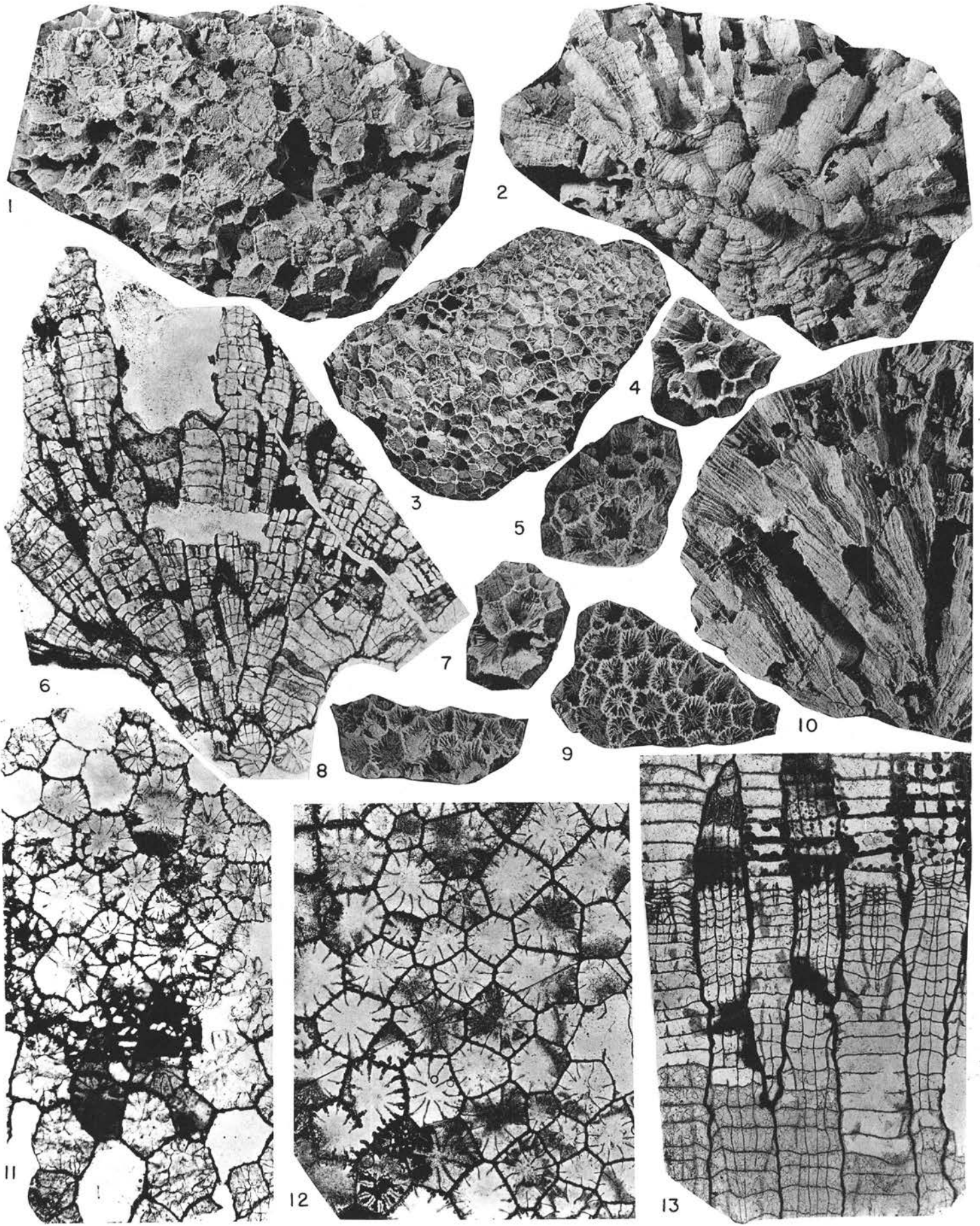
Nos. 796, 798, 799; all from Cutter dolomite, Tank Canyon, northern Black Range, New Mexico.

*Paleofavosites mccullochae* Flower, n. sp.

P. 75

2. Lateral view,  $\times 2$ , of a portion of a colony, showing mural pores and crenulations most marked at corallite angles. No. 797; Cutter dolomite, Tank Canyon, New Mexico.
6. Lateral view of a moderate-sized colony,  $\times 1$ . No. 568; Cutter dolomite, Mud Springs Mountains, New Mexico.
7. Surface view of an immature colony,  $\times 2$ , showing larger corallites attained here than in *P. cf. prayi*. No. 800; Cutter dolomite, Tank Canyon, New Mexico.
8. Side view of broken portion of colony,  $\times 2$ , showing pores at angles; a single pore in the center of a wall, at center of photograph; crenulations of corallite corners. No. 801; Cutter dolomite, Tank Canyon, New Mexico.
9. Vertical section,  $\times 3$ , showing general wall crenulation and spacing of tabulae. No. 802a; Lone Mountain, New Mexico.
10. Vertical section,  $\times 3$ , of young portion of colony, showing general wider spacing of tabulae. No. 803a; Lone Mountain, New Mexico.
11. Weathered surface of colony,  $\times 2$ , showing general crenulation of edges of tabulae. No. 804; Lake Valley, New Mexico.
12. Cross-section,  $\times 3$ , showing general aspect of corallites, with numerous small round tubes representing initial stages of budding individuals. No. 802b; Lone Mountain, New Mexico.
13. Enlargement of part of same section,  $\times 5$ , showing tubules and normal corallites in greater detail; wall structure here suffers from replacement, the specimen being silicified.





## PLATE 38

*Favistina stellata* (Hall)

P. 80

1. Surface of a silicified and etched colony,  $\times 2$ . No. 696.
2. Base of the same colony,  $\times 2$ , showing rugose and longitudinal markings.
3. Portion of colony,  $\times 1$ , showing general size and appearance of corallites. No. 695.
4. Portion of surface of a young colony,  $\times 2$ , showing rapidly expanding corallites. No. 698.
5. Surface of another young colony, but a slightly later stage, with septa approaching the centers of the calyces. No. 698.
6. Longitudinal section,  $\times 3$ ; dominantly transverse septa somewhat irregular in form and spacing but without definite crowded zones. No. 695. (R)
7. Surface of a young colony,  $\times 2$ ; rapidly expanding individuals with septal striations well shown on the calyces. No. 698.
8. Portion of surface from a later growth stage,  $\times 2$ , showing slightly smaller but more uniform corallites. No. 698.
10. Side views of a broken colony,  $\times 2$ , showing septal striations. No. 697.
11. Cross-section,  $\times 3$ , showing general corallite size, rather short major septa, and minor septa rare and vestigial. No. 695. (R)

Nos. 695-698; a series of specimens attributed to this species from the Cutter formation, Tank Canyon, northeast of Hillsboro, New Mexico.

*Cyathophylloides*,(?) sp.

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9. Etched surface,  $\times 2$ , of the single fragment of a colony found in the Cutter beds of Tank Canyon, New Mexico, with the very long septa characteristic of this genus. No. 795.

*Favistina stellata* (Hall)

P. 79

12. Cross-section,  $\times 3$ , of a colony with rather large corallites and short septa; very similar in this respect to the New Mexico forms figured above. (R)
13. Longitudinal section,  $\times 3$ , differing from the New Mexico forms in spacing of the tabulae, as well as in the development of a short but distinct and uniform zone of crowded tabulae. (R)

No. 742; Saluda beds, Madison, Indiana.

## PLATE 39

*Favistina stellata* (Hall)

1-3. No. 778, Liberty beds, Bardstown, Kentucky.

P. 80

1. Longitudinal section,  $\times 3$ . Tabulae mainly horizontal, but showing extreme depression in the centers; in the lower center this is particularly marked, and one tabula bends down, joining the preceding one. Crowding near the top is local and nonuniform throughout adjacent corallites.
2. Cross-section,  $\times 3$ , showing septa approaching close to middle, their tips joined in irregular groups. The circular bands near several corallite centers are not septal, but sections through tabulae.
3. Cross-section,  $\times 3$ , showing septa slightly longer.

4-8. No. 1168/1 (AMNH), from Hall's collection; Saluda beds, Madison, Indiana.

P. 80

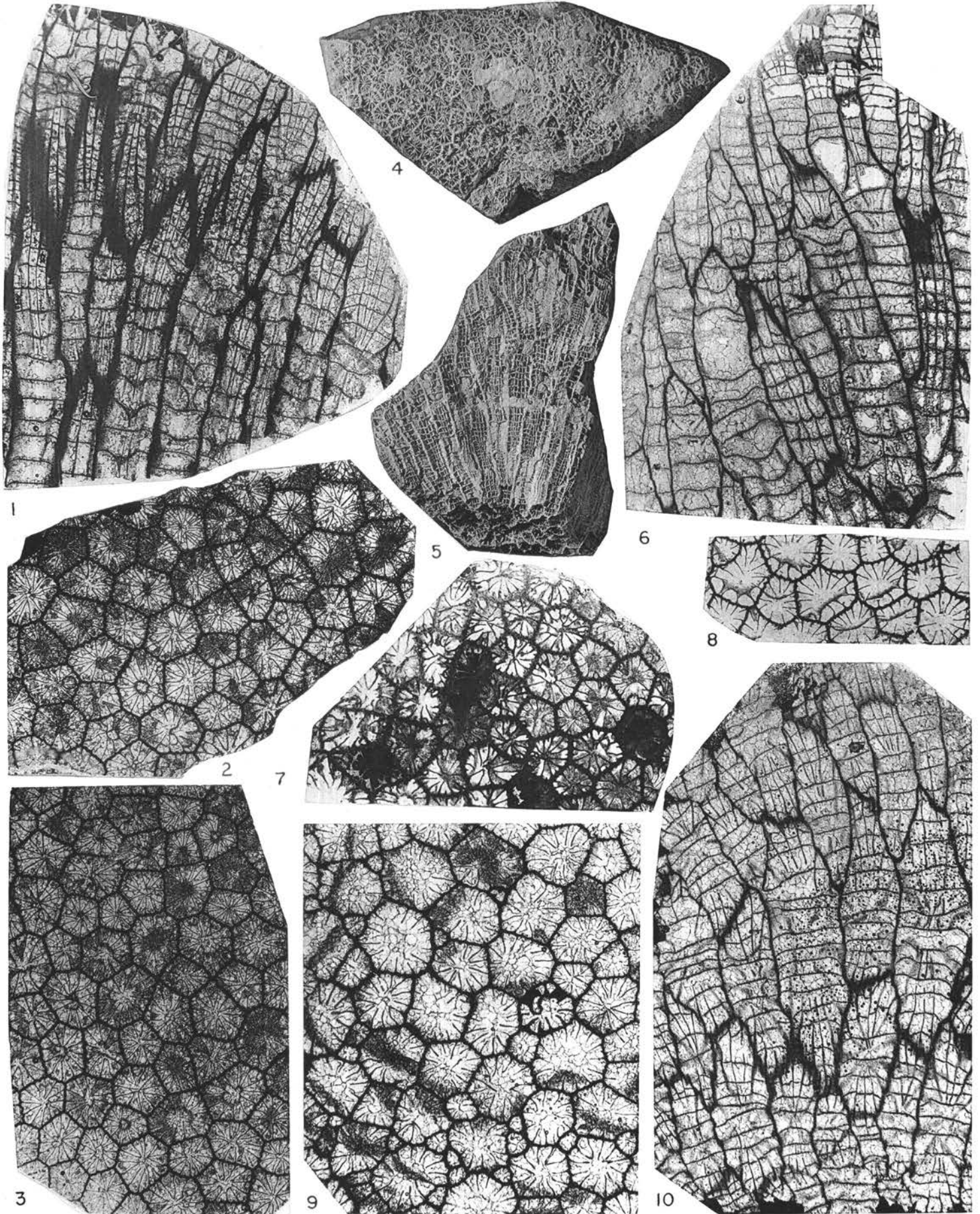
4. Surface,  $\times 1$ , showing size of corallites and aspect of septa.
5. Longitudinal view of the same piece,  $\times 1$ .
6. Longitudinal section from a fragment,  $\times 3$ , showing spacing and form of tabulae.
7. Cross-section,  $\times 3$ , from a portion showing the surface of a large colony. The section is only 4-5 mm below the surface; note rather small corallites and long major septa.
8. Cross-section from another fragment, the same piece as that yielding the section shown in fig. 6; in comparison with fig. 7, corallites are larger and major septa materially shorter.

