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NEW SPECIES OF FAVOSITES
FROM THE
NIAGARAN SERIES OF MICHIGAN

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NEW SPECIES OF FAVOSITES
 FROM THE
 NIAGARAN SERIES OF MICHIGAN

Occurrence of Species

The species of Favosites described in this paper were collected from the Niagaran series of the Northern Peninsula of Michigan, which is classified by G.M. Ehlers in a forthcoming paper as follows:

Silurian System	Niagaran Series	Lockport Group	Engadine dolomite	
		Clinton Group	Manistique dolomite	Cordell member
				Schoolcraft member
			Burnt Bluff limestone and dolomite	Hendricks member
		Byron member		
		Mayville dolomite		

Most of the species of Favosites were obtained from the Cordell member of the Manistique formation, which consists of thin, uneven-bedded, cherty, buff dolomites with numerous silicified remains of corals and other fossils. According to G.M. Ehlers, the Cordell species are representative of a North Atlantic fauna. This fauna lived in a sea which extended southwestward from the Gulf of St. Lawrence to Michigan and Wisconsin,

and spread as far west as Iowa. Some of the most characteristic fossils of this fauna are listed below:

Anthozoa

^a
Paleocyclus n. sp. aff. *P. rotuloides* (Hall)
Streptelasma conulus Rominger
Blothrophyllum caespitosum Rominger
Diphyphyllum huronicum Rominger
Omphyma verrucosa Rafinesque and Clifford
Ptychophyllum stokesi Edwards and Haime
Arachnophyllum pentagonum (Goldfuss)
Arachnophyllum striatum D'Orbigny
Cystiphyllum miagarense (Hall) var.
Lyellia papillata Rominger
Alveolites undosus Miller
Cladopora laqueata Rominger
Coenites laminatus Rominger (Hall)
Coenites crassus (Rominger)
Halysites labyrinthicus (Goldfuss)
Syringopora verticillata Goldfuss

Bryozoa

Lioclema sp. aff. *L. asperum* (Hall)
Fenestella sp. aff. *F. elegans* Hall
Pachydictya n. sp. aff. *P. crassa* (Hall)

Brachiopoda

Pentamerus oblongus Sowerby
Atrypa n. sp. or var. of *A. reticularis* (Linnaeus)

Cephalopoda

Armenoceras gouldense Foerste
Armenoceras sphaeroidale (Stokes)
Huroniella ehlersi Foerste
Huronia bigsoyi Stokes
Huronia vertebralis Stokes
Huronia obliqua Stokes
Huronia paulodilatata Foerste
Megadiscosorus remotus (Foord)
Stokesoceras gracile (Stokes)

Remains of this fauna are well represented in the so-called Lockport strata of Lake Timiskaming and Manitoulin Island, the Cordell dolomites of the Northern Peninsula,

the "Upper Coral Beds" of northeastern Wisconsin, and the Hopkinton dolomite of Iowa.

Two of the species of Favosites were obtained from the Hendricks member of the Burnt Bluff formation, and belong to an Arctic fauna which is distinctly different from the North Atlantic fauna. This fauna lived in a sea which covered a large part of Canada and Arctic North America, and extended as far south as Michigan and Wisconsin. Some of the most characteristic fossils of the Hendricks fauna are included in the list below:

Hydrozoa

Clathrodictyon vesiculosum Nicholson and Murray
n. var.

Brachiopoda

Camarotoechia winiskensis Whiteaves
Rynchospira lowi Whiteaves

Cephalopoda

Stokesoceras romingeri Foerste

Ostracoda

Leperditia hisingeri fabulina Jones
Isochilina grandis latimarginatus (Jones)

Remains of this fauna are well represented in the Wabi formation of Lake Timiskaming, Canada, in the Severn River and Ekwan limestones west of Hudson Bay, and in the upper beds of the Stonewall limestone of Manitoba.

Description of Species

Favosites casei n. sp.

Plate I, figs. A and B

Description. Corallum is large and has a flattened hemispherical form. A thin peritheca is present.

The corallites are thin-walled and for the most part are uniform in size and shape. Most of them are six-sided; a smaller number have four, five or seven sides. The average diameter of the corallites is 6.5 mm.; the diameters range from 3 to 7 mm.

No septal ridges are present. Exceedingly minute linear structures, suggesting rudimentary septal ridges are present in some corallites. On the walls of some corallites there are unevenly thickened ridges which look like welts, and which extend vertically for short distances.

The tabulae are very thin and flat, generally horizontal but occasionally oblique. They are from 1 to 3.7 mm. apart, the average distance between them being 5.7 mm. At various levels in the corallum the tabulae are closely crowded, their average distance apart in these crowded zones being about 1 mm. In some corallites the tabulae are indented by small marginal pits, some of which are located along the minute linear structures noted above. A small pit is present at the center of several of the tabulae.

Only one row of mural pores is typically present in each wall of a corallite, altho two rows occur in a few walls. They are irregularly spaced, and are usually about 2.5 mm. apart. A small raised rim is present around the pores.

The walls and upper surfaces of the tabulae are covered with minute, irregularly placed spines.

Occurrence. This species is present in the lower part of the Cordell member of the Manistique formation. The types were collected in a field about one-half mile south of Gould City, Mackinac County (S.E. $\frac{1}{4}$ sec. 29, T. 43 N., R. 11 W.)

(No. 11203)

Types. The holotype of this species is preserved in the Museum of Paleontology of the University of Michigan.

Remarks. This species differs from Favosites favosus in having corallites of larger diameters, flat and distantly placed instead of convex and closely placed tabulae, and no distinct septal ridges.

Favosites alticellus n. sp.

Plate II, figs. A and B

Description. Corallum consists of a low, laterally spreading expansion. Peritheca not preserved in the type, the only specimen available for study.

Corallites are uniform in size and shape. Their average diameter is 2.5 mm. Most of them are five or six-sided. The walls of the corallites are very thin.

Septal ridges are apparently absent.

The tabulae are very distantly separated, the distance between them, in some corallites, being as great as 4.5 mm., or almost twice the diameter of the corallites. The average distance between the tabulae is 3.5 to 4 mm. Only very few tabulae have marginal pits. When present, the marginal pits are two to four in number.

The mural pores are not well preserved, due to the fact that they have been filled with silica. Where observed, they are relatively large, few in number, and in one or two rows. Single rows of mural pores are more numerous than double ones. In single rows the pores are usually situated one above another and are equally spaced, the distance between them being about 1 mm. In the double rows the distribution and spacing is less regular. A distinct raised rim surrounds the pores.

Occurrence. This species is present in the Cordell member of the Manistique formation, and was collected in a field about one-half mile south of Gould City, Mackinac County, Michigan. (S.E. $\frac{1}{4}$ sec. 29, T. 43 N., R. 11 W.)

(No. 12844)

Type. The holotype of this species is in the collection of the Museum of Paleontology at the University of Michigan.

Remarks. This species resembles Favosites casei in the widely spaced tabulae and number of rows of mural pores, but differs from this species in having much smaller corallites and a relatively greater spacing of the tabulae.

