

**A NEW ZLICHOVIAN (EARLY DEVONIAN) SPECIES
OF THE RUGOSE CORAL GENUS *ZELOLASMA*
FROM THE EIDS FORMATION OF ELLESMERE ISLAND, NORTHWEST TERRITORIES**

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Abstract

***Zelolasma**, sensu stricto, is known from the Pragian of Tadzhikistan, late Pragian or early Zlichovian of New South Wales, early Zlichovian of Ellesmere Island, and Dalejan of Taymyr. Reported occurrences in the late Lochkovian of Salair and the Dalejan or Eifelian of Gansu have yet to be substantiated. Forms resembling **Zelolasma**, but differing from it by lacking discrete adaxial septal fragments, are known from the Ludlow Series of New South Wales and the Upper Silurian (Ludlow or Pridolian equivalent) of the southern Urals.*

***Zelolasma apsidiferum** sp. n. is described from high strata of the Eids Formation, 20.5 km west of the head of Sor Fiord, southwestern Ellesmere Island. The type horizon of the new coral is in the **Polygnathus dehiscens** Zone, which spans the Pragian/Zlichovian boundary. However, the age of the type stratum is judged to be early Zlichovian, rather than late Pragian, because it overlies probable Zlichovian brachiopods, as well as spores dated approximately as middle Emsian (equivalent to late Zlichovian).*

Résumé

*Le **Zelolasma**, au sens strict, a été identifié dans le Pragien du Tadzhikistan, le Pragien récent ou le Zlichovien ancien de la Nouvelle-Galles du Sud, le Zlichovien ancien de l'île Ellesmere et le Dalejan de Taymyr. La présence de ce fossile dans le Lochkovien récent de Salair et dans le Dalejan ou l'Eifélien du Gansu n'a pas encore été vérifiée. Des formes semblables, qui diffèrent du **Zelolasma** par l'absence de fragments septaux adaxiaux discrets, ont été identifiées dans la série de Ludlow en Nouvelle-Galles du Sud et dans le Silurien supérieur (équivalent au Ludlowien ou au Pridolien) des montagnes de l'Oural du Sud.*

*Les auteurs décrivent une nouvelle espèce, **Zelolasma apsidiferum**, qui provient des couches supérieures de la formation de Eids, à 20,5 km à l'ouest du sommet du fjord Sor dans le sud-ouest de l'île Ellesmere. L'horizon type du nouveau corail est la zone de **Polygnathus dehiscens**, qui embrasse la limite du Pragien et du Zlichovien. Toutefois, le stratotype daterait du Zlichovien ancien plutôt que du Pragien récent puisqu'il recouvre des brachiopodes d'origine probablement zlichovienne, ainsi que des spores datant de l'Emsien moyen environ (équivalent au Zlichovien récent).*

Introduction

With the exception of some Upper Devonian corals illustrated by Embry and Klovan (1971, 1972) from Banks Island, all of the Devonian corals previously figured or described from the Canadian Arctic Archipelago have derived from either the Blue Fiord or Bird Fiord formations. Much of the Eids Formation, especially in the type area of southwestern Ellesmere Island, consists of poorly exposed, fine grained, clastic sediments, that either lack or have few megafossils. Known shelly faunas of the formation have come from limestone members exposed on west central Ellesmere Island (Trettin, 1978) and from calcareous shales near the top of the formation, 20 to 35 km west of the head of Sor Fiord (Jones and Smith, 1980).

Corals from the upper limestone member of the Eids Formation near Vesle Fiord, west central Ellesmere Island, have been identified by one of us (Pedder, in Trettin, 1978, p. 114) as **Favosites** sp., **Thamnopora** sp., **Pseudamplexophyllum** sp. n., **Xystriphyllum** sp. and **Stringophyllum** sp. n. It is hoped that this probable Pragian assemblage will be described in the future. The present work describes and names the only rugose coral so far collected from the Eids Formation of southwestern Ellesmere Island.

Acknowledgments

We are grateful to D.C. McGregor and T.T. Uyeno, both of the Geological Survey of Canada, for identifying spores and conodonts that help date the new coral. L. Sherwin, of the Geological Survey of New South Wales, kindly allowed Pedder to examine a coral, collected by him in New South Wales, that has a bearing on the distribution of **Zelolasma**. A.I. Lavrusevich, of the Tadzhikskiy Gosudarstvennyy Universitet, Dushanbe, also aided our assessment of the distribution of **Zelolasma** by sending photographs of a specimen from Tadzhikistan.

