SOME NORTH AMERICAN SPECIES OF THE 
DEVONIAN TETRACORAL SMITHIPHYLUM 

by A. E. H. PEDDER

ABSTRACT. The tetracoral genus Smithiphylum is emended. It is shown to be closely related to Tabulophyllum and consequently is transferred from the Spongophyllidae to the Endophyllidae. Additional material of the type species, S. imperfectum (Smith), is described and three new Frasnian species, S. belanskii from Iowa, S. kindrei from Alberta, and S. whitakeri from the Northwest Territories, are erected.

Species now assigned to Smithiphylum were first erected for specimens from Timan, at the turn of the century. Since then, others have been named for North American specimens, but recent workers have referred these to quite different genera and even families.

Apart from the description of new species, the purpose of this paper is to redefine the genus and elucidate its relationships.

The following abbreviations are used:
GSC for Geological Survey of Canada (Ottawa) type number
SUI for State University of Iowa (Iowa City) type number
N.W.T. for Northwest Territories.

SYSTEMATIC PALEONTOLOGY

Family ENDOPHYLLIDAE Torley 1933
Genus SMITHIPHYLUM Birenheide 1962, emend.

Type species (original designation). Spongophyllum imperfectum Smith. See below, p. 622.

Description. Fasciculate to subcereoid tetracorals with a relatively thick wall. The septa are radially arranged, typically smooth and clearly differentiated into two orders. The major may be withdrawn both axially and peripherally and the minor are commonly represented merely by ridges on the interior of the wall and short crests on the dissepiments. The dissepimentarium is narrow and may be lonsdaloid; in some species, including the type, it is only intermittently developed. The tabulacae are broad and in narrow corallites many are complete. They are generally gently sinuous in longitudinal section and are commonly downturned peripherally.

The minute skeletal structure is imperfectly preserved in much of the material studied. The skeletal material of the wall is almost entirely lamellar. As seen in transverse section the lamellae are deflected towards the axis at the bases of the septa and in longitudinal section they lie oblique to the wall surfaces with their upper edge away from the periphery. A thin dark line (axial plate of Flower 1961, p. 28) separates contiguous corallites; however, no trace of this is present in most free corallites. Fibre fascicles have not been observed, but sparse, dark, and apparently structureless spine-like bodies within the septa and walls may represent trabeculae.

TEXT-FIG. 1. Known distribution of *Smithiphyllum* in North American Frasnian beds. Occurrences indicated by a black circle.
Additional species assigned

Smithiphyllum belanskii sp. nov. See below, p. 623.
Smithiphyllum kindlei sp. nov. See below, p. 625.
Spongophyllum rivus Smith 1945, p. 56, pl. 11, figs. 5a–d. Redknife Formation (late Frasnian), Jean Marie River, N.W.T.
Spongophyllum marlincense Stumm 1948, p. 41, pl. 11, figs. 9, 12; pl. 12, fig. 6. Martin Limestone (Middle Frasnian), Dear Creek Valley, Arizona.
Cyanophyllum weberi Lebedew 1902, p. 178, pl. 4, figs. 49–53. Uchta River, Timan. According to Soshkina (1952, p. 70) this occurs in the Middle Frasnian D1 2–3 beds.
Smithiphyllum whittakeri sp. nov. See below, p. 626.

Species requiring further description

Spongophyllum expansum Stumm 1937, pp. 436, 437, pl. 53, fig. 11; pl. 55, figs. 6a, b. Basal 500 feet of the Nevada Limestone, Eureka region, Nevada. Stumm considered this to be a lower Middle Devonian species; it is now thought to be Emsian (Johnson 1962).
Spongophyllum nevaldense Stumm 1937, pp. 435, 436, pl. 53, fig. 10; pl. 55, figs. 5a, b. Basal 500 feet of the Nevada Limestone (Emsian), Eureka region, Nevada.

Distribution. At present the genus is known definitely only from the Frasnian of North America and Timan. Its distribution in the former is indicated in text-fig. 1. In addition to the described species the figure indicates the occurrence of some undescribed forms as well as others listed by Sloss and Laird (1945), Crickmay (1962, p. 4), and by McLaren and Mountjoy (1962, pp. 8, 25).

