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A NEW SPECIES OF *FLETCHERIA* FROM THE MIDDLE SILURIAN FIBORN LIMESTONE OF MICHIGAN

BY

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VOLUME 24

PREFACE

In 1957—on the 24th of August, to be exact—I found the coral which we describe here. Fortunately, field notes establish the date, for otherwise I recall the time only as one of many hot summer days in the 1950's that I spent with Professor George M. Ehlers studying the stratigraphy and searching for fossils in the Silurian outcrops of the Northern Peninsula of Michigan.

The field label, in Professor Ehlers' handwriting, reads:

> August 24, 1957. Collector: R. V. Kesling. Top of west wall of Inland Lime & Stone Co. quarry about 9/10 mi. N. & 2/10 mi. W. of quarry office. Quarry located about 3 mi. N. of Huntspur, Mackinac Co., Michigan. Burnt Bluff (Hendricks dol.—top of Fiborn ls. mb.). 1 coral cf. *Pycnostylus* in 2 packages.

The quarry is in sections 5 and 6, T 42 N, R 12 W, its edge less than a mile from the western boundary of Mackinac County.

On this occasion, we were atop the west wall of the quarry, just off a spur road that branched from the main quarry access road. Extending back from the quarry rim for several yards was a low bioherm in the upper beds of the Fiborn Limestone Member. From the center of the bioherm, the beds apparently sloped off about three feet in elevation, although the bedding in the core was indistinct and the relationships were somewhat modified by glacial scouring.

We were anxious to secure specimens from this place because of the preservation and the stratigraphy. Well-preserved Silurian fossils are rare in Michigan; most are seriously affected by dolomitization or silicification. Most of the fauna of the Hendricks Dolomite is known from the Fiborn Limestone Member near the top of the formation. Although the same species apparently occur in the dolomitized equivalent beds, the fossils are represented by molds, many of them lined with crystals, or by dolomitic replacements that can seldom be separated cleanly from the matrix.

The Fiborn Member is the only source of high-calcium stone in the Northern Peninsula. It crops out in the western half of Mackinac County and terminates both east and west as the strata of the formation are dolomitized. At Fiborn Quarry, the type locality of the member, about five miles northeast of Rexton and near the eastern limit of the high quality limestone, the Fiborn Limestone is 30 feet thick. At Hendricks Quarry, seven miles north-northeast of Gilchrist, the Hendricks includes (from base to top) 7 feet of dolomitic limestone, 7 feet of limestone, 10 feet of dolomite, 27 feet of limestone, and 8 feet of dolomite; of these, only the upper 18 feet of limestone has been included in the Fiborn Member. At the Inland Quarry, where our coral was found, the Fiborn reaches about 50 feet, its maximum thickness. At the old Calspar or "Blaney" Quarry at Nicholsonville, just three miles to the west, in eastern Schoolcraft County, the unit is 26 feet and the lower part of the section is more dolomitic. Just two miles west of the Calspar Quarry, roadside exposures show even more extensive dolomitization of some strata; beds are coarsely crystalline instead of finegrained, and light-gray instead of the buff-gray typical of the Fiborn. No limestone has been found farther west, although the Hendricks Dolomite is exposed at many places around Indian Lake and forms bluffs on Garden Peninsula. Hence, the Inland Quarry offers the best opportunity to collect good specimens from the Burnt Bluff Group.

The fauna is important in correlating the Michigan strata with formations in Canada. As Professor Ehlers and I noted in our guidebook of 1957, the same species have been reported in the St. Edmund Formation of the Bruce Peninsula, the Wabi Formation of the Lake Timiskaming region, the East Arm Dolomite of southern Manitoba, and the Ekwan River Limestone of the Hudson Bay region.

From our collecting that day, we obtained fine specimens of the brachiopods *Camarotoechia winiskensis* Whiteaves, *Plectatrypa lowi* (Whiteaves), *Dolerorthis* aff. *D. flabellites* (Foerste), and *Whitfieldella* sp.; several kinds of stromatoporoids; the corals *Favosites* spp. and an undescribed coral thought to be a new genus; and several specimens of the trilobite *Scutellum* (*Scutellum*) sp. We did not find the large ostracod *Dihogmochilina latimarginata* (Jones), which occurs at Hendricks Quarry, although we looked diligently for it, nor did we discover any of the cephalopod *Stokesoceras romingeri* Foerste.

As we were about to depart, I walked along the quarry rim to the edge of the bioherm, where glacial scouring had made cross sections through several kinds of fossils. There I spotted a coral unlike any I had seen.

"Jim," I called, "what kind of coral is this?"

"So help me, you've got a new one," he replied, getting down on his knees for a closer look. "Let's get it out."

Finding it was much easier than taking it out. The coral had been overturned before burial, so that the corallites sloped off into a thick solid bed of limestone. Glacial scouring had removed any surface irregularities and the bed showed very few joints. Getting a sledge hammer from the car, I started breaking up the limestone at a solution crack several feet away. Finally I reached the corallum and succeeded in knocking out a chunk of it measuring about a foot square and six inches thick. Further efforts dislodged smaller pieces, some of which fitted against the large chunk. Reluctantly, we left additional corallites still embedded in the limestone. We have not visited the quarry since, and I expect the quarrying operations have long ago exploited the rest of the corallum for flux in the steel industry.

Professor Ehlers and I were quite excited about the coral at the time. As the years slipped by, we periodically planned to "write it up." For one reason or another, we never did. Something must be left for the next generation to do.

When my Advanced Invertebrate Paleontology class started studying corals, the coral came to mind as an example of an admixture of features belonging to Rugosa and Tabulata. The opportunity to thoroughly investigate and describe it sparked a response in the three students. They embarked in a flurry of activity that culminated in this paper. Whether the corallum is fulfilling its destined purpose I cannot say, but it certainly enabled paleontologists of three generations to work in happy and productive cooperation.

—Robert V. Kesling

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ABSTRACT—A new species of the rugose coral *Fletcheria*, *F. acanthina*, from the Middle Silurian Fiborn Limestone Member of the Hendricks Formation (Burnt Bluff Group) in the Northern Peninsula of Michigan, is characterized by well-developed amplexoid major septa and acanthine minor septa.

INTRODUCTION

WELL-PRESERVED CORALS are relatively rare in the Middle Silurian strata of Michigan. Even though corals are numerous in many units, their fine structures show damaging effects of silicification or dolomitization. In most outcrops of the Hendricks Formation of the Burnt Bluff Group, the specimens are dolomitized. In eastern Schoolcraft and Mackinac Counties, however, high-calcium limestones within the Hendricks Formation yield corals and other fossils that preserve minute details of their structure. The thickest unit of these calcitic rocks is called the Fiborn Limestone Member.

Because of its demand for flux, cement, and crushed stone, the Fiborn Limestone has been extensively quarried. The quarries provide excellent opportunities to collect. The new species described here was found in the Inland Lime & Stone Company Quarry near the western boundary of Mackinac County, in the NW¼ sec. 6, T 42 N, R 12 W.