Biostratigraphy

The type horizon of **Zelolasma apsidiferum** is in a stratigraphic unit comprising 4 m of dark grey, very thin-bedded, argillaceous limestone. Abundant favositid and alveolitid corals constitute most of the fauna. The top of the unit is 30.9 m stratigraphically below the contact between the Eids and overlying Blue Fiord formations. The thickness of the Eids Formation in its type area is not known precisely. McLaren (1963, p. 318) estimated it to be "not less than 1,000 feet", and the Panarctic ARCO et al. Blue Fiord E-46 well, which was located about 20 km WNW of the type

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locality of *Zelolasma apsidiferum*, spudded in the Eids Formation and drilled 480.4 m before entering the underlying Cape Phillips Formation (Mayr et al., 1978, p. 393). These data suggest that the *Zelolasma apsidiferum*-bearing unit is more than 400 m above the base of the Eids Formation.

A widely distributed, late Pragian to early Zlichovian conodont, *Polygnathus dehiscens* Philip and Jackson, has been recovered from near the top of the Eids Formation at GSC loc. C-12504 (Uyeno and Klapper, 1980, p. 83), which is about 8 km east of the type locality of *Zelolasma apsidiferum*. Field work by one of us (Smith) indicates that the type horizon of the new coral is stratigraphically above the horizon of GSC loc. C-12504.

The *Zelolasma apsidiferum*-bearing unit is 27 m above beds that yielded the brachiopod fauna of Jones and Smith's (1980) locality G. Forms identified from this locality are *Cortezorthis maclareni* Johnson and Talent, *Parapholidostrophia sorensis* Jones, *Phragmostrophia* sp., *Parachonetes?* sp., *Carinagypa aseptata* Johnson, *Trigonirhynchia* sp. aff. *T. occidentis* (Walcott), *Athyrynchus loriei* Jones, *Atrypa* sp. aff. *A. aspiformis* Lenz, and "*Fimbrispirifer*" *scheii* (Meyer). A Zlichovian age is suggested by this assemblage.

Conodonts (GSC loc. C-86753) and spores (GSC loc. 97206) have been isolated from 78.7 m below the unit bearing *Zelolasma apsidiferum* by T.T. Uyeno and D.C. McGregor. The conodont fauna is small. A 983 g sample from C-86753 yielded only *Belodella* sp., *Panderodus* sp., and a single fragment of a Pa unit of a *Pandorinellina* sp., indicating an Early or Middle Devonian age. The spore assemblage is much more abundant and diverse. McGregor (personal communication, September 1982) provided the following floral list: cf. *Archaeozonotriletes varius* Nadler, ?*Convolutispora* sp., *Dibolisporites echinaceus* (Eisenack) Richardson, cf. *Dictyotriletes emsiensis* (Allen) McGregor, *Punctatisporites* sp., *Retusotriletes antiquus* Naumova ex Kedo, *R. rotundus* (Streel) Streel, and *Verruciretusispora dubia* (Eisenack) Richardson and Rasul. This assemblage includes several undescribed species which distinguish it from other known assemblages. It is approximately dated as middle Emsian.

Zelolasma apsidiferum occurs low in the apparent range of *Polygnathus dehiscens* in the area, which is from some level high in the Eids Formation to 141 m above the base of the Blue Fiord Formation (Uyeno and Klapper, 1980, p. 83). Our interpretation of the occurrence of probable Zlichovian brachiopods and spores (middle Emsian is roughly equivalent to late Zlichovian) below the apparent range of *Polygnathus dehiscens*, is that this range is significantly less than the full range of the taxon. That is, it is a teilzone. Nevertheless, we recognize that although *Zelolasma apsidiferum* is probably Zlichovian, it must be very early Zlichovian, because possibly as much as 600 m of overlying Eids and Blue Fiord strata are also of Zlichovian age (Table 8.1 and Figures 8.2, 3 of Uyeno and Klapper, 1980).

Systematic Paleontology

Family COLUMNARIIDAE Nicholson, 1879

Subfamily TROPIDOPHYLLINAE Pedder, 1983

Genus *Zelolasma* Pedder, 1964

Zelolasma Pedder, 1964, p. 364, 365.