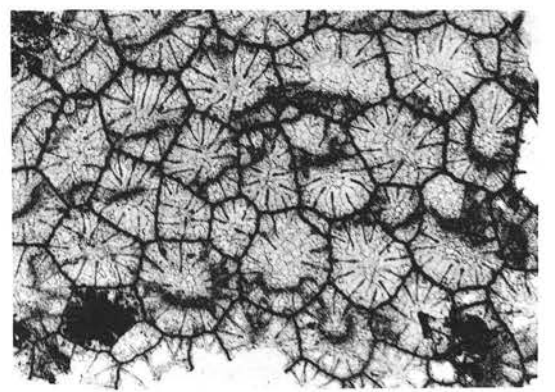
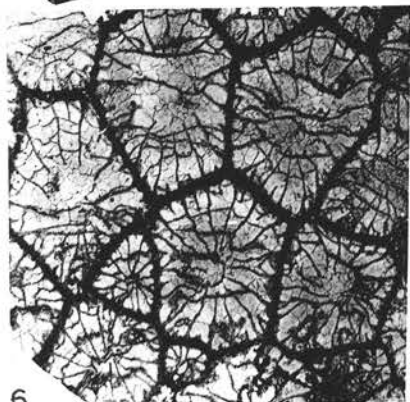
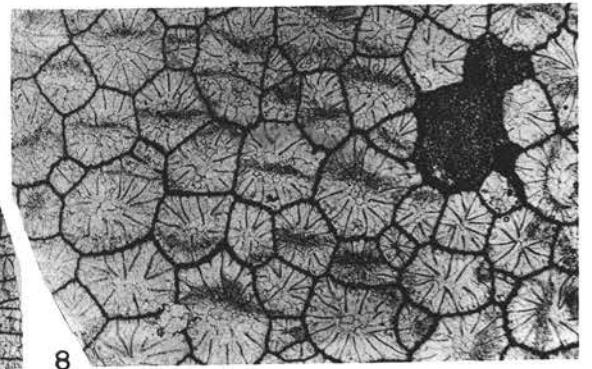
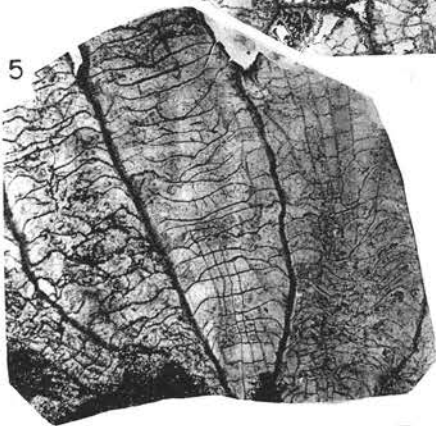
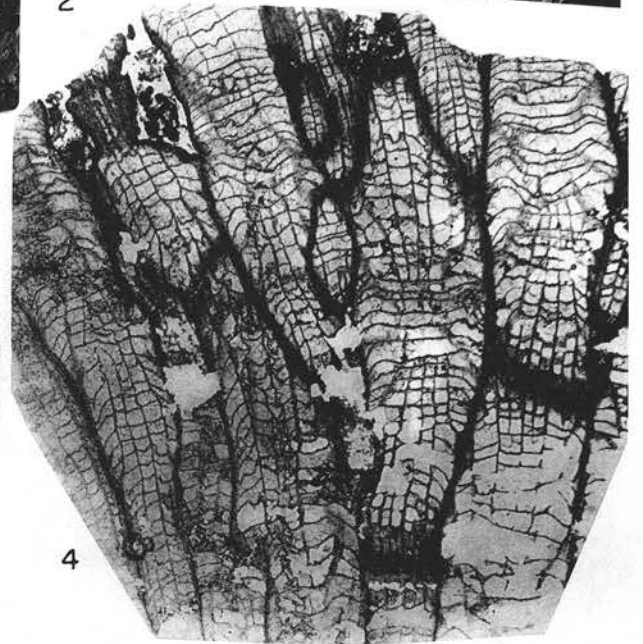
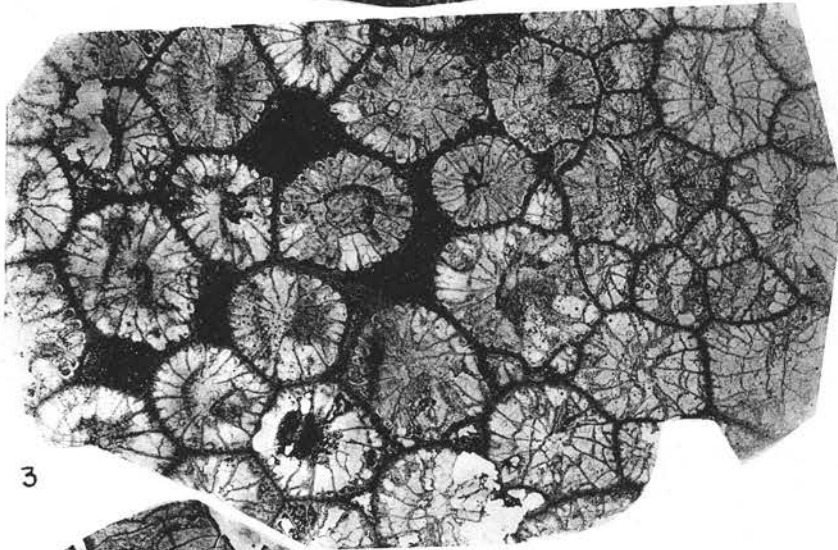
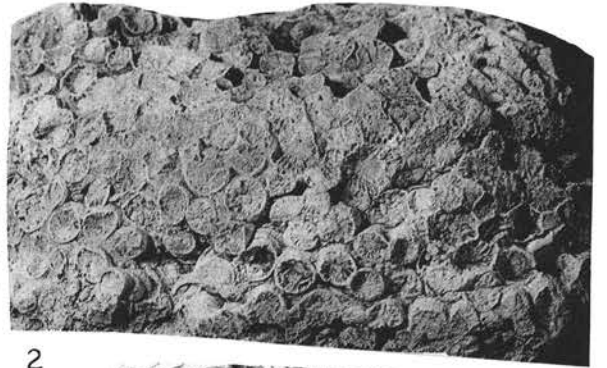
9-10. No. 774; from a colony of the Bardstown coral reef, Liberty beds, Bardstown, Kentucky, showing exceptionally large corallites for that occurrence.

P. 80

9. Cross-section,  $\times 3$ . Corallites are larger, septa relatively short; many corallites show one rather long septum flanked by two shorter ones on either side, a possible counterseptum. Minor septa are more prevalent than usual.
10. Longitudinal section,  $\times 3$ , showing variable form of tabulae, but with only minor and local variations in spacing.







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## PLATE 40

*Favistina calicina* (Nicholson)

P. 82

1. Lateral view of part of colony,  $\times 1$ , showing marginal corallites, which are extensively rounded and partially free for considerable lengths.
2. Portion of surface of colony,  $\times 1$ , showing size and rounding of the mature corallites.
3. Cross-section,  $\times 3$ , showing some corallites imperfectly free and rounded, as well as general size, length, and number of septa.
4. Longitudinal section,  $\times 3$ , showing general form and spacing of tabulae, here more consistently downturned at edges and centers than in *F. paleophylloides*.
5. Portion of another longitudinal section,  $\times 3$ , showing characteristic irregularities in tabulae, many of which anastomose with one another.
6. Cross-section from early, purely cerioid part of colony,  $\times 3$ . Note relatively long major septa, which may join at their tips, in only the small immature individuals.

No. 792; Richmond beds, Streetsville, Ontario.

*Favistina stellata* (Hall)

P. 80

7. Longitudinal section,  $\times 3$ , showing greater regularity of tabulae; compare pl. 39, fig. 1.
8. Cross-section,  $\times 3$ , showing rather short major septa, among which irregular variation in length is seen. (R)
9. Cross-section,  $\times 3$ , showing somewhat shorter septa than in the preceding figure, with rare examples of one long major septum flanked by two shorter ones on either side. (R)

No. 779; sections of a colony from the Bardstown coral reef, Liberty beds, Bardstown, Kentucky.

## PLATE 41

*Favistina magister* (Bassler)

P. 81

1. Surface of colony,  $\times 1$ , showing colony size and corallite dimensions.
2. Longitudinal section,  $\times 3$ , showing dominantly horizontal but irregular tabulae.
4. Cross-section,  $\times 3$ , showing corallites, whose diameter varies much more than does the length of the major septa.

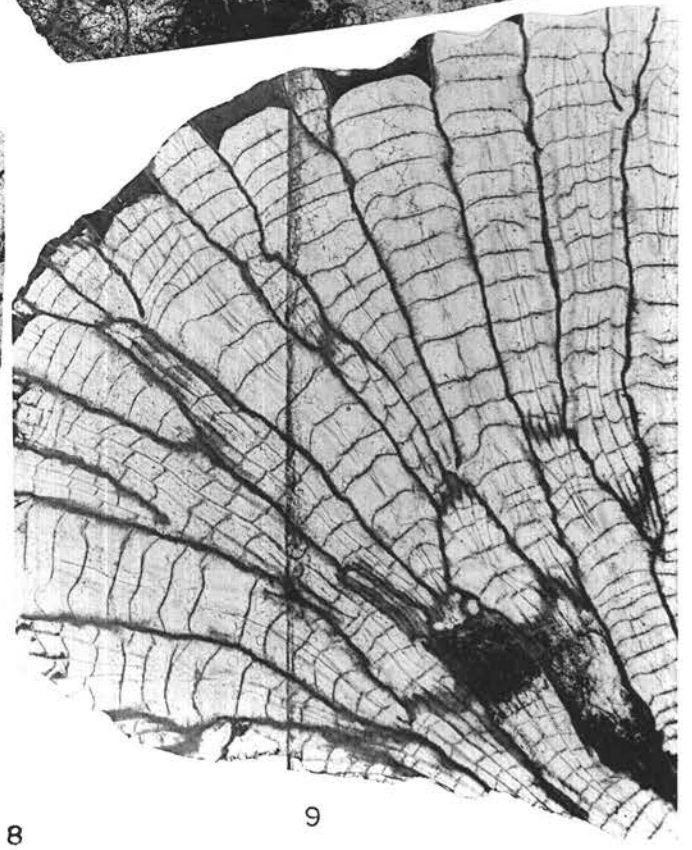
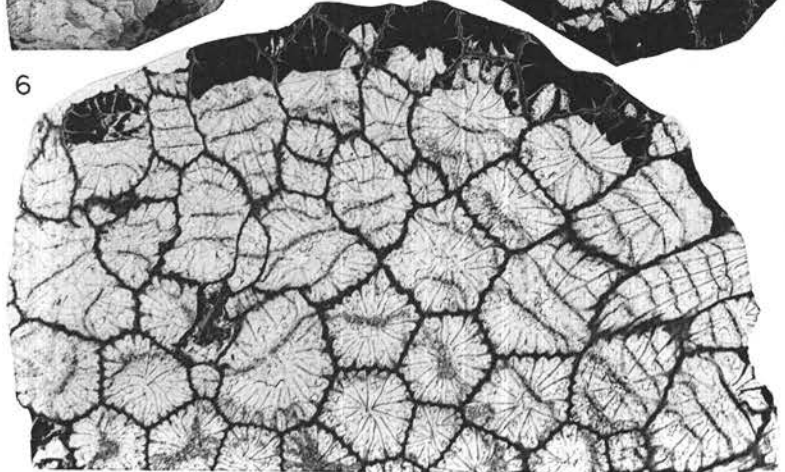
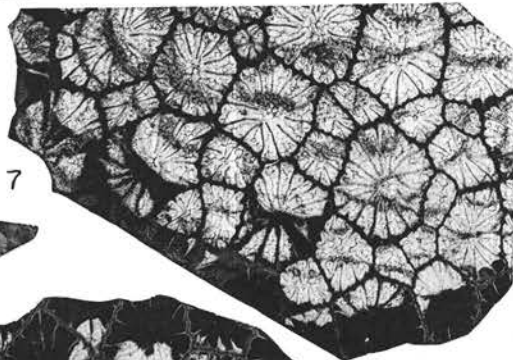
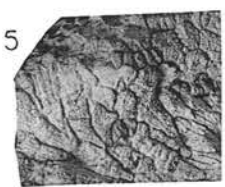
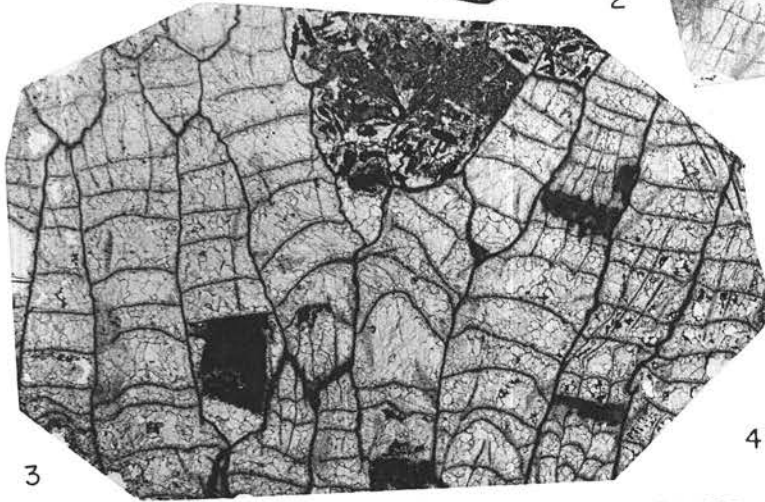
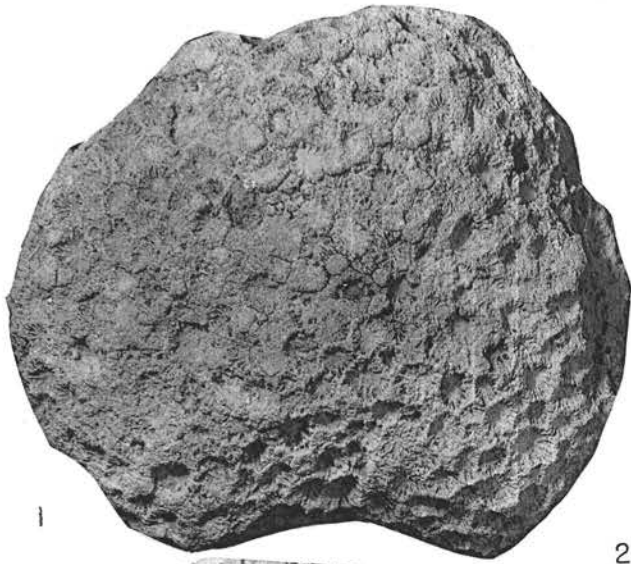
No. 1168/2(AMNH); Madison, Indiana, probably from the Saluda beds.