Favosites hobbsi n. sp.

Plate III, figs. A and B.

Description. Corallum consists of a large spreading mass with an undulating upper surface. The tabulae are aligned in such a manner that they conform to the undulations of the surface. Peritheca is present.

Corallites are mostly 5 or 6-sided, although some are 4 and 7-sided. They are quite uniform in size, having an average diameter of 4 mm. and a range in diameter of 3 to 5 mm. The walls of the corallites are very thin.

Septal ridges are so low and flat that they are scarcely observable.

Most of the tabulae are very flat; a few are slightly convex. They are very closely crowded, their average distance apart being about $\frac{3}{4}$ mm. They conform to the undulations of the surface of the corallum and hence are either perpendicular or inclined to the walls of the

corallites. The tabulae are very slightly depressed into small marginal pits.

Mural pores are more numerous and more irregularly distributed than in any of the preceding species. One, two, or three rows of pores may be present on a single wall. Very narrow, scarcely discernible, raised rims are present around the pores.

Numerous, closely spaced, minute spines cover the interior of the walls of the corallites and the upper surface of the tabulae in the better preserved portions of the corallum.

Occurrence. This species is present in the Cordell member of the Manistique formation. Specimens were found in a field, about one-half mile south of Gould City, Mackinac County, on a hill about one mile south of Raber, Chippewa County, and at a few other places in Chippewa and Mackinac Counties.

Types. The holotype⁽¹²⁸⁴¹⁾ and paratype⁽⁶³¹²⁾ of the species are in the collection of the Museum of Paleontology of the University of Michigan.

Remarks. This species resembles Favosites favosus in the uniform size of its corallites. It differs from this species in having much flatter and more closely spaced tabulae and in the undulatory surface of the corallum.

Favosites undulatus n. sp.

Plate IV, figs. A and B

Description. Corallum consists of flat expansions with a distinctly undulatory surface. Many undulations appear as broad, low monticules. In vertical section the corallum is decidedly laminated.

Corallites are polygonal and uniform in size. Most of them are five and six-sided. A few have a smaller or larger number of sides. The average diameter of the corallites is 2 mm. The diameters range from 1.5 to 2.5 mm. The walls are relatively thin.

No distinct septal ridges are discernible, although questionable septal ridges are present in a few corallites.

Tabulae are unequally spaced, except locally. Most of them are flat; a few are slightly convex or concave. At various levels in the corallum the tabulae are closely crowded, their average distance apart in the crowded zones being about .5 mm. In other parts of the corallum the tabulae may be as far apart as 2 mm. They conform to the undulations of the surface of the corallum, and hence are either perpendicular or inclined to the walls of the corallites. In some corallites the tabulae are depressed, forming small, marginal pits. In many species of Favosites

these pits are aligned along septal grooves, but in specimens of this species neither septal ridges nor grooves are definitely indicated.

Mural pores are arranged in one or two rows to a wall of a corallite. They are relatively large, irregularly placed and rather far apart.

Minute, poorly preserved spines cover the interior of a few corallites.

Occurrence. This species has been found in the Cordell member of the Manistique formation near Gould City, Mackinac County, Michigan (S.E. $\frac{1}{4}$ sec. 29, T. 43 N., R. 11 W.), and on Drummond Island, Chippewa County, Michigan.

Type. The holotype ⁽¹²⁸⁴⁶⁾ and paratype ⁽¹²⁸⁴⁵⁾ of this species are preserved in the Museum of Paleontology of the University of Michigan.

Remarks. This species differs from Favosites hobbsi in the smaller size of the corallites and greater prominence of the undulations. The tabulae are more distantly separated, and the mural pores are fewer in number.

Favosites romingeri n.sp.

Plates V and VI, fig. A

Description. Corallum is massive, compressed-hemispherical, with the corallites radiating upward and outward from a

basal point of attachment. No peritneca is visible.

Corallites are very unequal in size and of different shapes. They range in size from about 1 mm. to 6 mm. The corallites are polygonal in transverse section, the larger ones tending to be circular. The walls of the corallites are very thin.

Low, poorly preserved septal ridges are present. They are visible in only a few corallites.

Tabulae are thin and evenly spaced. With few exceptions they are flat. Some of them are convex or concave; these in many cases may be bent by the force of crystallization during the deposition of calcite on the tabulae and walls of the corallites. The tabulae are depressed into marginal pits at the walls of the corallites.

Mural pores are poorly preserved due to the fact that they have been filled with minute calcite crystals. Where preserved they are relatively small, numerous, evenly-spaced and apparently are located in vertical rows on the septal ridges.

Occurrence. This species is characteristic of the Hendricks member of the Burnt Bluff formation.

The holotype was collected from a stromatoporoid and coral-bearing limestone, exposed at the top of a talus and soil-covered bluff a little over a mile northwest

from the southeast corner of Luce County (N.E. $\frac{1}{4}$, sec. 35, T. 45 N., R. 8 W. -- formerly site of L.O. Paquin's lumber camp.)

(no. 12850)

Types. The holotype of this species is preserved in the collection of the Museum of Paleontology at the University of Michigan.

Remarks. This species is similar to Favosites orthoporus n. sp. in having corallites of greatly different sizes, in the close spacing of the tabulae and the arrangement of the mural pores along the septal ridges. It differs from this species, however, in having larger corallites, less prominent septal ridges, and relatively smaller mural pores.

Favosites orthoporus n. sp.

Plate VI, figs. B and C

Description. Corallum small and irregular sub-hemispheric in form. No peritheca is present in the type specimens, the bases of which are badly weathered.

Corallites vary greatly in shape, being polygonal to almost circular in transverse section. They likewise show extreme variations in size, their diameters ranging from .5 mm. to 4.2 mm. The large corallites tend to be circular and are surrounded by smaller, polygonal ones.

Twelve broad, low septal ridges are present in

all except the very small corallites.

Tabulae are very numerous, thin, flat and closely spaced. They are depressed at the walls into marginal pits, which fit into grooves between the septal ridges.

Mural pores are extremely numerous. They are arranged in definite rows, one row occurring on each septal ridge. The pores are relatively large and are closely spaced. The average distance between them is .7 mm.

Occurrence. This species is characteristic of the Hendricks member of the Burnt Bluff formation. Several variations of the species seem to be indicated by specimens in various beds of the Hendricks.

The types were collected from a cherty, buff dolomite in the lower part of the Hendricks, exposed in a small, abandoned quarry in a low ridge about 6 miles north of Cooks, Schoolcraft County (S.E. $\frac{1}{4}$ sec. 28, T. 42 N., R. 17 W.).

Types. The holotype^(no. 12847) and paratype^(no. 12848) of this species are preserved in the Museum of Paleontology at the University of Michigan.

Remarks. This species is characterized by the great difference in the size and shape of the corallites, the larger ones being decidedly circular and the smaller ones

polygonal. The close spacing of the tabulae and the definite alignment of numerous mural pores on the septal ridges is particularly characteristic.