Type species. *Diphyphyllum gemmiforme* Etheridge, 1902, p. 253-255, Pl. 37, fig. 1; Pl. 39, figs. 1, 2; Pl. 40, fig. 1. "Cave Limestone-Middle Devonian"; holotype from Taemas Bridge road, north bank of Murrumbidgee River, Parish of

Warroo, County Murray, New South Wales, Australia (Hill, 1940b, p. 259). The type stratum is now assigned to the Cavan Limestone, and is either late Pragian or early Zlichovian. Pedder (in Pedder et al., 1970, p. 232-234, Pl. 44, figs. 1, 3, 6; Pl. 46, fig. 17, text-fig. 10) has monographed the species with a full synonymy, and new illustrations of typical examples of it have been published by Hill (1981, Fig. 180, 1a, b).

Diagnosis. Fasciculate genus of tropidophyllinid corals.

Description. Corallum fasciculate, locally subcerioid or weakly catenoid. Increase marginal, multiple and parricidal in type species, single and nonparricidal in others.

Corallite walls thin. Septa radially arranged. Major septa withdrawn from the axis, so that they are only a little longer than the minor septa. Peripheral ends of septa smooth and straight or only slightly sinuous. Inner parts of the septa are more sinuous, and may be distinctly undulant and carinate. Adaxial terminations of the septa are commonly spinose. Spiniform septal fragments are present in the tabularium. At certain levels, septa become dilated and generally somewhat fusiform. Carination increases at these levels. Trabeculae are finely monacanthate and typically slightly divergent.

Dissepimentarium narrow, consisting of one to mostly not more than a few rows of dissepiments. Despite being narrow, the dissepimentarium is commonly exsert in mature corallites. The shape of the dissepiments is variable, many are either rhomboid or arched, but none is a true horseshoe dissepiment. Tabulae are broad and some are quite complete. They form essentially flat tabularial surfaces.

Assigned species. *Diphyphyllum gemmiforme* Etheridge (1902); *Cylindrophyllum planivesiculosum* Chernyshev (1941); *Zelolasma apsidiferum* sp. n.; ?*Zelolasma cystosa* (an apparent nomen nudum listed by Qin and Gan, 1976).

Distribution. Pragian *Farabophyllum intermedium* Zone of the upper Turkparida Suite, Magian River Basin, Tadzhikistan (Lavrusevich, 1971, p. 85-87, Pl. 4, figs. 1a-v). Late Pragian or early Zlichovian *Polygnathus dehiscens* Zone of the Cavan Limestone, Yass Shelf, New South Wales (type occurrence). Late Pragian or early Zlichovian *Polygnathus dehiscens* Zone of the upper Garra Beds, Molong High, New South Wales (Hill, 1942, p. 183; part of Pl. 6, fig. 6; Strusz, 1965, p. 534, 535, Pl. 72, fig. 7; text-fig. 5). Early Zlichovian part of the *Polygnathus dehiscens* Zone of the upper Eids Formation of southwestern Ellesmere Island (this paper). Dalejan Nganasanskie Beds of central Taymyr (Chernyshev, 1941, p. 11, 12, 53, Pl. 1, figs. 4, 5; Kravtsov in Besprozvannykh et al., 1975, p. 60, Pl. 13, figs. 2a, b).

Reports of the genus in the late Lochkovian Pettsevskiy (Peetz) Horizon of the Salair (Elkin et al., 1982, p. 67, 68), and in the Dalejan or Eifelian Lure Formation near Diebu, Gansu Province (Qin and Gan, 1976, listed on Figure 5), are unsupported by either illustrations or descriptions.

Remarks. The genus has been put into synonymy with *Acinophyllum* McLaren (1959, p. 22, 23) by Birenheide (1978, p. 87), and questionably into *Disphyllum* de Fromental (1861, p. 302, 303) by Ivanovskiy (1976, p. 187). The six known species of *Acinophyllum* are all from the Eastern Americas Realm and have been studied in detail by Oliver (1976, p. 53-68, Pls. 8-29). They differ from species of *Zelolasma* in having flanged carinae and consistently inwardly inclined dissepimentarial surfaces, and their tabularia lack spiniform septal fragments. An acceptable interpretation of *Disphyllum* has been given by Hill (1981, p. 264-266). *Disphyllum* differs from *Zelolasma* in lacking spiniform septal fragments and in having less undulant and carinate septa and longer major septa. Its dissepimentaria are rarely everted as those of *Zelolasma* are.