Discussion. Birenheide (1962, p. 82) included completely cerioid species, such as Spongophyllum alpenense Ehlers and Stumm, S. brevisetatum Stumm, and S. missouriense Ehlers and Stumm, in the genus. The present writer prefers to regard these species as constituting either a new genus, or at least a subgenus. Another species included in Smithiphyllum by Birenheide is Spongophyllum pax Smith. This is based on a specimen found in a river boulder and is therefore of unknown stratigraphical origin. Crickmay (1960, pp. 878, 879) listed it in Givetian faunas from British Columbia, but Norford (1962, p. 27) has suggested that the species is Silurian and placed it in Columnaria.

In recent years the species now grouped in Smithiphyllum have most frequently been referred to Spongophyllum. The latter cannot be said to be a fully understood genus since the minute structure of the type species is imperfectly known, but it does differ from Smithiphyllum in being cerioid and by having essentially concave tabulae and a well-developed dissepimentarium, even in very narrow corallites.

Smithiphyllum is close to Tabulophyllum (text-figs. 2a, 3b; 3a, 6) and in fact Soshkina (1952, p. 70) assigned S. weberi to Tabulophyllum. Both genera possess a lamellar wall, broad typically peripherally downturned tabulae, and similar septa. Furthermore, the discontinuity, which is seen in the dissepimentarium of such species as Smithiphyllum imperfectum and S. belanskii, has also been figured in various species of Tabulophyllum (e.g. Frech 1885, pl. 10, fig. 2; Sloss 1939, pl. 11, fig. 18). Smithiphyllum is distinguished from Tabulophyllum, which is solitary, by its fasciculate to subcerioid form.

Birenheide (1962, p. 69) placed Smithiphyllum, and also doubtfully Tabellaeophyllum, in the Spongophyllidae. However, this writer feels that the discontinuous crest-like septa and the peripherally downturned tabulae indicate a closer relationship with the Endophyllidae.
TEXT-FIG. 2. Minute skeletal structure (as far as preserved) in *Smithiphyllum* and *Tabuliphyllum*. All ×15. a, c. *Smithiphyllum belanskii* sp. nov., a from a transverse section of the paratype, SUI 11647, c from a longitudinal section of the holotype, SUI 11616. b, d. *Tabuliphyllum incomessi* (Whiteaves), b from a transverse section of topotype, GSC 17547, from the Escarpment Formation (middle Frasnian) on Hay River, N.W.T. d from a longitudinal section of GSC 17548 from the Ferques Limestone (middle Frasian) in the Parisienne Quarry, near Ferques, Boulogne region, France. e, f. *Smithiphyllum imperfectum* (Smith), from transverse and longitudinal sections, respectively, of GSC 17543.

TEXT-FIG. 3. *Tabuliphyllum rotundum* Fenton & Fenton, ×2. Based on topotype GSC 17549 from Cerro Gordo Member of the Lime Creek Formation at Rockford, Iowa. This specimen combines features considered by Fenton and Fenton (1924) as being diagnostic of both *T. rectum*, the type species of *Tabuliphyllum*, and *T. rotundum*. a, transverse section. b, longitudinal section.
Smithiphyllum imperfectum (Smith 1945)

Plate 88, fig. 7; Plate 89, figs. 1-3, 10-12; text-figs. 2a, 4a-1

1945 Spongiphyllum imperfectum Smith, pp. 55, 56, pl. 11, figs. 3a-g.

Holotype. GSC 6307. Upper Devonian, about one mile below the upper end of the middle gorge of Jean Marie River, N.W.T. In current stratigraphical terms (Belyea and McLaren 1962, pp. 6, 7) this specimen was obtained from the Redknife Formation (late Frasnian).

Other material. GSC 17543. Kakisna Formation (late Frasnian), 4 miles (direct) above the mouth of Pocar River, N.W.T. Collected by the writer in 1960 with Eudalyspa sp., Micropyllum mohacense Smith, M. tendakatanum Smith, Hexagonaria mogna (Webster and Fenton), Diophyllum sp., Tabuliphyllum sp. close to T. kusonowii (Whiteaves), Thaumopora spp., Alveolites sp., Syringopora sp., Schizophoria sp., Nervosaspis sp., Arrype sp., Cyrtospirifer sp., Cranea sp., and Scuellium sp.