Favosites favosus (Goldfuss)

Plate VII, figs. A and B

Description. Corallum consists of discoidal to sub-hemispherical masses. Peritheca is present.

Corallites are nearly uniform in size and shape. In mature specimens the diameters of the corallites average 4 mm. They are usually five or six-sided, although a few have four or seven sides. The walls of the corallites are thin.

Broad, low septal ridges are present, twelve ridges occurring in a six-sided corallite of average diameter.

Tabulae are thin and tend to be equally spaced. In some parts of the corallum, however, they are more closely spaced than in others. The distance between them ranges from about 1 to 3 mm. They are convexly arched, presenting a dome-like appearance at the surface of the corallum. The edges of the tabulae are indented by marginal pits, twelve of these normally being present in a corallite of average diameter.

Mural pores are relatively large and are surrounded by prominent raised rims. They are arranged in single rows on the septal ridges.

Minute spines⁷ cover the surfaces of the walls and tabulae. Spines are apparently absent in the very narrow grooves between the septal ridges. granules
or
papillae

Occurrence. The type specimen of this species, described by Goldfuss, was collected from Drummond Island, Chippewa County, Michigan. With little doubt it was obtained from the Cordell member of the Manistique formation.

The species is represented by silicified specimens in thin, uneven-bedded, cherty dolomites of the Cordell member of the Manistique formation at many exposures in the northern Peninsula of Michigan.

Types. The pleisiotype of this species is in the Museum of Paleontology of the University of Michigan, and bears the catalogue number 8436.

Remarks. This species was originally described as Calamopora favosa by Goldfuss on pages 77 and 78 of his "Petrefacta Germaniae", published at Düsseldorf in 1826.

In 1851 Milne-Edwards and Haime (Mon. d. Polyp. Foss. d. Terr. Pal., Arch. du Mus. d'Hist. Nat., 5, pp. 233-234, 1851) described this species, placing it in the

genus Favosites. Since this time the species has been included in the genus Favosites by other workers.

The specimens, figured in the present paper and providing the basis for the writer's description of this species, seem to conform very closely in structure to the type specimens illustrated by Goldfuss and to the description given by Milne-Edwards and Haime. Unfortunately the type specimen was not available to the writers for study, and hence an absolute identification could not be made.

In the writer's opinion the essential characteristics of the species are the uniformity in size and shape of the corallites, the decided convexity of the tabulae, and the definite arrangement of the relatively large mural pores in single rows on broad, low septal ridges.

Numerous corals from many Silurian formations of North America have been identified as Favosites favosus. Seemingly most of these identifications have been based on the similarity in size and shape of the corallites of these forms with that of the type. A careful comparison of all structures of these forms with those of the typical specimens of Favosites favosus will undoubtedly show ^{that} many of these forms should be referred to distinct species.

Favosites favosus prismatium n. var.

Plate VIII, figs. A and B

Description. Corallum, when complete, probably

low hemispherical to discoidal. Peritheca present in well-preserved specimens.

Corallites are very uniform in size and shape. Most of them are five or six-sided; a few have four or seven sides. They range in width from 1 to 4 mm; the average width is about 3 mm. The walls are fairly thin.

Septal ridges are low and distinct, 10 to 12 being present in a corallite of average size.

The tabulae are very closely spaced and extremely convex. They are depressed into pits between the septal ridges.

Mural pores are numerous and are very small and are aligned in rows on the septal ridges. Two rows of mural pores are present in walls of average width, one in narrow walls and three in very wide walls. A conspicuous rim surrounds the mural pores.

Numerous spines cover the walls and tabulae of the corallites.

Occurrence. This variety of Favosites favosus is present in the lower part of the Cordell member of the Manistique formation. The holotype was collected in a field about one-half mile south of Gould City, Mackinac County (S.E. $\frac{1}{4}$ sec. 29, T. 43 N., R. 11 W.).

(12849)

Types. The holotype is preserved in the Museum of Paleontology of the University of Michigan.

Remarks. This variety differs from the typical form of Favosites favosus in having smaller corallites and smaller mural pores.

Favosites eriprisma n. sp.

Plate IX, figs. A and B

1876. Favosites favosus Rominger, Fossil Corals: Geol. Surv. Michigan, vol. 3, pt. 2, pp. 21-22, pl. 4, fig. 2.

Description. Corallum, when complete, probably discoidal. Peritheca absent in type.

Corallites large and polygonal, showing a marked uniformity in size and shape. The average diameter across the greatest width of the corallites is 6 mm; diameters of some corallites are 7 to 8 mm. Corallites are usually 6-sided, and have rather thick walls.

Septal ridges are very broad and well-defined, twelve being present in each corallite.

Tabulae are flat or slightly arched. They are relatively close together, the average distance between them being 1 mm. Twelve prominent marginal pits, located in the septal grooves, indent the edges of the tabulae in

average-sized corallites.

Mural pores are small. Only a few are preserved owing to the fact that most of them have been filled with silica in the process of silicification of the corallum. When preserved they are aligned in single rows on the septal ridges.

Where not obliterated by silicification, minute, irregularly arranged spinules cover the surfaces of ^{the} walls and tabulae.

Occurrence. This species in all probability occurs only in the Cordell member of the Manistique formation.

The type specimen, which Rominger described and illustrated as an example of Favosites favosus, may have been collected either at Point Detour, Chippewa County, or from Drummond Island. Rominger states on page 22 of his Fossil Corals (Mich. Geol. Surv., vol. 3, pt. 2, 1876) that this specimen was found at Point Detour. In the explanation accompanying the illustration of this specimen (figure 2, plate 4) Rominger states that the specimen is from Drummond Island.

Types. The holotype of this species is preserved in the Museum of Paleontology at the University of Michigan where it bears the number 8435.

Remarks. This species resembles Favosites casei in the

large size of the corallites. It differs from this species in having well-defined septal ridges, more closely spaced tabulae, and a greater number of mural pores, which are aligned on septal ridges.

PLATES

All illustrations show natural size of specimens.

