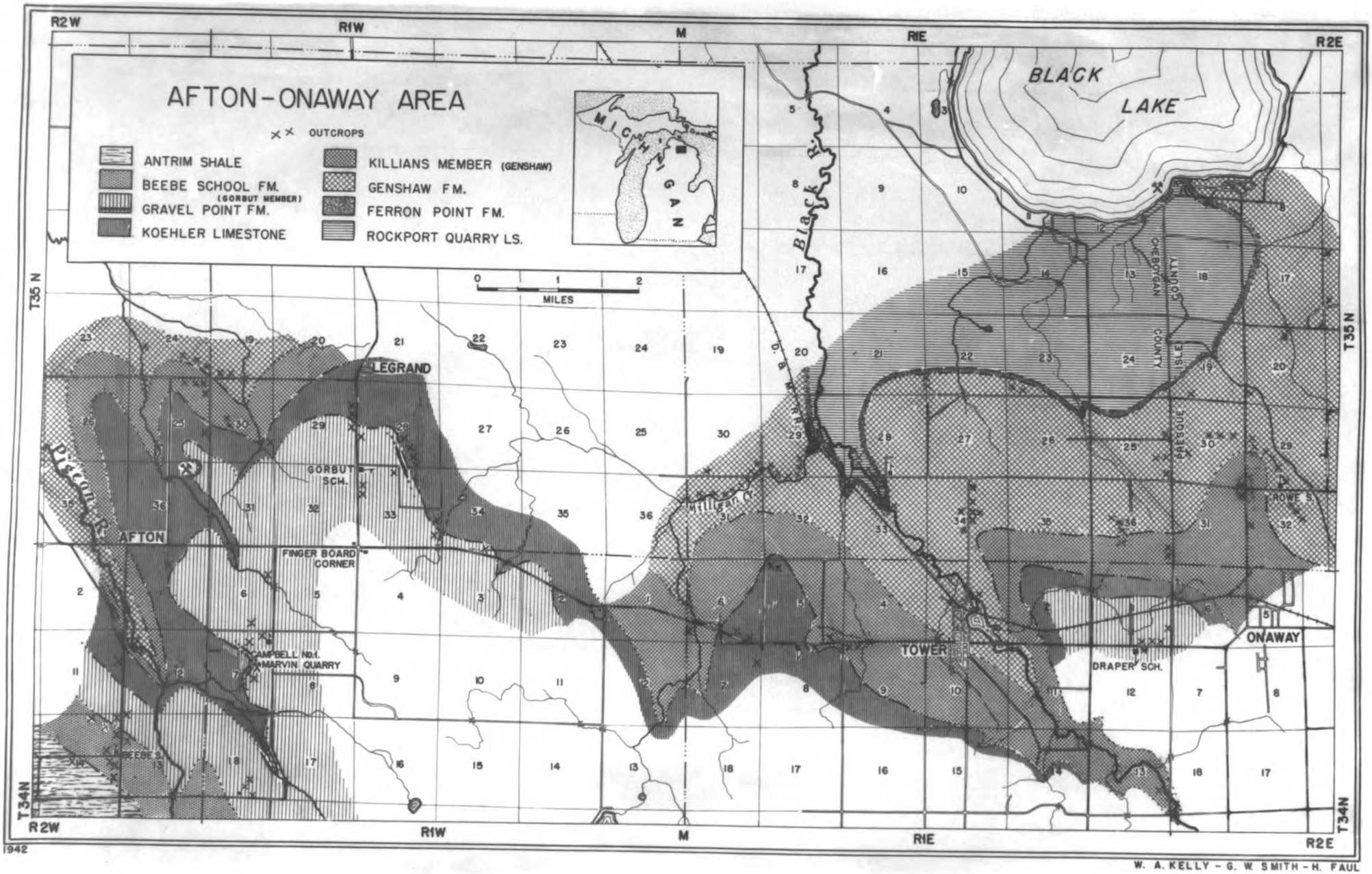
PRISMATOPHYLLUM IN THE TRAVERSE GROUP OF NORTH-CENTRAL MICHIGAN

Thesis for the Degree of M. S.

MICHIGAN STATE COLLEGE

Henry Faul

1942


AFTON-ONAWAY AREA
OUTCROPS
ANTRIM SHALE
BEEBE SCHOOL FM.
(GORBUT MEMBER)
GRAVEL POINT FM.
KOEHLER LIMESTONE
KILLIANS MEMBER (GENSHAW)
GENSHAW FM.
FERRON POINT FM.
ROCKPORT QUARRY LS.
MICHIGAN
0 1 2
MILES
R2W
R1W
M
R1E
R2E
T35 N
T34N
BLACK LAKE
Black R.
CHEBOYGAN COUNTY
PRESQUE ISLE COUNTY
LEGRAND
AFTON
Pigeon R.
GORBUT SCH.
FINGER BOARD CORNER
CAMPBELL NO.1
MARVIN QUARRY
BEEBE S.
TOWER
DRAPER SCH.
ROWE S.
ONAWAY
Miller Cr.
1942
W. A. KELLY - G. W. SMITH - H. FAUL

PRISMATOPHYLLUM IN THE TRAVERSE GROUP OF NORTH-CENTRAL MICHIGAN

by

Henry Faul

A THESIS

Submitted to the Graduate School of Michigan State College of Agriculture and Applied Science in partial fulfilment of the requirements for the degree of

MASTER OF SCIENCE

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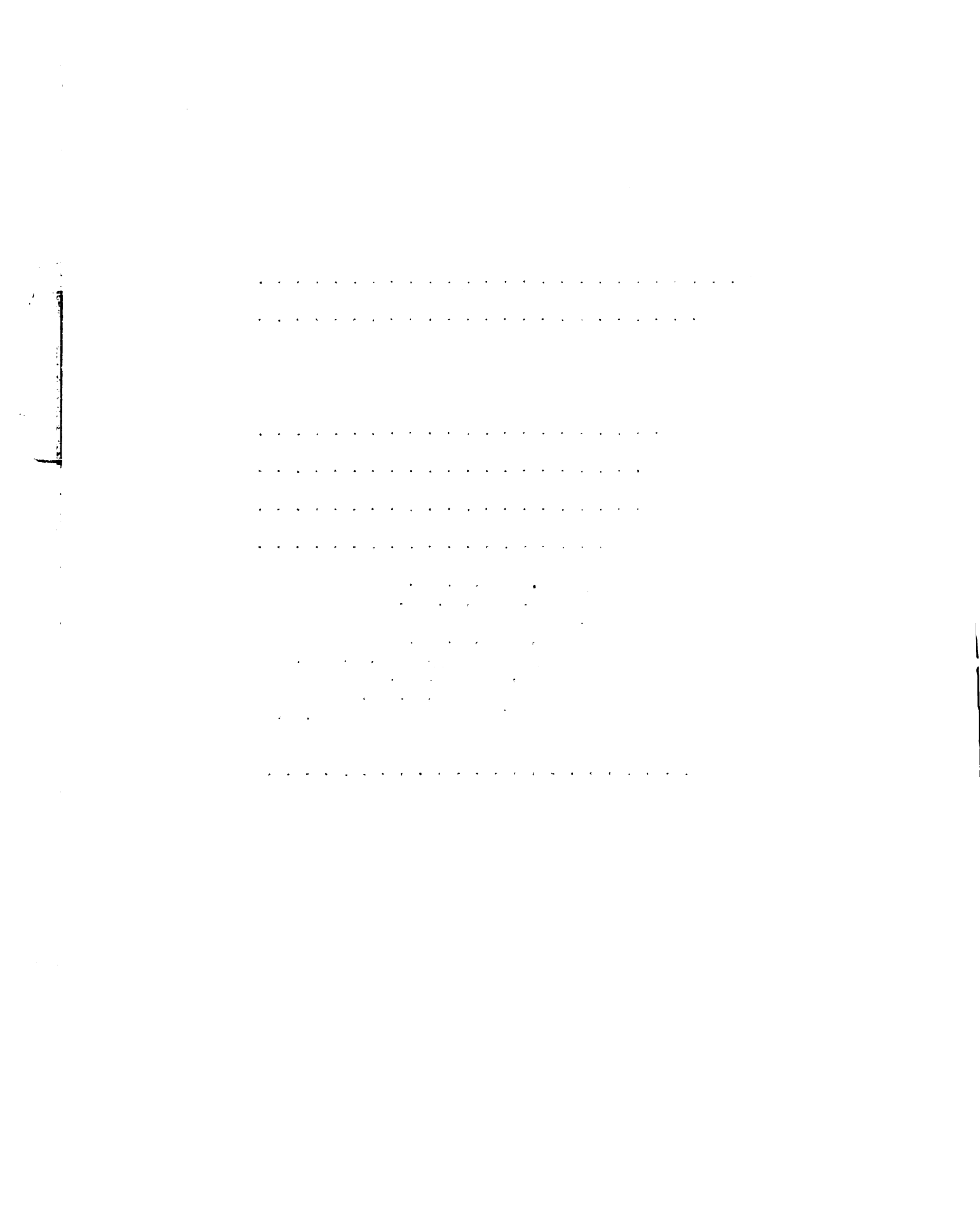

TABLES AND ILLUSTRATIONS

PRISMATOPHYLLUM IN THE TRAVERSE GROUP OF NORTH-CENTRAL MICHIGAN

Abstract

The tetracoral Prismatophyllum, occurring in beds of the middle Devonian Traverse Group of the Afton-Onaway area in the northern part of the lower peninsula of Michigan, is discussed. Seven new species and two new varieties are described. The occurrence of growth rings in Prismatophyllum is reported and analyzed.

INTRODUCTION:

Besides the ever present Favosites, Prismatophyllum is the most common coral found in the highly fossiliferous beds of the Traverse Group of Michigan. Although the Traverse has been recognized for a hundred years and examined by many geologists, only three species and one variety of Prismatophyllum have been described; P. cristatum by Rominger (1876) and P. percarinatum, P. pauciseptatum, and P. cristatum microcarinatum by Sloss (1939). These came from the shores of Little Traverse Bay on Lake Michigan, the first outcrops of the Traverse Group to be described. No corals have been described from the shores of Lake Huron, or from the inland area, where the Traverse Group crops out at numerous localities, but only studies of isolated faunal groups have been made from the Traverse Group.

The paleontology of the thin-drift area near Afton, Tower and Onaway has recently been discussed by G. W. Smith (1942) who did not attempt to identify any anthozoans, but limited himself primarily to the brachiopoda.

Although Prismatophyllum davidsoni is still widely used in Michigan as a specific name, some workers have recognized the fact that it has little meaning paleontologically. This name has developed into a blanket term denoting practically anything that remotely resembles the specimen incompletely described and figured by Rominger as Cyathophyllum davidsoni. Kelly has recognized that at least two species of Prismatophyllum occur in the Afton-Onaway area, and has referred to them as "Prismatophyllum sp." and "Prismatophyllum sp. with small calices".

Ehlers and Radabaugh (1937) have made similar distinctions. Upon Dr. Kelly's suggestion, the writer has undertaken the present examination of the prismatophyllid corals of the Traverse Group, with the principal objective the determination of the individual specific differences and their stratigraphic value.

LOCATION:

The writer has limited himself to the Afton-Onaway area (Smith, 1942) in Cheboygan and Presque Isle counties of north-central Michigan. This area, covering approximately townships 34 and 35 North and ranges 1 and 2 West and 1 and 2 East, was chosen for several reasons. First, because of its central location, the area may be a link between the Traverse of the east and west coasts of Michigan, which at present cannot be correlated with accuracy. Second, the area presents an almost complete section of the Traverse Group from the bottom of the Rockport formation to the Antrim Shale at the top. Third, it was the writer's intention that the present paper be complementary to the basic work of Kelly (1940) and Smith (1942).

ACKNOWLEDGEMENTS:

The writer is greatly indebted to Dr. W. A. Kelly of Michigan

State College for indispensable help and cordial criticism, and to Mr. J. A. Young and Dr. L. L. Ray for valuable suggestions and for reviewing the manuscript. Mr. Young's help in the preparation of plates 2, 5, 6, 9, 10, and 23 is gratefully acknowledged. The writer also appreciates the valuable suggestions of Drs. L. L. Sloss and M. A. Stainbrook, and the assistance in the field and laboratory of Miss Mildred Boehler and Mr. Robert Cardinell, students at Michigan State College.

The friendly encouragement and generosity of Dr. S. G. Bergquist is gratefully remembered. The department of Geology, Michigan State College has furnished laboratory facilities and given financial assistance toward the completion of this project.

NOMENCLATURE:

It is necessary, in any paleontological discussion, to decide on one certain terminology, and use it consistently if the paper is to be generally intelligible and accurate. The writer has adopted the current coral terminology as summarized by Sanford (1939). The few terms not included in Sanford's paper, are explained in this text, wherever they are first used. The terms "tabella" and those applied to types of carinae are diagramatically illustrated in Plate I, Figs. A--G.

LABORATORY WORK:

The corals in the Afton-Conway area are preserved by calcite incrustations, essentially of two types. First, in the harder limestones, the skeletal structures of the coralla are covered with a layer of white calcite crystals usually less than 1/4 mm. thick on both sides (Plates 11-14). Coralla preserved in this manner are very porous, light, soft, fragile, and generally white in color. Fragments have the appearance of a recent corallum, but their upper surface is rarely preserved. Second, in some of the more argillaceous sediments, the skeleton is incrusted in the same manner, but the interskeletal spaces are filled by a secondary growth of calcite, with usually one or two continuous crystals filling each space, (Plates 7, 8). The upper surface as well as the epitheca are generally well preserved, unless the corallum has been worn by wave-action before fossilization. These coralla are heavy, dark in color, and comparatively hard.

Only rarely are the porous coralla partially silicified in such a manner that they can be etched out of the rock matrix with acid. Even then the silicification does not penetrate deeper than about 1 cm, thus preserving little more than the calices and epitheca. Euhedral crystals of quartz have been found scattered deep inside some of the "hard-preserved" coralla, but these do not add to the preservation, for they grow with little or no relation to the coral skeleton.

Two different ways were devised for handling these two differently preserved kinds of coralla. The most successful way of obtaining a good section of the porous type was to cut it with a diamond saw in the approximate direction desired, grind down to the plane desired, smooth off the face with #000 carborundum powder, and cement a 2x3" glass slide directly onto this face with cooked Canada balsam allowing the balsam to soak well into the coral. The slide, and with it about 1/8" slice of the coral was then cut off on the saw, and the section ground down to a thickness of about .10-.08mm. It is not desirable to grind the sections any thinner, for no added detail can be obtained. Cover glasses were cemented on to the finished sections with Canada balsam dissolved in xylene, at a temperature high enough to make the liquid balsam run freely but low enough to prevent a softening of the cooked balsam holding the section on the slide. The sections .1mm thick are usually so weak that they float apart if heated to a temperature that melts the cooked balsam.

Thin sections of the hard coralla could be made in the same manner, but the grinding-down of large chips is too laborious, and too thick a slice of the corallum must be destroyed. Therefore, a peel technique was developed, using a nitrocelulose-butyl acetate solution described by Darrah (1936). The corals were cut on the diamond-saw as close to the desired plane as possible, ground smooth, and etched in medium strong hydrochloric acid for about a minute. Fine carbon black pigment was then rubbed into the etched surface,

and the face leveled in a sand box by means of a bubble-level. The solution was then applied in the manner described by Darrah (1936) Fenton (1935), and Sloss (1942), and the finished peel mounted between glass slides in liquid Canada balsam for photographing and better visual observation.

Positive photographs of both the peels and thin-sections were made by projecting the slide onto Eastman Lantern Slide Contrast plates in an ordinary photographic enlarger and re-projecting the plates onto contrast bromide paper.

Relative stratigraphic positions of species and varieties of Prismatophyllum in the Afton-Onaway area

TRAVERSE GROUP

Formation	Species (variety)
BEEBE SCHOOL	none
GRAVEL POINT	P. percarinatum P. percarinatum gorbutense ? P. altimoenitum P. aftonense P. exiguum | P. exiguum draperense ?
KOEHLER	none (?)
GENSHAW	P. kettneri
FERRON POINT	P. bouceki
ROCKPORT QUARRY	none (?)

TABLE I.

SPECIFIC CRITERIA:

When the writer first began this work he expected to find about three or four varieties of Prismatophyllum in the Afton-Onaway area. This belief was based on the fact that in the field, the differences between species appeared slight, save for the size of the corallites. It was obvious why Rominger, who rarely made thin-sections, grouped all Prismatophyllum under two species.

After a microscopic examination, however, the number of species identified increased greatly and certain criteria, originally believed to be of value had to be abandoned as means of specific differentiation. The number and shape of carinae per septum in transverse section, the shape of tabulae in logitudinal section, the exact shape of the calyx and the shape of the coralla appeared to have little meaning in the determination of species.

On the other hand, it was found that the mean total diameter* of the corallites of any one variety, even though variable within a few millimeters is of definite value when an average is obtained from many measurements of mature corallites.

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* The mean total diameter of a prismatic corallite is an average of its smallest and largest diameter in transverse section, usually at right angles to each other.

It is essential to select a large corallum for the measurements because gemmation is very rapid in small coralla, and even mature corallites are frequently constricted as a result of congested living space. Coralla with little budding, therefore, give the most reliable averages. The number of septa is almost constant in the ephebic stage of any of the species. Usually one definite number predominates, although two neighboring even numbers may be equally frequent in one corallum.