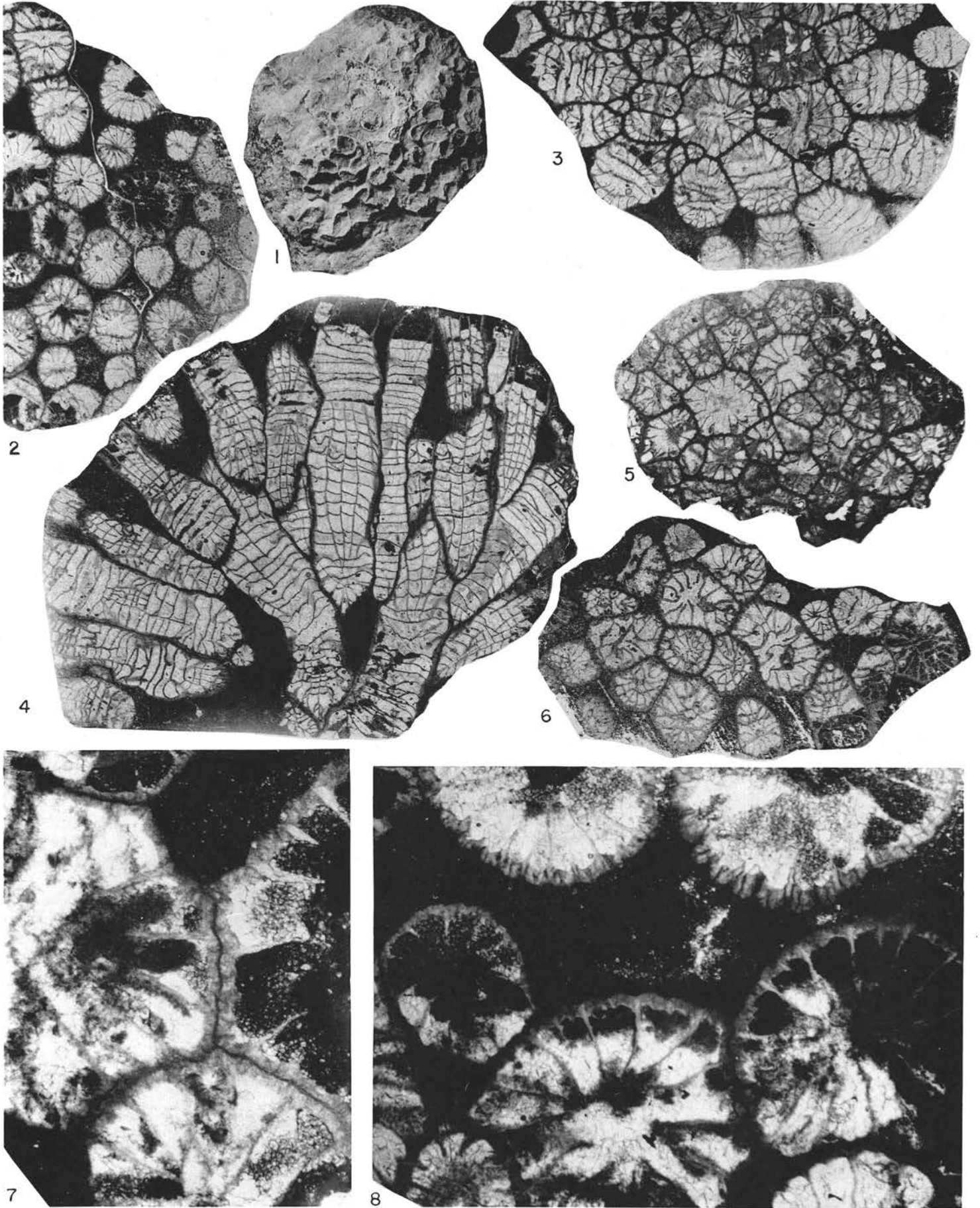
*Favistina crenulata* Flower, n. sp.

P. 81

3. Longitudinal section,  $\times 3$ , showing highly variable tabulae, some arched upward.
5. Lateral view, weathered,  $\times 1$ .
6. Portion of surface of colony, weathered,  $\times 1$ .
7. Cross-section,  $\times 3$ , from near the surface, showing strongly crenulate walls and general development of minor septa.
8. Cross-section,  $\times 3$ , from near midheight of colony, showing somewhat larger corallites, and rather long major septa, some joining in groups at their tips.
9. Longitudinal section,  $\times 3$ , from near center of colony, showing form and spacing of tabulae, with poor development of crowded zones.

Holotype, No. 736; Whitewater beds, Weisburg, Indiana.





## PLATE 42

*Favistina paleophylloides* Flower, n. sp.

P. 82

1. Anterior surface of paratype,  $\times 1$ , showing typical size of colony; surface with corallites becoming free and rounded.
2. Cross-section,  $\times 3$ , from near anterior surface of holotype, showing free or imperfectly joined individuals. (R)
3. Cross-section,  $\times 3$ , from near midheight of colony, showing corallites cerioid except at the margins, and attaining their largest size. (R)
4. Longitudinal section,  $\times 3$ , showing large corallites reduced in size at the late phaceloid stage, and variation in form and spacing of tabulae. (R)
5. Cross-section,  $\times 3$ , from near base of holotype colony, showing early growth stage, with completely cerioid corallites, slightly smaller than those in fig. 3. (R)
6. Cross-section,  $\times 3$ , near anterior surface, but slightly below section presented in fig. 2, showing the beginning of phaceloid growth. (R)
7. Enlargement of part of fig. 1,  $\times 15$ , showing sclerenchyme, axial plane where corallites join continuing over free parts as an epitheca.
8. Enlargement,  $\times 12$ , of another part of the same section, showing crenulate edges of the free corallites. The epitheca, here present, is not shown owing to darkness of matrix.

Holotype, No. 735 (figs. 2-8), and paratype, No. 793 (fig. 1); beds of Lowville age, Fourth Chute, near Eganville, Ontario.

## PLATE 43

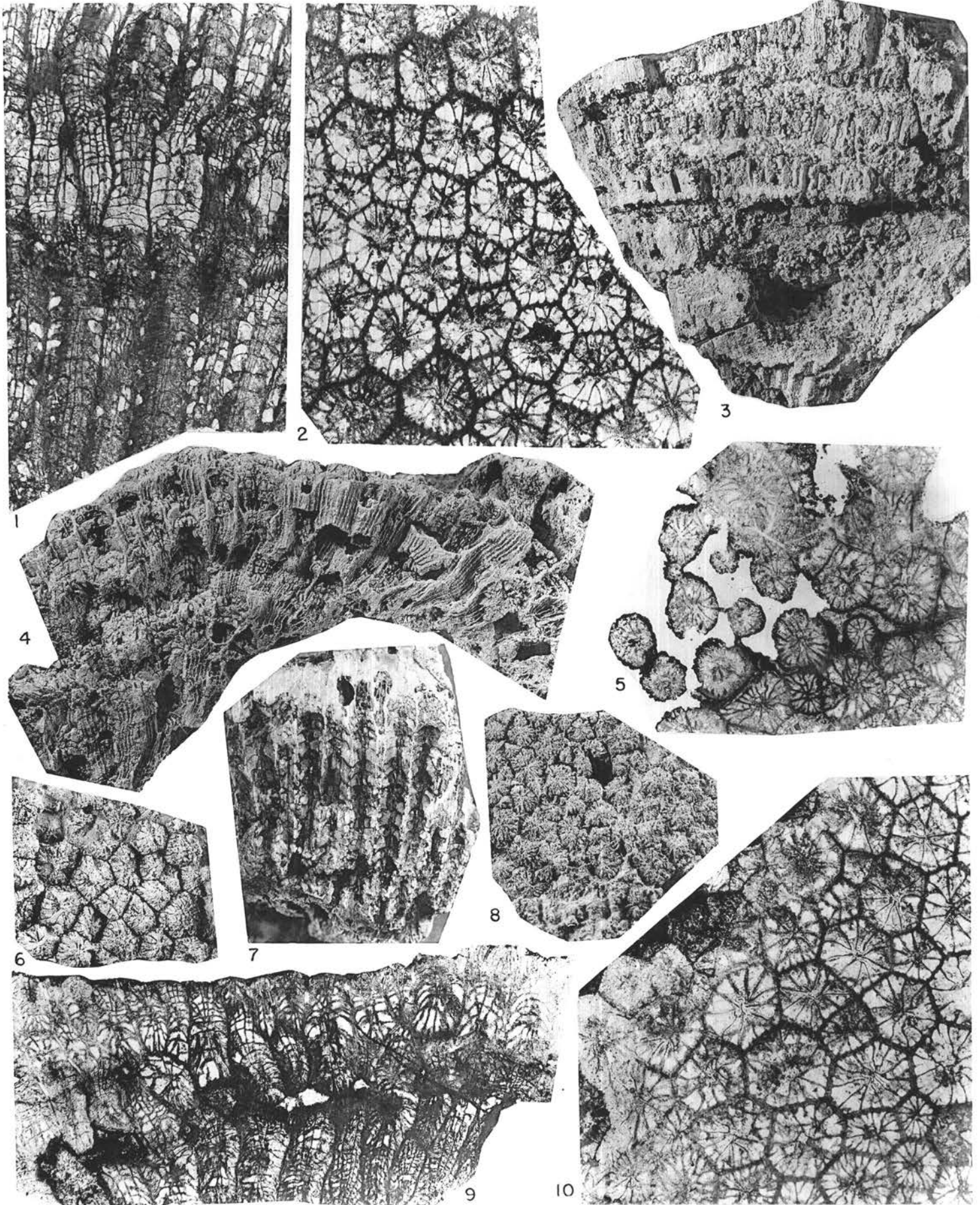
*Cyathophylloides burksae* Flower, n. sp.

