

CONTRIBUTIONS FROM THE MUSEUM OF PALEONTOLOGY

THE UNIVERSITY OF MICHIGAN

Vol. XVII, No. 12, pp. 265-276 (3 pls.)

OCTOBER 10, 1962

CORALS OF THE TRAVERSE GROUP OF MICHIGAN
PART IX, *HELIOPHYLLUM*

BY

ERWIN C. STUMM and JOHN H. TYLER



Published with aid from the
Edward Pulteney Wright and Jean Davies Wright
Expendable Trust Fund

MUSEUM OF PALEONTOLOGY
THE UNIVERSITY OF MICHIGAN
ANN ARBOR

CONTRIBUTIONS FROM THE MUSEUM OF PALEONTOLOGY

Director: LEWIS B. KELLUM

The series of contributions from the Museum of Paleontology is a medium for the publication of papers based chiefly upon the collection in the Museum. When the number of pages issued is sufficient to make a volume, a title page and a table of contents will be sent to libraries on the mailing list, and to individuals upon request. A list of the separate papers may also be obtained. Correspondence should be directed to the Museum of Paleontology, The University of Michigan, Ann Arbor, Michigan.

VOLS. II-XVI. Parts of volumes may be obtained if available.

VOLUME XVII

1. Evaluation of Prziбраm's Law for Ostracods by Use of the Zeuthen Cartesian-diver Weighing Technique, by Robert V. Kesling and Robert S. Takagi. Pages 1-58, with 5 plates.
2. A New *Glyptocystites* from Middle Ordovician Strata of Michigan, by Robert V. Kesling. Pages 59-76, with 3 plates.
3. A New Species of *Billingsites*, an Ascoceratid Cephalopod, from the Upper Ordovician Ogontz Formation of Michigan, by Robert V. Kesling. Pages 77-121, with 2 plates.
4. Notes on *Lepadocystis moorei* (Meek), An Upper Ordovician Callocystitid Cystoid, by Robert V. Kesling and Leigh W. Mintz. Pages 123-148, with 7 plates.
5. Addenda to the Check List of Fossil Invertebrates Described from the Traverse Group of Michigan, by Erwin C. Stumm. Pages 149-171.
6. *Gemmaecrinus variabilis*, a New Species of Crinoid from the Middle Devonian Bell Shale of Michigan, by Robert V. Kesling and Raymond N. Smith. Pages 173-194, with 9 plates.
7. A new Eurypterid from the Upper Silurian of Southern Michigan, by Erwin C. Stumm and Erik N. Kjellesvig-Waering. Pages 195-204, with 1 plate.
8. Middle Ordovician Black River Ostracods from Michigan. Part IV. Species of *Colacchilina* (New Genus), *Laccochilina*, and *Hesperidella*, by Robert V. Kesling, Donald D. Hall, and James C. Melik. Pages 205-213, with 2 plates.
9. Corals of the Traverse Group of Michigan. Part VII, The Digonophyllidae, by Erwin C. Stumm. Pages 215-231, with 6 plates.
10. Corals of the Traverse Group of Michigan. Part VIII, *Stereolasma* and *Heterophrentis*, by Erwin C. Stumm. Pages 233-240, with 2 plates.
11. A Mississippian Flora from Northeastern Utah and its Faunal and Stratigraphic Relations, by Chester A. Arnold and Walter Sadlick. Pages 241-263, with 2 plates.
12. Corals of the Traverse Group of Michigan. Part IX, *Heliophyllum*, by Erwin C. Stumm and John H. Tyler. Pages 265-276, with 3 plates.

CORALS OF THE TRAVERSE GROUP OF MICHIGAN
PART IX, *HELIOPHYLLUM*¹

BY
ERWIN C. STUMM and JOHN H. TYLER

CONTENTS

Introduction	265
Previous work	266
Acknowledgements	266
Register of localities	266
Systematic descriptions	267
Genus <i>Heliophyllum</i> Hall	267
<i>Heliophyllum elongatum</i> , sp. nov.	267
<i>Heliophyllum ferrounense</i> , sp. nov.	268
<i>Heliophyllum halli</i> Edwards and Haime	268
<i>Heliophyllum halli bellense</i> , subsp. nov.	269
<i>Heliophyllum halli potterense</i> , subsp. nov.	269
<i>Heliophyllum rotatorium</i> , sp. nov.	270
<i>Heliophyllum tenuiseptatum</i> Billings	271
<i>Heliophyllum tenuiseptatum traversense</i> , subsp. nov.	271
<i>Heliophyllum tenuiseptatum tenaculum</i> , subsp. nov.	272
Literature cited	272
Plates	(after) 273

INTRODUCTION

PART IX of the study of the Traverse group of Michigan concerns the species of the simple rugose coral genus *Heliophyllum*. This genus has numerous species in both Onondaga and Hamilton strata in eastern and central United States. The well-known Hamilton species *H. halli* and *H. tenuiseptatum* are discussed. A specimen of the former species from the Traverse group is illustrated. The internal structures of a specimen of the latter species from the type locality are illustrated for the first time. Three new species and four new subspecies of *Heliophyllum* are described from different formations in the Traverse group.