We appreciate the assistance of Mr. Karoly Kutasi in photography, and Mrs. Gladys Newton in typing and proofreading. Their excellent services add much to our presentation.

The type specimen is preserved in the Museum of Paleontology of The University of Michigan. It consists of numerous pieces, some large and some small, and several thin sections of one corallum.

SYSTEMATIC DESCRIPTION

Order RUGOSA Milne-Edwards & Haime

Suborder COLUMNARIINA Rominger 1876

Family STAURIIDAE Milne-Edwards & Haime 1850

Genus FLETCHERIA Milne-Edwards & Haime 1851

= *Pycnostylus* Whiteaves 1884; ? *Synamplexus* Grabau 1922.

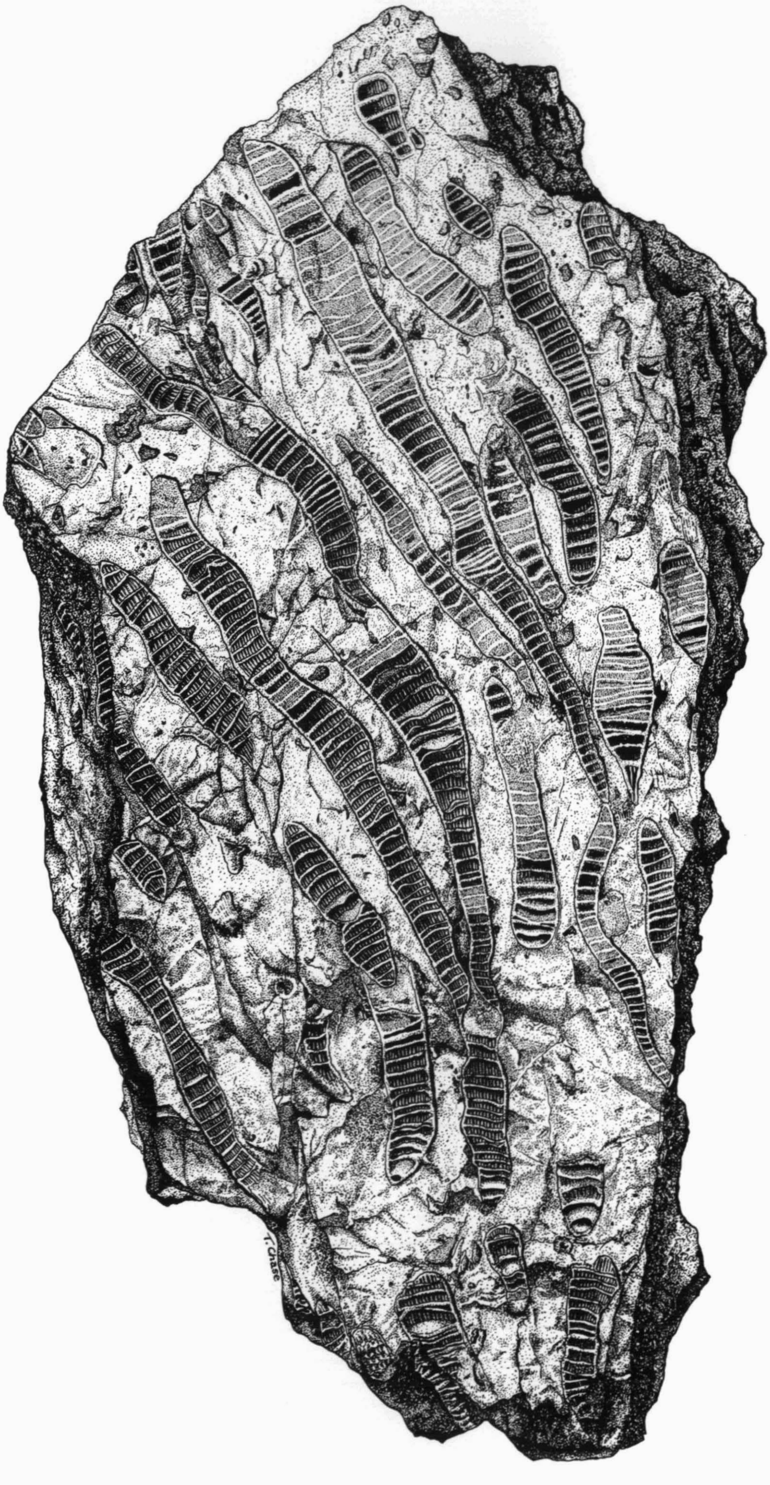
FLETCHERIA ACANTHINA n. sp.

Pls. 1–8; text-fig. 1

Corallum fasciculate and phaceloid with cylindrical, unequally spaced corallites. Each corallite commonly 0.75 to 1.00 cm in diameter, a few as large as 1.5 cm. Calyx about 1.0 cm deep. Space between neighboring corallites usually less than the diameter of the corallites themselves; corallites rarely in contact (text-fig. 1; pl. 8, figs. 2, 3). Epitheca with fine growth annulations and faint longitudinal striations corresponding to septa within (pl. 8, fig. 1). Corallites commonly displaying irregular constrictions and swellings, but maintaining their direction of growth. No connecting processes between corallites.

About 60 septa in a mature corallite, equally divided into two orders; major and minor. Major septa smooth and amplexoid, extending onto the upper surface of each tabula as much as halfway to the center (pl. 1, fig. 1). Below the tabula, major septa 0.5 mm or less in length and not extending at all onto the tabula (pl. 1, fig. 2). Minor septa (present throughout mature section of each corallite) acanthine and definitely shorter than the major septa (pl. 2, fig. 1; pl. 4, fig. 1), never encroaching onto the tabulae. Each septum a structural unit extending inward from the inner edge of the epitheca, passing through the wall of the corallite and into the calyx (pl. 7, fig. 4); as a result, corallite wall having the appearance of a sclerenchymal infilling between the septa (pl. 5, figs. 3, 5, 7).

Tabulae thin (0.05 mm), somewhat irregularly spaced, horizontal to slightly flexed (pl. 2, fig. 1), occasionally highly crinkled (pl. 2, figs. 2, 3; pl. 3, fig. 1), generally complete (although incomplete tabulae found here and there in the corallum, as shown in pl. 2, fig. 2). Tabulae spaced from 4 to 10 per cm. In corallites from the same parent corallite, spacing



TEXT-FIG. *1*—Exposed face of part of the type specimen, a corallum, here showing the peripheral and parricidal increase through several "generations." Drawing by Terry L. Chase.

of tabulae tending to be the same in corresponding intervals (within sections equidistant from the parent). Margin of tabula turned down, particularly strongly between septa, producing a scalloped edge with flutings between septa (pl. 5, fig. 7).