The character and thickness of the peripheral intercorallite boundaries is a good criterion if the boundaries are either straight or strongly serrate. Commonly, however, types are intermediate, with wall straight on one side of a corallite and serrate on another. Here the character of the boundary depends on whether or not septa of neighboring corallites meet peripherally. Wherever they do, the wall is straight; where they do not, the wall is serrate. These types can be distinguished from the truly straight or truly serrate-walled species, for the latter are practically straight (Fig. 21) or serrate (Plate 17) regardless of the relative position of septa in neighboring corallites.

Although their size and shape are generally variable, the number of dissepiments is of value in specific differentiation. It is necessary, when counting them, to select a longitudinal section of a mature corallite, since all species have few or no dissepiments in their neanic stage. A transverse section is of less

value because a globose dissepiment may be intersected at two points by the section, thus making the count in a transverse section invariably higher than the true count obtained from a longitudinal view. (Plate I, Fig. H). In the Genshaw forms, however, little reliance can be based on the number of dissepiments in a single corallite, because the number varies widely not only between individual corallites, but on opposite sides of a single corallite as well, (Plates 12, 14, 16).

The ratio of the diameter of the tabularium to the mean total diameter of the corallite is slightly doubtful criterion, for the ratio varies within about 15% within some coralla, as well as among coralla of one species from different localities. This variation, the writer believes, is not a true specific criterion, but rather may represent a slight variation of living conditions of the corals in the seas of Traverse time, which Smith (1942) and others believe to have been fluctuating. The ratio, furthermore, is difficult to measure in some species where the inner wall is obscured by tabellae.*

The number, character, and type of carinae are all useful to a limited extent, but no fine distinction can be based on them. The factor that determines the shape, number, and clarity of carinae in the transverse section, is the approximate angle which the

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* The term "tabella" is here used to describe a small skeletal element intermediate between a dissepiment and a true tabula (Plate I, Fig. A). Tabellae occur on the boundary between the tabularium and the dissepimentarium of several species.

carinae make with the axis. This vertical angle tends to be small in some species and high in others, but varies greatly within individual coralla, especially in those occurring in the Genshaw formation. This variability in character is clearly shown in Plates 12 and 14. Carinae, furthermore are arched in the axial region of many corallites in some species to such an extent, that they become almost horizontal near their axial end in spite of the fact that their initial vertical angle with the walls (parallel to the axis), may have been as low as 10-20° at their peripheral end.

Therefore, if carinae are to be examined, a longitudinal section must be used, and this section should be almost coplanar with one or two septa in each corallite. Their overall vertical angle with the axis must be determined, for where this angle is acute, carinae will appear distinct in transverse section, yet where it is obtuse, carinae will show only as irregular dilations of variable length, depending on the degree of parallelism between carina and transverse section at that point. (See Plate I, Figs. B and C.) Occasionally, Carina may be entirely invisible in transverse section, where the section happens to pass between the almost horizontal portions of two carinae. (Plate I, Fig. D).

Explanation of Plate I

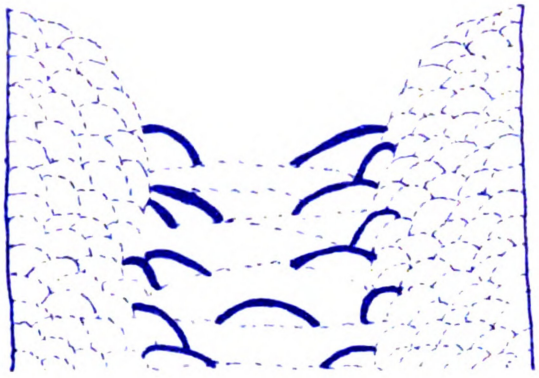
Fig. A — Illustrating tabellae (shown by heavy lines) in longitudinal section. See page 11.

Figs. B,C,D — The relationship of carinae in longitudinal and transverse section (see p 12.).

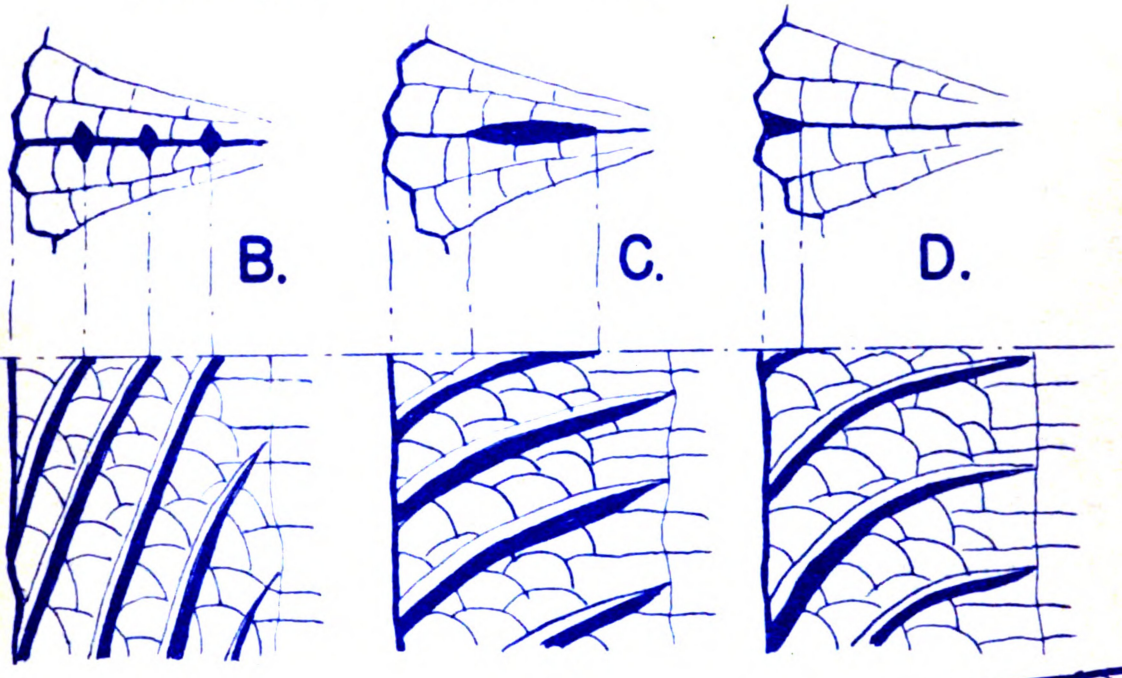
Figs. E,F,G — Types of carinae in transverse section: E, "diamonds" or "yardarms"; F, "triangles"; G, "elbows".

Fig. H — Three septa with theca removed, showing the complex curvature of dissepiments in perspective view. (See page 10.).

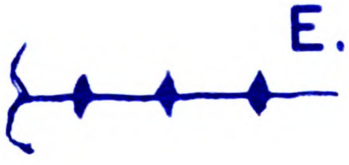
(All figures diagrammatically exaggerated and not to scale).



A.



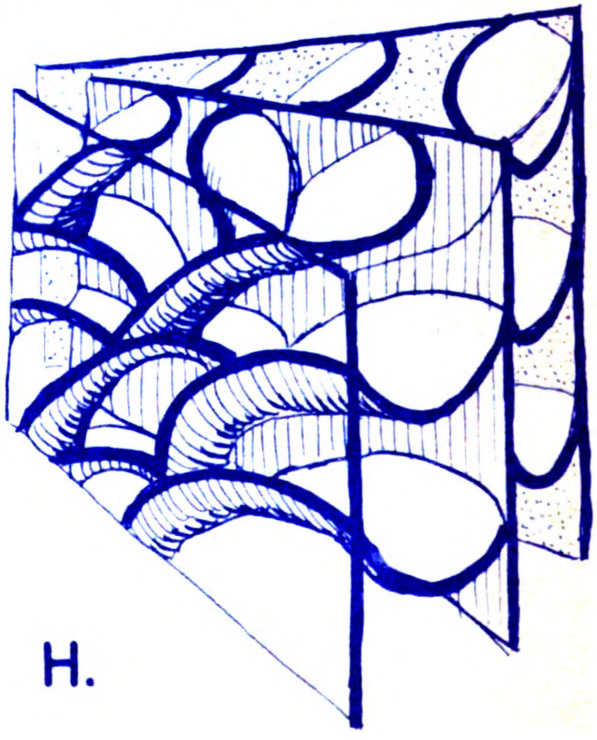
B. C. D.



E.

F.

G.



H.

RATE OF GROWTH

During field work in the spring of 1942, the writer observed peculiar markings on some weathered coralla, which consisted of parallel grooves and ridges, about 3mm apart, running entirely around some coralla as if formed by surfaces perpendicular to corallite axes at all points. The markings were most distinct on "porous" coralla from the Gravel Point formation near the Bunker farm S 1/4 cor. Sec 18, T 34 N, R 1 W, and the Gorbut school, SW 1/4 of the NW 1/4, Sec 33, T 34 N, R 1 W, but they are visible also on some "hard-preserved" coralla from the Genshaw formation. The markings are not distinct in fossils from all horizons, but they are not restricted to the Traverse Group. They have been illustrated from Ohio by Stewart (1938, Plate 10, Fig. 1) even though no mention of the phenomenon is made.

In longitudinal thin-sections of these specimens, a periodic decrease in size of dissepiments was observed, approximately evenly spaced, occurring in all corallites at the same level of growth, and accompanied by a thickening of the dissepiments and septa, high development of carinae, and a bunching of tabulae immediately above or at the thickened dissepiments. Furthermore, the constricted dissepiments and bunched tabulae trace exactly the calicular outline as if the corallites gradually decreased their rate of growth to a total stagnation, then suddenly recovered their high degree of metabolism

only to stagnate again some 3mm higher distally.

Thus it appears that these structures, corresponding to annuli on trees, fish-scales and other organisms, are evidence of a variable rate of growth of the coral. Since the variations are periodic, they are undoubtedly the result of periodic changes of environment, or more specifically of seasonal temperature variations of the sea water. Such seasonal variations may be accounted for in two ways. First, they may be considered to be the result of a seasonal temperature variation of the atmosphere, assuming that the water was shallow. Second, they may be the result of seasonal currents, or a combination of both. It is known that the Middle Devonian seas had outlets to the south, and it is believed (Kelly, 1942) that Devonian glacial erratics, found scattered in the Lake Superior region several hundred miles north of any known Devonian outcrop indicate a similar outlet to the north, even though no outcrops have been found there. The possibility of large-scale cold or warm currents, therefore, must not be discounted.

Vaughan (1917) has shown experimentally at the Tortugas laboratory that reef corals seek such environments that will give them a maximum of sunshine and perish or become abnormal if artificially placed in the dark.

Since, excluding all other factors, the depth penetration of light-rays in sea water is proportional to the inclination of the

rays, and this, in turn, varies with the season, there will be a seasonal variation in light intensity at any given depth penetrated by the rays. The intensity will be a maximum when the incident angle of the rays is the greatest, (summer), and it will be a minimum when it is the least, (winter). The light intensity variations therefore, will be "in phase" with the temperature variations, and will tend to reenforce their effects. Atmospheric cloudiness, water turbidity, and planktonic life will, of course, tend to decrease the light intensity. These effects cannot be rationally estimated, however.

There is, of course, no assurance that variable water temperatures and radiation intensity are the only factors causing the development of annuli in Prismatophyllum and corals in general. Variations in turbidity, salinity, pressure, and the movement of seawater are known to influence the metabolism of corals to a great extent (Vaughan, 1917), but it is the writer's belief that it would be extremely difficult to justify the assignment of seasonal characteristics to such agencies.

Annuli, such as those discussed above, have been observed in corals of the western Pacific by T. Y. H. Ma (1934) who gives a monthly table of surface water temperatures at twelve points around Japan, and the rate of growth of a recent reef coral at these stations at present as well as in recent geologic time.

Growth-ring distances measured parallel to axis

Prismatophyllum

Species	Locality	Formation	Number of Measurements	Max. (mm)	Min. (mm)	Average (mm)
P. bouceki	Black Lake Quarry	Lower Genshaw	3	6.2	5.6	6.0
P. Kettneri	Tower Dam Site	" "	3	4.2	3.8	4.0
P. exiguum draperense	Draper School	Lower Alpena	1			4.
P. exiguum	Afton Quarry	Gravel Point	7	2.2	1.75	2.0
P. exiguum	Marvin Quarry	" "	1			2.
P. percarinatum gorbutense	Gorbut School	" "	10	5.5	4.5	4.9
"	Bunker Farm	" "	4	3.	2.5	2.8
"	Petoskey P. C. Co. Quarry	" "	4	3.3	2.	2.7
P. altimoenitum	Bunker Farm	" "	4	4.15	3.6	3.8

Favia speciosa (recent) Japan (From: T. Y. H. Ma, 1934)

Locality	Monthly average surface water temperature		Number of specimens examined	Rate of growth per year (mm)
	Minimum (Feb)	Maximum (Aug)		
Vsibuka (Kyusyu)	15.4	26.7	7	3.04
Amami-o-Sima (Ryukyu)	18.1	27.7	9	4.68
Kusimoto (Honsyu)	15.8	28.8	3	4.17
Ogasawara-Zima	19.9	27.2	6	5.04
Mariana Islands			2	8.55

Table II

Comparing growth-rate data from the corals of the Traverse Group with those living at present in Japanese waters (Table II.) as to the probable temperature of the Traverse Sea must assume that the variation of growth-rate with temperature is comparable for Prismatophyllum and Favia speciosa, the species studied by Ma. Whether or not such an assumption is reasonable is, of course open to debate, regardless of the apparent comparability of the size of actual yearly increments. If it is correct, however, one may make certain deductions as to the probable climate of Traverse time from the growth-rate data, placing this region in the sub-tropical belt. Such a deduction is suggested by the very presence of reef corals, however, and could be made independently as well. The temperature and light intensity variations would be somewhat greater in the sub-tropical regions that in the vicinity of the equator, and the writer believes, therefore, that the strong annuli observed in some corals of the Traverse Group make a sub-tropical climate more probable for that period.

The writer is not inclined to state whether or not the growth rings can be used for purposes other than abstract speculations on the environments of ancient sea-bottoms, such as stratigraphic correlations, facies problems, etc. Such and other applications may become possible when the growth rings are more fully described and collected in larger quantities from more widespread localities.

Specific descriptions

Phylum CCELENTERATA

Class ANTHOZOA

Order TETRACORALLA

Family CYATHOPHYLLIDAE

Genus PRISMATOPHYLLUM Simpson, 1900

Remarks:

The species described are assigned to the genus Prismatophyllum, genotype P. prismum Lang &. Smith (1935, p. 558). The writer did not have an opportunity to consult the original genotype, but used the excellent descriptions and figures given by Lang &. Smith (op. cit.), Stewart (1938 pp. 50-51) and Stainbrook (1940, pp. 273-274). The species do not belong to the genus Acervularia Linné, for their tabulae are simple. The difference has been well discussed and illustrated by Stainbrook (1940), and others.

Prismatophyllum boucoti, Paul, n. sp.

(Plates 5-8)

The corallum is massive, cerioid, convex above to a varying degree, roughly round or elliptical in outline. Its size is variable, up to about 30cm in diameter and 10cm high, although coralla about 12-20cm in diameter are the most abundant and commonly found complete at the type locality. Calices are bounded by sharp peripheral walls, less than .5mm high. Calicular bottoms slope gently toward the central pit, usually about 2mm deep, with steep walls and more or less flat bottom. Only one corallum was observed in which corallites have a slight tendency to grow independently. The proximal surface (peritheca) is rough and finely grooved, with coarse, concentric growth ridges.

Transverse section:

Mature corallites are polygonal with thin, straight or curved peripheral walls, occasionally serrate where septa of neighboring corallites do not meet. The average mean diameter is about 9-10mm, but the corallites exhibit marked variations in size. The septa range in even numbers up to 40, but 36 is the usual number. They are very fine, carinate, crenulate or irregular, seldom straight, and all extend into the tabularium. The difference between major and minor septa is very slight, for they are all comparatively short, usually about 2/3 of the mean corallite radius. Carinae are fine and commonly of the "triangle" type, but other types are present. In mature corallites, they average about 6 per septum and extend almost

as far into the tabularium as the septa. Dissepiments are fine, only slightly bunched toward the tabularium, usually 4-7 between a pair of septa. They do not form a distinct ring around the tabularium, and the inner boundary is, therefore, vaguely defined. The tabularium has a diameter about 1/2 of the total diameter in the ephebic stage, and exhibits tabular edges in most corallites.

Longitudinal section:

The corallite is divided into a tabularium and a dissepimentarium by almost clear line formed by the innermost row of steeply inclined rows of numerous fine, small, globose dissepiments. The tabulae are fine, flat or irregular, and show a sharp transition into dissepiments. They sometimes split, or bend upwards, near the inner wall, but usually they meet the dissepiments at an angle approaching 90°. Carinae are fine, slightly arched distally, about .3mm apart, and make angles around 45° with the axis where a septum is coplanar with the section. In the early neanic stage the dissepimentarium is absent. Calicinal budding is very common, and clearly visible in most longitudinal sections.

Remarks:

The 36 thin, short septa and thin, slightly crenulate walls are characteristic of this species.

P. kettneri is somewhat similar to P. boucaki, but it has a larger number of septa (38-40), a wider tabularium (3/5 of total corallite diameter), and thicker, more distinctly serrate peripheral walls.

The species is named in honor of my teacher, Docent, Dr. Bedrich Boucek of Charles University, Praha, Czechoslovakea.

Type locality and occurrence:

The holotype, HF 25-1, and the paratypes, HF 25-4, HF 25-5, HF 25-8, HF 25-9, and HF 25-10 were all collected from float in the western end of the abandoned Black Lake quarry, 1/2 mile west of the Onaway State Park boundary, SW 1/4, NW 1/4, Sec. 7, T 35 N, R 2 E, Prisque Isle county, Michigan. There is no doubt that the specimens came from the shale of the Ferron Point formation near the top of the quarry face.