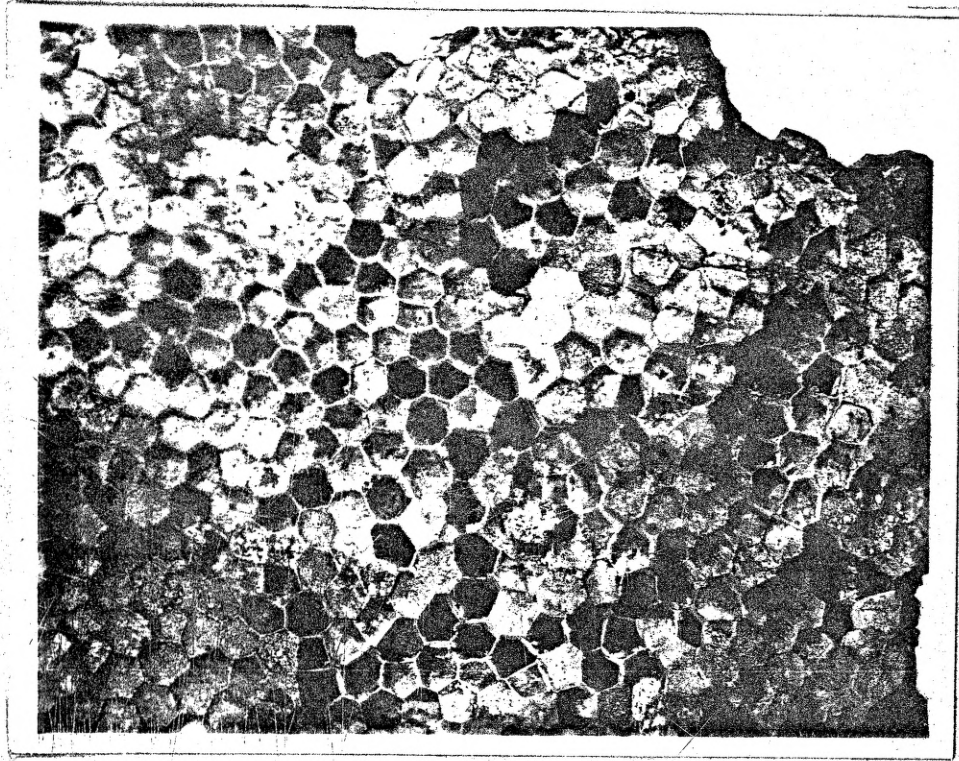
PLATE I

Favosites casei n. sp. ----- 4

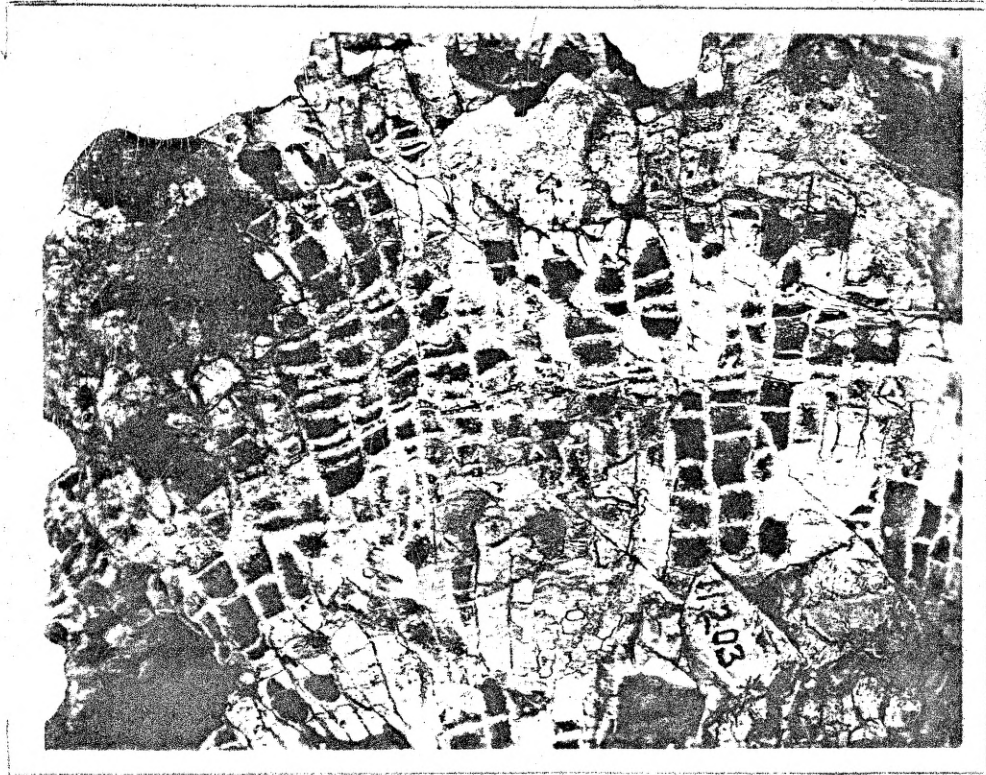
A. Upper surface showing thin walls, marginal pits of tabulae, and absence of septal ridges. Holotype. 11203

B. Vertical section showing spacing of flat tabulae and a few mural pores. Peritheca shown at lower center. Holotype. 11203

PLATE I



A.



B.