Increase peripheral and parricidal (text-fig. 1). Offsets (budding of daughter corallites) most commonly occurring in groups of four (quadripartite; pl. 7, figs. 1–3), but as many as 5 observed and, in rare cases, only 2 (pl. 7, figs. 1–3) or 3. In a prolific corallite, groups of offsets (generations; levels of budding) occurring within 3 to 6 cm from earlier groups of offsets; in most corallites, however, spacing about 6 to 10 cm. A few corallites showing no trace of offsets throughout their exposed length (over 20 cm); instead, their diameter strongly constricted at intervals and gradually increasing thereafter. Each offset or new corallite lens-shaped in cross section while within the parent corallite (pl. 6, figs. 1–4; pl. 7, figs. 1–3), rapidly becoming circular above it. In the section of parental calyx cut off by the new corallite wall, septa continuing from the parent, seemingly without interruption. Initial wall of offset without septa, but adding them below level of parental calyx termination. With growth, offsets of a group tending to occupy nearly all of the parental calyx (pl. 5, figs. 1, 2), strongly constricting the space available for the parent coral; wall of parent corallite extending only a short distance beyond the strong constriction.

Based on size of specimen collected (approximately 30 cm in diameter) and on the divergence of corallites due to increase, the original corallum estimated at approximately 40 cm in diameter.

Holotype UMMP 60598.

DISCUSSION

For comparison with our *Fletcheria*, we studied the descriptions of the previously known species of the genus: *F. congregationis* (Etheridge 1907), *F. deadwoodensis* Norford 1962, *F. dendroides* (Etheridge 1907), *F. elegans* (Whiteaves 1884), *F. guelphensis* (Whiteaves 1884), *F. incerta* (Billings 1859), *F. major* Norford 1962, and *F. sinclairi* Okulitch 1937. Of these, our new species has little in common with the species having very small corallites, such as *F. deadwoodensis* (3 mm in diameter) and *F. incerta* (1.2 mm); or with *F. sinclairi*, which appears to lack septa and tabulae; or with *F. congregationis*, which is characterized by numerous connecting processes and lacks acanthine septa; or with *F. major*, which has only 48 septa in the form of low ridges lining the inside of the wall. Other differences serve to further separate these species from *Fletcheria acanthina*.

The remaining three previously described species bear closer similarities to ours. Nevertheless, the new species described here can be readily differentiated from *F. dendroides* by its distinctly acanthine minor septa; from *F. elegans* by its smaller corallites and by its minor septa which are distinctly shorter than the major; and from *F. guelphensis* by its larger corallites, longitudinal ribs on the epitheca, and nearly twice as many septa. The original description of *F. dendroides* by Etheridge (1907) was supplemented by Hill (1940), who noted that coralla expand to 15 to 20 mm just before increase, thus attaining diameters considerably greater than those of *F. acanthina.* The original descriptions of *F. elegans* and *F. guelphensis* received modifications and additions from Lambe (1901), who noted that *F. elegans* normally gives rise to 6 or 7 offsets at a time and that *F. guelphensis* has many corallites in contact, some through a considerable distance.

From the descriptions in literature, we are led to believe that variations of appreciable magnitude exist within each species. The genus *Fletcheria* needs revision.

Without destroying most of the corallum we could not trace the branching to determine answers to several questions. Do corallites arising from a group of offsets tend to produce the next generation of offsets at about the same level? Do successive new corallites from a particular corallite bear a relationship to its original diameter (or to the number of "sibling" offsets)? Is the number of tabulae between offset levels significant? Why are tabulae crowded in some sections of a corallite and not in others? Do the number of offsets arising from a particular corallite bear any relationship to the history of previous offsets when traced back to the start of the corallum?

Other questions present themselves. Our observations on this unusually large corallum lead us to believe that spacing of tabulae may have been nearly constant during any one time interval in the growth of the corallum. We are further led to speculate that the whole corallum underwent periodic rejuvenation, which manifested itself in many corallites by offsets and in others by sharp constriction in diameter, that the outermost level of the corallum was an area of intense intracorallite competition, and that the final form of the corallum was a balance between corallite increase and corallite survivorship.

For answers to these questions and for a thorough investigation of growth in this spe-

→

Explanation of Plate 1

Both figures stereograms, × 6. Specimen lightly coated with fine spray of white oil-color pigment in naphtha.

Fletcheria acanthina n. sp. Holotype UMMP 60598. *1*, *2*, the same corallite viewed at an inclination from above and below; *1*, showing amplexoid nature of septa on distal surface of tabulae; *2*, showing termination of septa without extension onto tabulae.

Explanation of Plate 2

All figures stereograms, × 4. Specimen lightly coated with fine spray of white oil-color pigment in naphtha.

Fletcheria acanthina n. sp. Holotype UMMP 60598. *1*, longitudinal section showing irregular spacing of tabulae and the acanthine minor septa. *2*, *3*, corallites showing crinkled and incomplete tabulae.

Explanation of Plate 3

All figures stereograms. Specimens lightly coated with fine spray of white oil-color pigment in naphtha.

Fletcheria acanthina n. sp. Holotype UMMP 60598. *1*, section showing constriction of corallite and irregular spacing of tabulae, × 4. *2*, section showing flexed margins of tabulae and acanthine minor septa, × 4. *3*, section showing incomplete tabula, × 6.

Explanation of Plate 4

Both figures stereograms. Specimen lightly coated with fine spray of white oil-color pigment in naphtha.

Fletcheria acanthina n. sp. Holotype UMMP 60598. *1*, section showing amplexoid major septa and acanthine minor septa, × 4. *2*, closeup of same corallite showing increased length of major septa where extended onto tabulae; entire surface inside intertabular camerae lined with coating of tiny calcite crystals, giving abnormal thickness to septa and tabulae; × 10.

Explanation of Plate 5

All figures × 4. Specimen in figures 1 and 2 lightly coated with fine spray of white oil-color pigment in naphtha, with corallite walls retouched. Thin sections in figures 3–7 photographed by transmitted light.

Fletcheria acanthina n. sp. Holotype UMMP 60598. *1*, *2*, longitudinal sections through axis of parent corallite and offsets, showing contemporaneous development of offsets in each corallite and similar depths of calyx between last tabula of parent and the bases of the offsets. *3*, *4*, tangential thin sections showing septal arrangement and spacing; darker portions within corallite are intersections of flexed tabulae. *5*, *7*, tangential thin sections showing extension of septal structure through the corallite wall; *7*, dark crenulations near the inner border are intersections of the peripheral downwarping of the tabula between septa (compare with plate 7, figure 4). *6*, longitudinal thin section showing the very thin tabulae encrusted with calcite crystals, and secondary crystals nearly filling one intertabular camera.

Explanation of Plate 6

All figures × 6. Successive polished surfaces through the section of two parent corallites developing offsets; series continued on plate 7.

Fletcheria acanthina n. sp. Holotype UMMP 60598. *1*, parent corallites before start of increase. *2*, initial increase in larger corallite. *3*, further development of offsets in larger corallite and the start of offsets in the smaller corallite; note absence of septa on newly formed walls. *4*, further development of offsets showing first appearance of septa on new walls of the offsets and the first appearance of a third offset in the larger parent; the polished surfaces are slightly oblique, so that offsets seem to develop at different levels within the parent corallite (instead of at the actual same level).