The holotype is conspecific with a specimen found in the Ferron Point Shale of the Rockport quarry, Sec. 6, T 32 N, R 9 E, Alpena county, Michigan.

Prismatophyllum kettneri, Faul, n. sp.

(Plates 9-16)

The corallum is cerioid, massive, probably up to 50cm in diameter and 20cm high. It is irregularly convex above and commonly concentrically wrinkled below. The calicinal surface of the holotype, a large fragment, 25cm long, is not preserved.

Calices of a paratype in which the upper surface of the corallum is preserved are very variable in shape and depth with low but sharp peripheral boundaries. The angle of slope varies from gentle to steep, but is never flat. The transition from platform to calicinal pit is gradual, even though the walls of the pit may be almost vertical. The depth of the pit is greatly variable even within one single corallum.

Transverse section:

The corallites are circular to polygonal in outline, depending on the degree of maturity, and greatly variable in size, (7 to 11mm) with an average mean diameter of 10mm. in the holotype, but only 7 to 8mm in some paratypes (Nos. HF 24-1, HF 25-7). The septa range from 34 to 44, but average 36 to 40. They are thin, commonly showing a marked dilation adjacent to the peripheral walls, commonly cremulate or somewhat irregular, but frequently straight. The major-minor division of septa is distinct in some corallites, but varies greatly in clarity among corallites and coralla.

Carinae are distinct in some corallites but may be obscure or apparently lacking in neighboring corallites or even in the opposite portion of the corallite. This apparent sporadic development does not indicate the absence of carinae, but is interpreted as being due to the variable angle at which carinae are intersected by the transverse section. Discussion of this factor has been given in an earlier part of this paper (pp. 10, 11 and Plate 1). The carinae extend into the tabularium almost as far as the septa, but this distance is in itself greatly variable from corallite to corallite.

Peripheral walls are thick and strongly serrate in the holotype and some paratypes, but the serrate character is not constant in other paratypes. The thick walls are regarded as characteristic, however.

There is an average of about 6 dissepiments between a pair of septa, but the number is extremely variable, and may be as low as 2 or 3 and as high as 10. They are invariably fine, commonly peripherally convex, forming arcs. In some instances these arcs are in circles of equal or nearly equal radii, thus producing the effect of a distinct inner ring around the tabularium (paratypes HF 18-1, HF 20-1, HF 24-1, etc.) Whether or not the dissepiments are peripherally convex or concave in transverse section, depends largely on whether they have been intersected in their axial or their peripheral portion, however. Their spacing is generally sub-equal and

and they are not bunched toward the tabularium, which exhibits numerous tabular edges.

The ratio between tabularium diameter and total diameter is about 1/2, but cannot be determined with certainty, in all corallites, for the tabularium boundary is not always in the form of a well-defined inner wall.

Longitudinal section:

The corallites are clearly divided into a tabularium and a dissepimentarium, but no sharp inner wall can be defined, for the transition is invariably obscured by numerous tabellae. Dissepiments are globose or lenticular and arranged in more or less regular inclined rows. The number of dissepiments in a row is variable among corallites of any corallum as well as among different paratypes. The extremes lie between 2 and 10, with an average near 5. Departures from the average are common and little significance is placed on these variations. In one specimen, an erratic collected in the quarry at Black Lake, and probably derived from the lower Genshaw, the number of dissepiments in a row approaches constancy. In this form there are three dissepiments in a row, except for one part of one corallite in which it has up to 10. Since the specimen was collected before the possible significance could be appreciated, it cannot be determined whether the specimen should be regarded as an abnormal form, a mutation, or a different species. Since, at present, it is an isolated example, it is figured, and referred with

some doubt to P. kettneri.

Tabulae are fine, nearly flat or irregular. The spacing is apparently without system and varies from .2 to about 1.0mm, measured parallel to the axis. Carinae are distinct in longitudinal sections coplanar with a septum. They are distally arched to a varying degree, and sometimes become almost horizontal axially. Peripherally they make angles of about 45° with the walls and axis. This vertical angle, however, may be as great as 60-30°, thus making it appear in some transverse sections that carinae are altogether absent. It can be seen in Plates 12 and 14 that these angles approach 90° in many instances, especially toward the axis. The distance between carinae on any one septum averages about .25mm. They extend into the tabularium almost as far as the septa. Peripheral walls are thick and irregular, trending straight, with evidence of calicinal gemmation and abortion in some paratypes (Nos. HF 24-1 and 25-7)

Remarks:

P. kettneri is an extremely variable species. It resembles and is closely related to P. bouceki, but differs from it in a greater thickness of walls and septa, and in the fact that P. bouceki has consistently non-serrate peripheral walls. Furthermore, the tabularium of P. bouceki is generally narrower (always less than 1/2 of the total diameter).

The large number of septa, the comparatively large corallites, and the absence of a strong inner wall readily distinguish P. kettneri from all of the Gravel Point forms.

Within the species itself, several varietal trends or mutations can be observed, none, however, constant enough to warrant the erection of a definite variety. The most pronounced trend is probably that toward a smaller size and more distinctly outlined tabularium than those of the holotype. These trends are exemplified by paratypes (Nos. HF 20-1, HF 24-1, HF 25-7), from Milligan Creek, the county line E of the 1/4 corner of Sec. 25, T 35 N, R 1 E, and from the Black Lake Quarry.

Type locality and occurrence:

The holotype (HF 23-2) was collected in situ in a ditch along the county-line road 2 3/4 mi. south of Black Lake Quarry, .4 mi. south of the E 1/4 corner, Sec. 25, T 35 N, R 1 E, Cheboygan-Presque Isle county line, Michigan.

The species occurs throughout the Genshaw formation, and paratypes have been selected from the following localities:

Paratypes HF 18-1, HF 18-2 and HF 18-4 were collected from the Tower Dam site, Sec. 3, T 34 N, R 1 E, Mich., from the Middle Genshaw.

Paratype HF 15-1 was collected loose 1 1/4 mi. N. of the Afton quarry, SE 1/4 of the SE 1/4 Sec. 24, T 35 N, R 2 W, Michigan, probably from the upper Genshaw.

Paratypes HF 19-1, HF 19-2, and HF 19-3 were collected from the Upper Genshaw 1 mi. N. of Tower Dam site, along the road

near the center of Sec. 34, T 35 N, R 1 E, Michigan.

Paratype 29-1 was collected from float, on Milligan Creek, near the SE corner of Sec. 30, T 35 N, R 1 E, Michigan, and comes from the middle Genshaw.

Paratype HF 24-1 was collected along the county line road near the E 1/4 corner, Sec. 25, T 35 N, R 1 E, on the north side of a hill, from the middle Genshaw.

Paratype 25-7 was collected loose in the Black Lake quarry, Sec. 7, T 35 N, R 2 E, and appears to have come from the lowermost Genshaw.

Paratype HF 29-1 was collected in situ from the middle Genshaw in a dry gully about 3/4 mi. W. of Rainy Falls, SE 1/4 of the SE 1/4, Sec. 26, T 35 N, R 2 E, Michigan.

The species is named in honor of Professor Dr. Radim Kettner, of Charles University, Praha, Czechoslovakia.

Prismatophyllum sp.

An incomplete specimen, No. HF 29-1 which was collected from the middle Genshaw formation in a ledge along a shallow ravine in the SE corner of Sec. 26, T 35 N, R 2 E, resembles P. kettneri. It has from 34 to 38 septa, generally obscure carinae and an ill-defined tabularium with a diameter about 1/2 of the total mean diameter. The corallites are variable in size, averaging about 8-9mm.

The chief difference between this specimen and P. kettneri are very thin, commonly straight peripheral walls, resembling those of P. aftonense. The number of septa, however, is much higher than that of P. aftonense, dissepiments are more numerous, and the inner wall is much more indistinct.

This form may represent a new species, but the material collected is considered insufficient for the erection of a species or a variety.

Prismatophyllum exiguum n. sp.

(Plates 2, 4, 17-18)

The corallum is massive, cerioid, distally convex, usually about 10-20cm in diameter, but some fragments indicate a size of up to about 50cm in diameter, and about 15cm high. Calyx and epitheca unknown. The majority of specimens show evidence of wear from wave action and are usually grown over by stromatoporoids.

Transverse section:

Corallites are polygonal with thick, strongly serrate walls. Their size is uniform, with an average mean diameter of 7 to 8mm. Septa range in even numbers up to 38, but the usual number is 34 or 36 in mature corallites. They are straight or slightly crenulate, distinctly carinate, sometimes irregular near the center. All extend into the tabularium. Minor septa are distinctly shorter than major septa (by about .5 to 1.2mm), and some majors almost reach the axis of the corallites.

Carinae, commonly less than 8 per septum, are of all types, the short "yardarms" (Hill, 1935, p. 501) being the most common. They are fine toward the periphery and become stronger as they approach the tabularium. The boundary of the tabularium is formed by slightly bunched, fine, simple dissepiments. The dissepiments, usually about 6 to 8 between a pair of septa, do not form a distinct circle around the tabularium, and the boundary, therefore, is not very

pronounced. The tabularium has a diameter about 1/2 of the total mean diameter of the corallite, and shows numerous tabular edges.

Longitudinal section:

The corallite is clearly divided into the tabularium and the dissepimentarium. The boundary is a sharp line or steep transition, although tabellae are locally developed. Tabulae are closely spaced, flat, slightly concave or convex, and highly variable in shape. Dissepiments are fine, globose, regular in most corallites. Carinae are pronounced, only slightly arched distally, visible where the section cuts a septum at a low angle, and make an angle of about 30° with the corallite axis.

Remarks:

The characteristic features of this species are comparatively small corallites separated by a strongly serrate boundary, and possessing a large number of septa.

It superficially resembles P. altimoenitum, but differs from it in the latter's higher number of septa (34-36), a slightly larger average mean diameter, and the character of peripheral boundaries (thick, and strongly serrate).

The species is named for its size (Lat. exiguus = small).

Type locality and occurrence:

The holotype, HF 10-1, and the paratypes HF 10-2 and HF 10-3 were all collected loose from the shallow eastern end of the

Marvin Quarry, 2 miles SE of Afton, SW 1/4 of the NE 1/4, Sec. 7, T 34 N, R 1 W, Cheboygan county, Michigan.

The species has also been collected from the Afton Quarry, 1 mile N of Afton, NE 1/4, Sec 36, T 35 N, R 2 W, Cheboygan county, Michigan.

Prismatophyllum exiguum draperense, n. sp. et var.

(Plates 19-20)

Entire corallum unknown. Fragments indicate it to be massive, cerioid, 25cm in diameter and up to about 8 cm high. Formed by calicinal gemmation. Shape convex above, and axially more or less circular. Calyx unknown.

Transverse section:

Corallites irregularly polygonal, with thin, serrate walls, usually trending straight, but sometimes slightly curved. Mature corallites show a slight variation in mean diameter, averaging about 6 to 7 mm.

Septa straight, thin, locally somewhat thickened, distinctly carinate, 28 to 32 in number, averaging 30 in mature corallites. All septa penetrate into the tabularium, the majors almost reaching the center in some corallites. Near the center, they remain straight or bend irregularly, while the minors peretrate only about .5 to .7mm.

Carinae are distinct and of various types, usually short diamond shaped, and become more pronounced toward the tabularium boundary. The usual number is about 6 per septum.

Dissepiments are fine, simple, usually about 5-7 between a pair of septa, and slightly bunched toward the tabularium. They do not form a distinct inner circle, however, and the tabularium

boundary is, therefore, not pronounced in most corallites. The mean tabularium diameter is approximately 1/2 of the mean total diameter in mature corallites. Edges of tabulae are visible in the tabularium.

Longitudinal section:

Corallites distinctly divided into dissepimentarium and tabularium, commonly by irregular lines formed by the innermost dissepiments. Transition from tabulae to dissepiments is sharp, and tabulae usually meet dissepirents at almost a right angle. Splitting of tabulae near the boundary is rare.

Dissepiments fine, globose, variable in size, usually regularly arranged in various ways. Carinae fine, about .3mm apart, distally arched, but meeting the inner wall at a high (almost right) angle, visible only where the section is almost coplanar with a septum.

Remarks:

Superficially, P. exiguum draperense is quite similar to P. altimoenitum and P. exiguum. P. altimoenitum, however, has a smaller, more clearly defined tabularium, more (32) septa, and shorter ones, and a less serrate wall. The mature corallites of P. altimoenitum are more uniform in size and average slightly larger (7mm).

P. exiguum differs from P. exiguum draperense chiefly by its larger number of septa (34-36), and a larger mean diameter of

corallites, (7-8mm).

The septa of P. exiguum draperense are less distinctly carinate, but otherwise similar.

The variety is named after the type locality.

Type locality and occurrence:

Both the holotype, HF 21-1, and the paratype, HF 21-2 were collected in situ from lower Alpena beds correlated with the lower Gravel Point (Smith, 1942), in the southern road ditch along State highway M 33, 1 1/2 miles west of Onaway, just northeast of the old Draper school, N 1/2 of the NW 1/4 of the NE 1/4, Sec. 12, T 34 N, R 1 E, Cheboygan county, Michigan.

The species does not occur at any other locality.

Prismatophyllum aftonense, Faul, n. sp.

Plates 21-22.

Corallum large, unknown. Only fragments have been found, some up to 50 cm. in diameter, convex above, massive, cerioid, about 30 cm. high, formed by calicinal gemmation, with no tendency of corallites to grow independently.

Calices incompletely known, probably shallow, and with gently sloping bottoms.

Transverse section:

Corallites polygonal, in large coralla frequently regularly hexagonal with walls thin, straight, or slightly and assymetrically crenulate where septa of neighboring corallites do not meet peripherally. The corallites are fairly uniform in size, averaging 8.5mm in diameter. The septa range up to 36 in number, but average 32 in mature specimens. They are usually straight, but locally sinuous or quite irregular near the tabularium. They are clearly differentiated into majors and minors. Major septa extend into the tabularium about 1/3 of its radius and the minors only about 2/3 of that amount. The septa are obscurely carinate, and the carinae are rarely visible in transverse section. Dissepiments are few in number, with only 3 to 5 between a pair of septa, axially far apart in the peripheral region of the corallites and closely bunched along the tabularium boundary (inner wall). This boundary is usually a clearly defined circle with a diameter about 3/5 of the mean diameter of the

corallite, displaying the edges of tabulae where intersected by the plane of the section.

Longitudinal section:

The corallite is clearly divided into a wide tabularium and a narrow dissepimentarium consisting of about three rows of distally convex, globular, and comparatively large dissepiments. Tabulae are flat, or centrally depressed, generally simple, and usually meet the dissepiments almost at right angles. Only very seldom do the tabulae show a gradual transition into dissepiments by splitting and bending upward. Carinae are very fine, and visible only in sections coplanar to, or cutting a septum at a very low angle.

Remarks:

The species is characterized by its few dissepiments, axially closely bunched toward the inner wall, a wide, clear-cut tabularium, carinae obscure in transverse sections, and straight peripheral bounderies. It resembles no other species examined by the writer.

Type locality and occurrence:

The holotype HF 13-1, and the paratypes HF 14-1 and HF 13-2 were all collected from float from under the walls of the abandoned Afton quarry, 1 mile north of Afton, NE 1/4 of the NE 1/4, Sec. 36, T 35 N, R 2 W, Cheboygan county, Michigan. The types appear to have come from the light-colored limestone above the black Gorbut member, near the top of the eastern quarry face. The species is known from

no other locality.

It is named after the type locality.

Prismatophyllum altimoenitum, Faul, n. sp.

(Plates 23-25)

Corallum cerioid, convex above, irregular below, up to 25 cm in diameter and probably nor more than 15 cm high. Complete coralla are rare, and are commonly less than 10 cm in diameter. There is no tendency for corallites to grow independently.

Calices are fairly regular, polygonal in shape, separated by very pronounced, but thin, walls about 1.5 mm. high. Within these walls the calicular bottom is almost flat, radially dissected by the carinate septa protruding only very slightly above this platform. The calicular pit in the center is about 2 to 3 mm deep, and descends abruptly from the platform, with its walls almost vertical and its bottom flat. The diameter of the pit is about 1/3 of the mean total corallite diameter in mature corallites.

Longitudinal section:

The corallite is clearly divided into tabularium and dissepimentarium, with the tabularium about 1/3 of the total diameter. Transition sharp with tabulae meeting dissepiments usually at right angles. Gradual transition by splitting of tabulae is rare. Tabulae simple, distally convex or almost flat, spaced about .3 to .8 mm apart. Dissepiments globose, variable in size, usually regularly arranged in rows that are almost horizontal. Carinae distinct

where plane of section meets septum at a low angle, about .5 mm apart, distally arched, and meeting the walls at low angles. Walls are strong, irregular, trending straight.

Transverse section:

Corallites are polygonal in outline, with an average diameter of about 7 mm. Departures from this average are small but common (about 1 mm). Walls thin, locally slightly thickened, straight or slightly curved, commonly slightly crenulate. Septa are thin, straight or somewhat curved, rarely crenulate, and range in even numbers up to 34 but average 32 in mature corallites. The differentiation between major and minor septa is clear. Majors extend into the tabularium about 1/2 of its radius, whereas minors intrude usually less than 1/4 of the radius. Carinae commonly of the short yard-arm type (Sloss 1939) sometimes set obliquely to the septa, very strong near the tabularium and becoming less pronounced toward the periphery of the corallite, commonly up to 8 per septum. Dissepiments fine, numerous, up to about 9 between a pair of septa, closely bunched inward and forming a distinct circular inner wall around the tabularium. The tabularium has a diameter about 1/3 of the mean total diameter, and shows edges of intersected tabulae in most corallites.