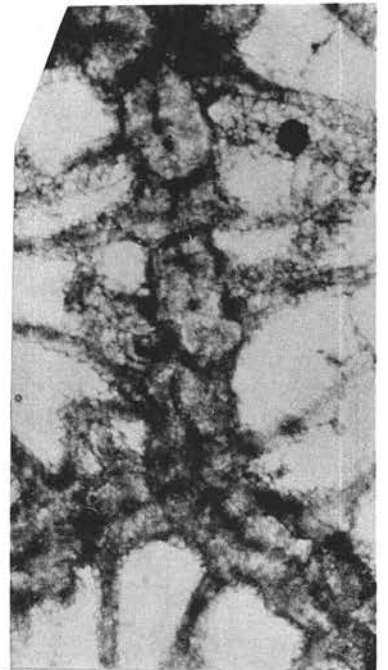
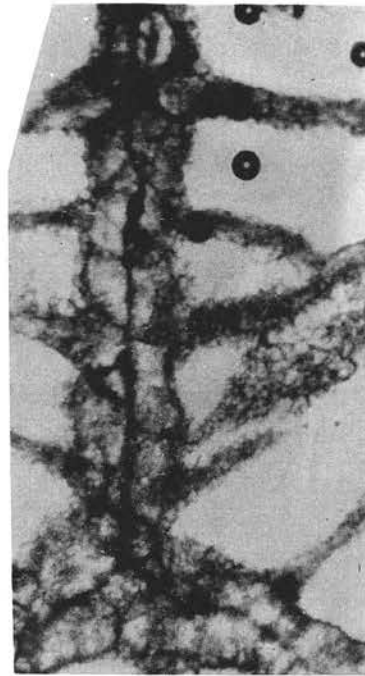
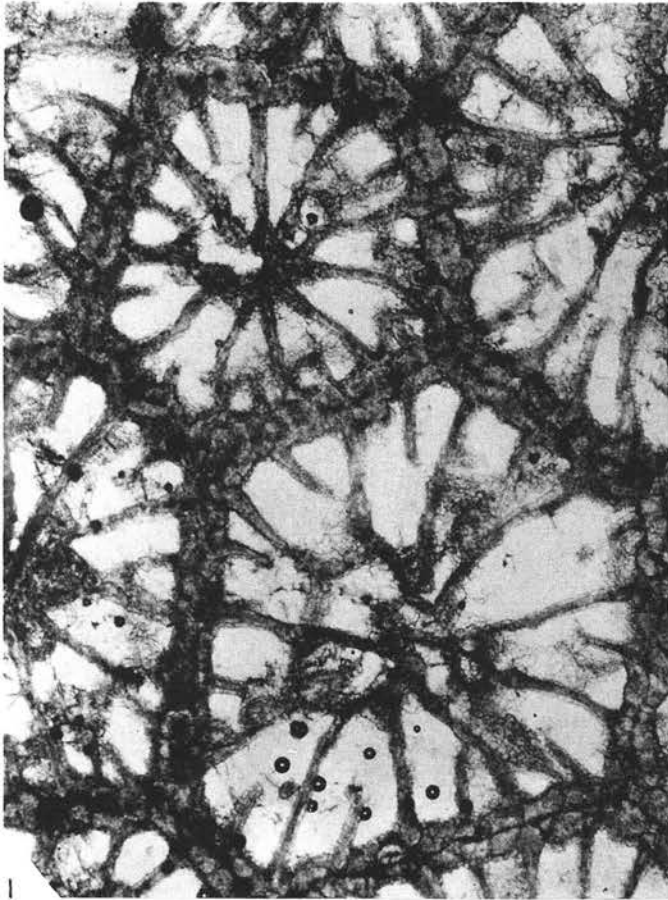
P. 83

1. Longitudinal section,  $\times 3.5$ , showing general arching and spacing of tabulae. No. 68og.
2. Cross-section,  $\times 4$ , showing general fusion of major septa at center of corallites and general development of short minor septa. No. 68oe.
3. Lateral view,  $\times 1$ , of holotype colony. No. 68o.
4. Lateral view of paratype,  $\times 2$ , showing striations formed by septal insertions on broken corallite walls. No. 683.
5. Cross-section,  $\times 3$ , from adoral part of paratype colony, showing slight development of free rounded corallites. No. 681.
6. Weathered surface,  $\times 2$ , of a paratype with relatively large corallites. No. 684.
7. Lateral view of a broken colony,  $\times 2$ , considerably silicified; corallite centers are weathered; arched tabulae show dark obscure centers, and here exhibit V-shaped patterns as they meet the rather obscure walls. No. 683.
8. Portion of weathered surface of colony,  $\times 2$ , showing typical corallites. No. 684.
9. Vertical section,  $\times 2.5$ , showing variations in tabular arching and spacing. No. 684c.
10. Cross-section,  $\times 4$ , showing many major septa only imperfectly joining at their tips; variation in aspect of corallites is due largely to local silicification. No. 68od.

Holotype, No. 68o, and paratypes, Nos. 681-684; coral zone of Aleman formation, northern Franklin Mountains, Texas.

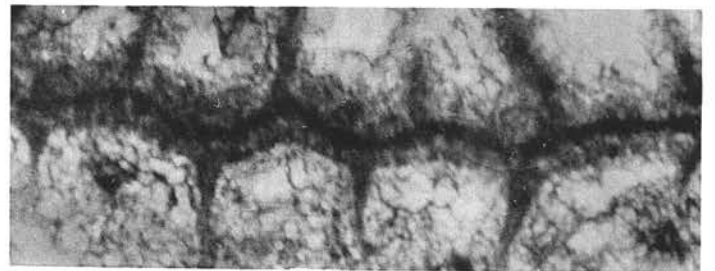




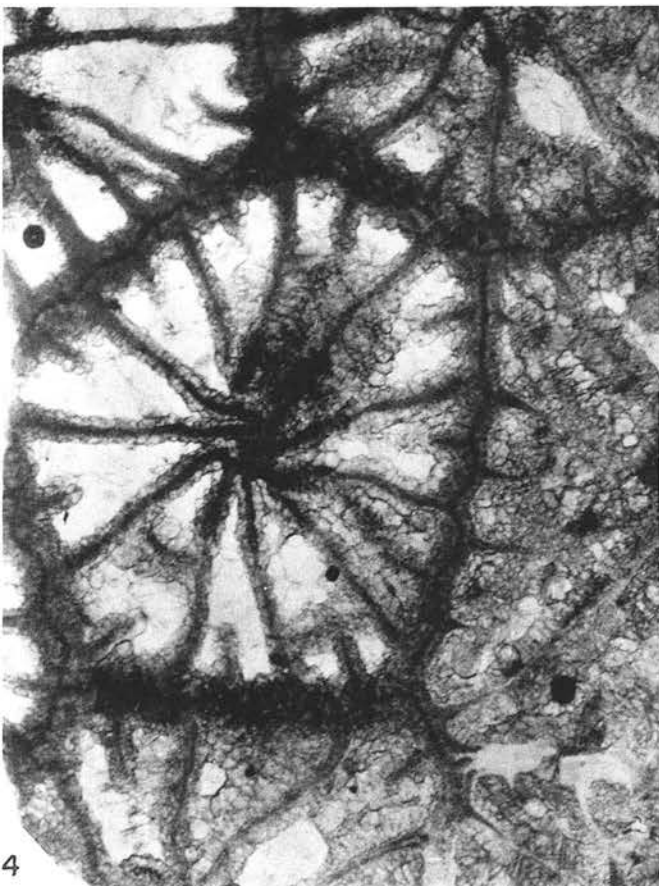


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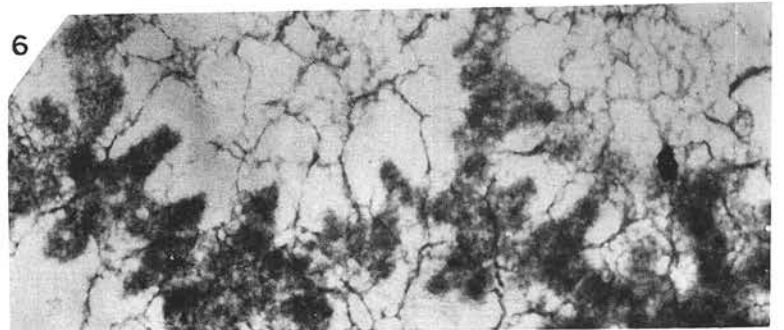
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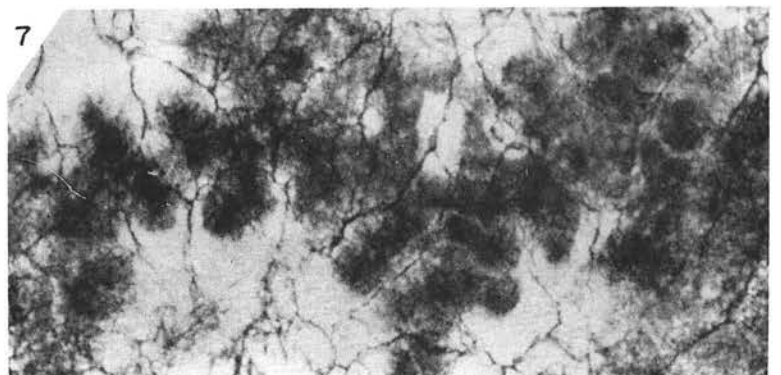
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## PLATE 44

*Cyathophylloides burksae* Flower, n. sp.

P. 85

1. Cross-section,  $\times 17$ , of a calcitic specimen, showing axial plane, locally imperfect, a probable result of recrystallization, with septa extensions of the sclerenchyme. No. 68od.
2. Further enlargement, about  $\times 40$ , of part of the same section, showing a region where the axial plate is continuous.
3. Another portion, about  $\times 40$ , of the same section, showing wall apparently broken into discrete units, and the axial plane discontinuous, attributed to alteration.
4. Cross-section,  $\times 17$ , of a corallite largely replaced by silica; the axial plate is clearly differentiated, but fine structure of the sclerenchyme is lost. No. 68od.
5. Further enlargement, about  $\times 40$ , of part of the same, showing continuity of the apparently single axial plate.

Holotype, No. 68o; Aleman formation, northern Franklin Mountains, Texas.

*Nyctopora mutabilis* Flower, n. sp.

P. 63

6. Portion of cross-section, about  $\times 50$ , of a moderately thin wall, showing trabeculae. No. 676d.
7. Cross-section, about  $\times 50$ , of a relatively thick part of the wall; fibers of the trabeculae are lost by apparent recrystallization and are only faintly suggested. No. 676c.

Holotype, No. 676; Second Value formation, southern Franklin Mountains, near crest of Scenic Drive, El Paso, Texas.

## PLATE 45

*Foerstephyllum* cf. *halli* (Nicholson) Pp. 28, 70

Cross-sections of a colony from the Chaumont beds at Crown Point, New York, showing fibrous walls, in part with a light axial plane, in part with this structure obscured, and showing varying degrees of recrystallization of the fibrous structure. No. 737.

1. Cross-section,  $\times 19$ , showing a part of the wall where the light axial plane is visible for some distance; fibrous sclerenchyme is little altered. No. 737b.
2. Cross-section,  $\times 20$ , showing considerably broader walls and larger spines, broad basally; fibrous material shows evidence of alteration, and the axial plane is obscured. No. 737c.
3. Cross-section,  $\times 18$ , showing a narrower wall with more prominent septal ridges, the whole showing considerable recrystallization and resembling trabecular structure. No. 737a.

*Foerstephyllum* cf. *halli* (Nicholson) Pp. 28, 70

A colony from the Amsterdam limestone from near Schenectady, New York, differing from the above form in having a good axial plate and thick sclerenchyme, from which extend short broad-based spines. No. 738.

4. Portion of cross-section,  $\times 18$ , showing axial plate and sclerenchyme, which exhibits traces of fibrous structure, but is imperfectly differentiated from inorganic calcite in the matrix, as shown at the upper left. No. 738d.
5. Cross-section,  $\times 18$ , showing thicker, more sharply differentiated axial plate and clearer retention of fibrous structure in the sclerenchyme. No. 738d.
6. Section,  $\times 18$ , showing sclerenchyme extended into unusually long and large septal ridges, retaining suggestion of original fibrous structure, but with some replacement; dark axial plate is visible in relatively slight contrast, but still distinct. No. 738c.

*Foerstephyllum* cf. *halli* (Nicholson) Pp. 28, 70

A third form, with good axial plate, but with thinner sclerenchyme and smaller septal ridges; corallites somewhat larger than in the preceding forms; from beds regarded as of Rockland age, Newport, New York. No. 739.

7. Cross-section,  $\times 15$ , showing dark axial plate and lighter sclerenchyme somewhat altered but distinct from calcite in the matrix. No. 739a.
8. Another part from the same section,  $\times 15$ , showing clear axial plate and fibrous sclerenchyme, with boundary between sclerenchyme and calcite of the matrix somewhat obscure. No. 739a.

*Foerstephyllum porosum* Flower, n. sp. P. 70

9. Portion of surface of the holotype,  $\times 1$ , showing size and aspect of weathered corallites. No. A50676(SMC), from 800-foot elevation, Harp Burn, Akpatok Island, Ungava Bay.