Since the inception of the genus *Zelolasma*, several species and forms have been transferred from other genera to it, with varying degrees of certainty. Of these corals, only *Cylindrophyllum planivesiculosum* Chernyshev is retained in *Zelolasma*, sensu stricto.

Disphyllum praecox Hill (1940a, p. 398, 399, Pl. 11, figs. 15-17) from the Silverdale Formation (Ludlow age), near Yass, New South Wales, was questionably assigned to *Zelolasma* by Pedder (1964, p. 365) and by McLean (1976, p. 188, 189). A specimen of a somewhat similar form, from the Upper Silurian on Yamashla River, west slope of the southern Urals, which was described and figured by Soshkina (1937, p. 63, 64, Pl. 17, figs. 1, 2) as *Acervularia luxurians* var. *brevisseptata* Weissermel, and refigured by Ivanovskiy and Shurygina (1975, Pl. 13, figs. 4a, b) as *Acervularia* ?sp., was considered to be a species of *Zelolasma* by Lavrusevich (1971, p. 85), and to be a possible member of the genus by McLean (1976, p. 188). Both of these forms are, indeed, similar to *Zelolasma*, sensu stricto, but lack signs of any spiniform septal fragments in their tabularia.

Thamnophyllum abrogatum Hill (1940b, p. 260, 261, Pl. 10, figs. 4a, b) from the Cavan Limestone (Late Pragian or early Zlichovian), in the Taemas region of New South Wales, was referred to *Zelolasma* by Pedder (1964, p. 365; in Pedder et al., 1970, p. 234). This assignment, however, is not satisfactory, because of the strongly dilated septa, coarse monacanth and small presepiments that are present in the coral. It would seem that a new genus is required for *Thamnophyllum abrogatum*, but the available material of the species is limited – at present, only two specimens are known to us.

Thamnophyllum curtum Hill (1940b, p. 261, 262, Pl. 10, figs. 5a, b), from the Zlichovian part of the Taemas Limestone of the Taemas and Wee Jasper areas of New South Wales, has also been placed in *Zelolasma* by Pedder, at first without qualification (Pedder, 1964, p. 365) and later with doubt (in Pedder et al., 1970, p. 234, 235). This and the form identified as a new species of *Zelolasma* by Pedder (1964, p. 365), and as cf. *Zelolasma* sp. by Philip and Pedder (1968, p. 1034), from a level now known to be Dalejan, in the Mount Frome Limestone, near Mudgee, New South Wales, are here considered more likely to be members of the subfamily Spongonariinae than of the subfamily Tropidophyllinae.

Similarities between *Zelolasma gemmiforme* and *Hexagonaria mayendorfi* Le Maître (1952, p. 59, 60, Pl. 5, figs. 1-3), from the "Emsien inférieur" (?Zlichovian), between Beni Abbès and Kerzaz in southern Algeria, were noted by Pedder (1964, p. 365). They are probably responsible for Hill's (1981, p. 280) record of the possible occurrence of *Zelolasma* in the Lower Devonian of Algeria. However, the Algerian species is entirely cerioid, and exterior calicular views, shown in Figure 1 of Le Maître's Plate 5, indicate that it has long major septa.

Schlueteria verrucosa Soshkina (1952, p. 100, Pl. 40, fig. 138, text-fig. 118), from the Voronezh, Evlanova and Liven Horizons (all Frasnian) of the Russian Platform, was removed to *Zelolasma* by Spasskiy (1977, p. 63). We agree with Rozkowska and Fedorowski's (1972, p. 291) decision to place it in the genus *Disphyllum*.

Spasskiy (1977, p. 63) also removed *Schlueteria lyskovensis* Ermakova (1957, p. 163-165, Pl. 2, fig. 2; Pl. 2 [two plates numbered 2], figs. 3-5; Pl. 3, figs. 1, 2), from subsurface beds of the upper Voronezh Horizon (Frasnian) of the Russian Platform, to *Zelolasma*. Illustrations of the internal morphology of the holotype of this species have not been published, but good thin sections of a paratype show that at least part of the type series should be assigned to the genus *Peneckiella*.