Explanation of Plate 7

Figures × 4, except as noted. Successive polished surfaces through a section of increase in two parent corallites in figures 1–3; series continued from plate 6. Enlarged tangential thin section in figure 4.

Fletcheria acanthina n. sp. Holotype UMMP 60598. *1*, appearance of the fourth offset in the larger corallite. *2*, strong constriction of the smaller parent corallite by abutting walls of the offsets; both offsets in this corallite developing into the circular cross section, which is fully attained where free of the parent calyx. *3*, extension of septa onto the tabula in the larger group of four offsets. *4*, tangential thin section showing differentiation of major and minor septa and the extension of septal structure through the wall to the epitheca (compare with plate 5, figure 7), × 10.

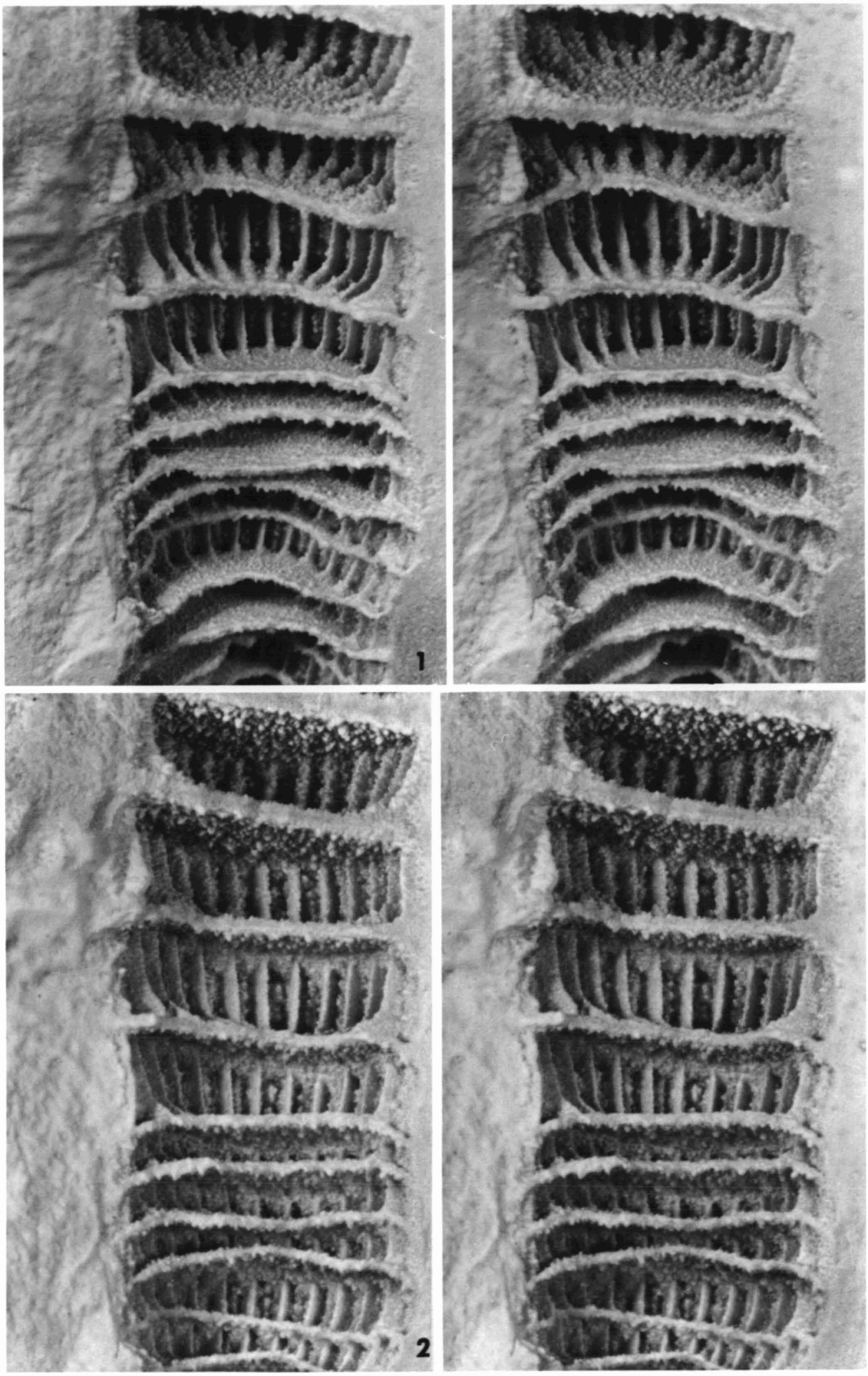


PLATE 1

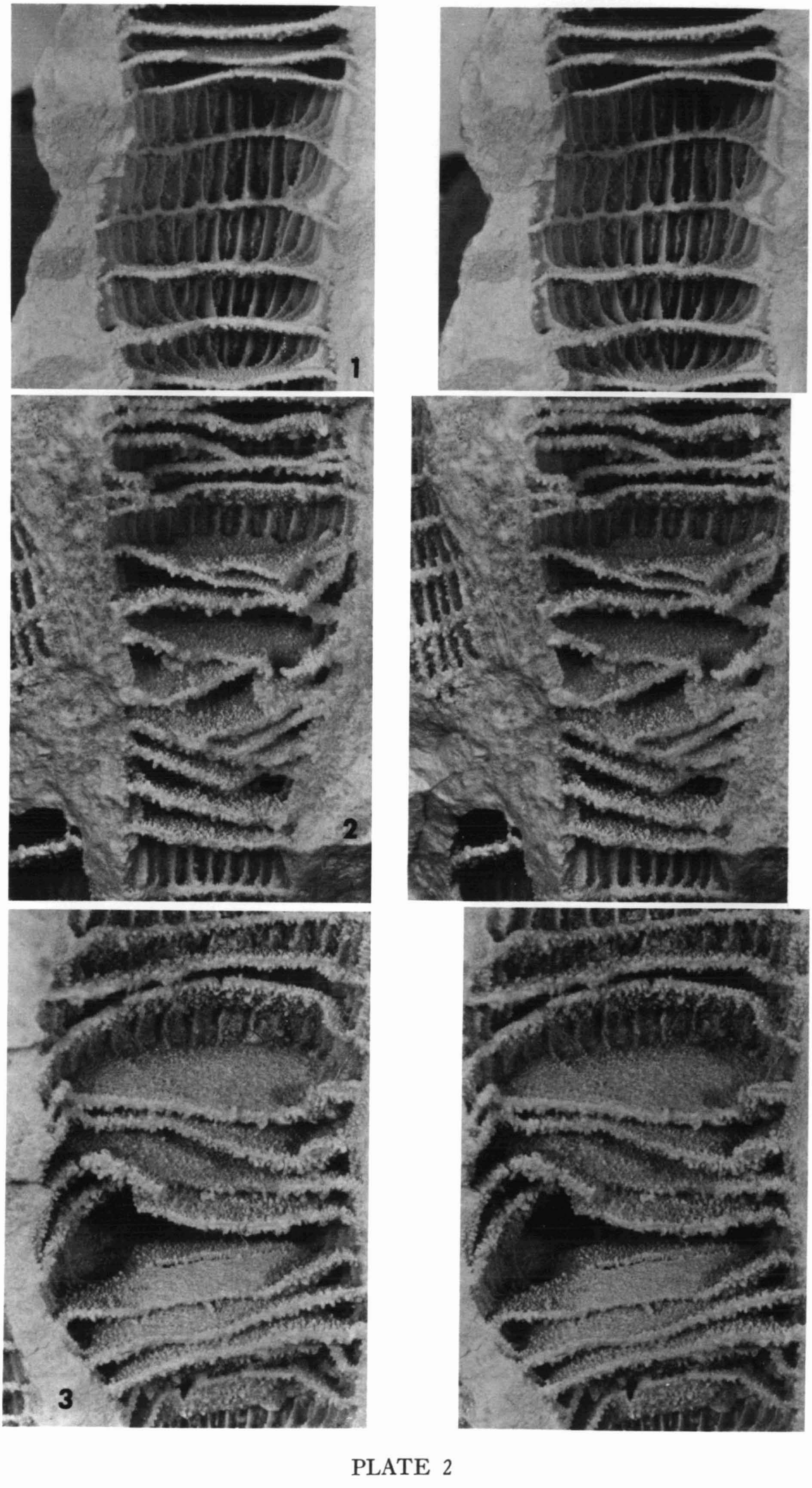


PLATE 2

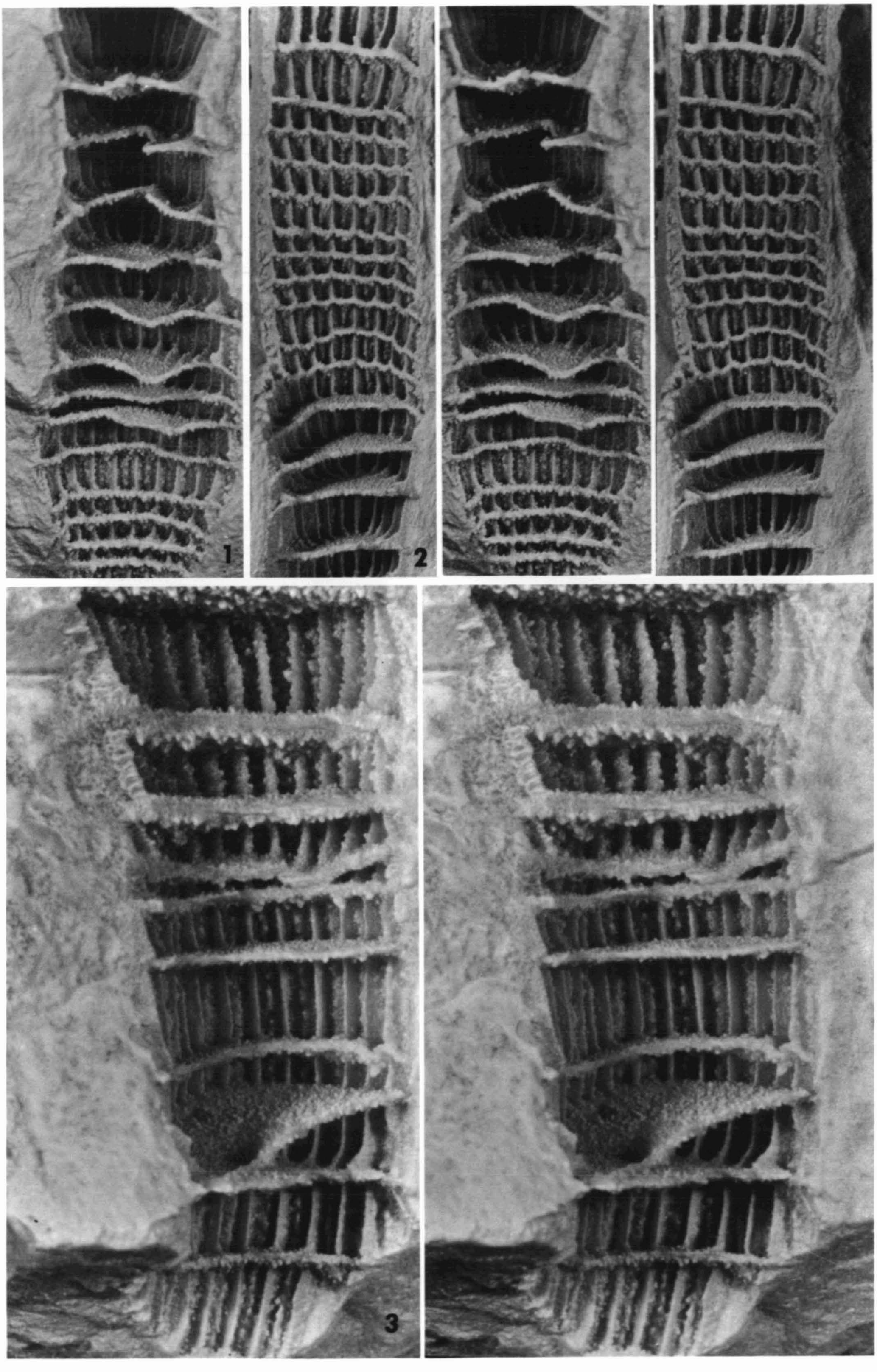
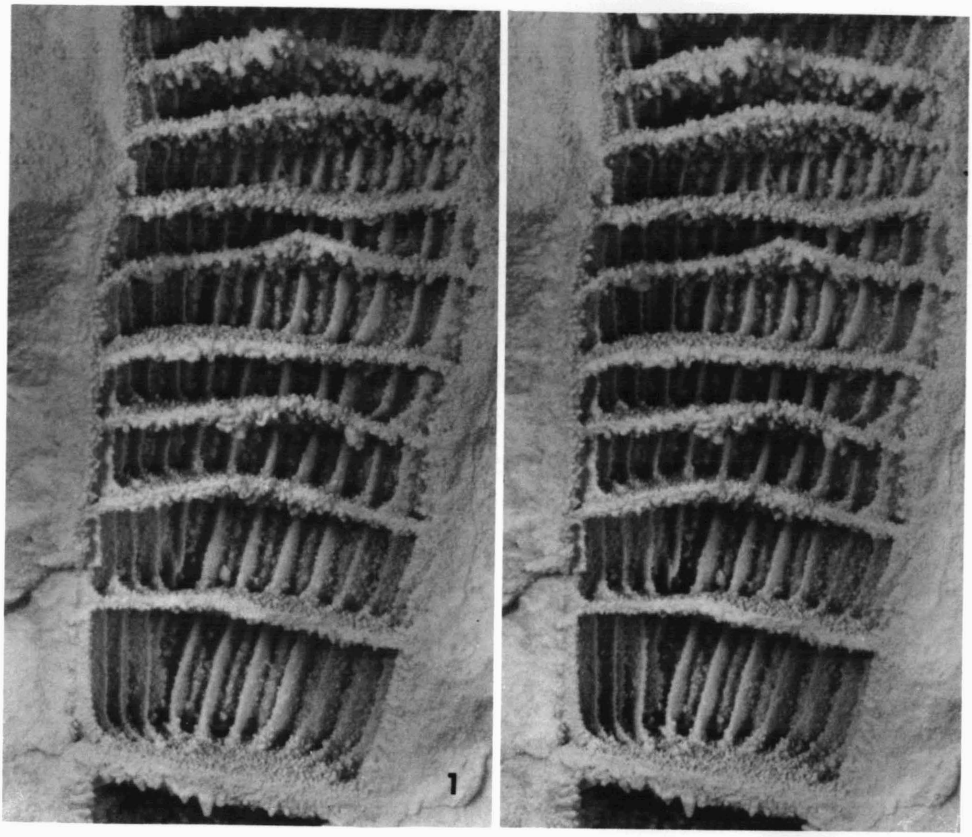