Remarks:

The species is characterized by its flat calicular floor, steep and flat-bottomed calicular pit, high bounding walls, and a small round tabularium,

The species differs from P. parvulum Stainbrook in the failure of septa to reach the center of the tabularium, in its high calicinal walls, and in its somewhat larger mean diameter, (7mm). It differs from P. percarinatum var. gorbutense, n. var. in its much smaller mean diameter, a smaller number of septa (32), and much narrower tabularium (1/3 of total mean diameter).

The species is named for its high bounding walls (Lat. altus= high, moenitus = walled).

Type locality and occurrence:

The holotype, HF 7-1 and the paratypes HF 7-3, HF 7-5, and HF 7-7 were collected in situ in the road ditches just east of Bunker farm, S 1/2 of the SW 1/4, of the SE 1/4, Sec. 18, T 34 N, R 1 W, Cheboygan County, Michigan.

The species is known from no other locality.

Prismatophyllum percarinatum var. gorbutense, Faul, n. var.

(Plates 3, 26-27)

Entire corallum unknown. Fragments up to 40 cm in diameter have been found and indicate a probable size of about a meter or more for large mature coralla. They are massive, cerioid, formed by extracalicinal gemmation from one or more individuals, and show no tendency of corallites to grow independently. Calyx unknown, probably greatly variable in shape, as indicated by the badly worn corallum.

Transverse section:

Corallites are polygonal in outline, with an average mean diameter of about 12 mm; departures from the average are generally within 10%. Walls are medium thin, about .15mm, straight or crenulate depending on the relative position of septa in neighboring corallites. The septa range up to 46 but the usual number is 40 in mature corallites. They are thin, generally straight, carinate, with major septa clearly differentiated from the minor. Major septa extend almost to the axis in some corallites, whereas the minors protrude only little beyond the dissepimentarium. Carinae are fine but distinct, numerous, up to about 8 per septum, and become more pronounced toward the tabularium. In some corallites they extend a variable distance inward beyond the dissepimentarium. The dissepiments are fine, numerous, up to about 10 between a pair of septa, closely bunched toward the tabularium,

and together with the somewhat dilate septa forming a usually distinct circular inner wall around the tabularium. The tabularium diameter is about 3/7 of the total mean diameter of the corallite, and frequently displays edges of intersected tabulae and tabellae.

Longitudinal section:

The division into tabularium and dissepimentarium is distinct, but transition from tabulae to dissepiments is often gradual with abundant formation of tabellae, i. e. small tabulate, distally convex structures extending only partway across the tabularium. Tabellae of this kind are frequent in the holotype of P. percarinatum s. s. Tabulae are rarely simple and generally distally convex, spaced about .2 to 1.0 mm apart. Dissepiments are globose or lenticular, variable in size, partly as a result of growth-rate variations, and more or less regularly arranged in as many as 7 rows between a pair of septa. Carinae are strong, distally arched, meeting the peripheral walls at a sharp angle, but becoming almost horizontal toward the axis. They are about .2 to .4 mm apart. Peripheral walls are distinct but not thick, usually irregular, but trending straight.

Remarks:

In transverse section, the variety has a somewhat larger mean diameter (12mm) of mature corallites, and a slightly narrower tabularium (only 3/7 of the totat mean corallite diameter) than P. percarinatum. The variety, furthermore, exhibits distinct carinae inside the tabularium. In these respects it resembles closely a specimen collected from the lower Gravel Point Formation intthe Petoskey Port-

land Cement Co. Quarry at Petoskey, a horizon distinctly lower than that of Sloss' type locality of P. percarinatum s. s.

The new variety has a larger mean diameter and more septa than P. bunkerense.

The variety is named after the type locality.

Type locality and occurrence:

The holotype, HF 11-1, and the paratypes, HF 11-2 and HF 11-3, were collected in situ in the eastern road ditch, 3/4 miles north of the Finger Board Corner or 1/4 mi. south of the Gorbut school, N of W 1/4 cor., Sec. 33, T 35 N, R 1 W. The paratypes HF 7-2 and HF 7-6 were collected in situ in the road culverts just east of Bunker farm, S 1/2, SW 1/4 of the SE 1/4, Sec. 18, T 34 N, R.1 W, and the paratypes HF 1-2, HF 2-1 and HF 2-2 were collected from float about 1/4 mile north of Beebe school NE 1/4, Sec. 13, T 34 N, R 2 W, all in Cheboygan County, Michigan.

Prismatophyllum percarinatum Sloss

Prismatophyllum percarinatum Sloss, 1939, Jour. Paleontology, Vol. 13, pp. 69-70.

Remarks: The specimen comes from the uppermost beds of that part of the Gravel Point represented in this area, and may be intermediate between P. percarinatum gorbutense n. var. and P. percarinatum S.S. It resembles the latter more closely, however, especially in its wide tabularium, strong inner wall formed by dilate septa and dissepiments and a smaller average mean diameter.

Occurence:

Only one specimen (No. HF1) was collected ¼ mile north of the Beebe School, SE¼ of the NE¼, Sec 14 T34N, R2W Cheboygan County, Michigan. The specimen was apparently derived from the Gravel Point beds directly underlying the Favosites biostrome of the Beebe School formation.

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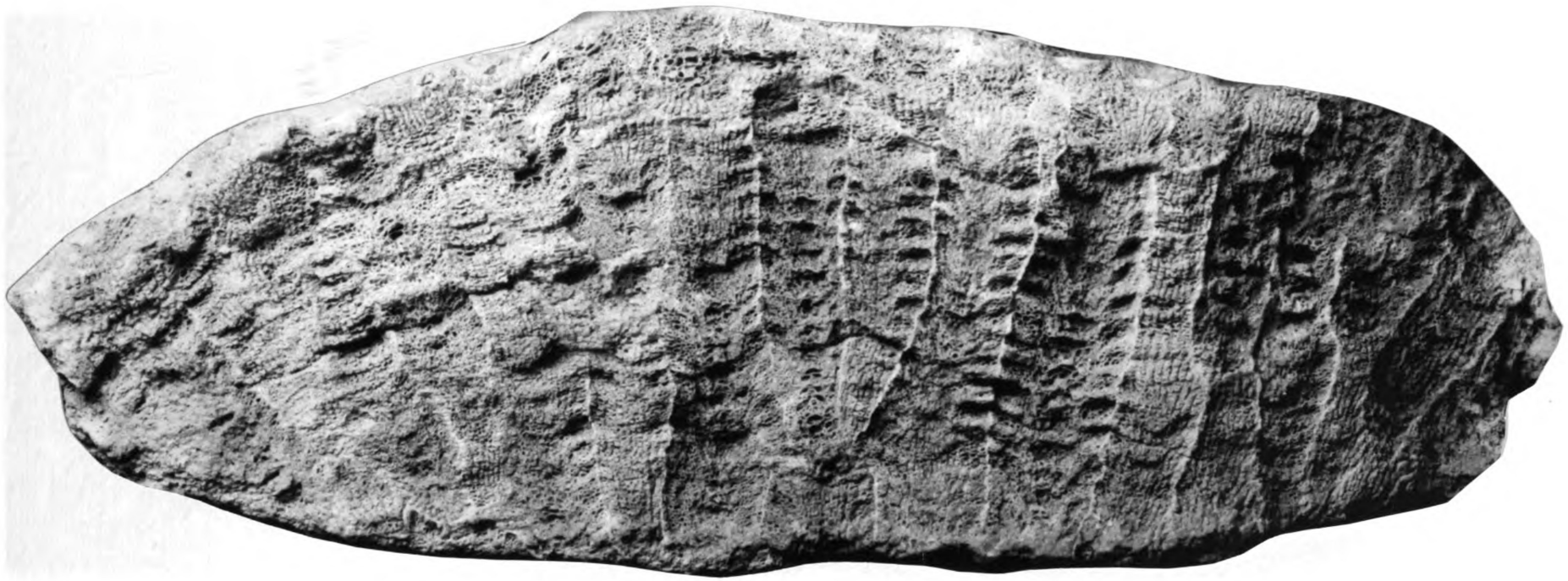
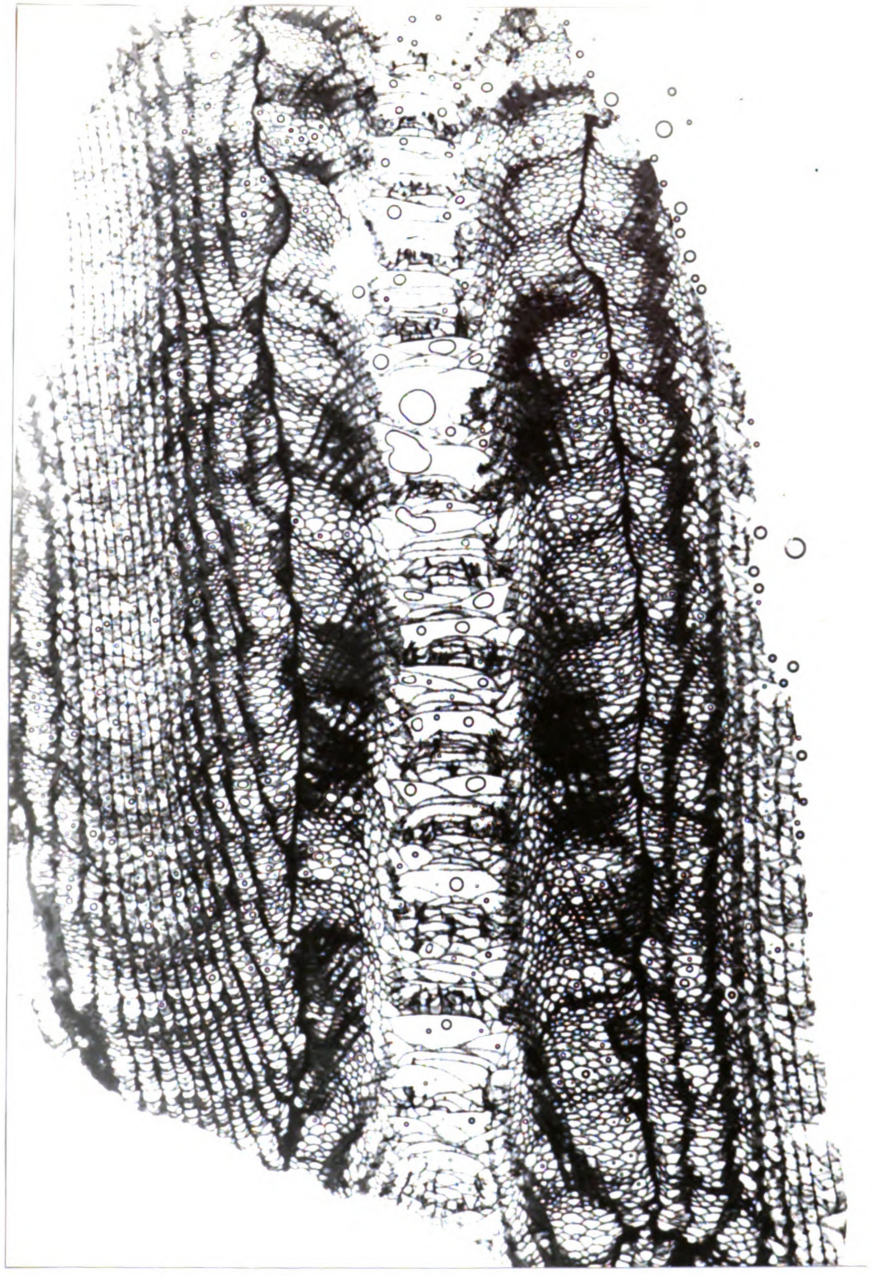
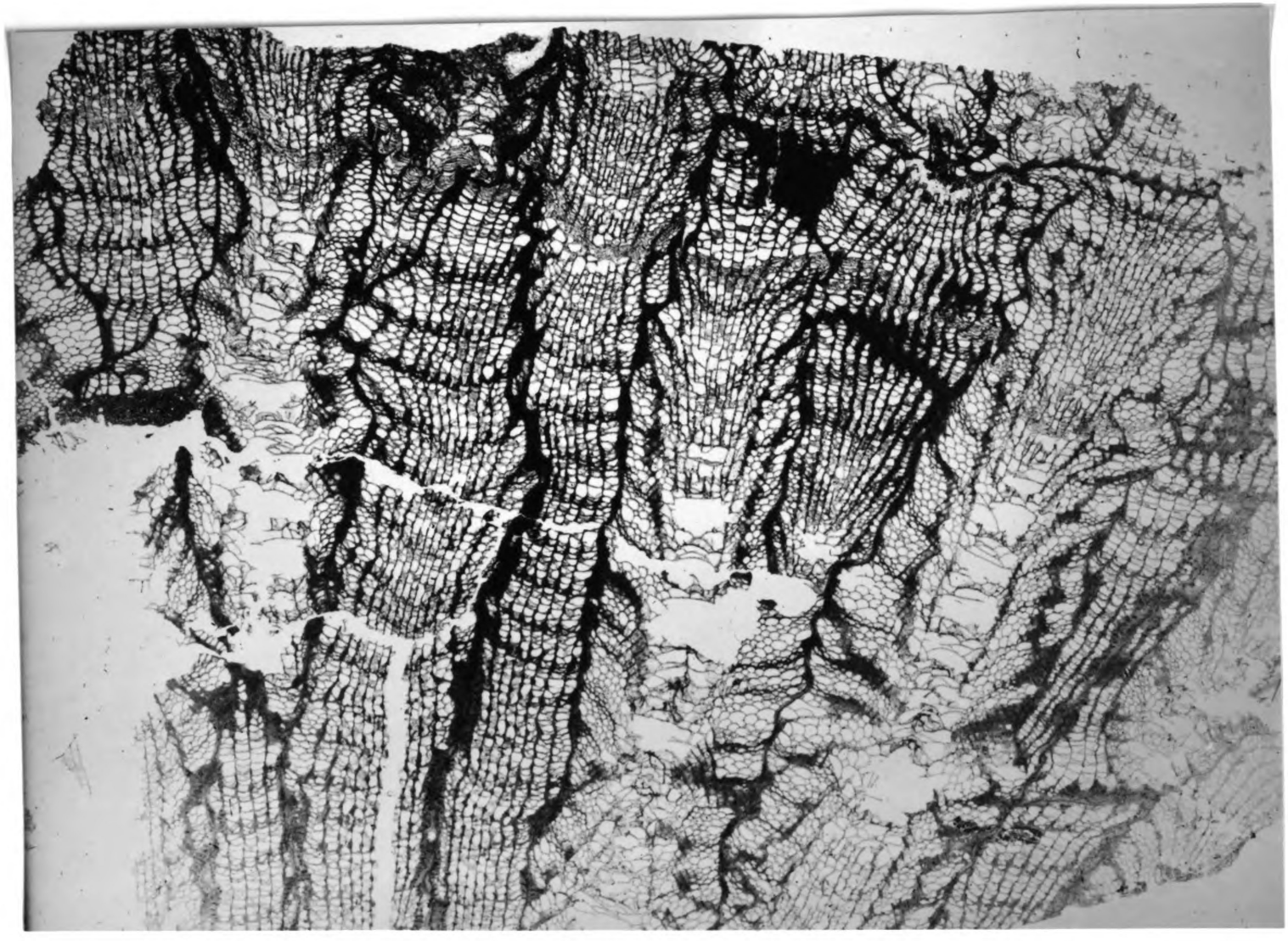


Prismatophyllum exiguum Faul, n. sp.
View of a weathered longitudinal section (x2) of a fragment (No. HF 12-1) from the Afton Quarry. Note periodic growth-marks.