Description. The growth form is dendroid; in most cases the offshoots diverge widely from the parent corallite so that the corallum has the appearance of being well spread out. Specimen GSC 17543, which was not completely collected, measured about 150 x 100 x 70 mm. before sectioning. The corallites are sub-cylindrical and have an adult diameter of between 7 and 9 mm. Increase is lateral. The exterior of the exposed corallites bear rugae, but not interseptal ridges.

Although the wall is generally about 0.4 mm. thick, it varies between 0.25 and 0.75 mm. (Smith gives the range as 0.5 to 0.75 in the holotype); it consists of a very thin dark outer axial plate and an inner much thicker lamellar layer.

The septa are smooth, radially disposed and well differentiated into two orders. The major taper towards their axial extremity where they are very thin; most are continuous lamellae typically extending from one- to two-thirds the distance to the axis; some are peripherally withdrawn. The minor septa are very short, most are less than 0.5 mm. long and in young corallites they may be almost imperceptible. Number of major septa ranges from nineteen at 6.5 mm. diameter to twenty-two at 9.0 mm. diameter.

The disseptarium is intermittently developed and is entirely absent in some longitudinal sections; where it is developed it consists of a single row of elongate disseptiments numbering about ten in 10 mm.

The tabuloles are broad and may be predominantly complete. Some are very nearly flat, but most are very gently sinuous as seen in longitudinal section.

Discussion. The synonymy and distribution of the species is fully treated elsewhere (Preddler in press) and is not repeated here.

The cylindrical corallite described by Lebedev (1902, p. 148, pl. 2, figs. 29-31) under the name Calophyllum tchernyschevii is similar to isolated corallites of S. imperfectum.

EXPLANATION OF PLATE 88

All figures × 2

Figs. 1-3, 5. Smithiphyllum betunesi sp. nov. from the Shellrock Formation, Iowa. 1-3, Holotype, SU1 11616, 5, Para-type, SU1 11617.
Fig. 4. Smithiphyllum whittakeri sp. nov. from the Redknife Formation, N.W.T. Holotype, GSC 17545.
Fig. 6. Smithiphyllum kusonowii sp. nov. from the Mount Haw Formation, Alberta. Holotype, GSC 17544.
Fig. 7. Smithiphyllum imperfectum (Smith) from the Redknife Formation, N.W.T. GSC 17543.
If Lebedew's species is based on an individual corallite of a fasciculate corallum, it appears to differ from *S. imperfectum* only in having as many as twenty-seven major septa at its full diameter of 9 mm.

![Diagram](image)

**Text-fig. 4.** *Smithiphyllum imperfectum* (Smith), ×2. Based on figures given by Smith and Birenheide of the holotype, GSC 6307, and original figures based on GSC 17543. **A--D**, transverse sections of the holotype. **E**, transverse section of GSC 17543. **F--I**, longitudinal sections of GSC 17543. **G, H,** longitudinal sections of the holotype.

*Smithiphyllum belanski* sp. nov.

Plate 88, figs. 1–3; 5; Plate 89, figs. 13, 16; text-figs. 2a, c; 5a–D

**Name derivation.** The species is named for the late C. H. Belanski in recognition of his contribution to the study of the Shellrock Formation and its fauna.

**Holotype.** SUI 11616. Mason City Member of the Shellrock Formation (early Frasnian) at Nora Springs, Floyd County, Iowa. Collected by the writer in 1956 with calcispheres, stromatoporoids and *Phillipsastraea websteri* (Belanski).

**Paratype.** SUI 11617. Same horizon, locality, and collector as the holotype.

**Diagnosis.** Maximum corallite diameter about 14 mm. Major septa up to twenty-five in number and withdrawn both axially and peripherally. Minor septa very suppressed. Dissepimentarium discontinuous.