¹ Part I is published in Vol. VII, No. 8; Part II in Vol. VIII, No. 3; Part III in Vol. VIII, No. 8; Part IV in Vol. IX, No. 3; Part V in Vol. XIV, No. 11; Part VI in Vol. XVI, No. 4; Part VII in Vol. XVII, No. 9, and Part VIII in Vol. XVII, No. 10, of the *Contributions from the Museum of Paleontology, The University of Michigan*.

PREVIOUS WORK

Rominger (1876) described specimens of *Cyathophyllum halli* Edwards and Haime and the new species *Cyathophyllum juvene*. Both are typical *Heliophyllum*. The specimens of *H. halli* which he illustrated from the Hungry Hollow formation of southwestern Ontario are of that species. The specimen he illustrated from the Traverse group is from the Potter Farm formation at Stony Point and is a representative of *H. halli potterense*, subsp. nov. Rominger's three syntypes of *H. juvene* are from the Hungry Hollow formation of southwestern Ontario. *H. juvene* is conspecific with *H. tenuiseptatum* Billings, 1859.

Sloss, 1939, pp. 58-59, Pl. 9, Figs. 14-17, assigned some specimens from the Gravel Point formation of Emmet County, Michigan, to *Heliophyllum juvene* (Rominger). These are here placed in *H. tenuiseptatum traversense* subsp. nov.

ACKNOWLEDGMENTS

I wish to thank Dr. L. B. Kellum, Dr. C. A. Arnold, and Dr. R. V. Kesling for critically reading the manuscript of this paper. Unless otherwise stated all type specimens described and illustrated herein are in the Museum of Paleontology, The University of Michigan.

REGISTER OF LOCALITIES

Localities:

14. Quarry of Petoskey Portland Cement Company, about 1½ miles west of Petoskey, Emmet County, SW ¼ sec. 2, and SE ¼ sec. 3, T. 34 N., R. 6 W.
- 14e. Abandoned "Bell" quarry and ledges on shore about 2 miles east of Bay Shore, Emmet County, near northeast corner sec. 8, T. 34 N., R. 6 W. (Rose quarry of Fenton and Fenton, 1930).
31. Quarry of Michigan Limestone and Chemical Company at Calcite, Presque Isle County. Site of Crawford's Marble quarry. 10 sections in southeast part T. 35 N., R. 5 E., and adjacent townships.
38. Abandoned quarry of Kelley's Island Lime and Transport Company (Great Lakes Stone and Lime Company) at Rockport, Alpena, and Presque Isle Counties, sec. 6, T. 32 N., R. 9 E.
53. Abandoned quarry of Thunder Bay Quarries Company, eastern edge of Alpena, Alpena County, SE ¼ sec. 14, T. 31 N., R. 8 E.
68. Small shale pit at the northwest corner of Alpena Cemetery (Evergreen Cemetery), Alpena County, SW ¼ sec. 21, T. 31 N., R. 8 E.
90. Excavations at the Alpena City waterworks and ledges outcropping on beach at Stony Point, south edge of Alpena, Alpena County, near northwest corner sec. 34, T. 31 N., R. 8 E.

SYSTEMATIC DESCRIPTIONS

Genus *Heliophyllum* Hall in Dana, 1846

Type species, by monotypy, *Strombodes helianthoides?* Hall, 1843, non Goldfuss, 1826, = *Heliophyllum halli* Edwards and Haime, 1850, p. lxix; 1851, pp. 170, 408, Pl. 7, Figs. 6–6b. Middle Devonian, Hamilton group, western New York.

***Heliophyllum elongatum*, sp. nov.**

(Pl. II, Figs. 1–2)

Description.—Corallum long, ceratoid in neanic stage becoming cylindrical in ephebic stage, attaining a maximum length of 17 cm and maximum diameter of 42 mm. Upper 3 cm of holotype becoming constricted to average calyx diameter of 34 mm. Epitheca moderately annulated; septal grooves clearly defined on holotype. Calyx of holotype filled with limestone but apparently with a peripheral platform and a shallow axial pit. In transverse section, septa thin, numbering 84, major extending to axis, minor about one-half as long. Carinae numbering 14 to 16 to a septum, extending axially to ends of minor septa. Cardinal fossula absent. Epitheca thin. In longitudinal section, carinae striking epitheca tangentially at an angle less than 25 degrees; and extending axially to axial margin of dissepimentarium. Dissepiments small, cystose, strongly arched distally and axially. Tabularium with flat and distally arched, complete and incomplete tabulae.