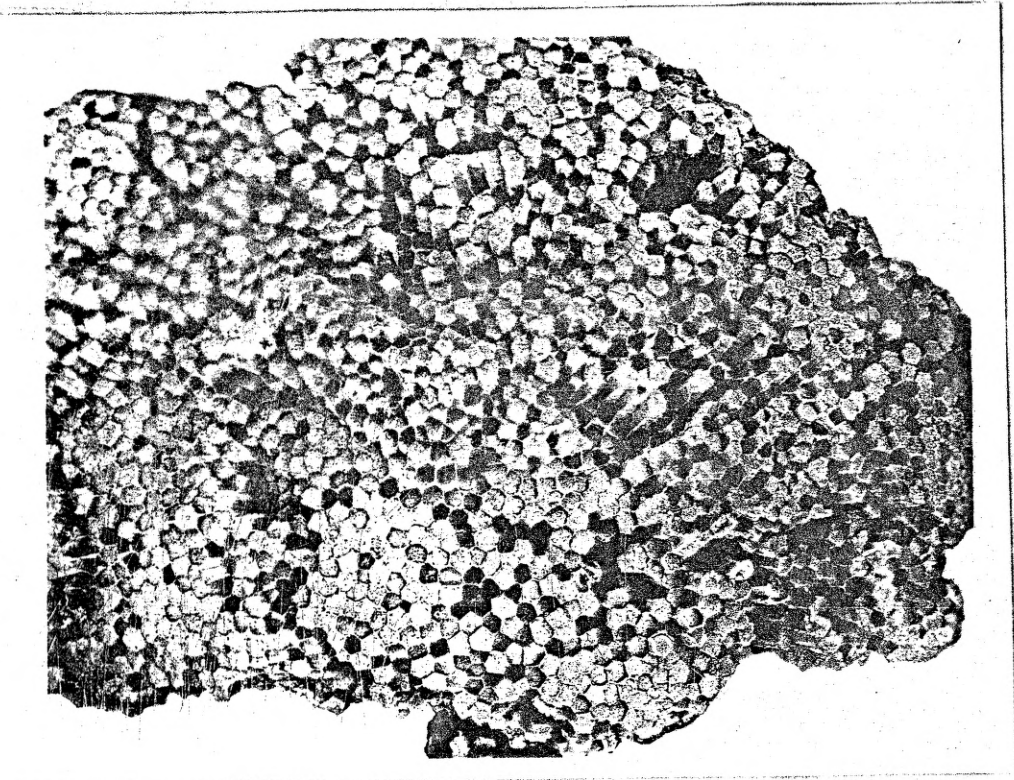
PLATE II

Favosites alticellus n. sp. ----- 5

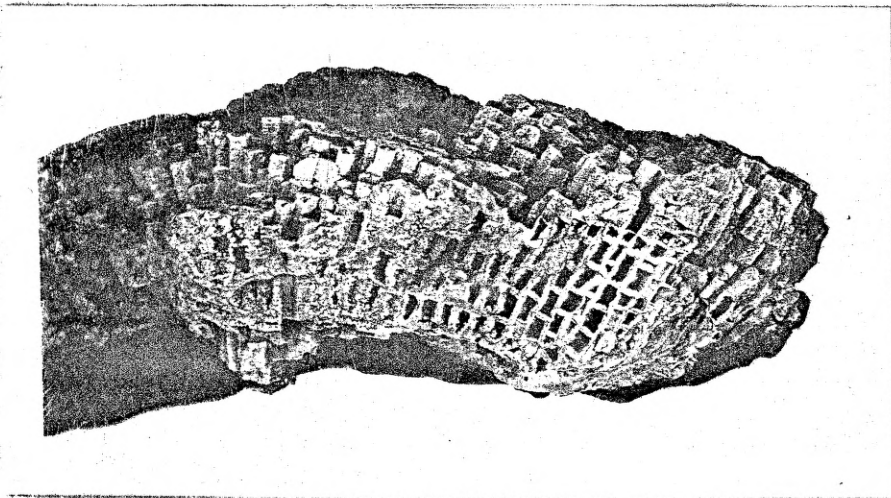
A. Upper surface of corallum showing uniformity
in size of corallites. Holotype. 12844

B. Vertical section showing extremely wide spac-
ing of tabulae. Holotype. 12844

PLATE II



A.



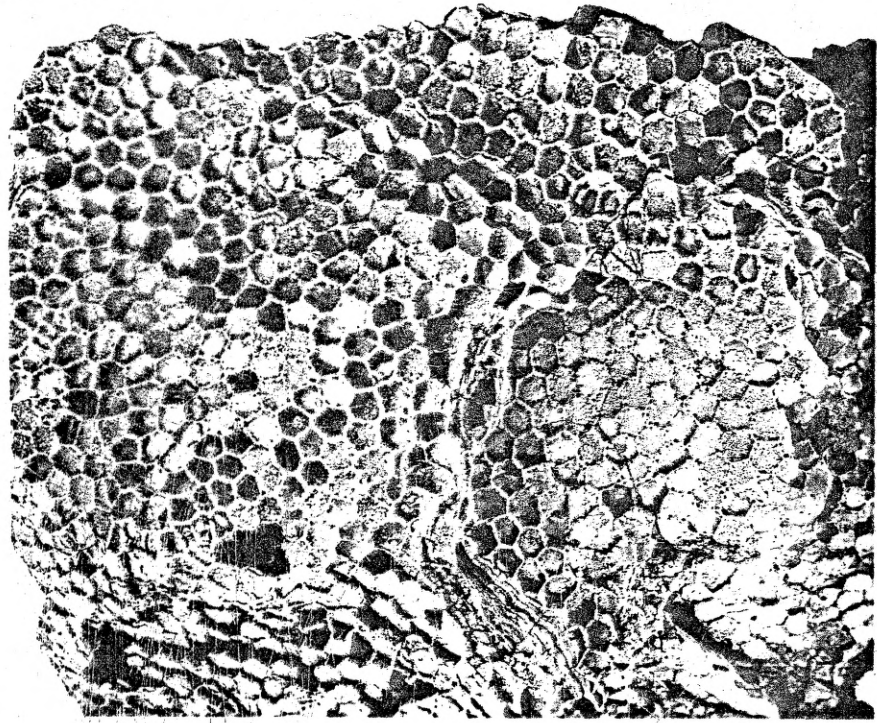
B.

PLATE III

Favosites hobbsi n. sp. ----- 7

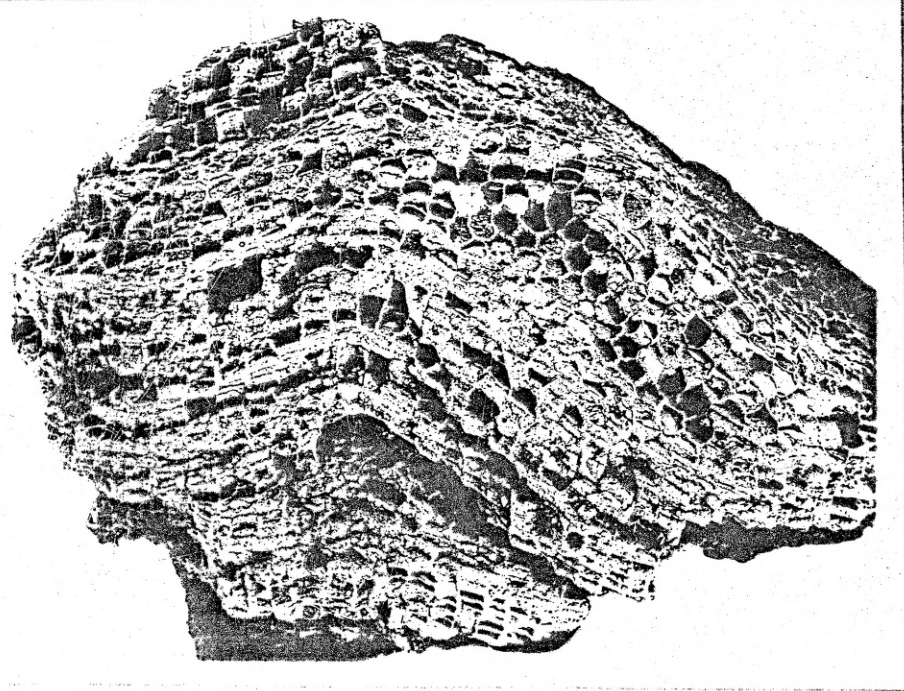
- A. Upper surface showing uniform size of corallites and marginal pits of the tabulae.
Paratype. 6312
- B. Vertical section showing the closely-spaced tabulae conforming to the undulations of the corallum. Holotype. 12841

PLATE III



6312

A.



12841

B.