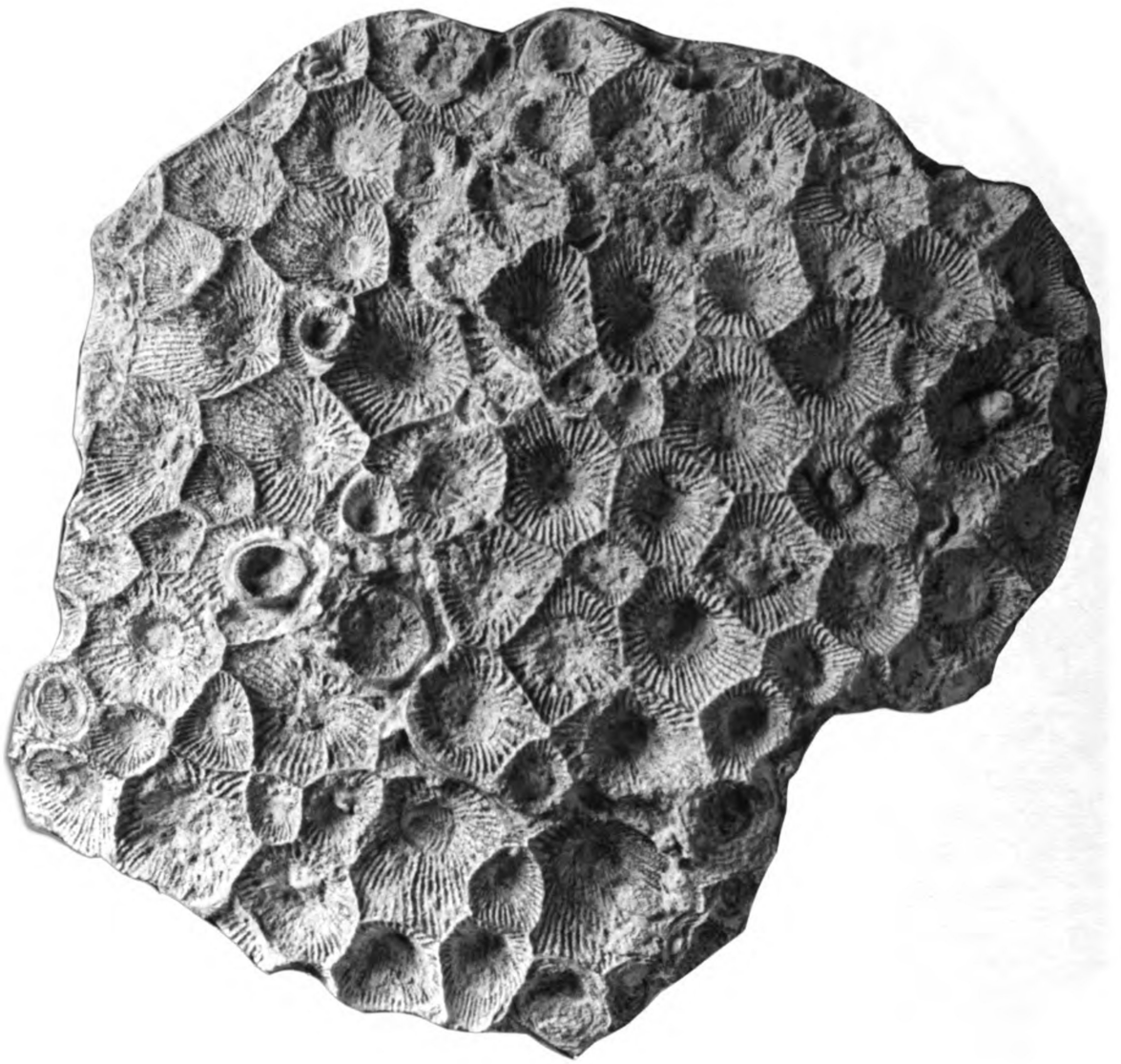
Plate 2



Prismatophyllum percarinatum gorbuteuse Faul n. var.
Longitudinal thin-section (x4) of a paratype, (No. HF 7-6) from near the Bunker Farm, SW 1/4 of the SE 1/4, Sec 18, T 34 N, R 1 W, Michigan, showing periodically variable rate of growth.

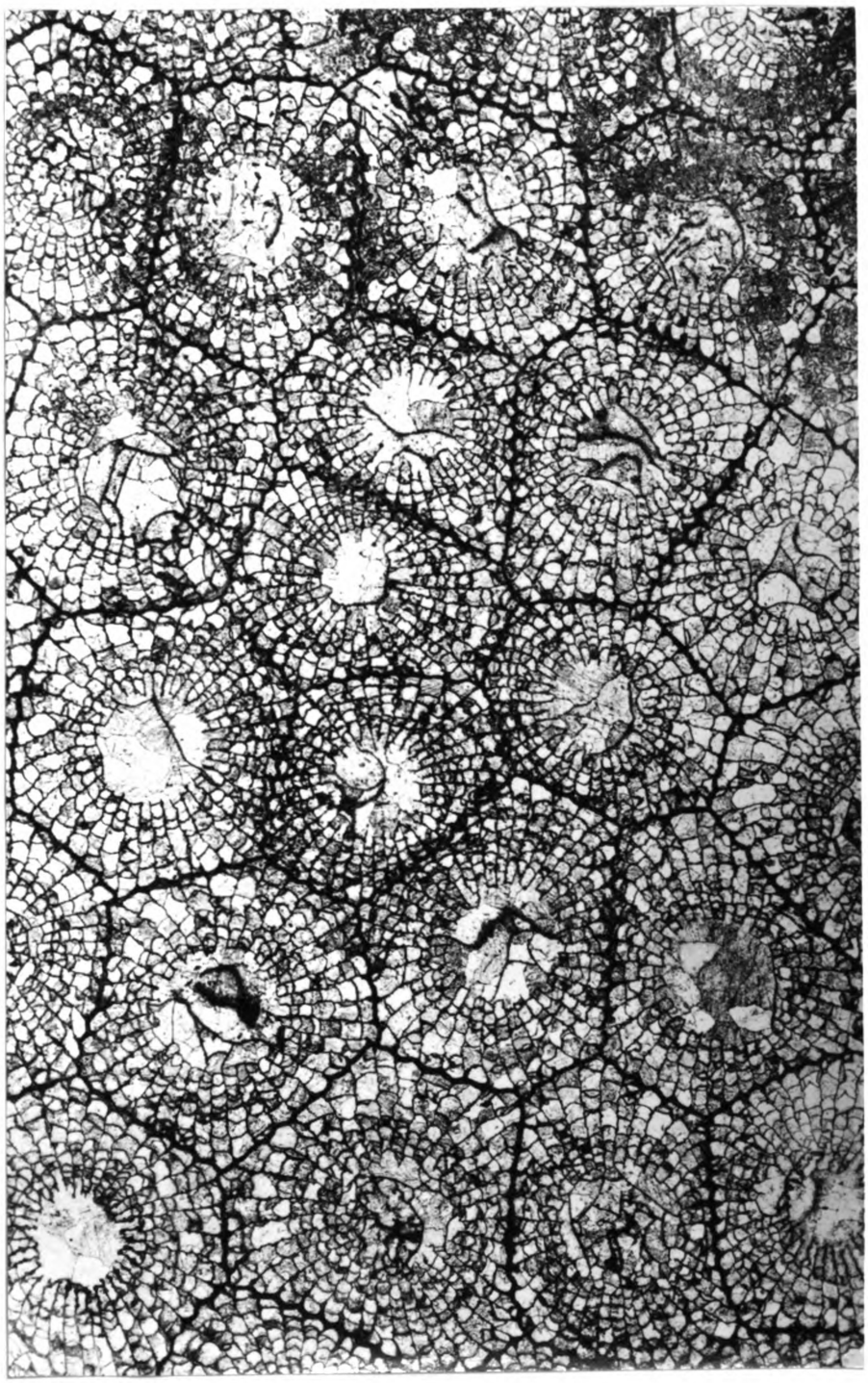


Prismatophyllum exiguum Faul, n. sp.
Longitudinal section (x4) of a specimen from the Afton Quarry NE 1/4 of the NE 1/4, Sec. 36, T 35 N, R 2 W, Michigan. (No. HF 12-1) Showing periodic growth rate variations. Note thickened septa and carinae.

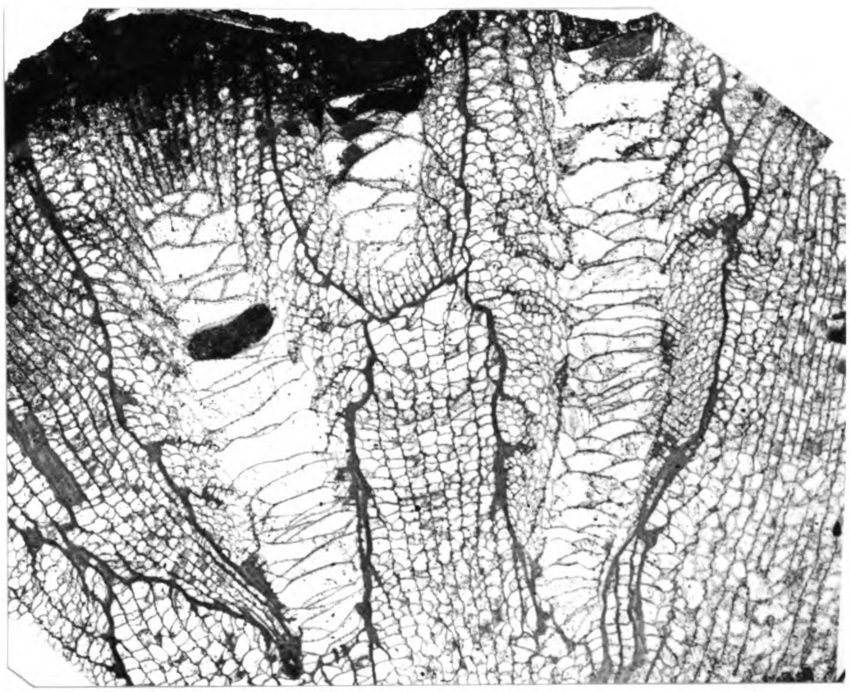


Prismatophyllum bouceki Faul, n. sp.
Calicinal view (x2), of a small complete corallum from the Black Lake quarry.

Prismatophyllum boucekĭ Faul, n. sp.
Bottom view (x2) of an almost complete corallum
from the Black Lake quarry.

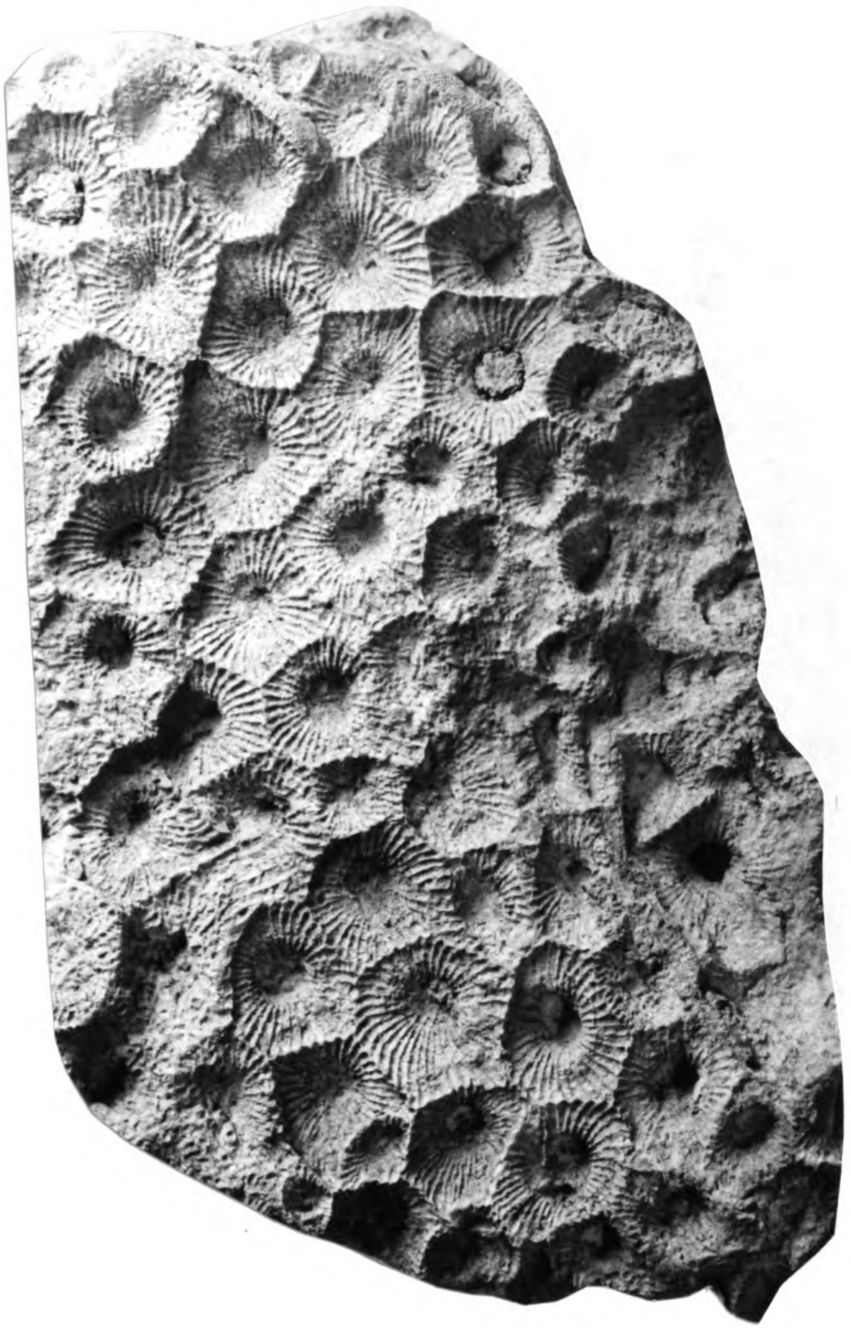


Prismatophyllum bouceki Faul n. sp.
Transverse peel (x4) of a paratype (HF 25-5) from the Black Lake Quarry.

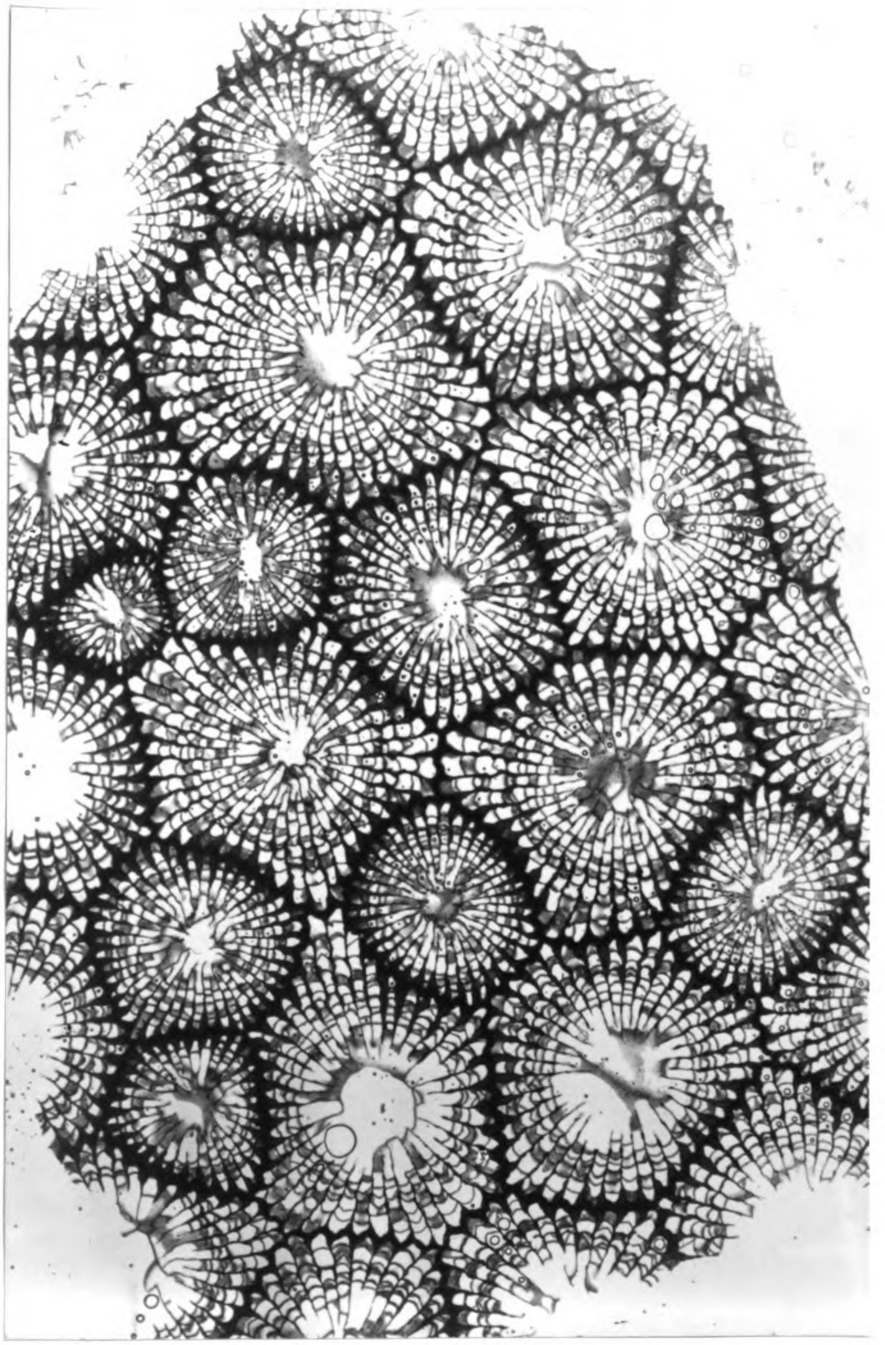


Prismatophyllum bouceki Faul, n. sp.
Longitudinal peel (x4) of the holotype (HF 25-1) from the Black Lake quarry.