PLATE 3



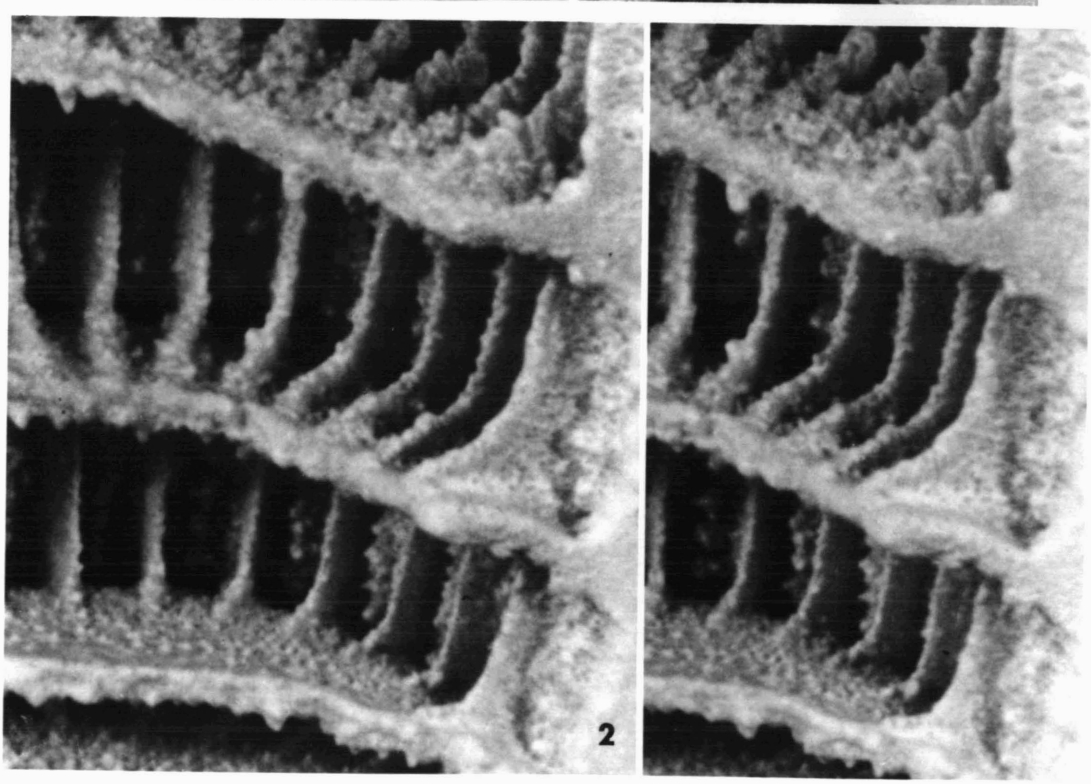


PLATE 4

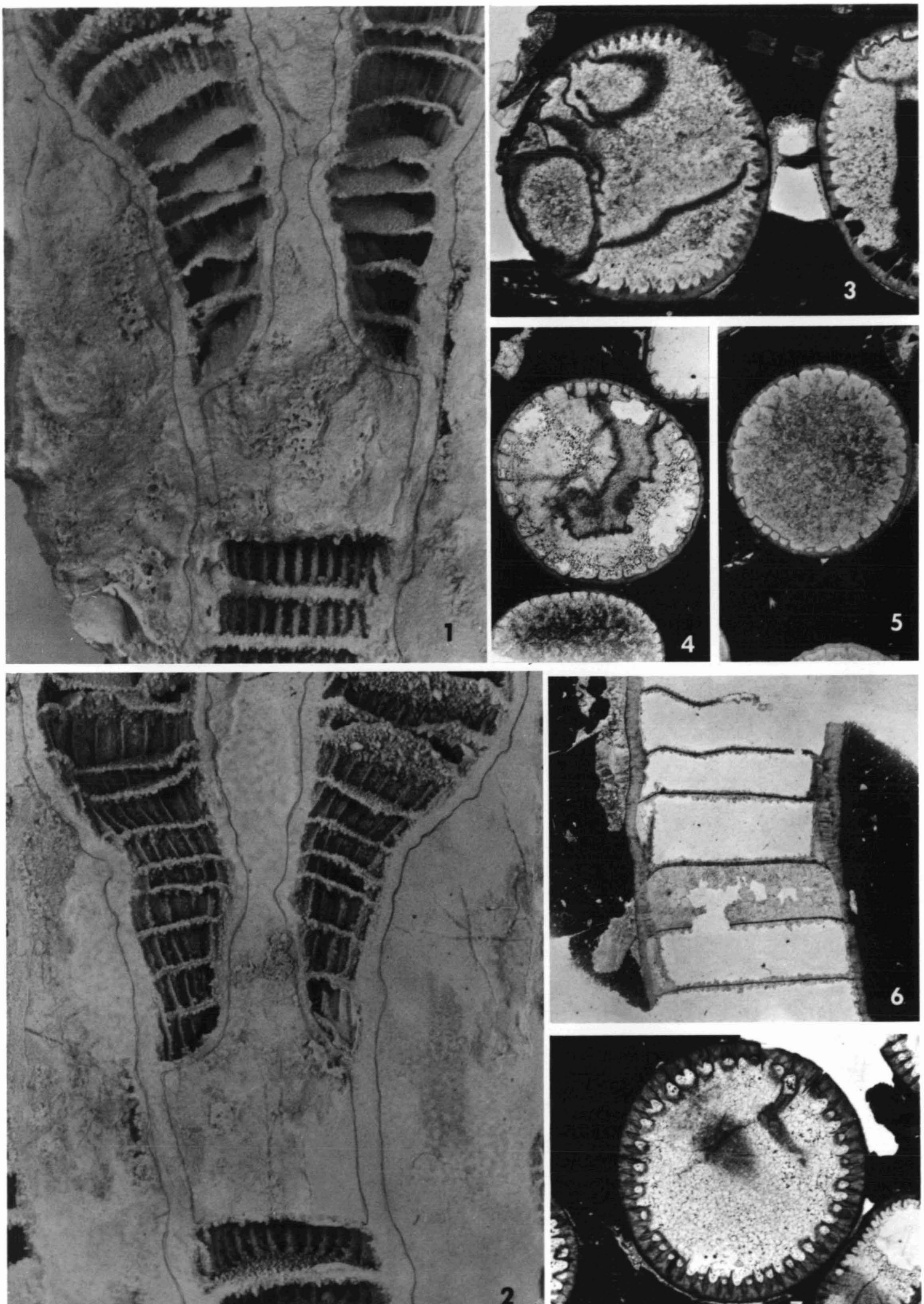


PLATE 5

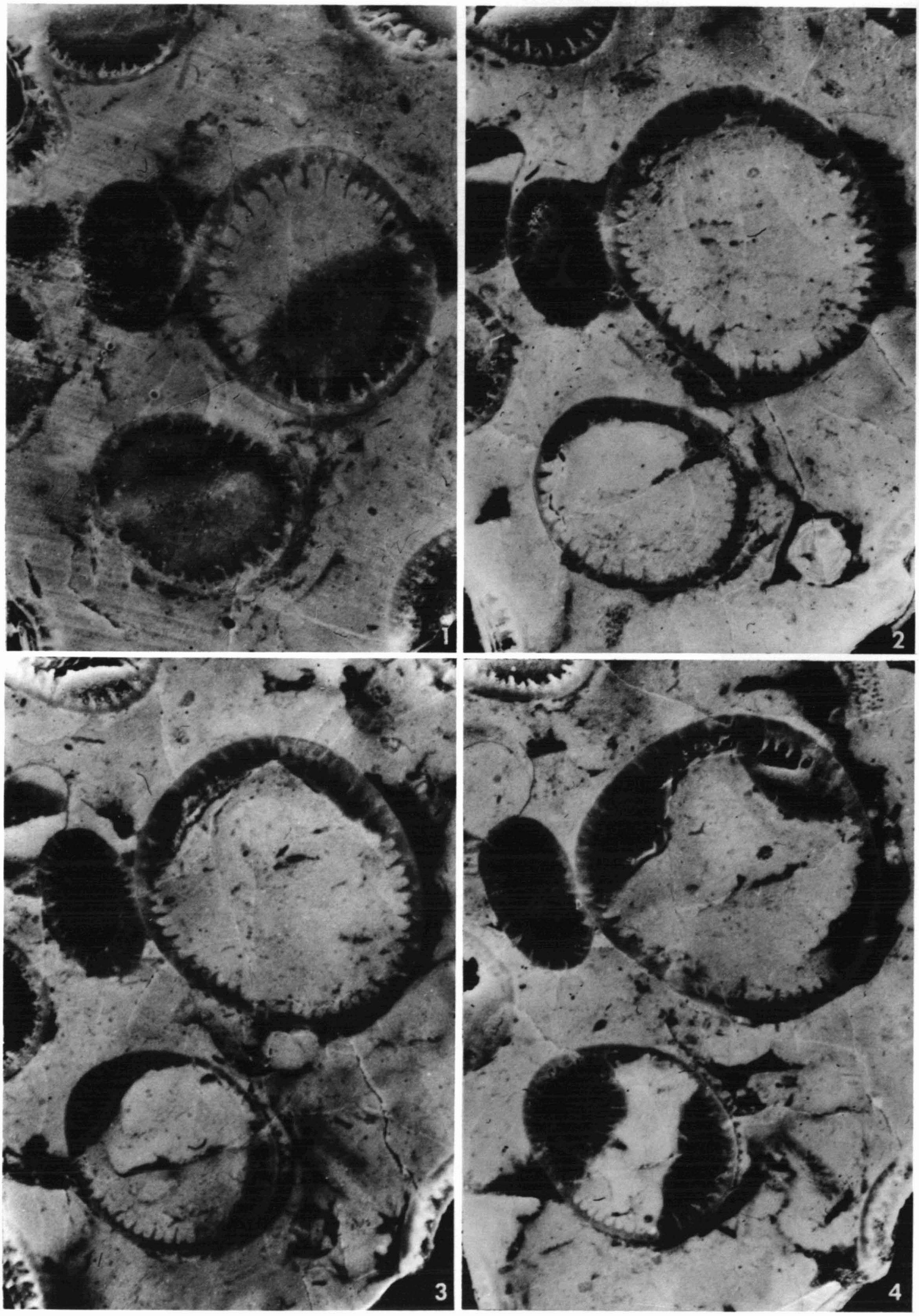


PLATE 6

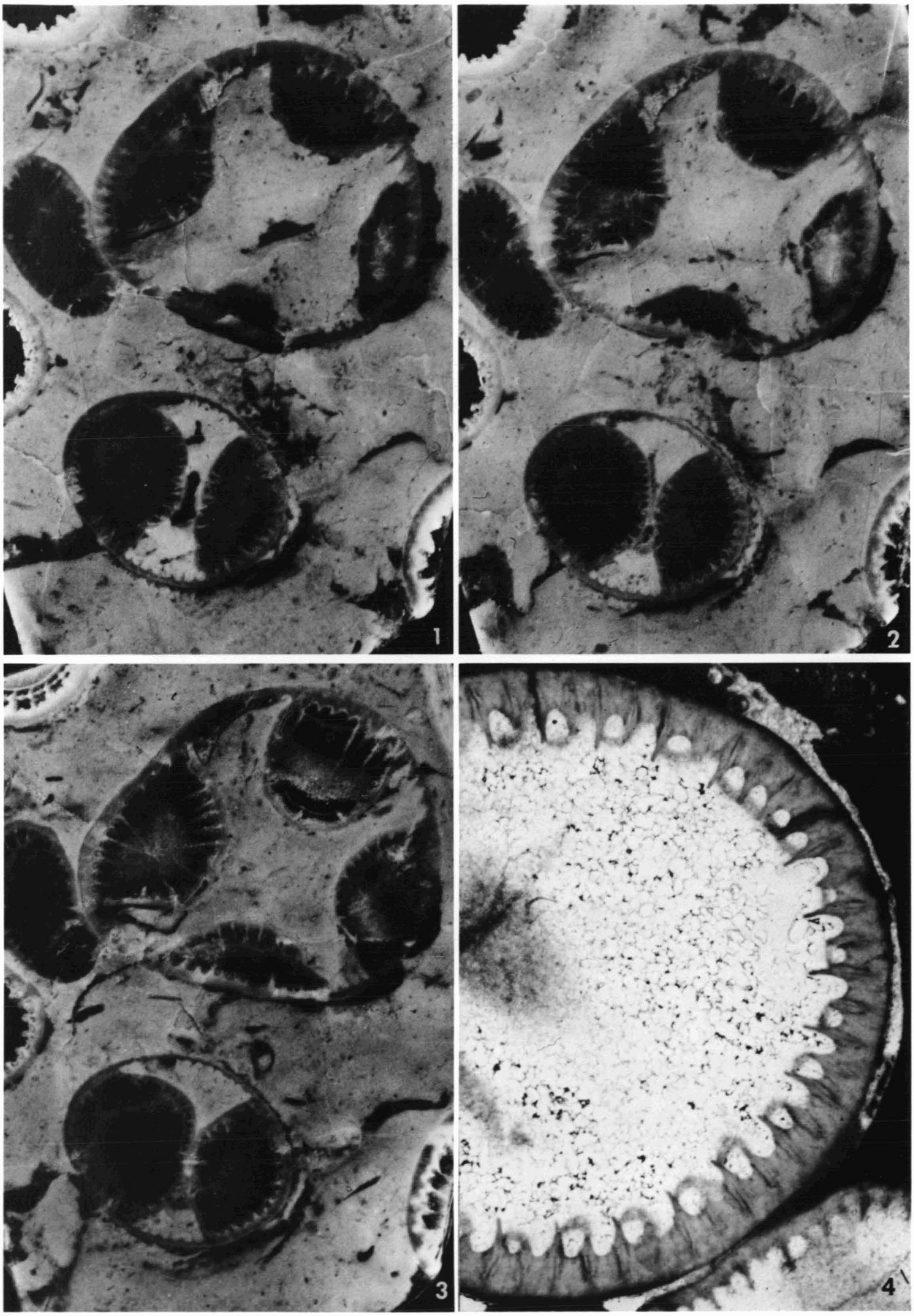


PLATE 7

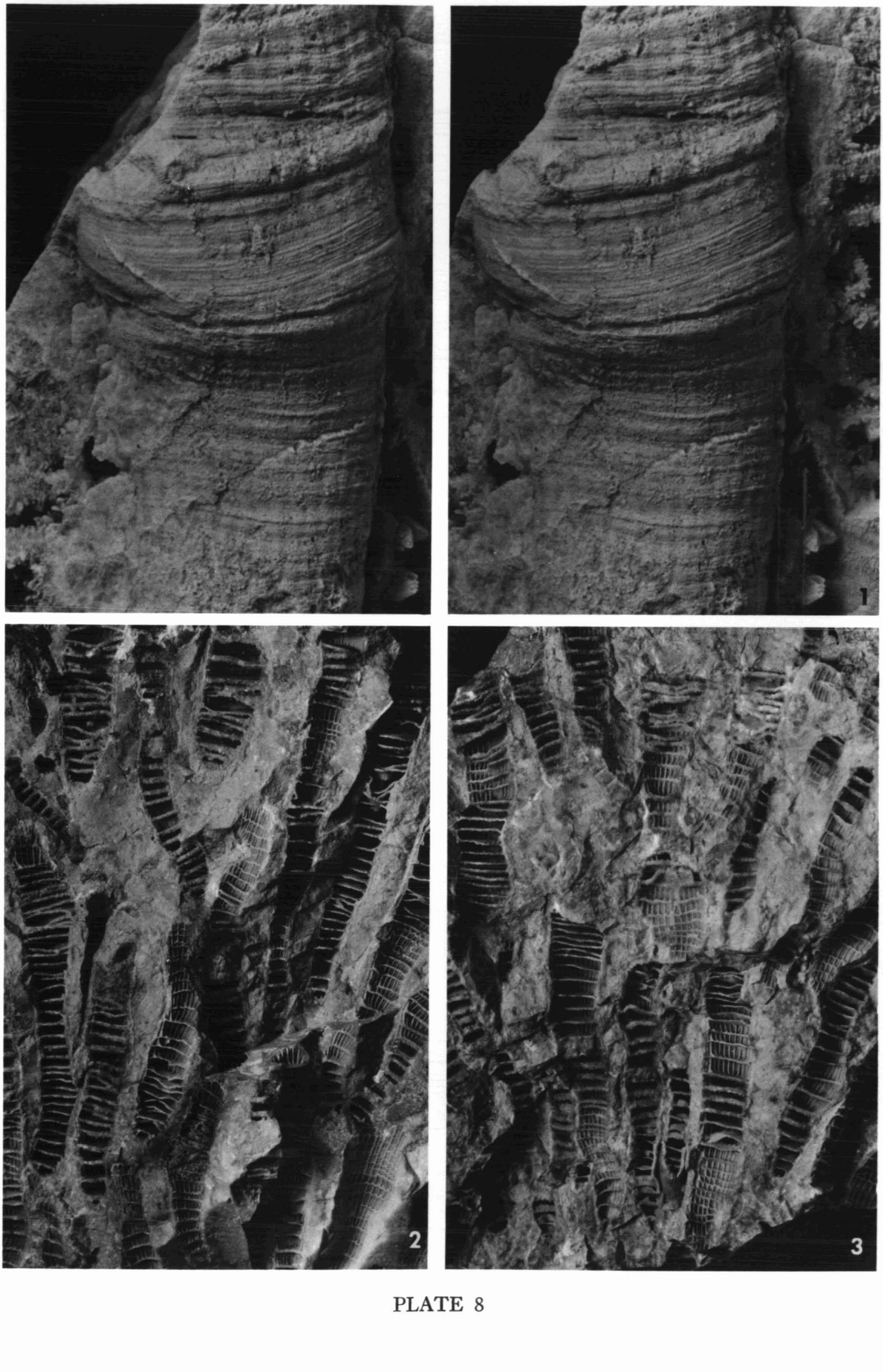


PLATE 8

cies we would require several complete coralla which could be sacrificed by careful dissection. An ideal record of such a study could be preserved by thorough impregnation of the fossil material and preparation of large peels at closely spaced parallel intervals. As with many problems in paleontology, laboratory methods can proceed only as far as the fossil material permits—then, back to the field.