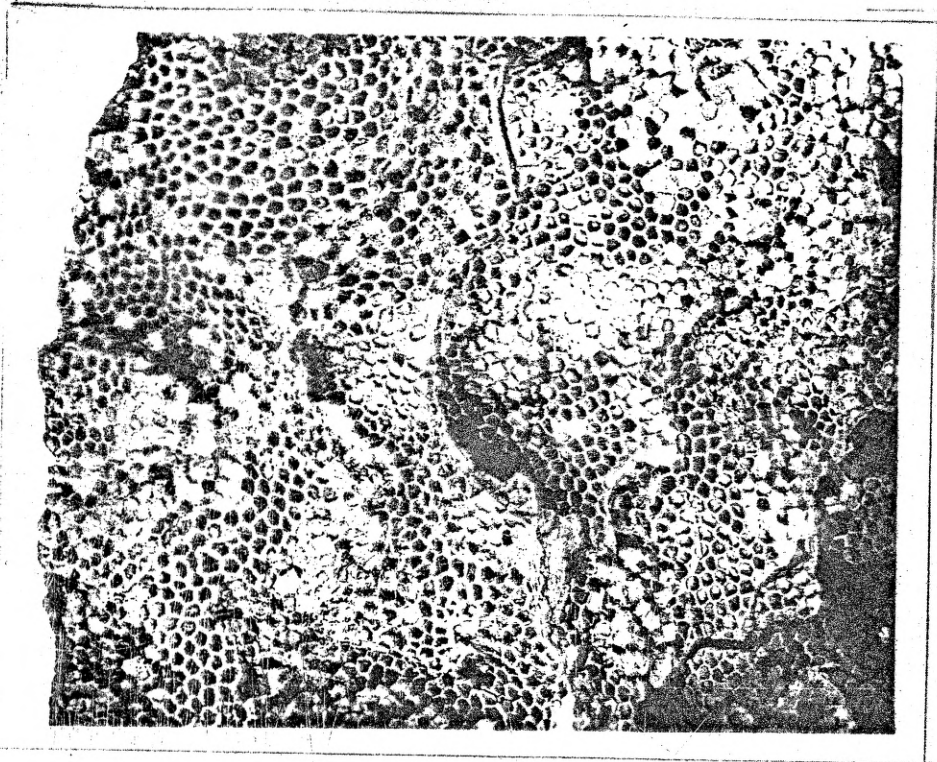
PLATE IV

Favosites undulatus n. sp. ----- 9

A. Upper surface showing broad, low, monticules. Holotype. 12846

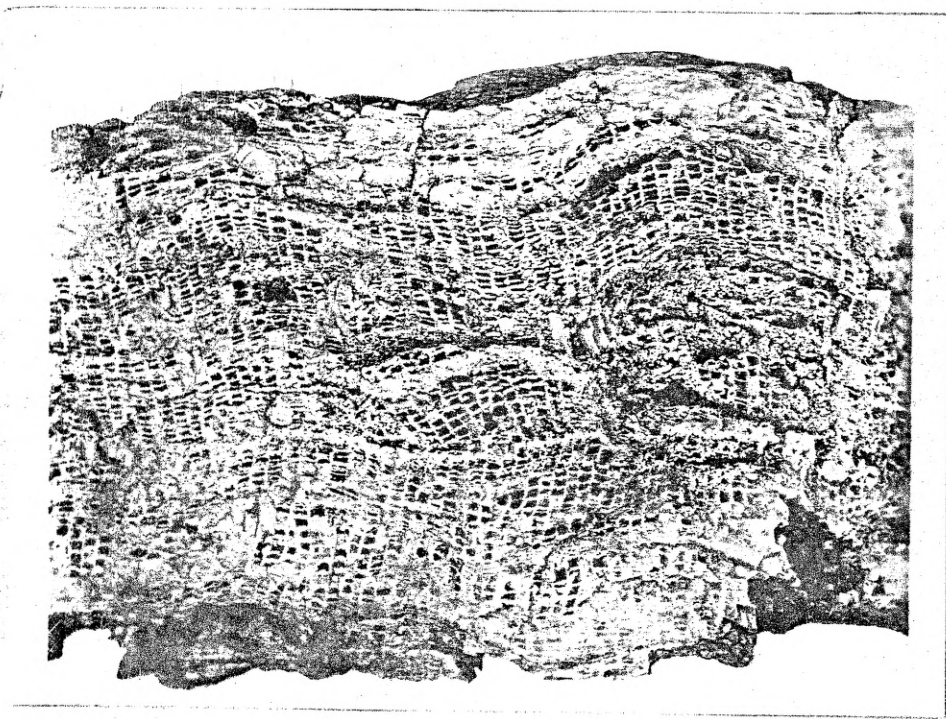
B. Vertical section showing flat tabulae conforming to the undulations of the corallum. Paratype. 12845

PLATE IV



12846

A.



12845

B.

PLATE V

Favosites romingeri n. sp. ----- 10

(12850)

Holotype attached to specimen of Favosites orthiporus (below) showing the great difference in size of the corallites. Relative sizes of corallites of F.romingeri and F.orthiporus are well shown.

PLATE V



12850

PLATE VI

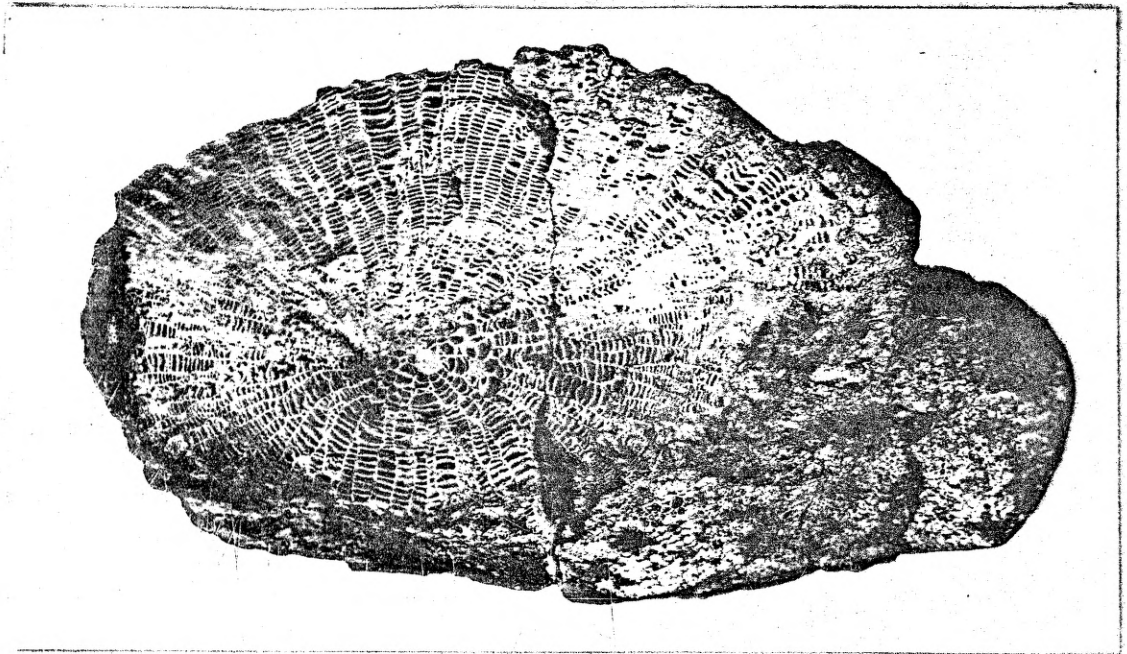
Favosites romingeri n. sp. ----- 10

- A. Section through corallum showing corallites radiating from a central axis and numerous flat, uniformly spaced tabulae. Holotype. 1285⁰