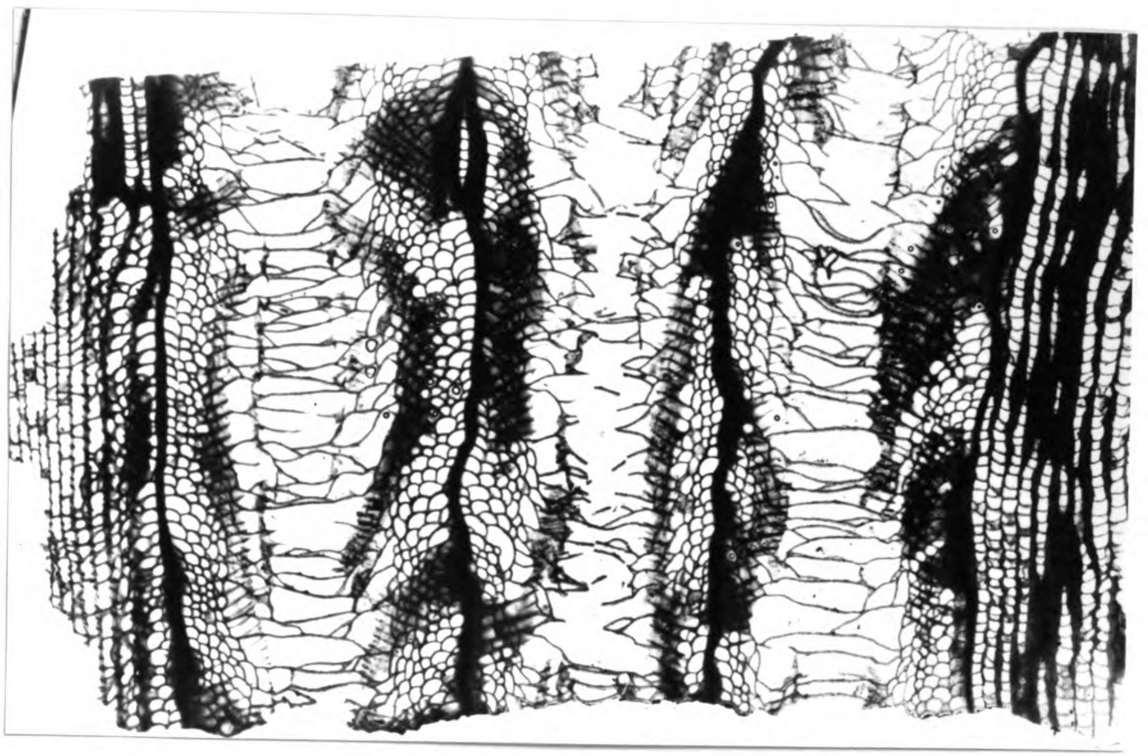
Prismatophyllum kettneri Faul, n. sp.
Calicinal view (x2) of a fragment of a silicified specimen from 1 mile N of Tower Dam, near the center of Sec. 34, T 35 N, R 1 E.



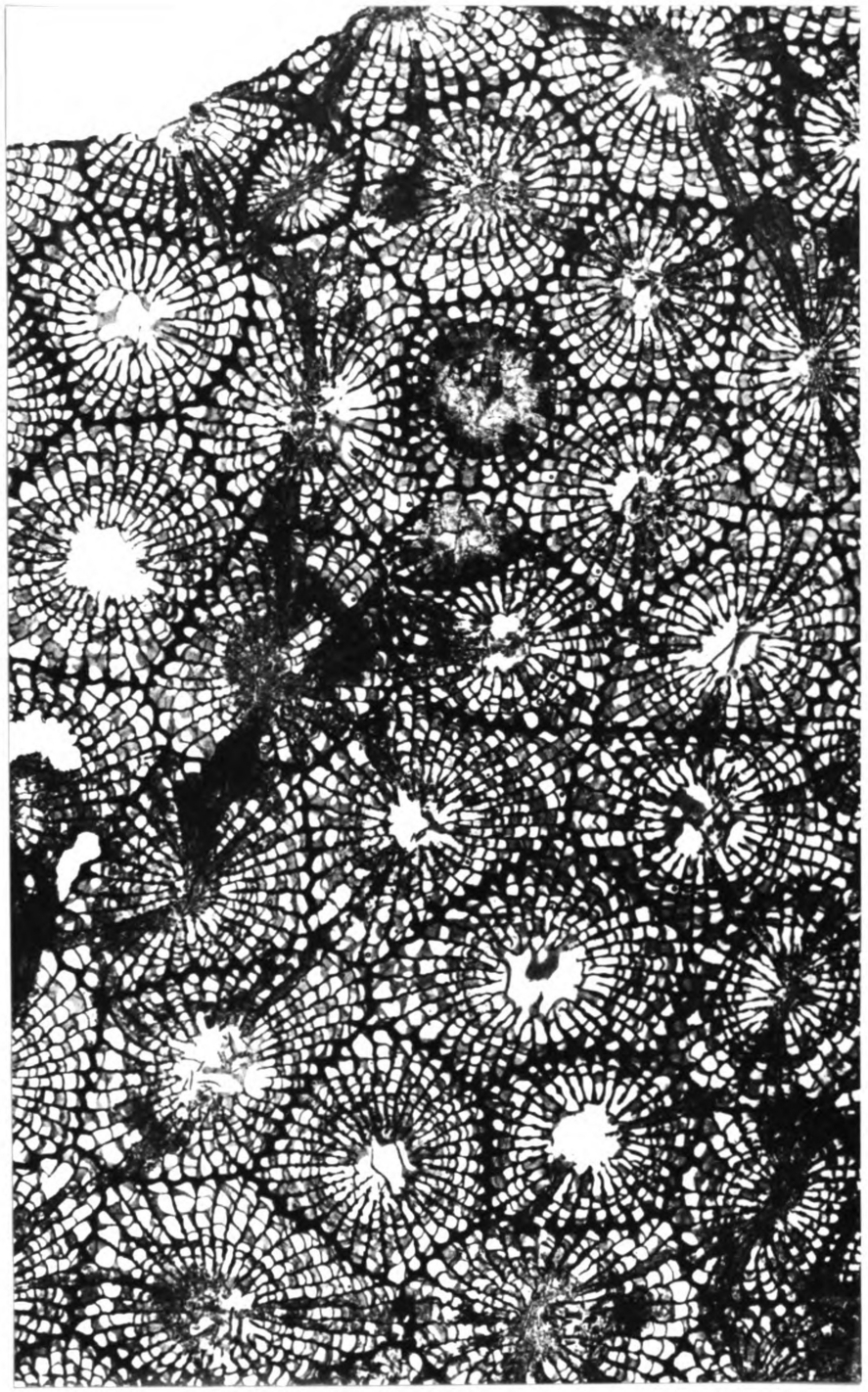
Prismatophyllum kettneri Faul, n. sp.
Calicinal view (x2) of a fragment from the Milligan Creek, Sec. 30, T. 35 N, R 1 E.



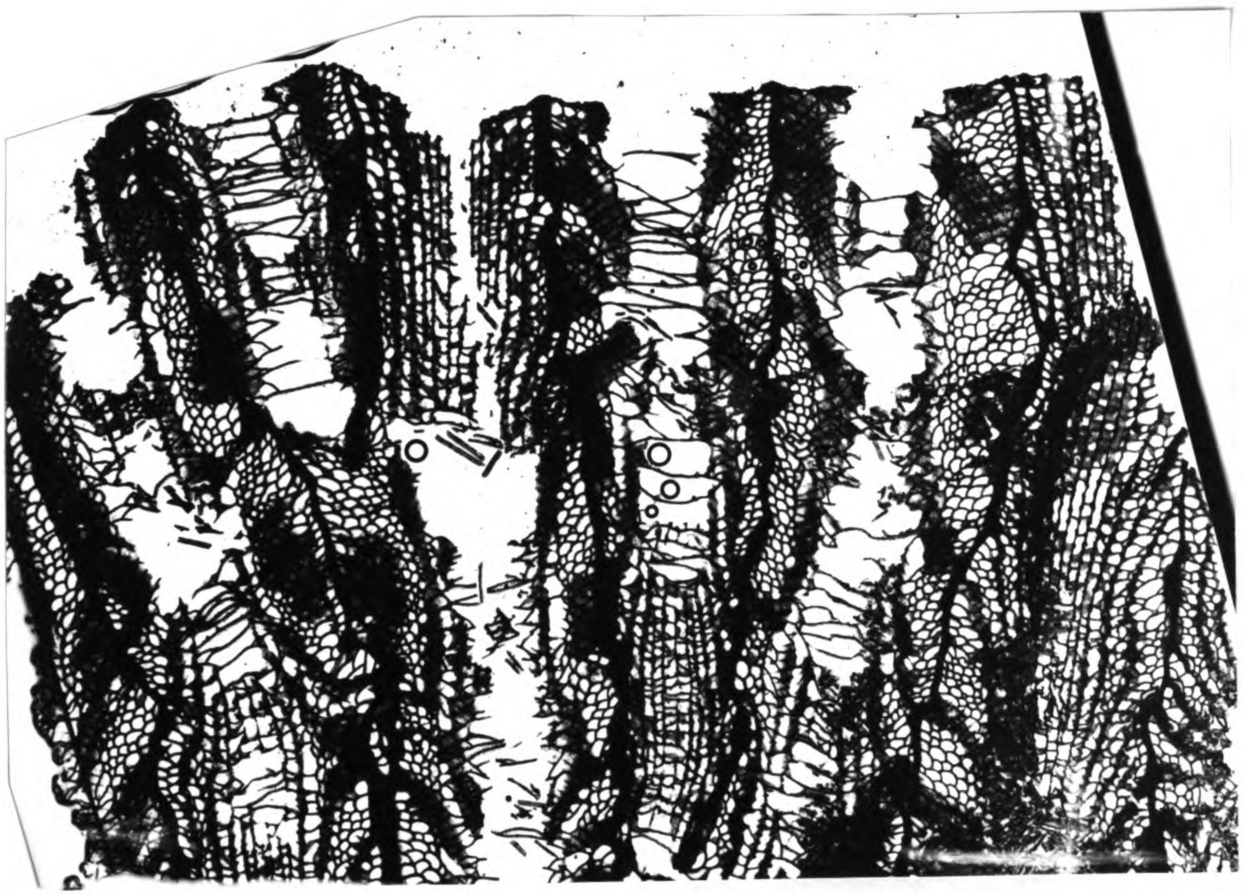
Prismatophyllum kettneri Faul, n. sp.
Transverse thin-section (x4) of the holotype (No. HF 23-2) from the county-line road, 2 3/4 mi. S. of Black Lake Quarry.



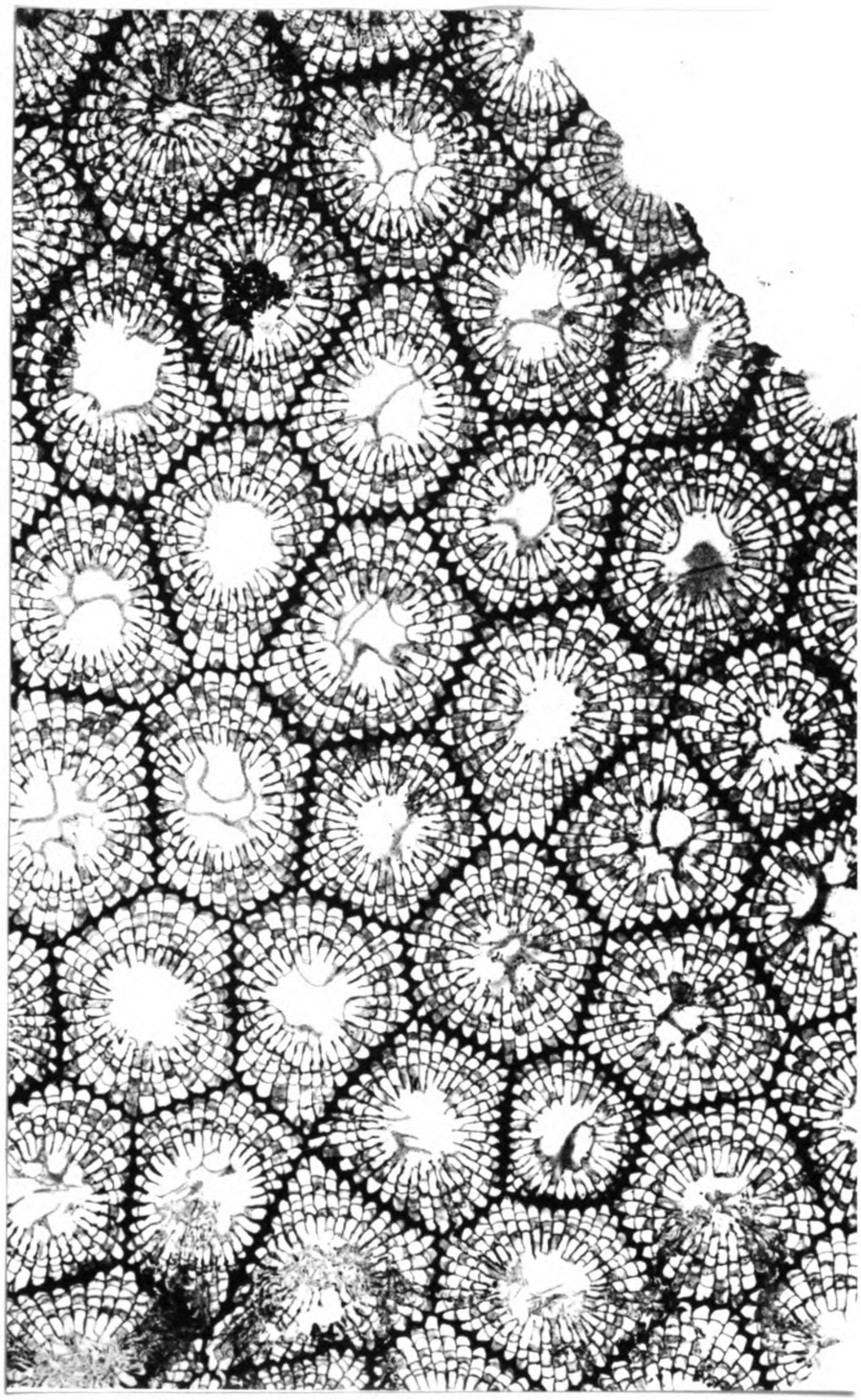
Prismatophyllum kettneri Faul, n. sp.
Longitudinal thin-section of the holotype. (x4)



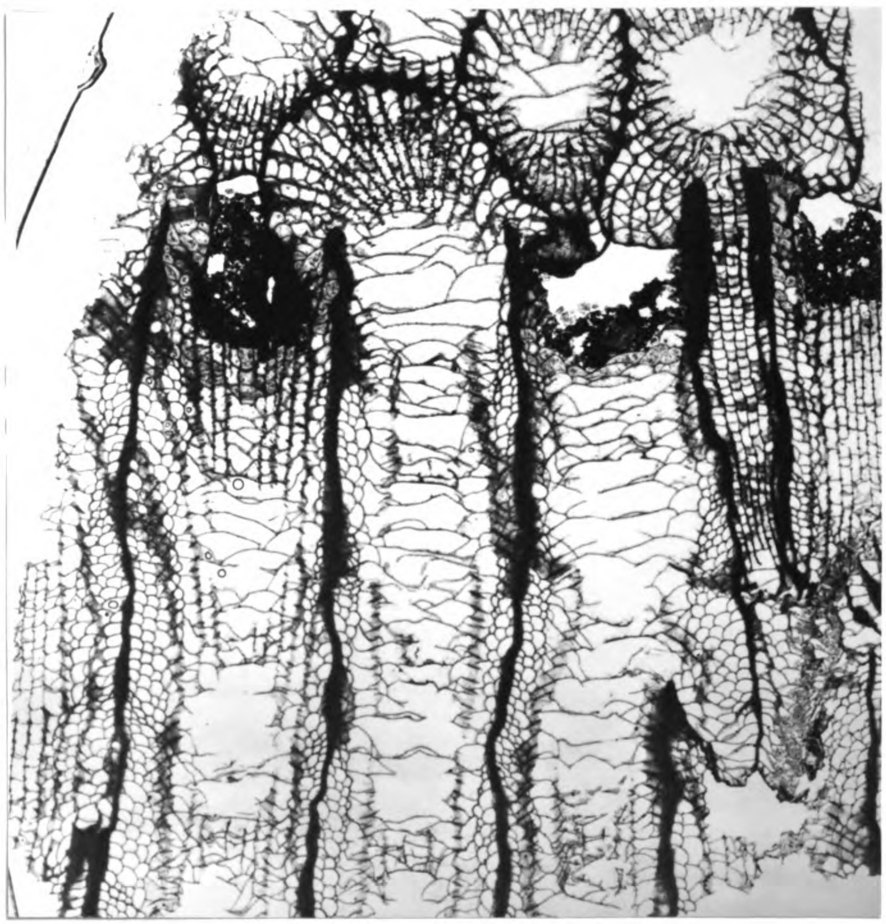
Prismatophyllum kettneri Faul, n. sp.
Transverse thin-section (x4) of a paratype (No. HF 24-1) from the county-line road, 2 1/2 mi. S of Black Lake quarry.



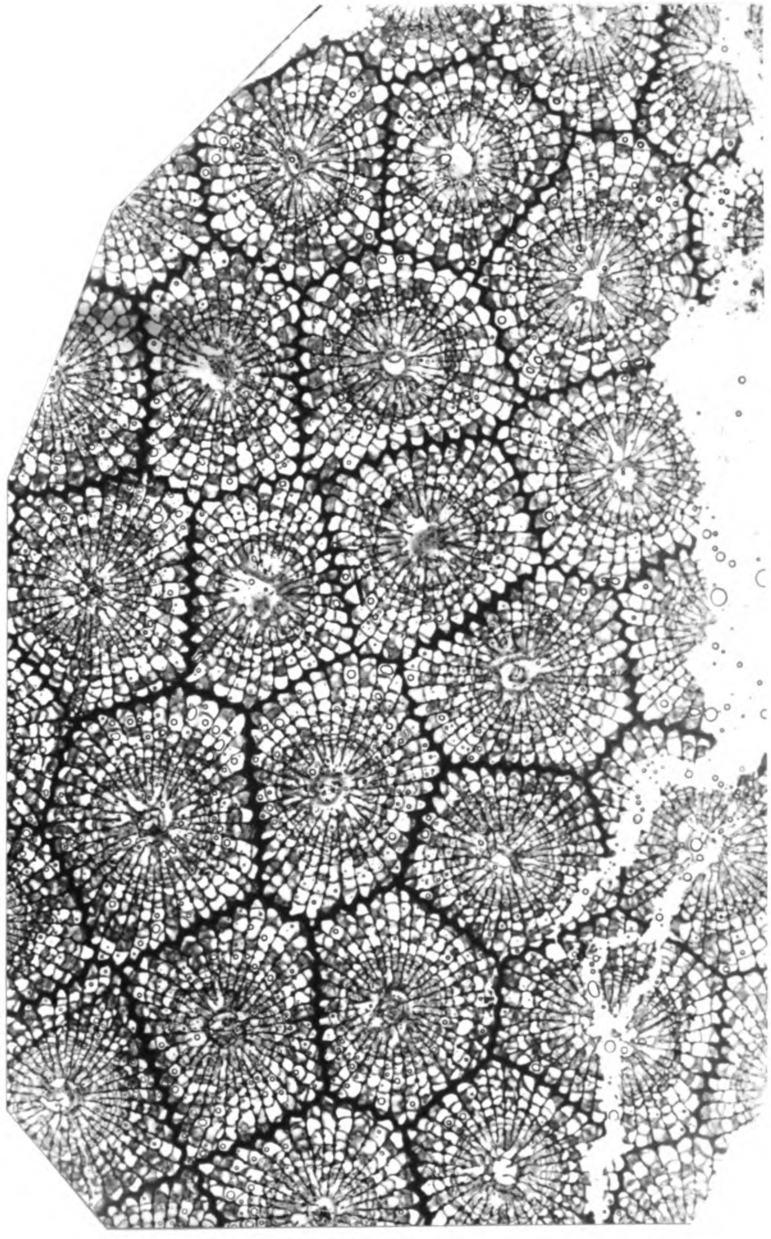
Prismatophyllum kettneri Faul, n. sp.
Longitudinal thin-section (x4) of paratype (No. HF 24-1).