Remarks.—The most characteristic features of this species are the length of the corallum, slightly constricted calyx, number and distribution of carinae, absence of cardinal fossula, and acute angle of carinae and epitheca as seen in longitudinal section. The most closely related species is *H. verticale* of the Jeffersonville limestone coral zone of southern Indiana and northern Kentucky. *H. elongatum* and *H. verticale* are nearly similar in length and diameter of corallum, number and length of the septa, restriction of the carinae to the dissepimentarium, and acute angle between carinae and epitheca as seen in longitudinal section. The cardinal fossula, absent in *H. elongatum*, is weakly developed or absent in *H. verticale*. The two species are different principally in that *H. verticale* has a broadly bell-shaped calyx whereas *H. elongatum* has a slightly constricted calyx similar to that of *H. degener* Hall (1876). The carinae of *H. verticale* number about 8 to a septum and extend two-thirds the distance to the axis, whereas those of *H. elongatum* number 14 to 16 and are restricted to the peripheral half of the corallum.

Occurrence.—Middle Devonian, Traverse Group, Four Mile Dam formation, locality 53.

Type.—Holotype No. 35258.

***Heliophyllum ferronense*, sp. nov.**

(Pl. I, Figs. 1-3; Pl. II, Figs. 5-6)

Description.—Corallum simple, ceratoid, holotype measuring 41 mm in length. Epitheca moderately annulated, septal grooves well defined. Calyx of holotype oval, measuring 26 mm and 28 mm in short and long diameters respectively. Calyx with steeply sloping walls and axial pit 13 mm deep, the latter having a gently concave floor occupying about half the calyx diameter. Septa thin, numbering 64, major extending to axis. Carinae fine, clearly defined. In transverse section, 64 septa present, major extending to axis, minor one-half as long. Carinae numbering about 4 to a septum, restricted to peripheral one-third of corallum. Cardinal fossula weakly defined. Epitheca thin. In longitudinal section, carinae striking epitheca at 75 to 85 degree angle and spaced 0.6 mm to 1.0 mm apart. Tabularium filled with long, nearly plane, incomplete tabulae. Dissepiments small, globose near epitheca, becoming larger toward inner margin of dissepimentarium, cystose, axially convex.

Remarks.—This species is distinguished from *H. halli* by a typically smaller and more elongate corallum, finer septa, fewer carinae, and absence of a peripheral platform on the calyx.

Occurrence.—Middle Devonian, Traverse Group, Ferron Point formation, locality 38.

Types.—Holotype No. 44647; paratypes Nos. 35198 and 21085.

***Heliophyllum halli* Edwards and Haime**

(Pl. I, Figs. 15-16; Pl. II, Figs. 7-8)

? *Strombodes helianthoides* Hall, 1843, p. 209.

Heliophyllum halli Edwards and Haime, 1850, p. lxix; 1851, p. 408, Pl. 7, Figs. 6-6b (for synonymy, emended descriptions, and illustrations of interior; see Wells, 1937, pp. 1-20, and Fenton and Fenton, 1938, pp. 211-227).

Remarks.—This well-known species is characteristic of the Ludlowville and Moscow formations of the Hamilton group of western New York and of the coral zone of the Hungry Hollow formation of Ontario. In the latter locality both exteriors and interiors are exceptionally well preserved. The species is present in the Four Mile Dam formation of the Traverse group of Michigan. The exteriors of the Michigan specimens are not well preserved but the characteristic shape of the corallum and calyx can be

determined. Internal structures as revealed by thin sections indicate that the Michigan specimens are conspecific with those from New York and Ontario.

Occurrence.—Middle Devonian, Traverse group, Four Mile Dam formation, locality 53.

Types.—Rominger's hypotype from the Hungry Hollow formation No. 8566a; hypotype from the Four Mile Dam formation No. 35260.

***Heliophyllum halli bellense*, subsp. nov.**

(Pl. I, Figs. 6-7; Pl. II, Figs. 3-4)

Description.—Corallum simple, ceratoid, holotype measuring 50 mm in length. Epitheca moderately annulated, costae clearly defined. Calyx oval, measuring 28 mm and 32 mm in short and long diameters respectively. Calyx with flat to gently axially sloping peripheral platform 6 mm wide and an axial pit 15 mm deep. Septa thin, numbering 84, major extending to axis. Carinae fine to coarse, clearly defined. In transverse section, 76 septa present, major extending to axial region. Minor septa about one-third length of major. Carinae well developed, numbering 2 to 5 to a septum and restricted to peripheral region. Cardinal fossula undefined. In longitudinal section, tabulae mostly horizontal, incomplete. Dissepiments globose, strongly arched distally.