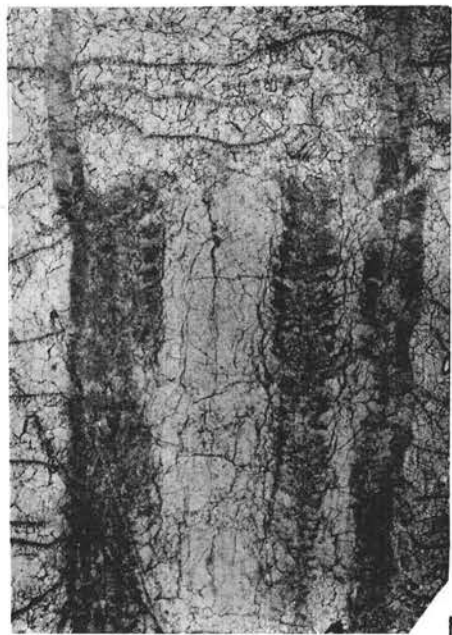
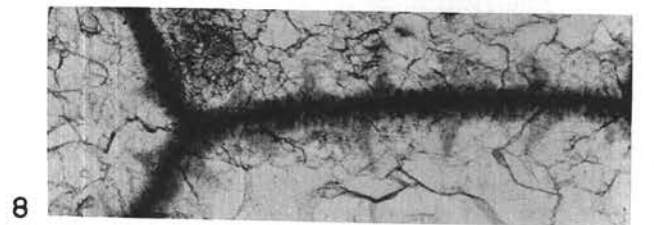
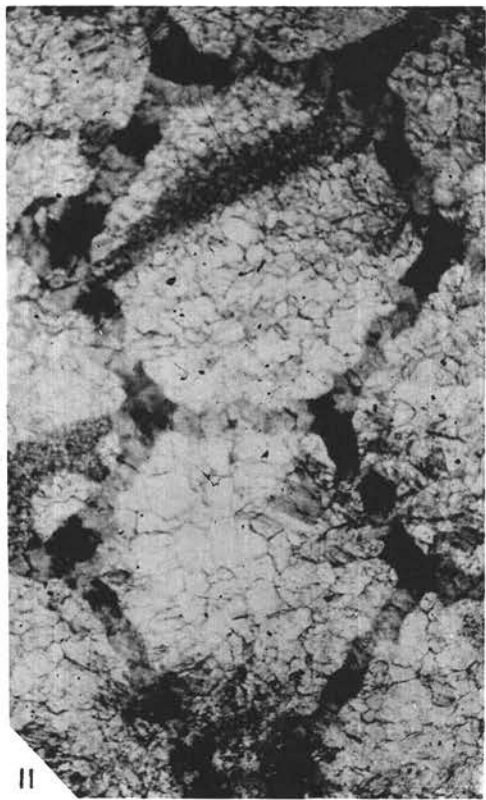
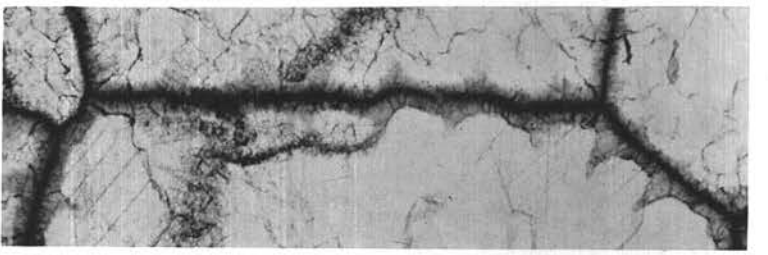
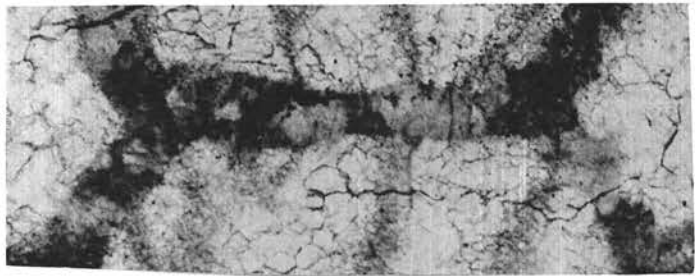
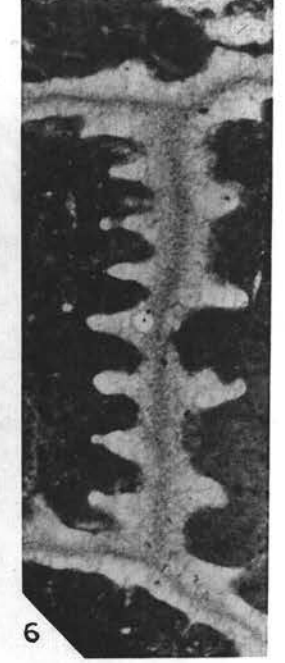
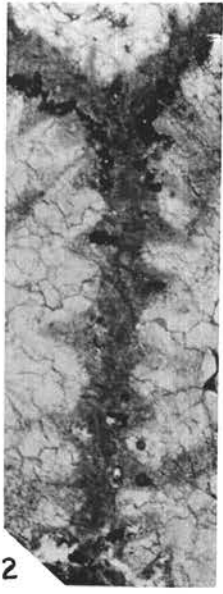
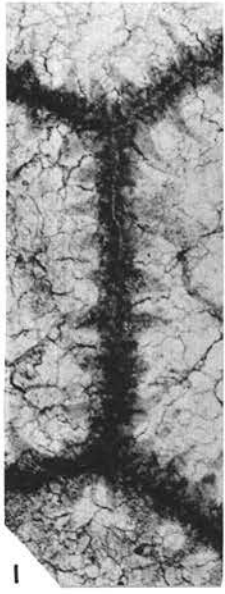
*Trabeculites maculatus* Flower, n. sp. P. 62

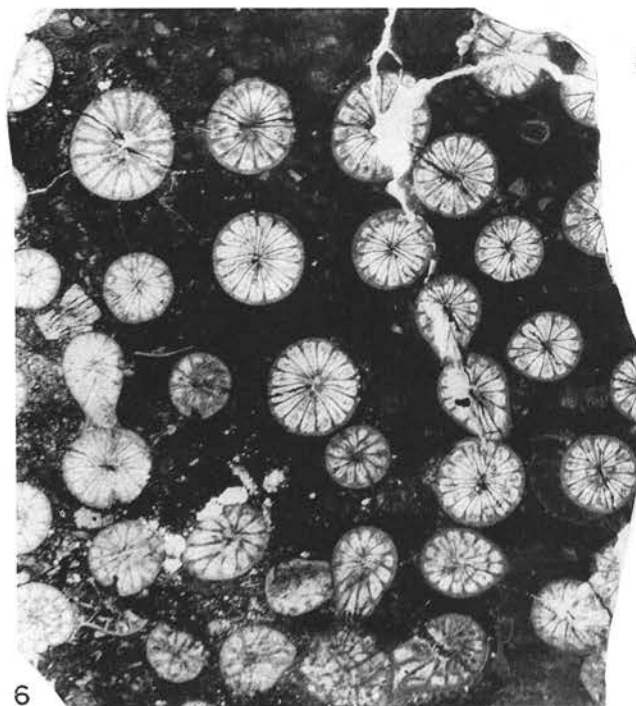
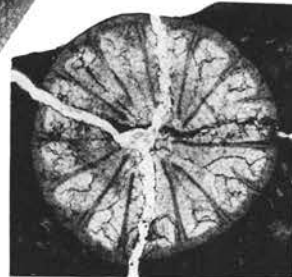
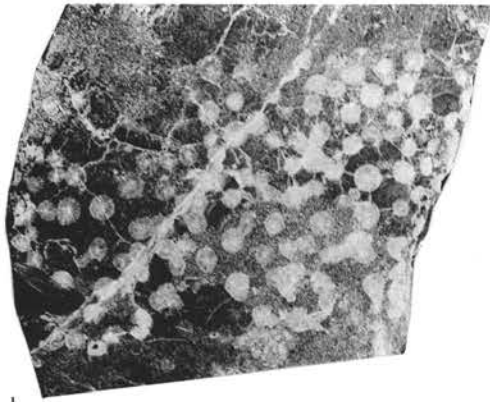
10. Enlargement of cross-section, about  $\times 35$ , showing detail of a portion of the wall in which there is considerable alteration, but retaining traces of trabeculae centered on short vertical planes as axes.
11. Portion from the same section,  $\times 19$ , showing two corallites in cross-section with characteristic mottling due to replacement of lighter portions of the walls. The section shows gradations from essentially fibrous regions to those in which fibers center about short, discrete vertical planes. No. A50687b(SMC).
12. Vertical section,  $\times 20$ , a great part of which intersects the common wall between two corallites. Dark, relatively unaltered regions show U-shaped fibers (trabeculae); the U-shaped rather than the V-shaped pattern develops, as the section apparently does not quite reach the middle of the common wall; clear lighter areas, replaced more extensively, have lost the fibrous structure. V-shaped fibers are shown in the walls on the right and again at the upper left.

No. A50687(SMC); Ordovician, from 325-foot elevation, Harp Burn, Akpatok Island, Ungava Bay. See also pl. 28.

*Crenulites magnus* Flower, n. sp. P. 85

13. Cross-section,  $\times 20$ , showing dark axial plate, in places giving evidence of being composed of two identical opposed layers, and contrasting with the much lighter sclerenchyme, of which the septa are here seen as extensions. Sclerenchyme and matrix are both of light calcite, and are photographed here with strong contrast. No. 787c; Second Value formation, Scenic Drive, El Paso, Texas. See also pl. 33, figs. 1-5.





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## PLATE 46

*Paleophyllum gracile* Flower, n. sp.

P. 89

1. Transverse section of part of type colony,  $\times 1$ , showing size and general spacing of corallites.
2. Corallite,  $\times 10$ , showing 13 septa, most of which join irregularly at their tips, though leaving a small central space; one short septum, free at its tip, suggests possible biradial symmetry, not shown by most corallites.
3. Longitudinal section,  $\times 3.5$ , showing varying aspect of tabulae; some corallites, showing many obvious septa, are cut well off center; tabulae may be displaced, and flattening of tabulae in the center is not here apparent; such flattening is shown, however, in the lower right and again in the upper center, where sections attain corallite centers. No. 689a. (R)
4. Longitudinal section,  $\times 5$ ; in the lower left, a large corallite shows tabulae unusually broadly flattened and slightly depressed centrally; in the upper right, the section is eccentric, and tabulae are slightly displaced where they intersect septa. No. 689i. (R)
5. Cross-section of a corallite,  $\times 11$ , broken, but showing details of sclerenchyme and traces of axial elements in the thick bases of the major septa. No. 689g.
6. Cross-section,  $\times 4$ , showing variation in aspect of corallites. No. 689d. (R)
7. Longitudinal section,  $\times 5$ ; at the base, tabulae are cut well off center, show scarcely any arching, and are displaced by septa; in the left center, arching is increased; at the upper left, tabulae are exceptional in height of arching and sinuosity. No. 689b. (R)
8. Enlargement,  $\times 15$ , of part of right side of fig. 4, showing details of wall, septa, and tabulae, all of which are fibrous. Section is well off center above and below.

Holotype, No. 689; from the basal 15 feet of the Second Value formation, near the Scenic Drive, El Paso, Texas.

## PLATE 47

*Paleophyllum gracile* Flower, n. sp.

P. 89

1. Cross-section,  $\times 15$ , showing two large budded individuals still attached to the parent; at lower right, a section intersecting the lower part of the calyx, showing septa that are short and unjoined terminally. No. 689c.
2. Another part of the same section, showing the above three attached individuals, with epitheca developed separating two of them in the upper right, but with no wall developed between the two joined in the upper center. Two lower individuals show contrast in length of septa; the one at the right is exceptional in the development of several very short minor septa.
3. Cross-section,  $\times 6$ , showing rather thick septa, tending to join in pairs, leaving a rather large central cavity. No. 689c. (R)
4. Cross-section,  $\times 6$ , showing typical thin distal septa, their tips irregularly joined. No. 689e. (R)
5. Cross-section,  $\times 6$ , showing at left three joined individuals representing terminal division of a corallite; in upper center, another young individual is cut at the anterior end of the calyx, showing major septa short and thick. No. 689f. (R)
6. Cross-section,  $\times 6$ , showing, upper left, two free septa separated by two joined, and in lower part two groups of three. (R)
- 7, 8. Cross-sections,  $\times 9$ , showing further variation in terminal joining of septa, those in fig. 7 nearly attaining the center. The semblance of a columella is here false and the result of recrystallization. No. 689d. (R)

For occurrence see Pl. 46.

*Paleophyllum thomi*

P. 91

9. Cross-sections,  $\times 14$ , of two attached corallites, showing general suppression of minor septa; major septa similar to those of *P. gracile*, but more numerous. No. 691c. From the coral zone in the Aleman formation, from the southern Franklin Mountains, Texas.