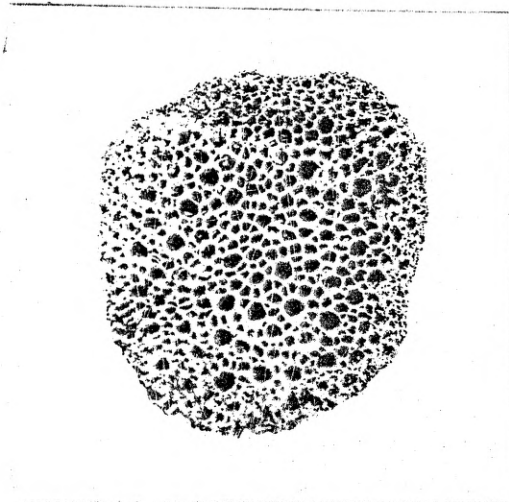
Favosites orthiporus n. sp. ----- 12

- B. Upper surface showing form of corallum, larger nearly circular corallites and smaller polygonal corallites. Holotype. 1284⁷
- C. View of weathered lower surface of corallum showing flat, closely spaced tabulae and linear arrangement of numerous mural pores. Paratype. 1284⁸

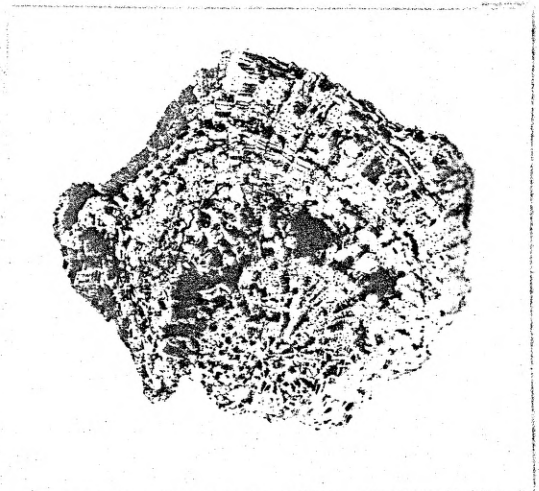
PLATE VI



A.



B.



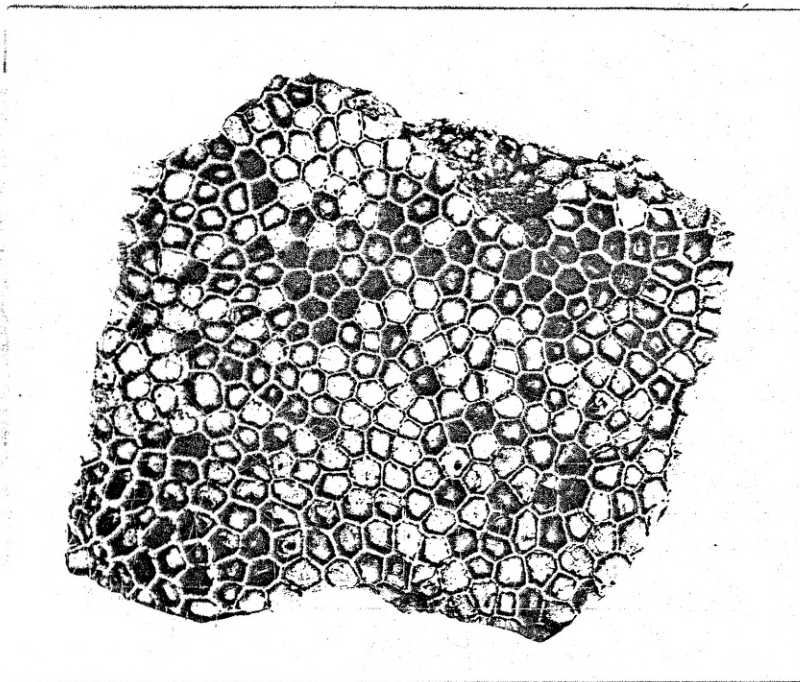
C.

PLATE VII

Favosites favosus (Goldfuss) ----- 14

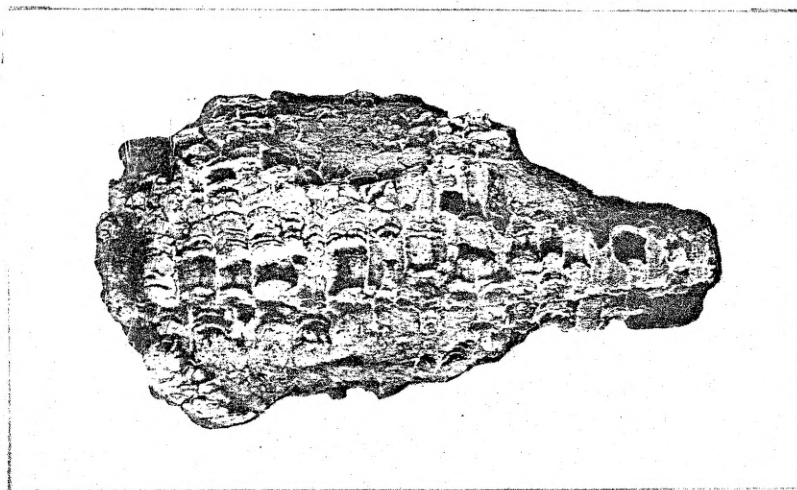
- A. Upper surface showing uniform size of coral-
lites and prominent marginal pits. Plesio-
type. *8436. Runyon collection*
- B. Vertical section showing convex tabulae,
septal grooves, and mural pores aligned
on septal ridges. Plesiotype.

PLATE VII



§436
(Pinnaceae)

A.



Not numbered

B.

PLATE VIII

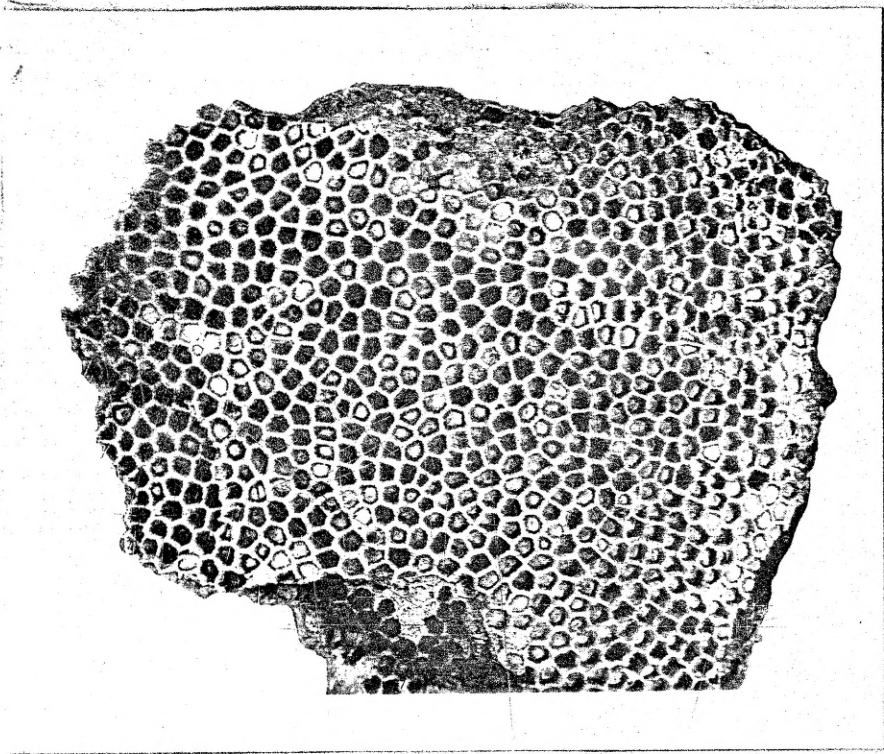
Favosites favosus prismatium n. var. ----- 16