Remarks.—This subspecies is distinguished from typical *H. halli* in having less than five carinae to a septum, these being restricted to the peripheral region, not extending to the periaxial region as in typical *H. halli*. The greater calyx depth with respect to calyx diameter ratio also distinguishes this subspecies from typical *H. halli*. In addition, the incipient fossula typical of *H. halli* is not present in *H. halli bellense*.

Occurrence.—Middle Devonian, Traverse Group, Bell shale, localities 31 and 38.

Type.—Holotype No. 44539. Paratype No. 35156.

***Heliophyllum halli potterense*, subsp. nov.**

(Pl. I, Figs. 4-5; Pl. III, Figs. 10-13)

Cyathophyllum halli Rominger, 1876 *partim*, Pl. 35, upper tier, upper specimen in center.

Description.—Corallum ceratoid, holotype measuring 53 mm long and 35 mm in maximum diameter. Exterior with the typical wrinkled epitheca and prominent interseptal ridges. Attachment talons present on some specimens. Calyx with a narrow inwardly sloping peripheral platform averaging 7 mm wide and an axial pit 20 mm wide and 12 mm deep. In some speci-

mens, especially juvenile ones, peripheral platform reduced or lacking. A very obscure cardinal fossula present in some specimens. In transverse section, septa thin, ranging from 54 to 74 in mature specimens, radially arranged, no fossula visible. Major septa extending to axis, minor averaging about one-half as long. Carinae ranging from 7 to 11 to a septum. In longitudinal section, tabularium occupying central one-third of corallum, composed of small, elongate, distally arched tabellae. Dissepimentarium composed of very small, globose, axially convex dissepiments. Carinae crossing dissepimentarium at an angle ranging from 45 to 60 degrees to the periphery.

Remarks.—This subspecies is variable but differs from typical *H. halli* in having a less well-defined peripheral platform on the calyx, more obscure or absent fossula, and in having the tabularium composed of small, cystose tabellae.

Occurrence.—Middle Devonian, Traverse group, Potter Farm formation, localities 68 and 90.

Types.—Holotype No. 44540; paratypes Nos. 35261 and 35262.

***Heliophyllum rotatorium*, sp. nov.**

(Pl. I, Figs. 8-10; Pl. III, Figs. 3-5)

Description.—Corallum simple, patellate to turbinate, holotype measuring 17 mm in length. Holotype twisted about 70 degrees in counter-clockwise direction from base to top of corallum, and typically attached by one or more talons. Epitheca moderately annulated. Calyx oval, measuring 25 mm and 30 mm in small and large diameter respectively. Peripheral platform absent or poorly developed. Calicular pit variable, from shallow, bowl-shaped to deep, steep-sided with flat base. Septa of fine to medium thickness, numbering 88, the major extending to axis twisted in axial region and forming a small axial boss. Carinae fine to medium, not well defined. In transverse section, 84 septa present, major extending to axis. Carinae poorly defined, numbering 4 to 5, restricted to peripheral region. Cardinal fossula undefined. In longitudinal section, carinae at about 90 degrees to epitheca, spaced about 0.35 mm apart. Tabularium filled with plane and distally arched incomplete tabulae and cystose tabellae. Dissepiments variable in size, smaller in peripheral region.

Remarks.—This species is characterized by the spirally twisted corallum, the axial boss, and the attachment talons. The species is extremely variable in depth of calyx and development of peripheral platform.

Occurrence.—Middle Devonian, Traverse Group, Potter Farm formation, locality 68.

Type.—Holotype No. 44533; paratypes No. 44534 and 44537.

Heliophyllum tenuiseptatum Billings

(Pl. I, Figs. 13-14; Pl. III, Figs. 1-2)

Heliophyllum tenuiseptatum Billings, 1859, p. 1226.

Cyathophyllum juvene Rominger, 1876, p. 101, Pl. XXXV, upper tier, three right-hand specimens.

Remarks.—This species, typical of the coral zone of the Hungry Hollow formation has previously never had the internal structures illustrated. As seen in transverse section the septa are radially arranged and the major septa extend about three-fourths the distance to the axis with the minor being almost as long. No fossula or other modifications of the protosepta are visible. As seen in longitudinal section the tabulae are relatively horizontal, complete or incomplete. The dissepiments are small, globose, and axially convex. The carinae make a very acute angle with the periphery as compared with *H. tenuiseptatum traversense* the new subspecies described herein.

Occurrence.—Middle Devonian, Hungry Hollow formation, coral zone, Thedford and Arkona regions, Ontario.