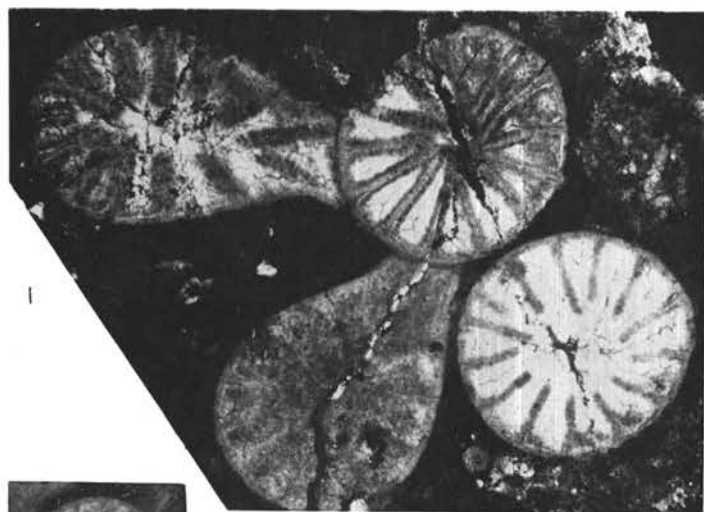
*Paleophyllum margaretae*

P. 90

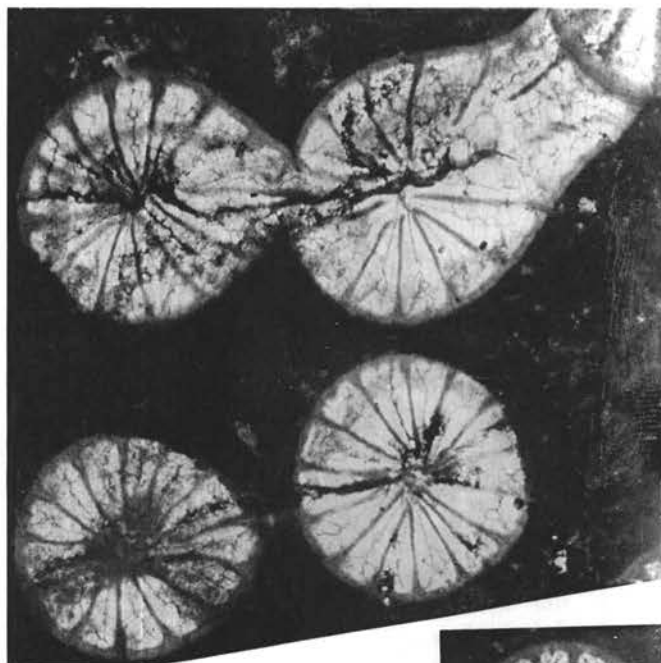
10. Two cross-sections,  $\times 12$ , showing typical major septa with tips joined in groups, bases thickened, and general development of short secondary septa. Slide 688b.
11. Longitudinal section,  $\times 3.5$ , showing quadrangular pattern of tabulae where section attains centers of corallites, with marked displacement of tabulae where they intersect septa in eccentric sections, shown notably on the left. No. 688a. (R)

Holotype, No. 688; Upham limestone, near the crest of the Scenic Drive, El Paso, Texas.





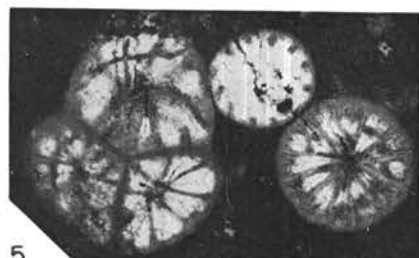
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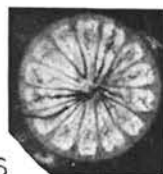
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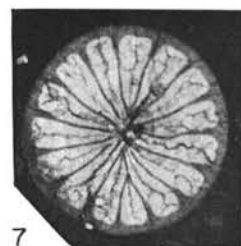
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4



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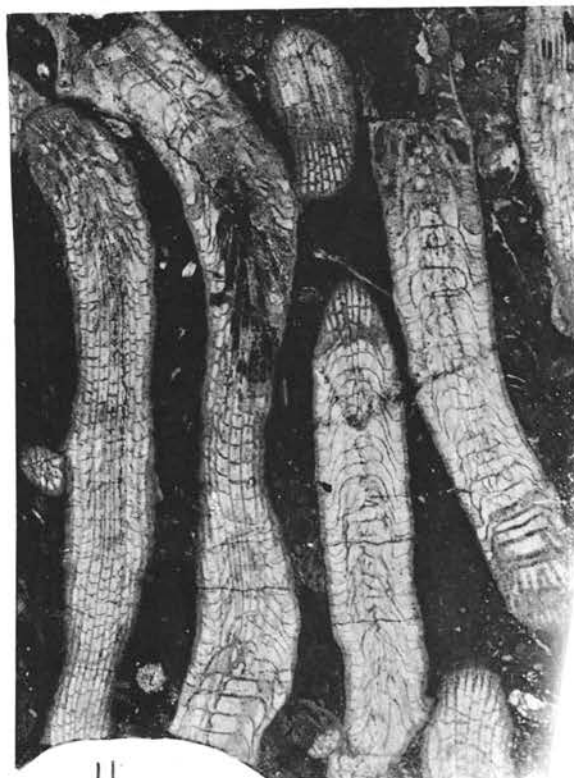
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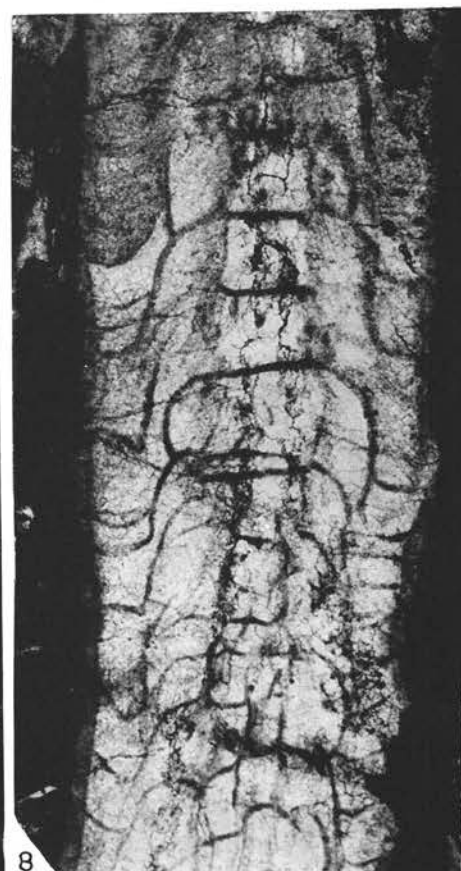
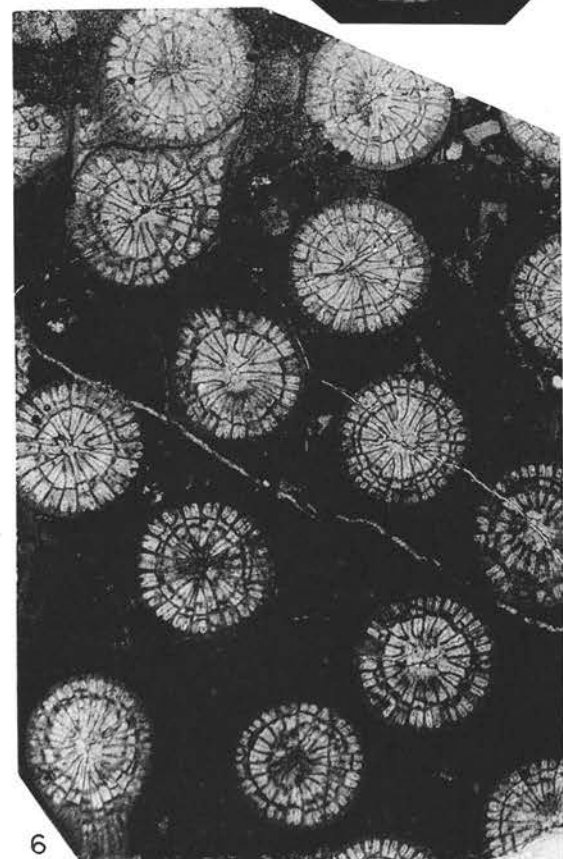
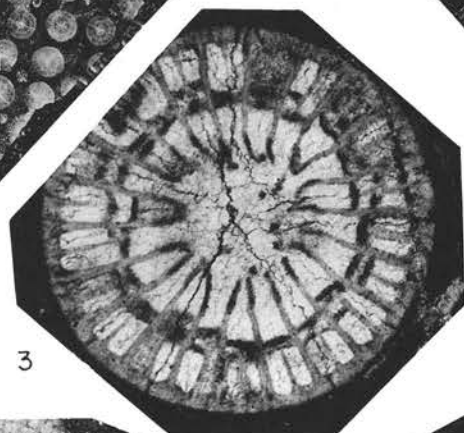
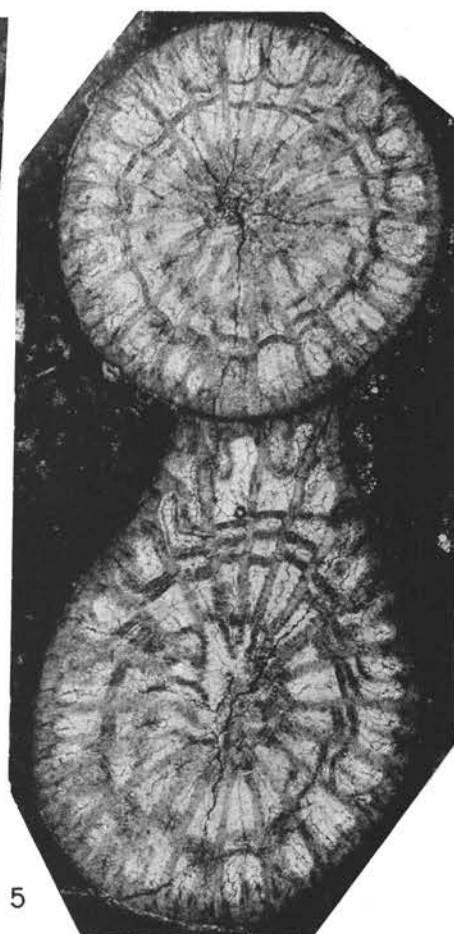
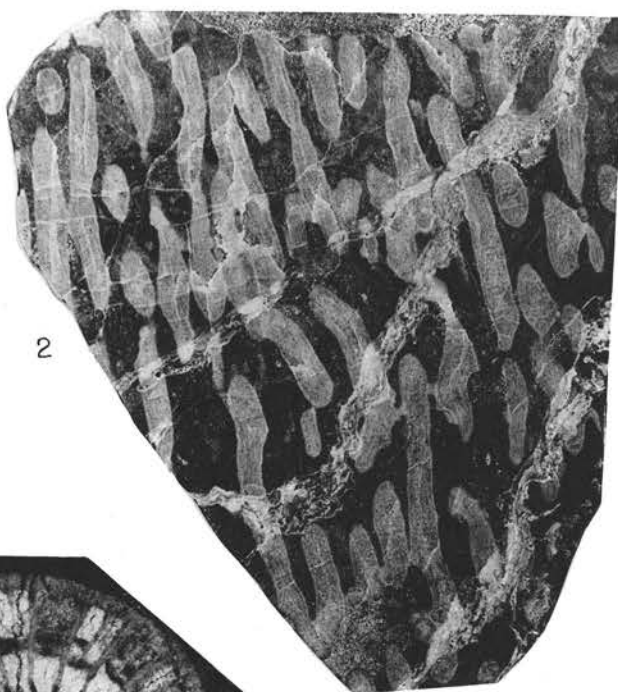
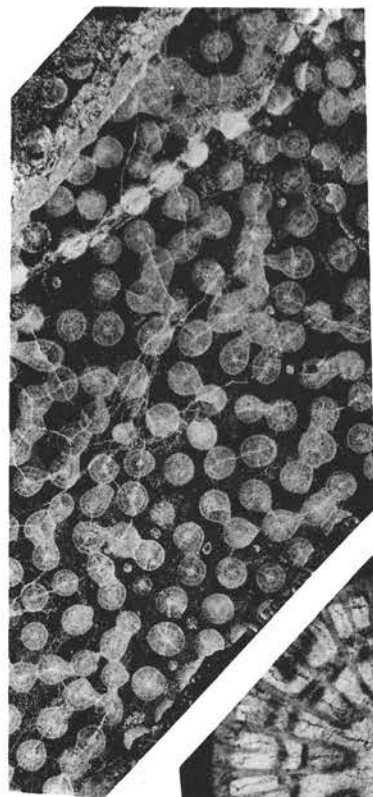
9



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11



## PLATE 48

*Paleophyllum margaretae* Flower, n. sp.

P. 90

1. Cross-section of part of holotype colony,  $\times 1$ , showing characteristic size and spacing of corallites; note occasional chains.
2. Longitudinal section,  $\times 1$ , showing irregular course of corallites.
3. Cross-section,  $\times 13$ , showing sclerenchyme, minor septa extending to tabular zone, and major septa tending to join in pairs, with several paliform dots in the corallite center, a feature observed in only a few sections. No. 688b.
4. Cross-section of two corallites,  $\times 4.5$ , showing unusually long septa. No. 688d. (R)
5. Cross-section of two corallites,  $\times 13$ , showing elongation of corallite, common in the short cateniform groups, and textural contrast of tabulae and septa, with some paliform dots in the lower corallite. No. 688c.
6. Cross-section,  $\times 4.5$ , showing group of corallites. Fig. 3 is a further enlargement of the corallite in the lower right, in which paliform dots are visible; to the lower left of this corallite, in the lower center, is one in which the section intersects the central transverse part of a tabula. No. 688b. (R)
7. Cross-section of two attached corallites,  $\times 13$ . The lower corallite shows a large central paliform dot; on its lower right is an attached organism of uncertain affinities. No. 688c.
8. Longitudinal section,  $\times 12$ , showing strongly rectilinear pattern of tabulae; the dark region to the upper left is a septum intersected by the plane of the section; below, the section is slightly eccentric, tabulae being displaced where they intersect septa. No. 688a.

Holotype, No. 688; Second Value formation, near the crest of the Scenic Drive, El Paso, Texas.

