
EDAPHOPHYLLUM IRREGULARUM, A NEW MIDDLE
DEVONIAN DIGONOPHYLLID CORAL FROM THE LOWER
ARKONA FORMATION, ONTARIO, CANADA¹

STEVEN W. MITCHELL AND EGBERT G. DRISCOLL

Department of Geology, Wayne State University, Detroit, Michigan 48202

ABSTRACT

Edaphophyllum irregularum n. sp., a digonophyllid coral, is described from limestone fragments in glacial drift inferred to represent the Middle Devonian (Traverse Group) Lower Arkona Formation of Ontario, Canada. The species is characterized by the development of a massive sequence of septal cones. This is the first occurrence of *Edaphophyllum* Simpson in the Michigan Basin.

INTRODUCTION

In a recent article (Driscoll and Mitchell, 1969), a tetracoral assemblage was described from a previously unreported Middle Devonian (Traverse Group) fauna in southwestern Ontario. Subsequently, we have collected several specimens of a tetracoral not described in that article. These specimens belong to the digonophyllid genus *Edaphophyllum* Simpson and represent the first known occurrence of this genus in the Michigan Basin.

Edaphophyllum irregularum n. sp. occurs with the tetracorals *Bethanyphyllum bellense* Stumm and Tyler, *Cystiphyllodes americanum bellense* Stumm, *Heliophyllum halli bellense* Stumm and Tyler, and *Tabulophyllum elongatum* Stumm in the Lower Arkona Formation of Driscoll and Mitchell (1969). The overall fauna is similar to that reported from the Brint Road Member of the Silica Formation (Mitchell, 1967) and the Bell Shale (Stumm, 1951, 1961b). Consequently *E. irregularum*, n. sp. is associated with a fauna which occurs at the base of the Middle Devonian Traverse Group in the Michigan Basin.

All type material described in this paper is housed in the Museum of Paleontology, University of Michigan, Ann Arbor, Michigan (UMMP).

All material was collected from glacial drift along the Ausable River, approximately 4½ miles east of Arkona, Lambton County, Ontario, Canada. Specimens of *Edaphophyllum irregularum*, n. sp. were found in pieces of gray to dark-gray, very argillaceous limestone containing a fauna including: *Acanthoclema ohioense*

¹Manuscript received January 5, 1970.

McNair, *Helopora inexpectata* McNair, *Hercostrophia robusta* Williams, *Intrapora? irregularis* Stewart, *Leptotrypella ohioensis* (Stewart), *Mucrospirifer alpenensis* (Grabau), *Stictoporina granulifera* Stewart, *Streblotrypa anomala* McNair, *Sulcoretepora deissi* McNair, as well as the tetracorals indicated above. The limestone fragments containing this fauna are restricted to a small area three to five miles east of Arkona and show no evidence of glacial transport.

No outcrops of beds containing this fauna are known in the Thedford-Arkona region (Lambton and Middlesex Counties, Ontario), though the assemblage is recognized in the subsurface. The unit containing this fauna occurs stratigraphically between the "Arkona Shale," which crops out in the Thedford-Arkona region, and the Dundee-Delaware Limestone, exposed in Elgin, Huron, and Perth Counties, Ontario, a relationship determined from examination of samples and cores from over 100 wells in southwestern Ontario and adjoining Michigan (Driscoll and Mitchell, 1969). The fauna is of lower Traverse age and is assigned to the Lower Arkona Formation. Subsurface mapping of the areal distribution of the Lower Arkona Formation indicates that it occurs directly below the very thin glacial drift cover in the area three to five miles east of Arkona, Ontario, where *Edaphophyllum irregularum*, n. sp. was collected. Consequently, we are confident that the limestone fragments containing *Edaphophyllum irregularum*, n. sp. and the fauna listed above are indeed derived from the underlying bedrock, the Lower Arkona Formation.

SYSTEMATIC PALEONTOLOGY

ORDER RUGOSA MILNE-EDWARDS AND HAIME, 1850

SUBORDER CYSTIPHYLLINA NICHOLSON, 1889

Family Digonophyllidae Wedekind, 1923

Subfamily Digonophyllinae Wedekind, 1923

Genus *Edaphophyllum* Simpson, 1900

Edaphophyllum Simpson, 1900, p. 221; Stumm, 1949, p. 43; Hill, 1956, p. 321; Stumm, 1961a, p. 233; Stumm, 1964, p. 56.

Type Species: *Cystiphyllum bipartitum* Hall, 1882, by original designation.

Edaphophyllum irregularum Mitchell and Driscoll, n. sp.