Types.—Holotype in the National Museum of Canada; Rominger's types of *H. juvene* No. 8567a-c; hypotype herein illustrated No. 20726.

Heliophyllum tenuiseptatum traversense, subsp. nov.

(Pl. I, Figs. 11-12; Pl. III, Figs. 6-9)

Heliophyllum tenuiseptatum Sloss, 1939, pp. 58-59, Pl. 9, Figs. 14-17, *non H. tenuiseptatum* Billings.

Description.—Corallum simple, ceratoid, holotype measuring 33 mm in length. Epitheca moderately annulated, costae indistinct. Calyx round, measuring 17 mm in diameter, with peripheral platform 5 mm wide and axial pit 7 mm deep. Septa of medium thickness, numbering 58, the major extending to the axis. Carinae fine to medium, well defined. In transverse section, 52 septa present, major extending to axis, becoming thin in the tabularium. Carinae on each major septum numbering 7 to 9, restricted to peripheral two-thirds of corallum. Minor septa one-third to one-half length of major. Cardinal fossula undefined. In longitudinal section carinae striking epitheca at 75 to 85 degree angle and spaced 0.3 mm to 0.5 mm apart. Tabularium filled with long, nearly plane, incomplete tabulae and short cystose tabellae. Dissepiments small, globose, axially and distally convex.

Remarks.—This subspecies is distinguished from typical *H. tenuiseptatum* by having a less acute angle of carinae-epitheca intersection, more cystose tabellae, and in having major septa extending to axis.

Occurrence.—Middle Devonian, Traverse Group, Gravel Point formation, zone 6, bed 3, upper blue shale, localities 14 and 14e; Dock street clay, locality 53.

Type.—Holotype No. 44536; paratypes Nos. 35305 and 44535; unfigured paratypes Nos. 44644 and 44645.

***Heliophyllum tenuiseptatum tenaculum*, subsp. nov.**

(Pl. I, Figs. 17–18; Pl. III, Figs. 14–15)

Description.—Corallum simple, ceratoid, holotype measuring 25 mm in length. Epitheca moderately annulated, costae and septal furrows indistinct. Attachment talons typically extending from one side near base of corallum. Calyx oval, measuring 16 mm and 19 mm in short and long diameters respectively, with axial pit 11 mm deep. Calyx walls steeply sloping to a narrow base 3 mm in diameter. Peripheral platform very weakly developed or absent. Septa thin, numbering 54, the major extending to axial region, Carinae fine, well defined. In transverse section, 62 septa present, major and minor extending about two-thirds and one-third the distance to the axis respectively. Carinae averaging 9 to a septum, thickened in dissepimentarium. Cardinal fossula undefined. In longitudinal section carinae striking epitheca at 80 to 85 degree angle and spaced 0.3 mm to 0.4 mm apart. Tabularium filled with long, slightly convex and concave, incomplete tabulae. Dissepiments small in peripheral region, large in periaxial region, axially and distally arched.

Remarks.—This subspecies differs from *H. tenuiseptatum traversense* in having a very weakly developed peripheral platform, or none at all, and in having attachment talons on one side of the base of the corallum.

Occurrence.—Middle Devonian, Traverse Group, Potter Farm formation, locality 68.

Type.—Holotype No. 44539; paratypes No. 44536 and 44538.

LITERATURE CITED

- BILLINGS, ELKANAH. 1859. On the Fossil Corals of Canada West. Can. Journ., n.s., Vol. 4.
- DANA, J. D. 1846. "Zoophytes" in United States Expl. Exped. 1838–1842 under command of Charles Wilkes, U.S.N.
- EDWARDS, H. M., and HALME, J. 1850. A Monograph of the British Fossil Corals, Pt. 1, Introd. Monog. Paleontog. Soc. London.
- 1851. Monographie des Polypiers Fossiles des Terraines Paleozoiques. Archives Mus. Hist. Nat. Paris, Vol. 5.
- FENTON, C. L., and FENTON, M. A. 1937. *Heliophyllum* and "*Cystiphyllum*" corals of Hall's "Illustrations of Devonian Corals." Ann. Carnegie Mus., Vol. 28.

- GOLDFUSS, G. A. 1826. *Petrefacta Germaniae*, Vol. I, Düsseldorf: Arnz and Co.
- HALL, JAMES. 1843. *Natural History of New York*, Pt. 4; *Geology of New York*, Pt. 4. Albany: Carroll and Cook.
- 1876. *Illustrations of Devonian Fossils*. N. Y. State Geol. Surv., Paleontol.
- ROMINGER, CARL. 1876. *Paleontology. Fossil Corals*. Geol. Surv. Mich., Vol. 3, Pt. 2.
- SLOSS, L. L. 1939. *Devonian Rugose Corals from the Traverse Beds of Michigan*. Journ. Paleontol., Vol. 13, No. 1.
- WELLS, J. W. 1937. *Individual Variation in the Rugose Coral Species *Heliophyllum halli** E. & H. Palaeontog. Americana, Vol. 2, No. 6.