A coral, of probable Ludlow age, from the Mirrabooka Formation of the Cheesemans Creek region, in east central New South Wales, was listed as *Disphyllum* cf. *praecox* Hill by Sherwin (1971, p. 215) and subsequently referred questionably to *Zelolasma* by McLean (1982, p. 20). Through the kindness of L. Sherwin, Pedder has been able to examine this coral. It has a narrow, discontinuous and inwardly sloping dissepimentarium and long thin major septa, and is not *Zelolasma*, as the genus is interpreted in this paper.

Zelolasma apsidiferum sp. n.

Plate 22.1, Figures 1-7

Type series. Holotype, GSC 71260; paratype GSC 71261. Both from 30.9 to 34.9 m below top of the Eids Formation; early Zlichovian part of the *Polygnathus dehiscens* Zone. Southwestern Ellesmere Island, recessive beds above first bluff, near the convergence of two small creeks, 20.5 km west of the head of Sor Fiord; 77° 18'N latitude, 85° 17'W longitude. Collected by Gary P. Smith, August 1978 (Field no. DA27).

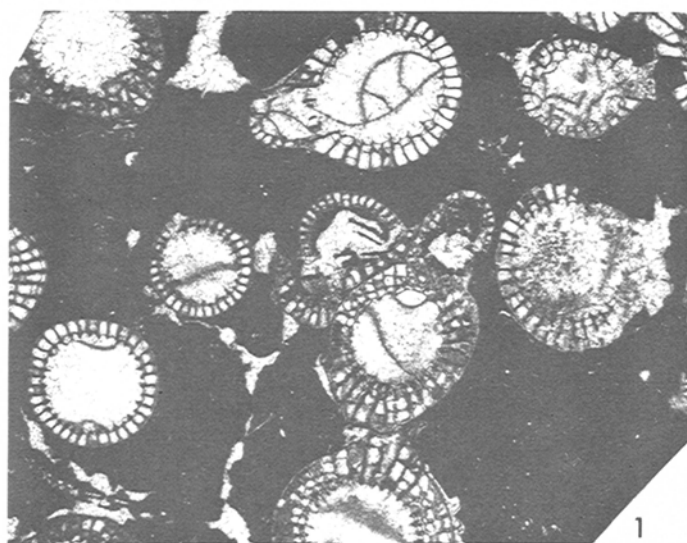
Diagnosis. Dendroid species of *Zelolasma* with marginalial nonparricidal increase. Adult corallites have a mean diameter of 5.0 to 6.5 mm, and 17x2 or 18x2 septa.

Description. Corallum irregularly shaped, dendroid, with the tendency for groups of three or four corallites to be attached to each other and aligned like links in a chain. Corallites attain a maximum mean diameter of 5.0 to 6.5 mm. Their direction of growth changes every centimetre, or so, with the result that long, longitudinal thin sections are difficult to obtain. Increase is marginalial and nonparricidal; normally only one offset is produced at a time. The type material is embedded in matrix, transverse sections suggest that septal furrows and interseptal ridges are variable.

The outer corallite wall is continuous and mostly 0.06 to 0.1 mm thick (total observed range 0.03 to 0.13 mm). It normally embeds the septal bases, but, in places, is continuous with them. Arrangement of the septa is radial. Minor septa just project from the dissepimentarium; major septa are only slightly longer than the minor septa, and normally extend only about one half of the distance to the axis. The full septal count of 17x2 or 18x2 is acquired as the corallite diameter enlarges from about 3.3 to 3.5 mm. Most of the septa are thin and only slightly undulant; some are more strongly undulant; a few, particularly at levels where the septa are dilated, bear zig-zag carinae. Adaxial ends of the septa may be slightly spinose. Short, spiniform septal fragments are present in parts of the tabularia. Typically, they are confined to an intertabularial space and do not penetrate the overlying tabula. Trabeculae are fine monacanth that are only slightly divergent.

In early stages, the narrow dissepimentarium is inwardly inclined and comprises a single row of small globose dissepiments. In later stages, the dissepimentarium increases only a little in width, but develops everted dissepimentarial surfaces. In the mature dissepimentarium many of the dissepiments are rhomboid, or almost symmetrically arched and additional vesicles may be added on either side of the high point of the dissepimentarium. An internal wall, typically 0.05 to 0.15 mm thick and formed by sclerenchymal thickening of the inner surface of the dissepimentarium, is present in many corallites. Tabular are broad, many are complete. Tabularial surfaces are mostly flat or slightly concave, a few are sloping or slightly convex.