**Description.** The corallum is dendroid to phaceloid. The largest specimen studied is the holotype, which was incompletely collected and measured about 100 × 90 × 60 mm. before sectioning. Free corallites are subcylindrical, but contiguous ones may have their shape modified by pressure from adjacent corallites. They appear to have attained their full diameter of from 14 to 16 mm. slowly, so that most transverse sections show numerous
corallites of less than maximum diameter. Increase is lateral. The external features of the type specimens are completely masked by matrix.

The wall consists of an inner lamellar layer and a dark outer axial plate; the latter is extremely thin and only clearly visible between touching corallites. The thickness of the wall varies between 0.2 and 1 mm.

TEXT-FIG. 5. Smithiphyllum belanskii sp. nov. ×2. Based on the holotype, SUI 11616 and the paratype, SUI 11617. A, longitudinal sections of the holotype. B, transverse section of the holotype. C, transverse section of the paratype.

The septa are meagrely developed, radially arranged, and are highly differentiated into two orders. The major are smooth and spring from either the interior of the wall or a dissepiment; in addition to being peripherally discontinuous, they are withdrawn axially, so that few extend more than two-thirds the distance to the axis and many

EXPLANATION OF PLATE 89
All figures ×2
Figs. 1–3, 10–12. Smithiphyllum imperfectum (Smith) from the Redknife Formation, N.W.T. GSC 17545.
Figs. 4, 6, 19, 20. Smithiphyllum whitakeri sp. nov. from Redknife Formation, N.W.T. 4, 6, 20, Paratype, GSC 17546. 19, Holotype, GSC 17545.
Figs. 5, 7–9, 14, 15, 17, 18. Smithiphyllum kindlei sp. nov. from the Mount Hawk Formation, Alberta. Holotype, GSC 17544.
Figs. 13, 16. Smithiphyllum belanskii sp. nov. from the Shellrock Formation, Iowa. 13, Paratype, SUI 11617. 16, Holotype, SUI 11616.
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considerably less. The minor septa are mere ridges on the interior of the wall and some are totally suppressed. Number of major septa ranges from none at 3 mm. diameter to twenty-five at 15.5 mm. diameter.

The disseptimental is lonsdaleoid and as viewed in longitudinal section typically consists of a single row of elongate dissejections; two rows occur in parts of some corallites and in places the disseptimentarium is entirely absent.

The tabulae are broad and many are quite complete; in longitudinal section they are mostly very slightly convex or slightly sinuous.

Discussion. The new species resembles Smithiphyllum weberi (Lebedew), particularly specimens figured by Soshkina (1952, pl. 4, fig. 16). It is distinguished by having a slightly more persistent disseptimentarium and by having fewer septa, which number up to seventy in S. weberi.

S. maritense (Stumm) differs from S. belanskii in being slightly smaller and having fewer and considerably less differentiated septa.

Text-fig. 6. Smithiphyllum kindlei sp. nov., ×2. Based on the holotype, GSC 17544. A, transverse section. B, longitudinal section.

Smithiphyllum kindlei sp. nov.

Plate 88, fig. 6; Plate 89, figs. 5, 7-9, 14, 15, 17, 19; text-figs. 6a, b

Name derivation. From the late E. M. Kindle in recognition of his work on the succession of faunas in the Jasper Park region.

Holotype. GSC 17544, Mount Hawk Formation, 350 to 370 feet above base, Roche Ronde, Bosche Range, Jasper National Park, Alberta, 53° 14' N, 118° 01' W. Collected by P. B. Jones in 1960. Elements of the Calcinus albericensis fauna, including Thaumophyllum colemense (Smith) and Smithiphyllum imperfectum (Smith) were collected above and below the type horizon.

Diagnosis. Known maximum width of corallite 15 mm. Maximum septal count fifty. Major septa long and commonly not withdrawn. Disseptimentarium well developed.

Description. The corallum is dendroid. Before sectioning the incomplete fragment of the holotype measured about 90 x 65 x 55 mm. The corallites are subcyindrical where free and have adult diameters of from 12 to 15 mm. Increase is lateral. External features in the type material are largely obscured by matrix but the poorly preserved surface of one corallite bears traces of rugae,
The wall, consisting of a very thin axial plate and an inner lamellar layer, is about 0.4 or 0.5 mm thick in the regions farthest from the septal bases.