Manuscript submitted March 29, 1962

PLATES

EXPLANATION OF PLATE I

(All figures x 1)

	PAGE
<i>Heliophyllum ferronense</i> , sp. nov.	268
FIGS. 1-2. Calyx and side views of a well-preserved specimen showing funnel-shaped calyx, fossula and short ceratoid growth form. Holotype No. 44647. Ferron Point formation, locality 38.	
FIG. 3. Side view of another specimen showing epitheca. Paratype No. 35198. Same occurrence as original of Figs. 1-2.	
<i>Heliophyllum halli potterense</i> , subsp. nov.	269
FIGS. 4-5. Calyx and side views showing narrow peripheral platform, long major septa, and ceratoid growth form. Holotype No. 44540. Potter Farm formation, locality 68.	
<i>Heliophyllum halli bellense</i> , subsp. nov.	269
FIGS. 6-7. Calyx and side views showing calyx with broad peripheral platform and radially arranged septa. Holotype No. 44539. Bell shale, locality 38.	
<i>Heliophyllum rotatorium</i> , sp. nov.	270
FIGS. 8-10. Base, calyx, and side views showing spiral development of corallum and irregularly shaped calyx with twisted septa and axial boss. Holotype No. 44533, Potter Farm formation, locality 68.	
<i>Heliophyllum tenuiseptatum traversense</i> , subsp. nov.	271
FIGS. 11-12. Calyx and side views showing peripheral platform, radial septa, and narrow growth form. Holotype No. 44536. Gravel Point formation—upper blue shale, locality 14e.	
<i>Heliophyllum tenuiseptatum</i> Billings	271
FIGS. 13-14. Calyx and side views showing peripheral platform, narrow axial pit, and typical growth form. Syntype of <i>H. juvene</i> Rominger. No. 8567a, Hungry Hollow formation, coral bed, Thedford, Ontario.	
<i>Heliophyllum halli</i> Edwards and Haime	268
FIGS. 15-16. Calyx and side views showing peripheral platform, indistinct fossula, large axial pit, and typical subturbinate growth form. One of Rominger's hypotypes, No. 8566a. Hungry Hollow formation, coral bed, Thedford, Ontario.	
<i>Heliophyllum tenuiseptatum tenaculum</i> , subsp. nov.	272
FIG. 17. Side view showing attachment talons. Paratype No. 44536. Potter Farm formation, locality 68.	
FIG. 18. Calyx view showing conical calyx with very small base. Holotype No. 44539. Same occurrence as original of Fig. 17.	