LITERATURE CITED

ETHERIDGE, ROBERT, 1907, A monograph of the Silurian and Devonian corals of New South Wales, Part 2, The genus *Tryplasma*: Mem. Geol. Surv. New South Wales, Palaeontology, v. 13, p. 41–102, pls. 10–28.

HILL, DOROTHY, 1940, The Silurian Rugosa of the Yass-Browning District, N.S.W.: Linnaean Soc. New South Wales, Proc., v. 65, p. 385–430, 4 figs., 3 pls.

LAMBE, L. M., 1901, A revision of the genera and species of Canadian Paleozoic corals: Geol. Surv. Canada, Contrib. Canadian Palaeontology, v. 4, pt. 2, p. 97–197, pls. 1–18.

WHITEAVES, J. F., 1884, On some new, imperfectly characterized or previously unrecorded species of fossils from the Guelph Formation of Ontario: Geol. Surv., Canada Palaeozoic Fossils, v. 3, pt. 1, p. 1–44, pls. 1–8.

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EXPLANATION OF PLATE 8

Specimen lightly coated with sublimated ammonium chloride.

Fletcheria acanthina n. sp. Holotype UMMP 60598. *1*, stereogram showing surface of epitheca; longitudinal striations correspond to internal positions of septa, and transverse markings represent growth lines, × 6. *2, 3*, portions of corallum showing spacing of corallites, × 1.