A. Upper surface showing septal ridges and
uniform size of corallites. Holotype.

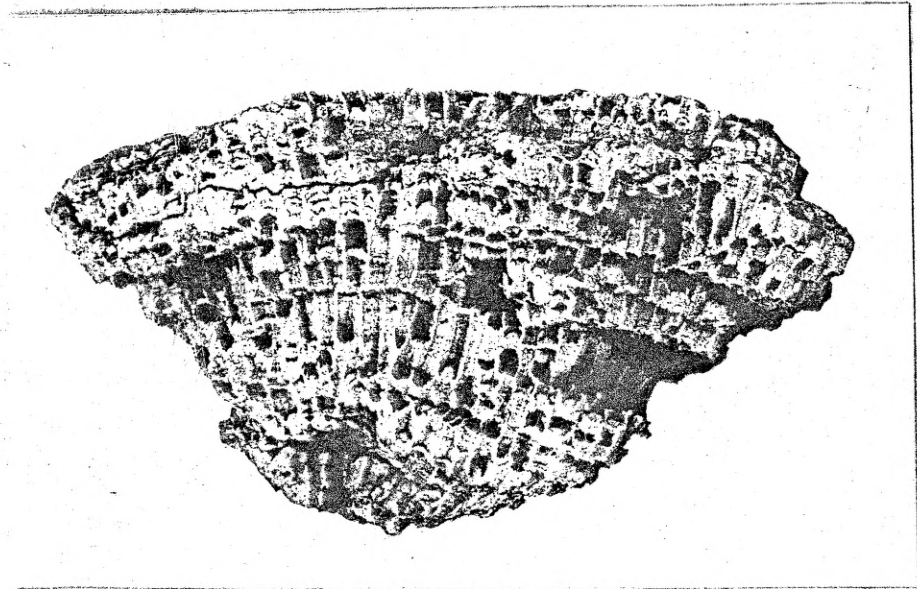
12849

B. Vertical section showing convex tabulae
and numerous mural pores aligned on sep-
tal ridges. Holotype. 12849

PLATE VIII



A.



B.

PLATE IX

Favosites eriprisma n. sp. ----- 18

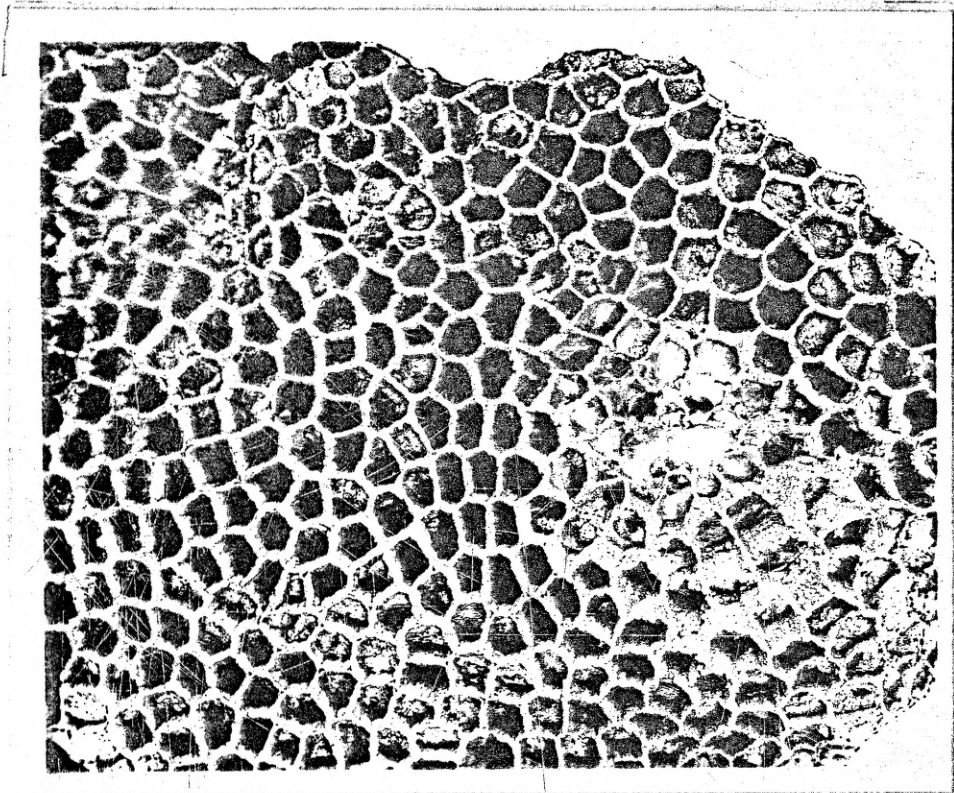
A. Upper surface showing large size of coral-
lites and well-defined septal ridges.

Holotype. 8435 *Pruniger coll*

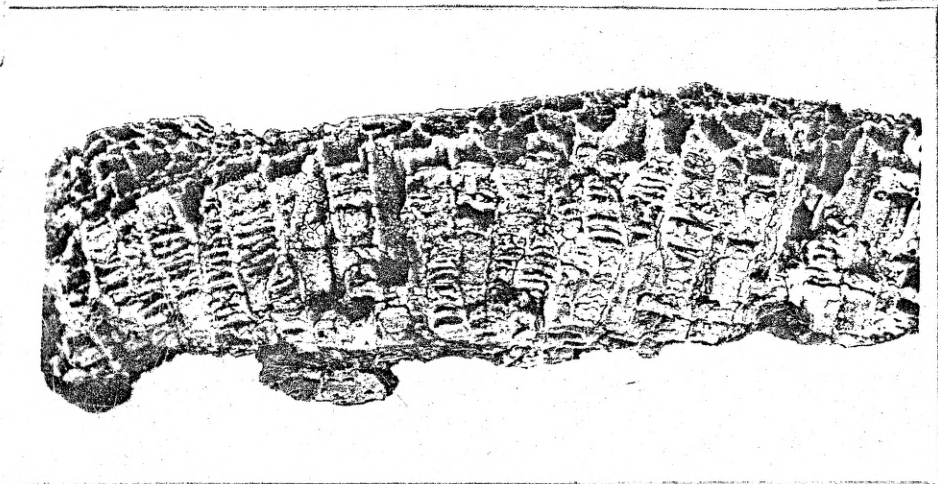
B. Vertical section showing close spacing of
tabulae, numerous spinules studing the
walls, and large mural pores. Raised
rims about mural pores are shown in white.

Holotype. 8435 *Pruniger coll*

PLATE IX



A.



B.



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