PLATE I

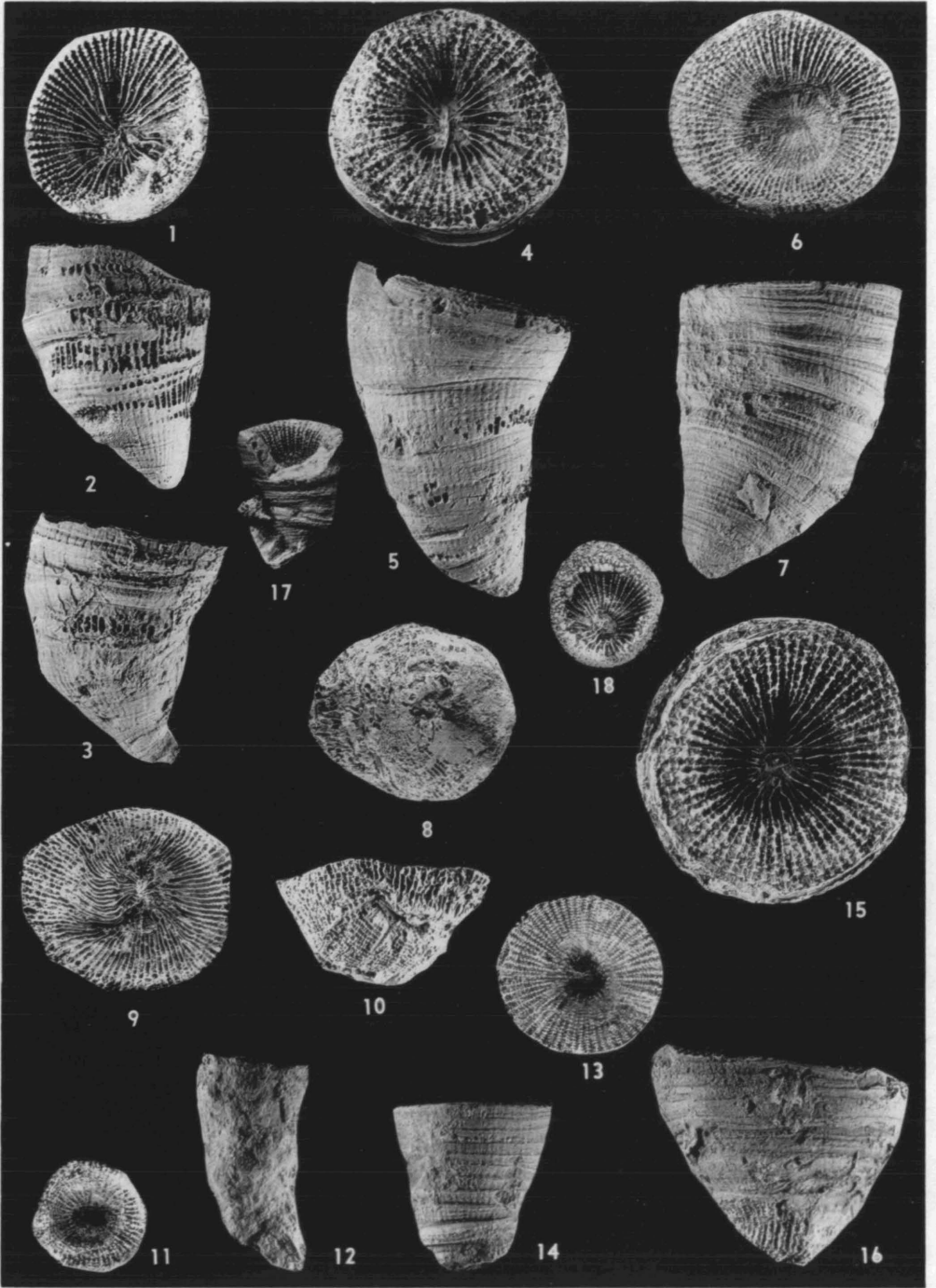
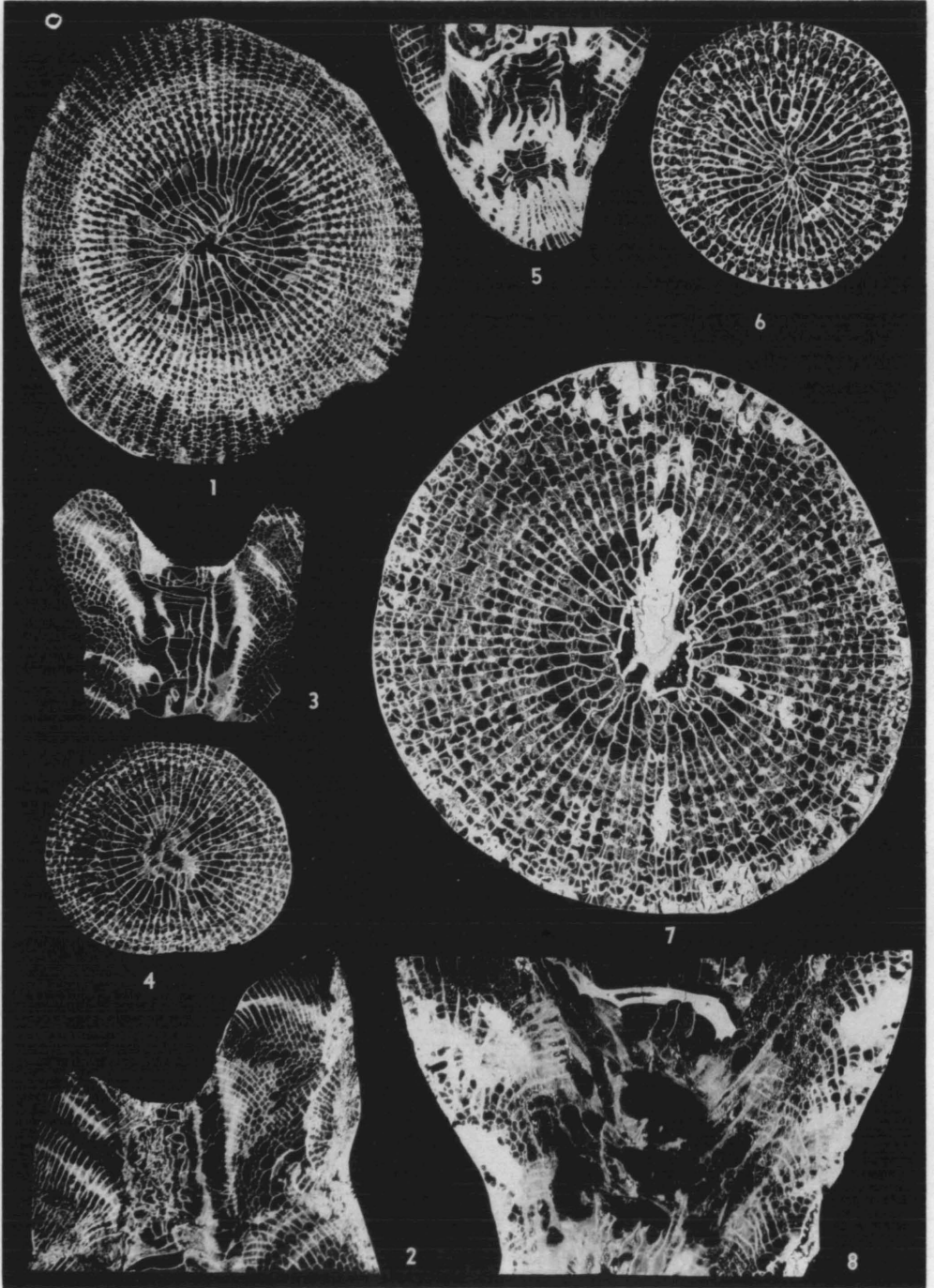