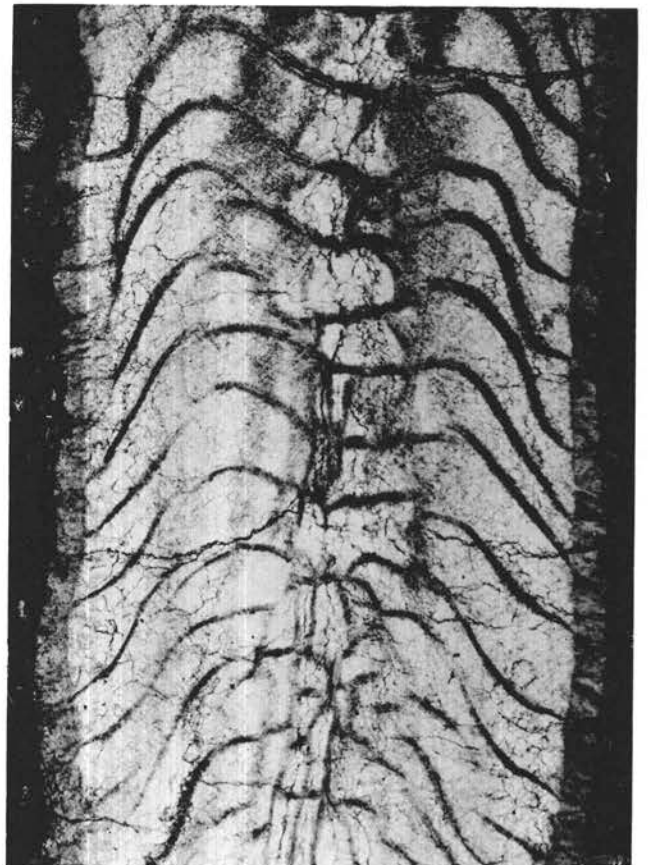
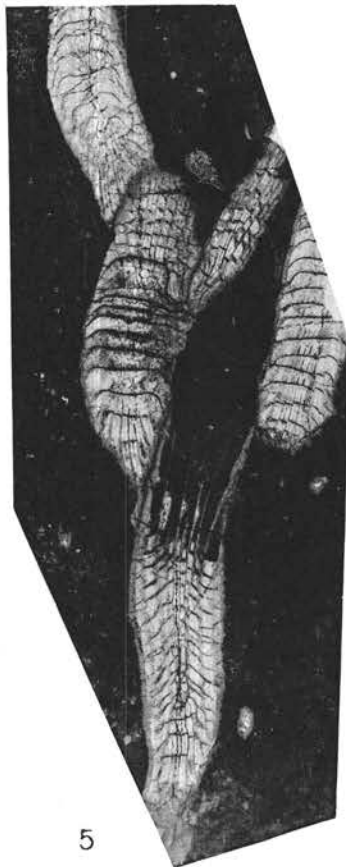
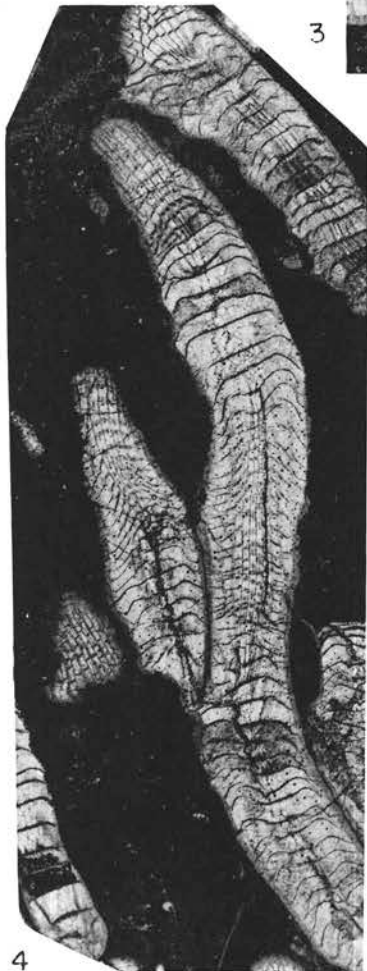
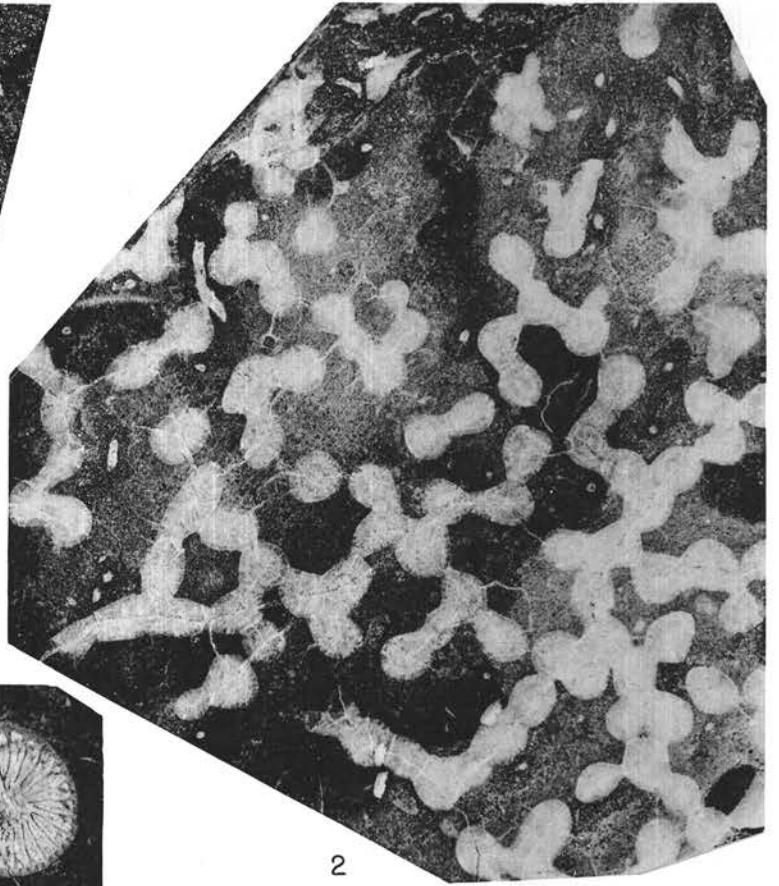
## PLATE 49

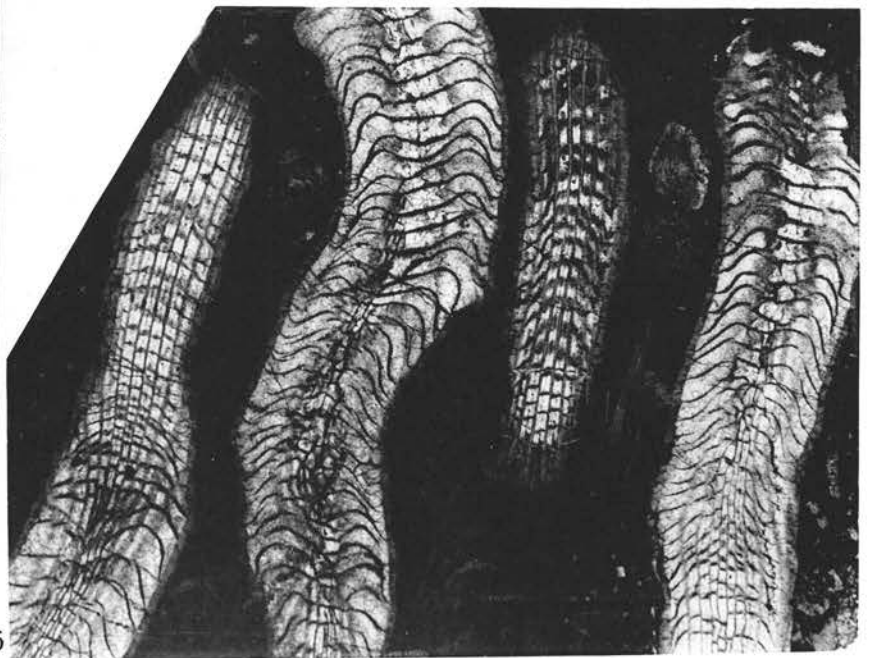
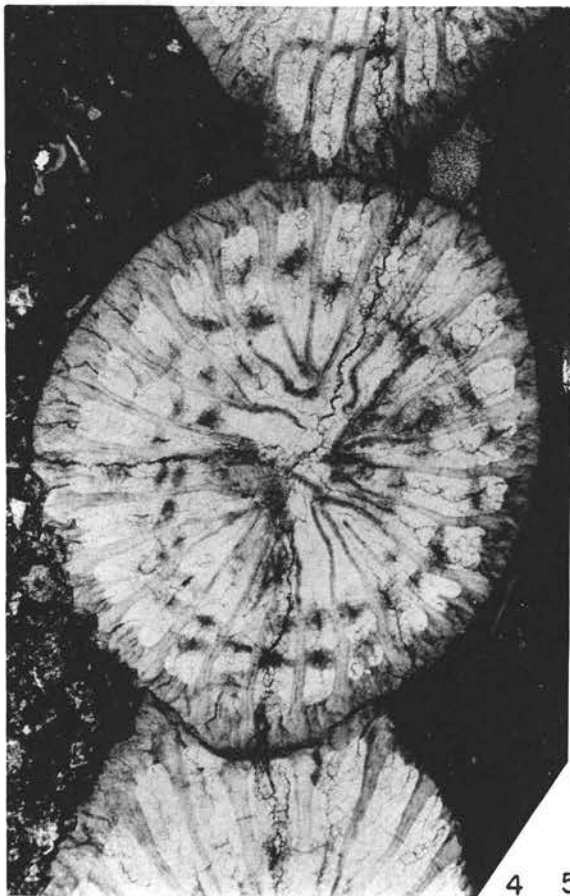
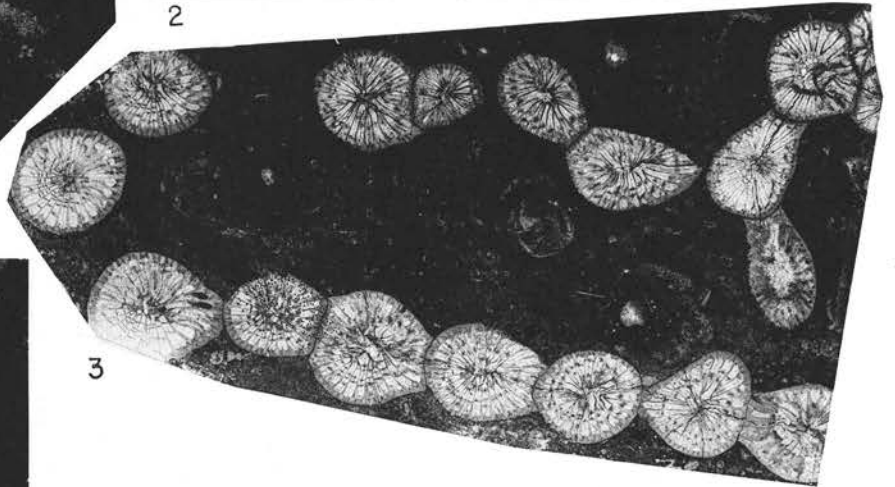
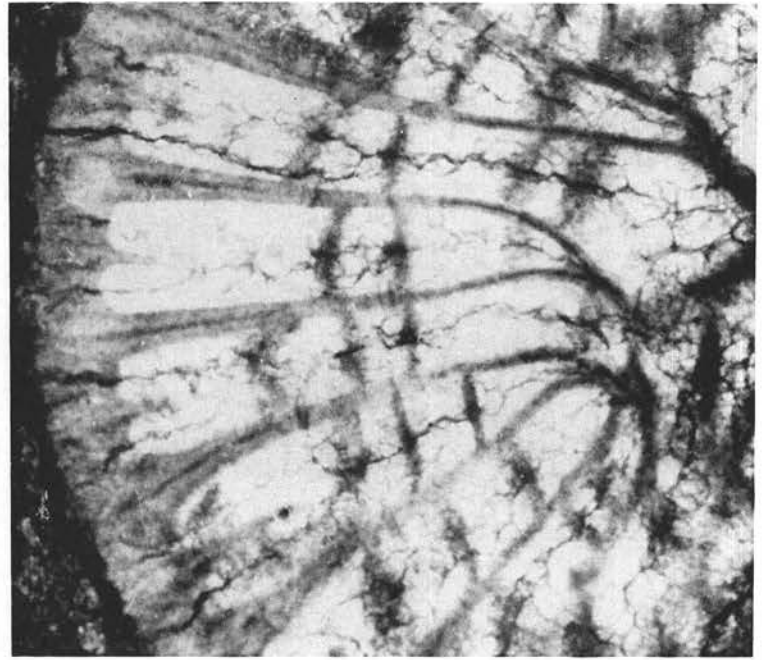
*Paleophyllum cateniforme* Flower, n. sp.