Figure 1 A-G

DESCRIPTION.—Corallum simple, moderate in size for genus, ceratoid. Holotype 6.0 cm in length and 3.5 cm in maximum diameter. Epitheca with closely set annulations and occasional calycinal rejuvenescence. Calyx funnel-shaped, relatively shallow, oblique; calyx wall on convex side of corallite sloping steeply; calyx wall on concave side of corallite sloping at low angle; walls sloping asymmetrically to axial pit with rounded base. In holotype, depth of calyx 1.2 cm and maximum width of axial pit 2.2 cm; in paratype 57590, depth of calyx 0.5 cm and maximum width of axial pit 1.6 cm. Calyx filled with dissepiments; cardinal fossula on convex side of corallum, very prominent, deep, and wide. Other features of the calyx not observable due to incomplete preservation of the available specimens (fig. 1A).

In transverse section, septa forming successive cones, some separated by a single row of distally convex tabellae, other cones not separated by tabellae (fig. 1G, D). In ephebic and gerontic stages of largest specimen (holotype, UMMP No. 57433), tabellae becoming increasingly well developed; at distal end of corallite, tabellae and dissepiments largely replacing septal cones. Transverse sections in this part of corallite reveal dissepimentarium composed of small, globose, distally convex dissepiments; tabularium composed of large, distally convex tabellae (fig. 1B, E, F).

In longitudinal section, dissepimentarium composed of small-to-large, globose, distally convex dissepiments; tabularium composed of massive septal cones, except in ephebic and

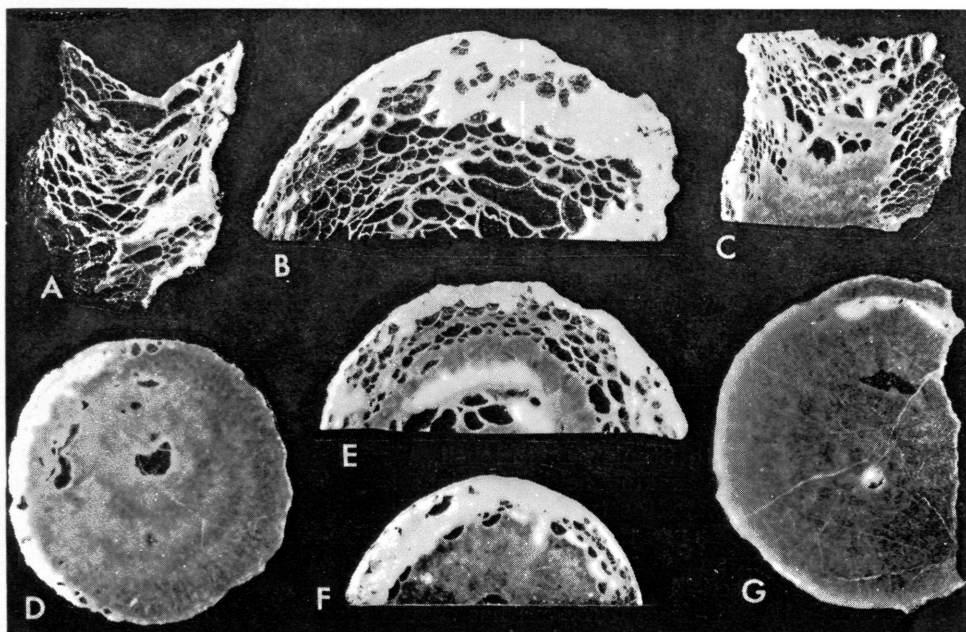


FIGURE 1. *Edaphophyllum irregularum*, n. sp. A, longitudinal section, holotype UMMP 57433, $\times 1$; B, transverse section (gerontic stage), holotype, UMMP 57433, $\times 2$; C, longitudinal section, holotype, UMMP 57433, $\times 1$; D, transverse section (neanic stage), holotype, UMMP 57433, $\times 2$; E-F, transverse sections (epebic stage), holotype, UMMP 57433, $\times 2$; G, transverse section (neanic stage), paratype, UMMP 57434, $\times 4$. Longitudinal sections A and C are from different positions in holotype. Section A is higher in corallite; section C is lower and slightly off center.

All specimens from limestone fragments, probably of the Lower Arkona Formation, in glacial drift, four miles east of Arkona, Middlesex County, Ontario, Canada.

gerontic stages of largest specimen (holotype UMMP No. 57433), where large, globose, distally convex tabellae are present (fig. 1A, C).