PLATE II



EXPLANATION OF PLATE II

(All figures x 1.5)

	PAGE
<i>Heliophyllum elongatum</i> , sp. nov.	267
FIGS. 1-2. Transverse and longitudinal sections showing extension of major septa to axis, distribution of carinae, thin epitheca, and tabularium with complete and incomplete tabulae. Holotype No. 35258, Four Mile Dam formation, locality 53.	
<i>Heliophyllum halli bellense</i> , subsp. nov.	269
FIGS. 3-4. Longitudinal and transverse sections showing steep angle of carinae, incomplete tabulae, and major septa extending to axis. Paratype No. 35156, Bell shale, locality 38.	
<i>Heliophyllum ferronense</i> , sp. nov.	268
FIGS. 5-6. Longitudinal and transverse sections showing gently sloping carinae, incomplete tabulae, major septa extending to axis and poorly defined cardinal fossula. Paratype No. 21085, Ferron Point formation, locality 38.	
<i>Heliophyllum halli</i> Edwards and Haime	268
FIGS. 7-8. Transverse and longitudinal sections showing major septa extending to axial region, indistinct fossula, incomplete tabulae, and steeply sloping carinae. Hypotype No. 35260. Four Mile Dam formation, locality 53.	

EXPLANATION OF PLATE III

(All figures x 1.5)

	PAGE
<i>Heliophyllum tenuiseptatum</i> Billings	271
FIGS. 1-2. Transverse and longitudinal sections of a specimen showing septa extending three-fourths distance to axis, tabularium with nearly horizontal, complete and incomplete tabulae, and steeply sloping carinae. Hypotype No. 20726, Hungry Hollow formation, coral bed, brickyard, 1 mile N. of Thedford, Ontario.	
<i>Heliophyllum rotatorium</i> , sp. nov.	270
FIG. 3. Longitudinal section showing carinae intersecting periphery at an angle approaching 90 degrees, and tabularium with plane and convex incomplete tabulae and cystose tabellae. Paratype No. 44534. Potter Farm formation, locality 68.	
FIGS. 4-5. Serial transverse sections of a specimen showing twisted septa forming axial structure. Paratype No. 44537. Same occurrence as original of Fig. 3.	
<i>Heliophyllum tenuiseptatum traversense</i> , subsp. nov.	271
FIGS. 6, 9. Transverse and longitudinal sections of a specimen of average size showing thin, radially arranged septa with major reaching axis, cystose tabellae, and low angle of carinae. Paratype No. 44535. Gravel Point formation, upper blue shale, locality 14e.	
FIGS. 7-8. Serial transverse sections of a larger specimen showing distribution of septa and carinae. Paratype No. 35305. Same occurrence as original of Figs. 6, 9.	
<i>Heliophyllum halli potterense</i> , subsp. nov.	269
FIGS. 10-11. Transverse and longitudinal sections of a specimen showing radially arranged septa and cystose, convex tabellae. Paratype No. 35262. Potter Farm formation, locality 68.	
FIGS. 12-13. Transverse and longitudinal sections of another specimen with very thin minor septa and thickened carinae. Paratype No. 35261. Potter Farm formation, locality 90.	
<i>Heliophyllum tenuiseptatum tenaculum</i> , subsp. nov.	272
FIGS. 14-15. Transverse and longitudinal sections of a specimen showing thin, radially arranged septa and tabularium with long, incomplete tabulae. Paratype No. 44538. Potter Farm formation, locality 68.	

PLATE III