P. 91

1. Side view of colony,  $\times 1$ .
2. Cross-section from top of colony,  $\times 1$ , showing size and arrangement of corallites; note predominance of cateniform units.
3. Cross-section,  $\times 3.4$ , showing, inserted into a large corallite, a small budding individual in which septa form a triangle. No. 687d. (R)
4. Longitudinal section,  $\times 2.5$ , showing variable aspect of tabulae; those in the upper center, transverse across the center of the corallite, are atypical; below, the section is eccentric for a distance, but near the bottom resumes a central position. No. 687g. (R)
5. Longitudinal section,  $\times 2.5$ , showing in a nearly vertical section, one of the very few calices observed; the section cuts a number of other corallites at steep angles. No. 687f. (R)
6. Longitudinal section,  $\times 12$ , enlargement of same specimen as that shown in the lower right on pl. 50, fig. 5. Epitheca is thin and dark, not clearly evident and largely absent on the abraded left side; apparent wall is sclerenchyme, with tabulae, contrasting and much darker, attached. Septa intersect plane of the section, forming fainter longitudinal dark bands on either side of the upper center. Note displacement and fusion of tabulae below.

Holotype, 687; Second Value formation, lower limestone member, near Scenic Drive crest, El Paso, Texas.





## PLATE 50

*Paleophyllum cateniforme* Flower, n. sp.

P. 50

1. Cross-section,  $\times 13$ , showing extreme anastomosing of septa. No. 687a.
2. Enlargement from the same section, about  $\times 26$ , showing texture of fibrous sclerenchyme and septa. The dark epitheca can be seen.
3. Cross-section from the same slide,  $\times 2.5$ , showing cateniform grouping of corallites and the numerous, long, irregularly joined septa. The matrix shows cross-sections of vertical worm borings common in all *Paleophyllum* of the Upham limestone. (R)
4. Enlargement,  $\times 13$ , of another part of the same section, showing, with fig. 1, variation in appearance of sclerenchyme and fusion of septa at their tips.
5. Longitudinal section,  $\times 3.5$ , showing in part typical median sections, with tabulae conspicuously depressed centrally; also eccentric portions of section in which many septa appear, with tabulae displaced as they intersect them. No. 687e.

Holotype colony, as in preceding plate.

## PLATE 51

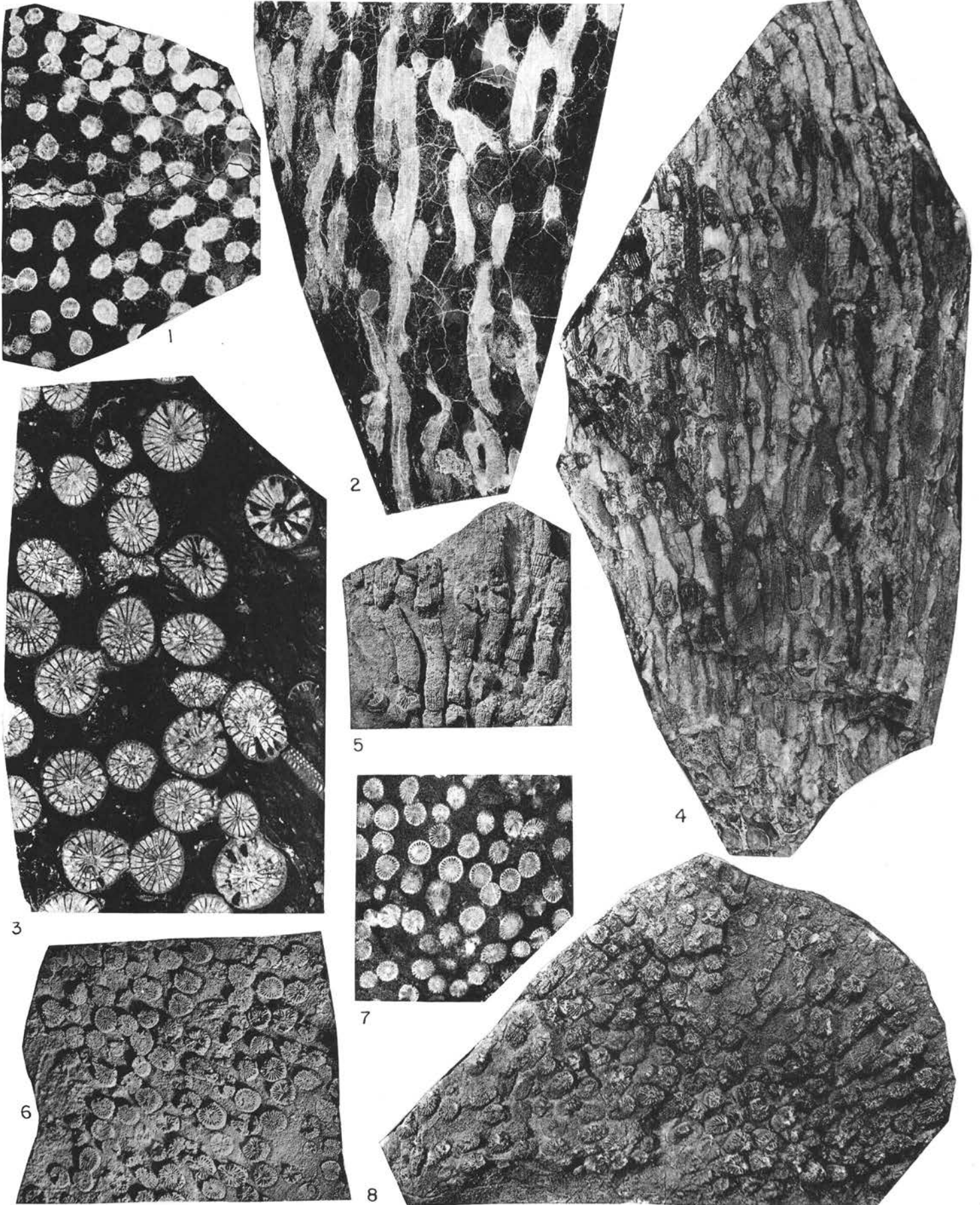
*Paleophyllum thomi* (Hall)

P. 91

- 1, 2. Cross- and longitudinal sections,  $\times 1$ , of a colony with rather large and widely spaced corallites, showing general appearance and habit of growth. No. 690.
3. Cross-section,  $\times 3$ , from the same colony. (R)
4. Lateral view of a large colony,  $\times 1$ , with smaller more closely spaced corallites. No. 692.
- 5-7. Three views,  $\times 1$ , of another colony, intermediate in spacing and size of corallites between the two previously shown. Fig. 5, lateral view, corallites slicified and exposed by weathering. Fig. 6, weathered adoral surface. Fig. 7, cross-section. No. 691.
8. Anterior view of part of colony,  $\times 1$ . No. 693.

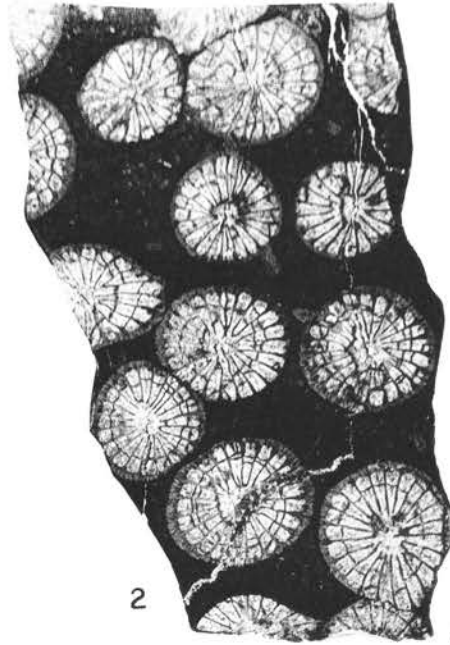
Hypotypes, Nos. 690-693; coral zone of the Aleman formation, southern Franklin Mountains, north of El Paso, Texas.



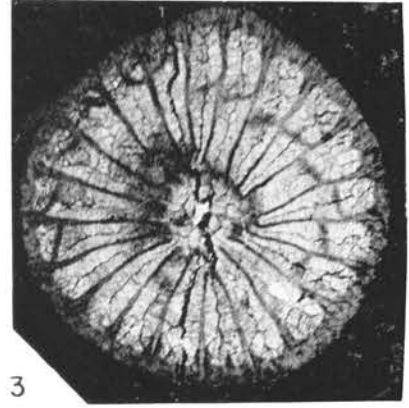




1



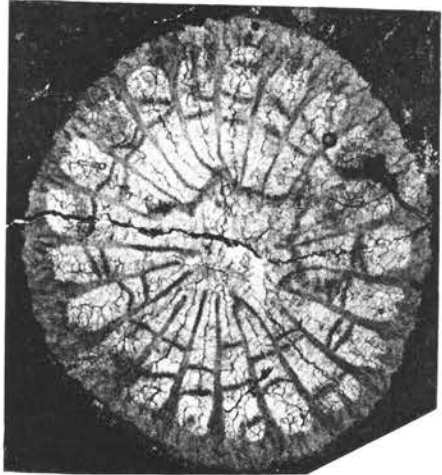
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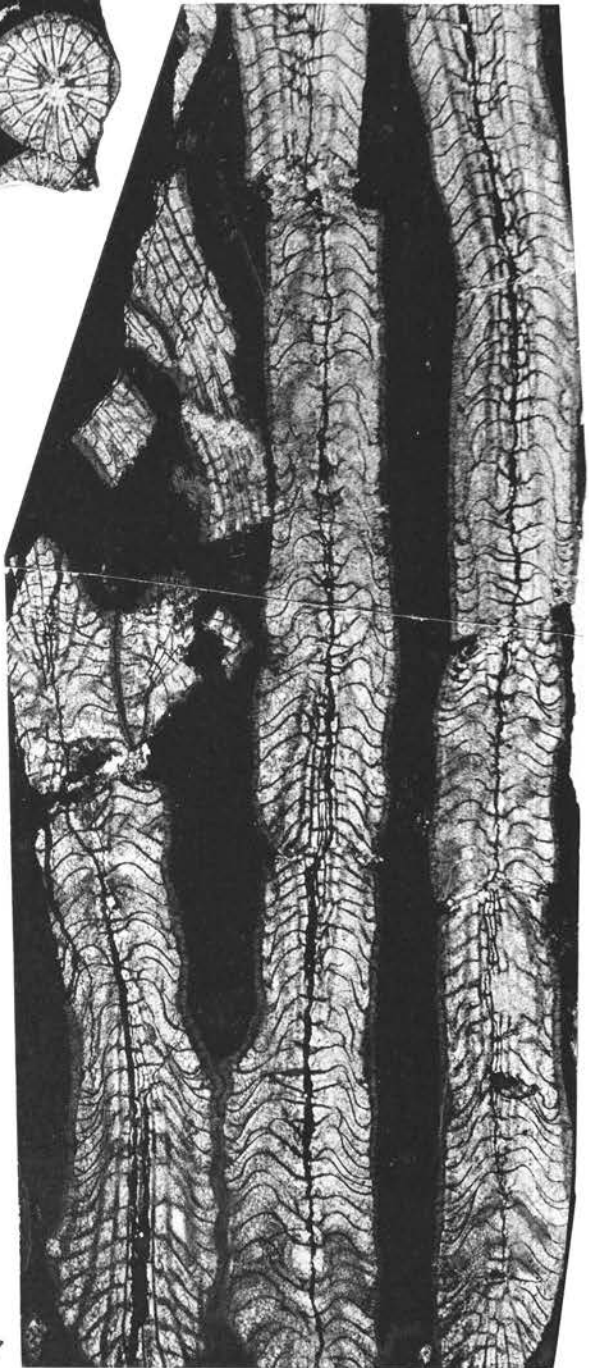
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## PLATE 52

*Paleophyllum thomi* (Hall)

## P. 91

1. Longitudinal section,  $\times 4$ . Where the section cuts the centers of corallites, broad undulate tabulae are formed, depressed centrally and resembling the tabulae of *P. cateniforme*. No. 690b.
2. Cross-section,  $\times 4$ , showing typical appearance of corallites at low magnification. No. 692c.
3. Enlargement of a corallite,  $\times 13$ , from the same section; note absence of clear tabular zone and suppression of secondary septa.
4. Enlargement of another corallite from the same section, a section failing to intersect tabulae; individual not quite mature.
5. A somewhat larger corallite from the same slide, showing the closest approach to the tabular zone of *P. margaretae*; this shows also a rare maximum of four short secondary septa.
6. Cross-section,  $\times 13$ , of a rare group of cateniform individuals; note similarity of septal pattern to that of the much smaller *P. gracile* of the Aleman formation. No. 690a.
7. Longitudinal section,  $\times 4$ , showing highly variable pattern of tabulae. Sections cutting corallite centers show tabular strongly sinuate, but curvature of the downturned center and lateral zones shows wide variation. No. 692a.

Hypotypes, Nos. 690 and 692; from the coral zone of the Aleman formation, southern Franklin Mountains, north of El Paso, Texas.