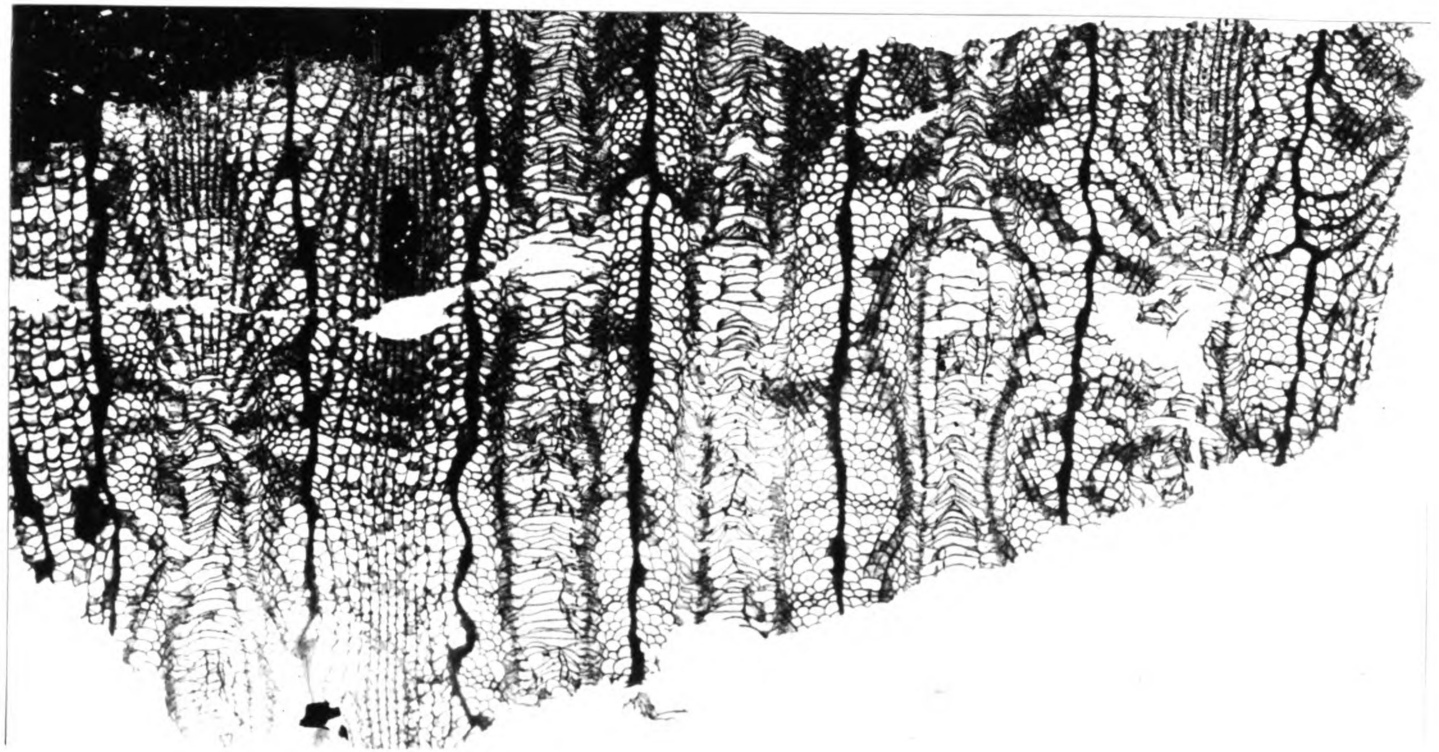
Prismatophyllum kettneri (?) Faul, n. sp.
Transverse thin-section (x^4) of a paratype (No. HF 25-7) from the Black Lake quarry.



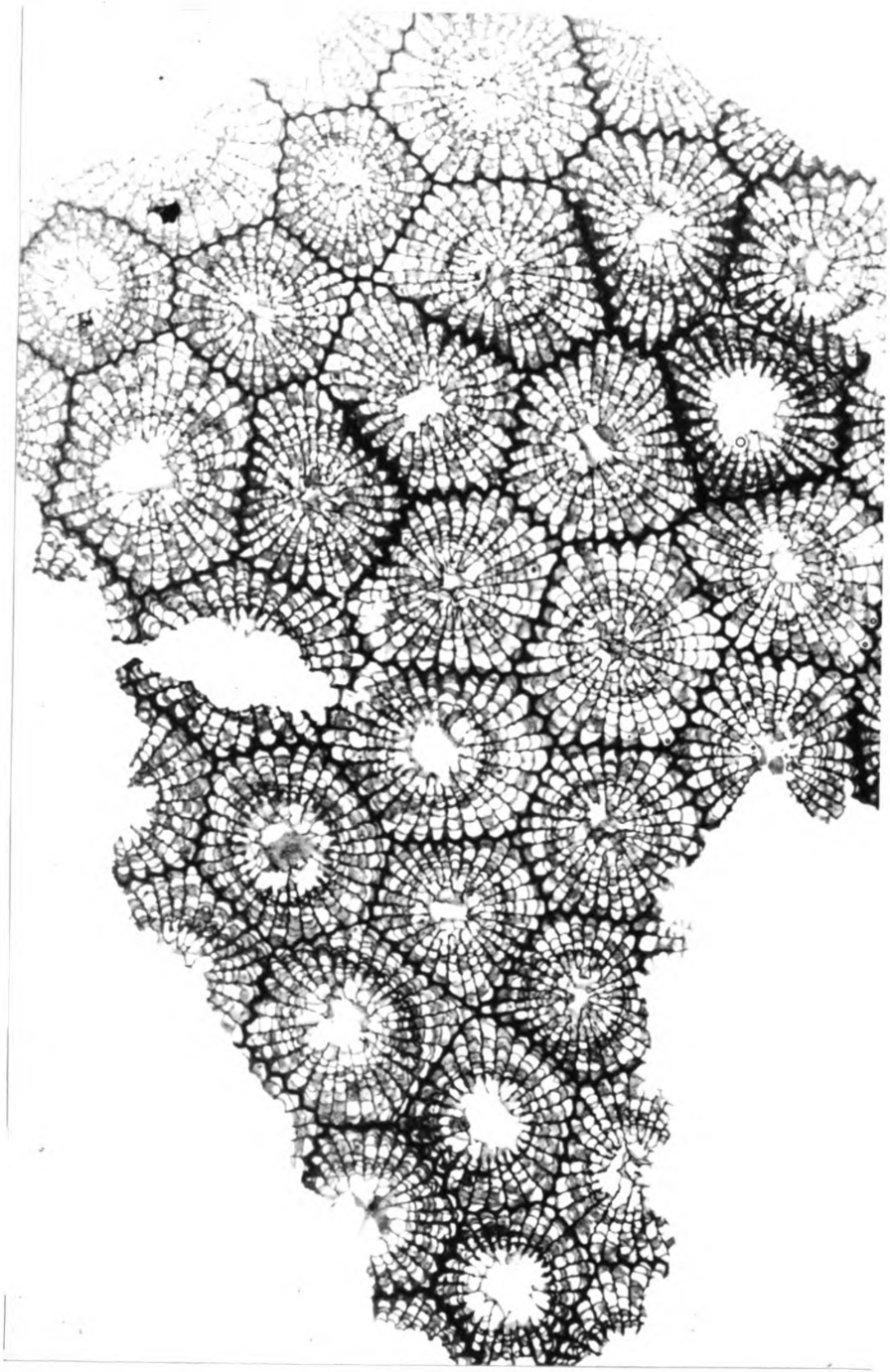
Prismatophyllum kettneri (?) Faul, n. sp.
Longitudinal thin-section (x4) of a paratype (No. HF 25-7) from the Black Lake quarry.



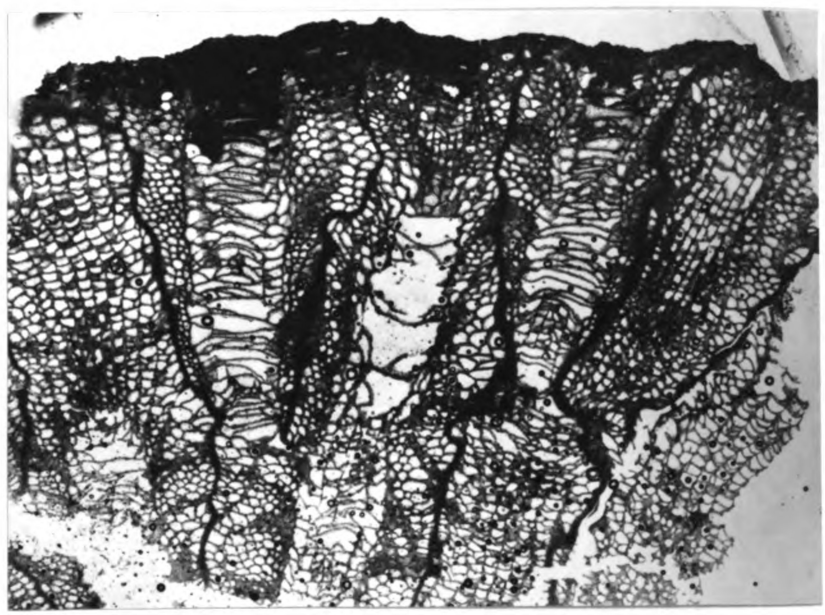
Prismatophyllum exiguum Faul, n. sp.
Transverse section (x4) of the holotype (No. HF 10-1) from the Marvin quarry SE i/4 of the NE 1/4, Sec. 7 T 34 N, P 1 W, Michigan.



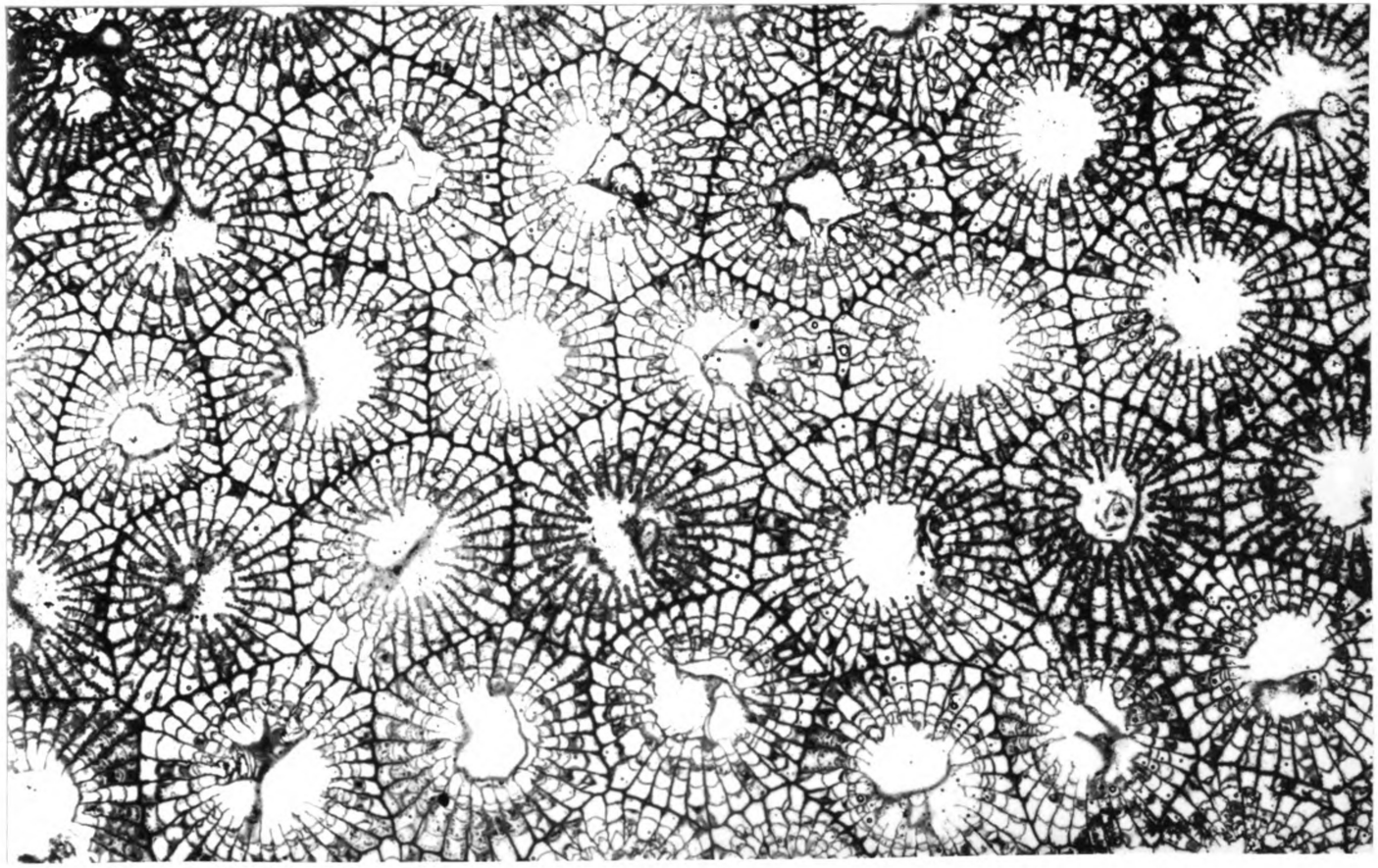
Prismatophyllum exiguum Faul, n. sp.
Transverse thin-section of the holotype (No. HF 10-1) from the Marvin Quarry, SE 1/4 of the NE 1/4, Sec. 7, T 34 N, R 1 W, Michigan. Variable growth-rate is feebly indicated by periodically constricted dissepiments.



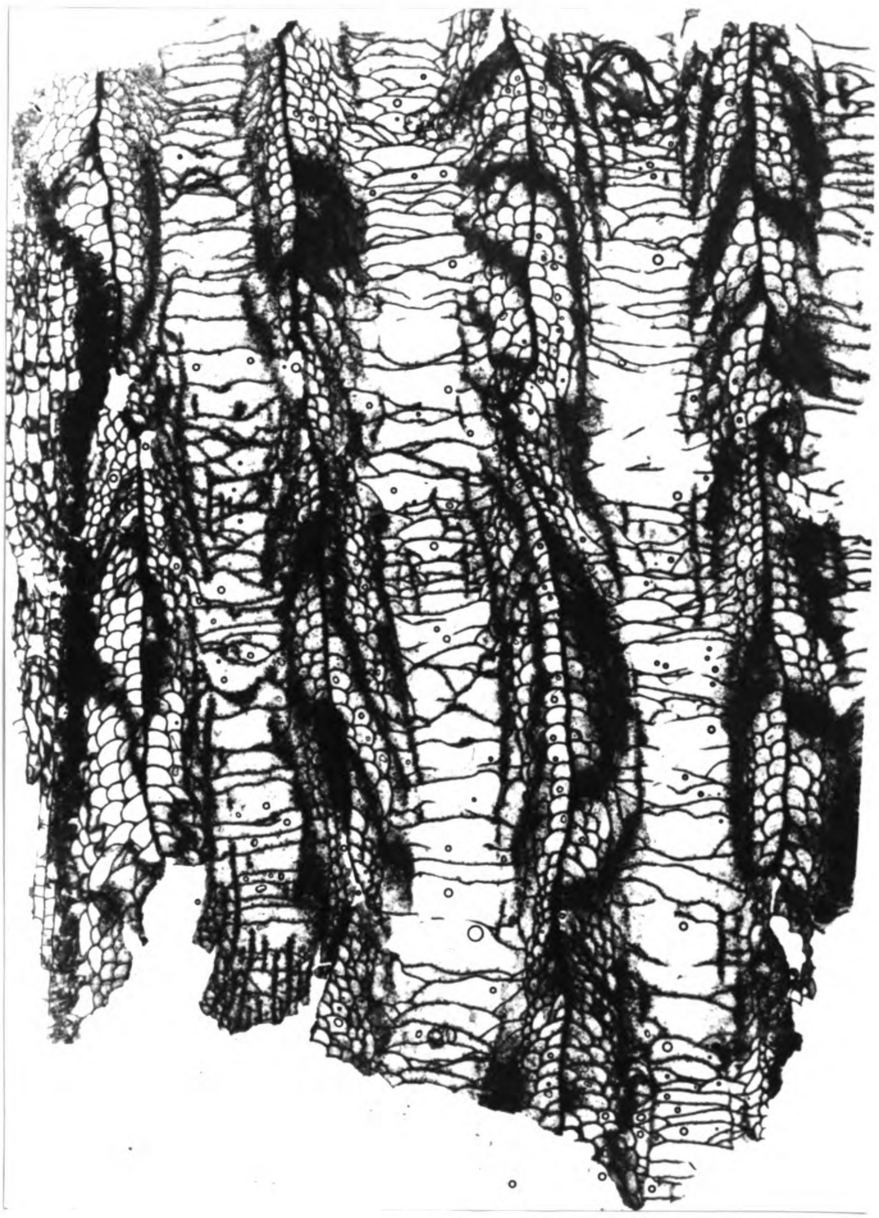
Prismatophyllum exiguum draperense Faul, n. sp et var. Transverse section (x^4) of the holotype (No. HF 21-1) from near the Draper School, NW 1/4 of the NE 1/4, Sec. 12 T 34 N, R 1 E, Michigan.