Measurements (in mm) of *Edaphophyllum irregularum*, n. sp.:

	Length	Maximum diameter
Holotype (UMMP 57433)	43.8	30.0
Paratype (UMMP 57434)	—	17.7
Paratype (UMMP 57435)	—	17.5
Paratype (UMMP 57590)	20.6	21.6

DISCUSSION.—Four specimens of this species were available for study. Although all of the specimens show the same general features, the specimen selected as the holotype is considerably larger than the three paratypes and exhibits a greater development of tabellae and dissepiments in the upper part of the corallite. In the extreme upper part of the corallite, septal cones are poorly developed and transverse sections are somewhat suggestive of the genus *Cystiphyllodes* Chapman. However, the predominance of septal cones throughout the greater part of the corallite indicates affinities with the genus *Edaphophyllum* Simpson. Although the four specimens studied differ from other reported species of that genus in the

development of a massive sequence of septal cones, we believe that the presence of septal cones and intermittently developed tabellae are sufficiently convincing evidence for assignment to *Edaphophyllum*.

Edaphophyllum irregularum, n. sp. differs from *E. bifurcatum* (Hall), *E. bipartitum* (Hall), and *E. sulcatum* (Billings) in its much more massive sequence of septal cones, and predominance of tabellae and dissepiments in the gerontic stage. Relationships with the only other species which may belong to *Edaphophyllum*, *E.? laciniatum* (Greene) from the Beechwood Limestone of southern Indiana and Kentucky, are not certain, as the internal structures of this latter species have not been described. Externally, *E.? laciniatum* (Greene) is considerably larger than *E. irregularum*, n. sp., and has a differently shaped axial pit: "cup-shaped to funnel-shaped with erect margins, steeply sloping walls, and rounded or pointed base" (Stumm, 1964, p. 57).

Occurrence.—Middle Devonian, Traverse Group, Lower Arkona Formation; in an exposure of glacial drift on the southeast bank of the Ausable River, approximately $\frac{1}{4}$ mile south of the old bridge of the Parkhill-Kayser Road. North end, lot 11, concession VIII, West Williams Township, Middlesex County, Ontario, Canada (Loc. 4 of Driscoll and Mitchell, 1969).

Types.—Holotype: UMMP No. 57433; Paratypes: UMMP Nos. 57434, 57435. 57590.

ACKNOWLEDGEMENTS

We are indebted to Stanley L. Mitchell, Wayne State University, Detroit, Michigan, for help in making field collections and for the donation of certain specimens here designated as type material. We also wish to acknowledge the assistance of the late E. C. Stumm, University of Michigan, Ann Arbor, Michigan, for helpful comments concerning the coral genus *Edaphophyllum* and for critical review of the manuscript.

The Federal Work-Study Program has partially supported the senior author throughout the course of the investigation.

REFERENCES

- Driscoll, E. G. and S. W. Mitchell.** 1969. Stratigraphy and tetracoral fauna of the Lower Arkona Formation, Middle Devonian, Ontario and Michigan. *Mich. Academician* 1: 117-141. 4 pls. 4 figs.
- Hill, D.** 1956. Rugosa. In R. C. Moore, Editor, *Treatise on Invertebrate Paleontology, Part F (Coelenterata)*. Geol. Soc. Amer. New York and Univ. Kansas Press, p. 233-324.
- Mitchell, S. W.** 1967. Stratigraphy of the Silica Formation of Ohio and the Hungry Hollow Formation of Ontario, with paleogeographic interpretations. *Papers Mich. Acad. Sci. Arts Letters* 52: 175-196. 5 pls. 1 fig.
- Simpson, G. B.** 1900. Preliminary descriptions of new genera of Paleozoic rugose corals. *N. Y. State Mus. Nat. Hist. Bull.* 8: 199-222.
- Stumm, E. C.** 1949. Revision of the families and genera of the Devonian tetracorals. *Geol. Soc. Amer. Mem.* 40, 92 p. 25 pls.
- 1951. Check list of fossil invertebrates described from the Middle Devonian Traverse Group of Michigan. *Univ. Mich. Mus. Paleo. Contr.* 9(1): 1-44.
- 1961a. North American genera of the Devonian rugose coral family Digonophyllidae. *Univ. Mich. Mus. Paleo. Contr.* 16(2): 225-243. 6 pls.
- 1961b. Addenda to the check list of fossil invertebrates described from the Traverse Group of Michigan. *Univ. Mich. Mus. Paleo. Contr.* 17(5): 149-171.
- 1964. Silurian and Devonian corals of the Falls of the Ohio. *Geol. Soc. Amer. Mem.* 93. 184 p. 80 pls.
- Stumm, E. C., and J. H. Tyler.** 1962. Corals of the Traverse Group of Michigan. Part IX, *Heliophyllum*. *Univ. Mich. Mus. Paleo. Contr.* 17(12): 265-276. 3 pls.