The septa are thin, smooth, and gently to moderately sinuous; their arrangement is radial and they are strongly differentiated into two orders. The major septa are generally well developed, some are peripherally discontinuous, and a few are entirely withdrawn from the dissepimentarium. Most, however, are continuous lamellae extending variably from about one-half to the entire distance to the axis. The feebly developed minor septa are typically represented by low crests on the dissepiments and to a lesser extent the tabulae, or by ridges on the interior of the wall. Numbers of major septa range from fourteen at 4 mm, diameter to twenty-five at 15 mm, diameter.

The dissepimentarium is from 1 to 3 mm wide; in places the dissepiments are limited to a single row as seen in longitudinal section, elsewhere they may be up to three deep; they number about ten in 10 mm.

The tabulae are broad and may be quite complete; in some cases their median profile is irregularly sinuous, in others it is peripherally downturned, or there is a peripheral trough.

Discussion. Smithiphyllum kindlei does not closely resemble any previously described species. It is, however, close to an undescribed species also occurring in the Frasnian of Alberta. S. kindlei is smaller, has fewer septa and a less pronounced dissepimentarium, furthermore the septa in S. kindlei are less withdrawn both axially and peripherally.

Smithiphyllum whittakeri sp. nov.
Plate 88, fig. 4; Plate 89, figs. 4, 6, 19, 20; text-figs. 7a, b

Name derivation. From the late E. J. Whitaker, the pioneer geologist and collector on Jean Marie and neighboring rivers.

Holotype. GSC 17545. Redknife Formation (late Frasnian), middle Jean Marie Gorge, N.W.T., about 60° 24' N., 121° 10' W. Collected by B. de Wit in 1937. Specimens of Tubiphyllum sp., close to T. mecmellii (Whiteaves), Smithiphyllum imperfectum (Smith), Devonopodotatus sp., Atrypa clipes Crickmay, Spirotyphya sp., Vanderbeekhotta kobayashii Crickmay, and Paracyclus sp. were also present in the collection.

Paratype. GSC 17546. Same horizon, &c., as holotype.

Diagnosis. Corallum probably loosely aggregate. Corallite wall thin. Corallites up to 14.5 mm in diameter. Major septa number up to twenty-seven, regularly withdrawn axially. Minor septa comparatively well developed. Dissepimentarium narrow, but regular.

Description. Fragments only of the corallum are available and it is not known whether the coral is weakly aggregate or truly fasciculate. The corallites are subcylindrical and have an adult diameter of from 12 to 14.5 mm. Increase is lateral. Fine rugae are present on the exterior, but there are no intersepal ridges.

The wall consists of a very narrow exterior axial plate and a lamellar layer; in the parts furthest from the septal bases it is about 0.5 mm thick.

The septa are thin, smooth, and most are gently sinuous as seen in transverse section; a few, however, are crenulate. They are radially arranged and clearly differentiated into two orders. The major septa are typically continuous lamellae, although some are
discontinuous in the dissepimentarium; they are withdrawn from the axis leaving a region from 2 to 4 mm wide devoid of septa. The minor septa, which are mere ridges in young stages, become well developed in later stages; in adult corallites they are about one-half as long as the major and occur as discontinuous crests on the dissepiments and tabulae. Numbers of major septa range from nineteen at 4.5 mm diameter to twenty-seven at 14.5 mm diameter.

As seen in longitudinal section the dissepimentarium is typically a single row of comparatively large dissepiments, numbering from ten to twelve in 10 mm; it is about 2 mm.

![Image](image.png)

**Text-fig. 7.** Smithiphyllum whittakeri sp. nov. ×2. Based on the holotype, GSC 17545. A, transverse section. B, longitudinal section.

wide and fairly constant, although it is absent immediately below a lateral offset in the holotype.

The tabulae are broad and many are quite complete; in median profile they tend to be flat, or gently sloping, in the axial region, and sigmoidal at the periphery.

**Discussion.** The species is reminiscent of Smithiphyllum weberi (Lebedew), but differs in having considerably more prominent minor septa and a less lonsdaleoid dissepimentarium.

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**REFERENCES**


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