Prismatophyllum exiguum draperense Faul, n. sp. et var. Longitudinal thin-section (x4) of a paratype (No. HF 21-2) from near the Draper School, NW 1/4 of the NE 1/4, Sec. 12 T 34 N, R 1 E, Michigan. Asexual reproduction by calicinal gemmation is well exemplified.



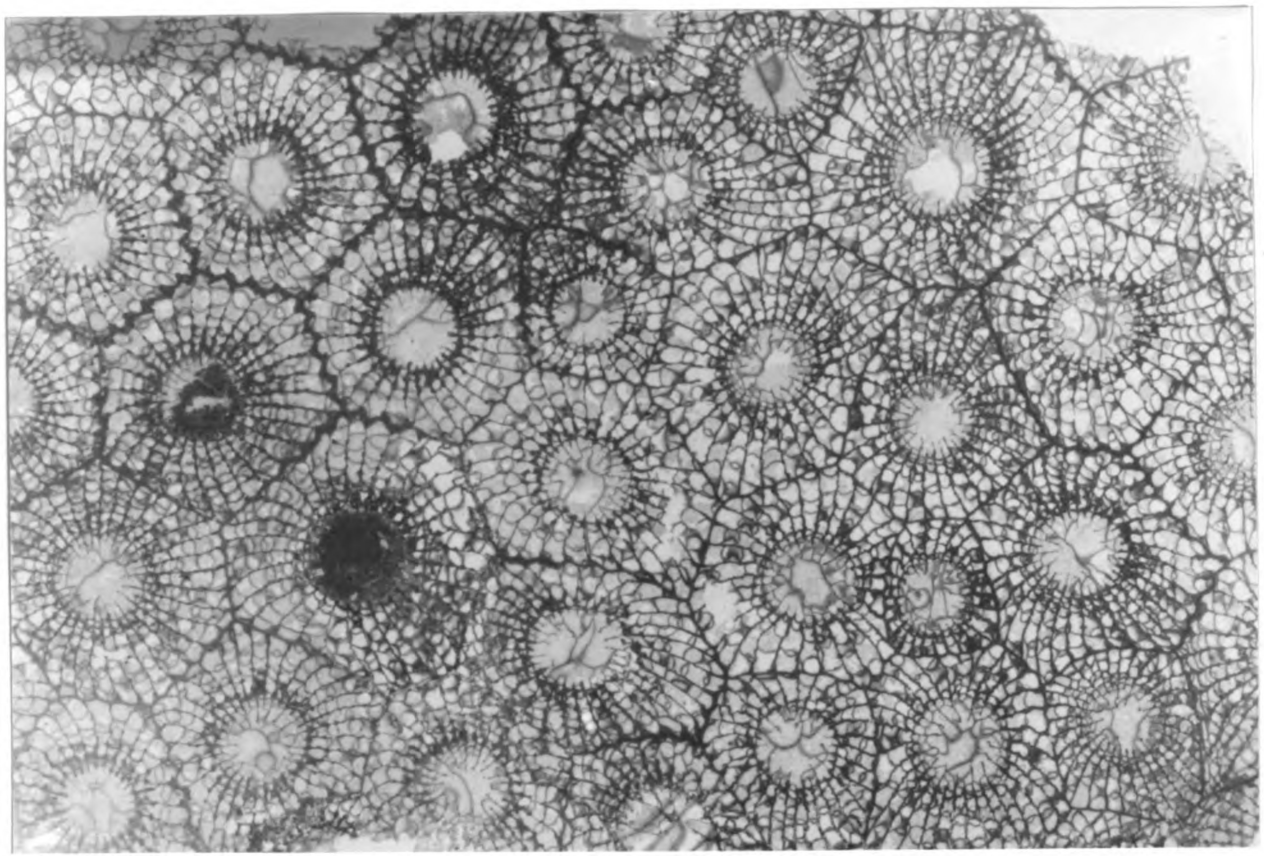
Prismatophyllum aftonense Faul, n. sp.
Transverse thin-section (x4) of a fragment of the holotype (No. HF 13-1) from the Afton Quarry, NE 1/4 of the NE 1/4 Sec. 36, T 35 N, R 2 E, Michigan.



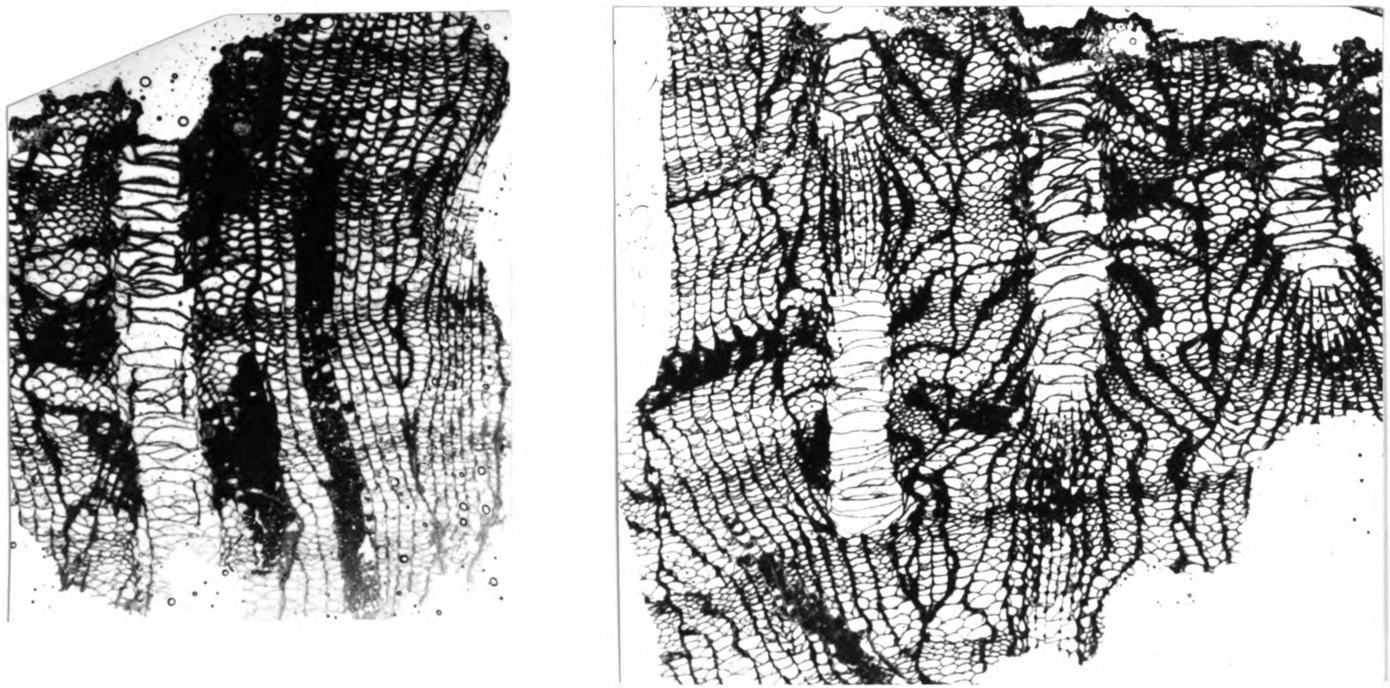
Prismatophyllum aftonense Faul, n. sp.
Longitudinal thin-section (x4) of the holotype (No. HF 13-1) from the Afton Quarry, NE 1/4 of the NE 1/4 Sec. 36, T 35 N, R 2 W, Michigan.

Prismatophyllum altimoenitum Faul, nl sp.
Calicinal view (x2) of a small, almost complete corallum preserved by silica. From the type locality near the Bunker Farm. (No. HF 7-7).

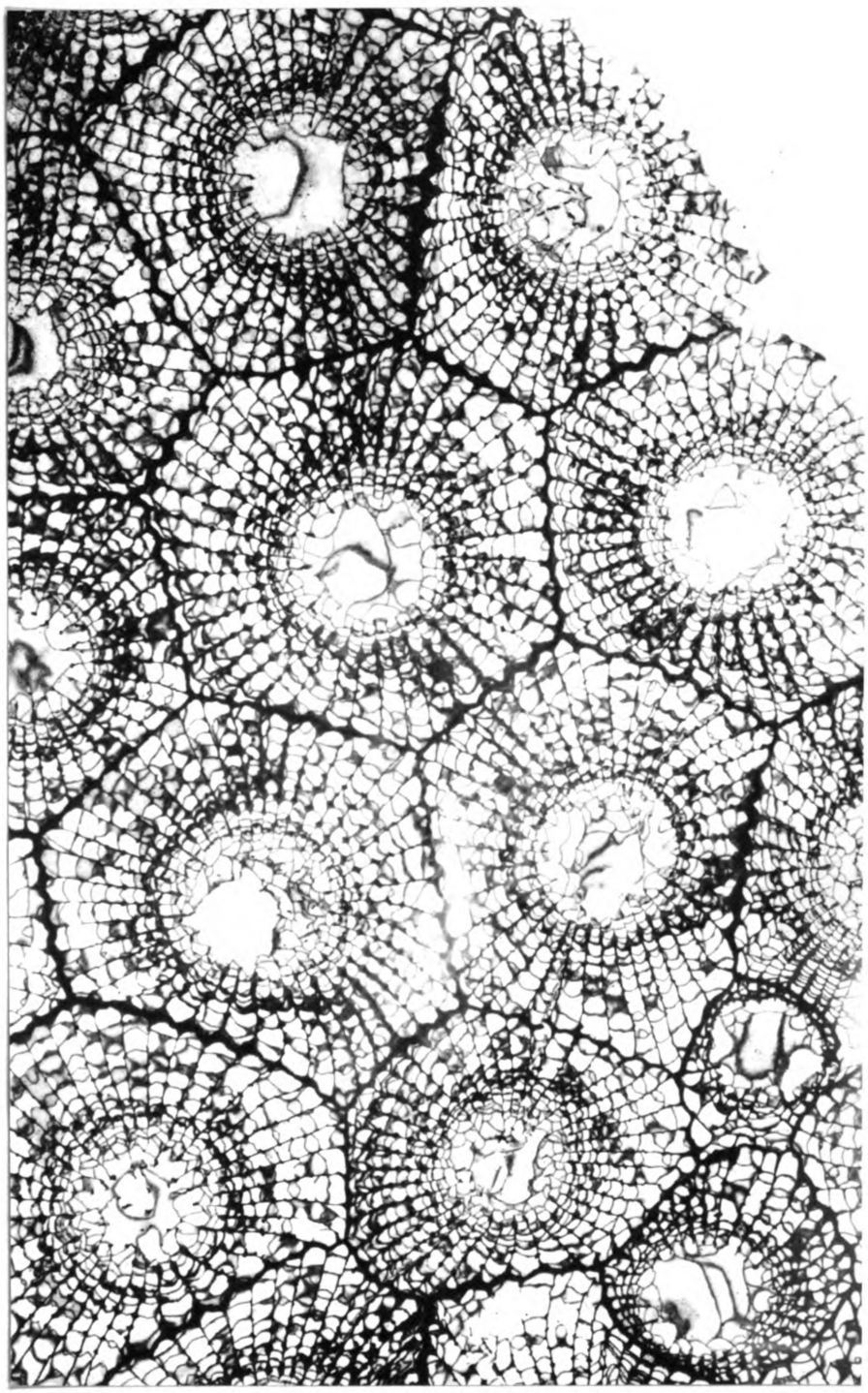
Note exceptionally high calicinal walls and flat bottom.



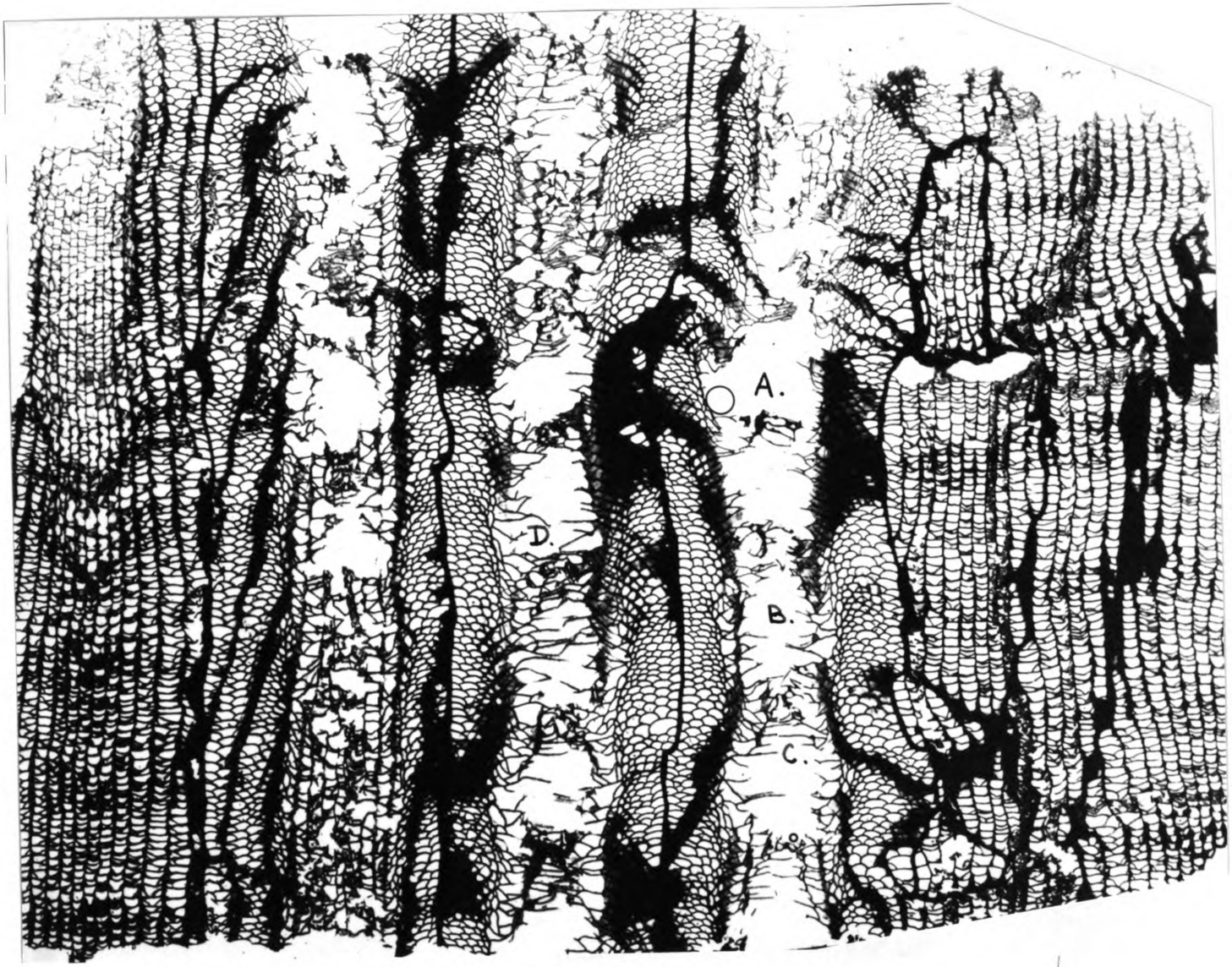
Prismatophyllum altimoenitum Faul, n. sp.
Transverse section (x4) of the holotype (No. HF 7-1) from near the Bunker Farm, SW 1/4, of the SE 1/4, Sec. 18, T 34 N, R 1 W, Michigan.



Prismatophyllum altimoenitum Faul, n. sp.
Longitudinal sections (x^4) of the holotype (No. HF 7-1) from near the Bunker Farm, SW 1/4, of the SE 1/4, Sec. 18, T 34 N, R 1 W, Michigan. Note periodic constriction of dissepiments and dilation of septa as a result of variable growth-rate.



Prismatophyllum percarinatum gorbutense Faul n. var. Transverse section (x4) of the holotype, (No. HF 11-1) collected near the Gorbut School, SW 1/4 of the NW 1/4, Sec. 33, T 35N, R 1 W, Michigan.



Prismatophyllum percarinatum gorbutense Faul n. var.
Longitudinal thin-section (x4) of the holotype (No. FF 11-1) from near the Gorbut School, SW 1/4 of the NW 1/4, Sec. 33, T 35 N, R 1 W, Michigan. Note periodically thickened septa, indicating growth-rate variation. At A septum is coplanar with section, but dips away at B. Returns at C. Arcuate character of carinae are best shown at D.

Plate 27

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