Remarks. Compared with the new species, *Zelolasma planivesiculosa* (Chernyshev) is larger (adult corallite diameter 6 to 8 mm), has more numerous (19 x 2 or 20 x 2) and more strongly differentiated septa (major septa almost twice as long as minor septa), and has tabularial surfaces that tend to be broadly convex, rather than flat or concave.



1



2



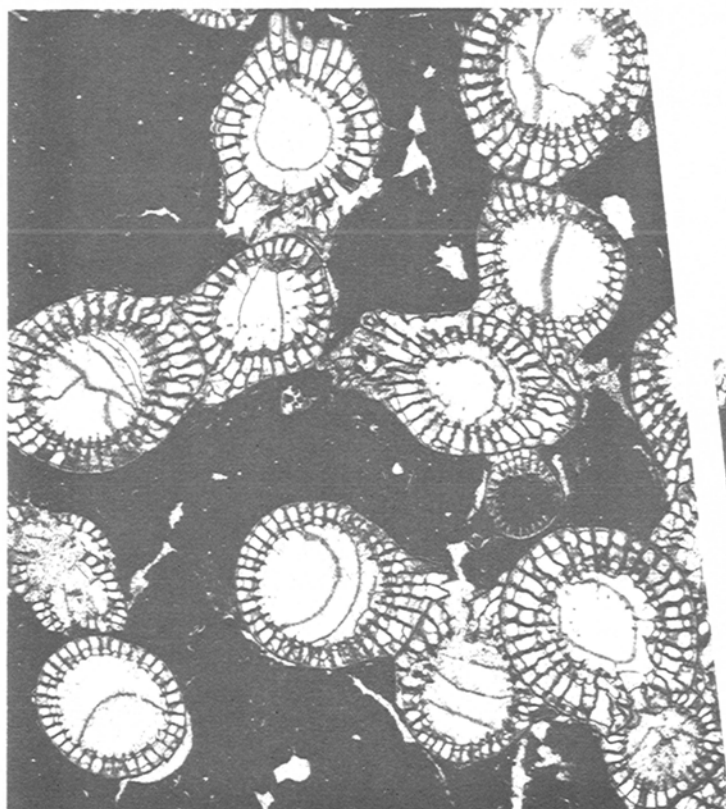
3



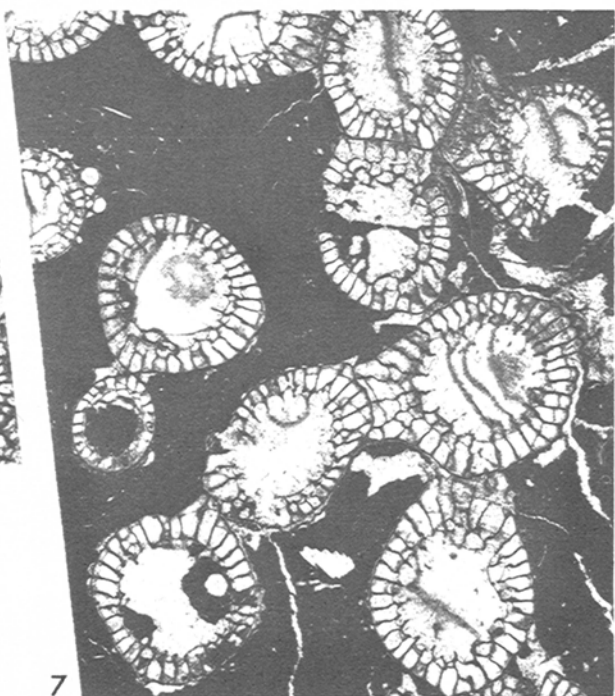
5



4



6



7

Plate 22.1

Figures 1-7. *Zelolasma apsidiferum* sp. n.
Holotype, GSC 71260
1, 6, 7. Transverse thin sections, X4.
2-5. Longitudinal thin sections, X4.

Zelolasma gemmiforme (Etheridge) is not likely to be confused with the new species. Its corallites are larger with diameters of as much as 15 mm, and have as many as 26 x 2 septa. Its septa are more carinate, and the mode of increase in *Z. gemmiforme* is multiple and parricidal, whereas in *Z. apsidiferum* it is neither multiple nor parricidal.

The trivial name of the new species is Latin, *apsis*, -*idis*, meaning arch, and the suffix *fer*, -*a*, -*um*, meaning to bear or carry. It refers to the arch-like dissepiments of the species.

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