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MORPHOLOGY, TAXONOMY AND DISTRIBUTION OF THE CRETACEOUS CORAL GENUS *PREVERASTRAEA* (LATE BARREMIAN-CENOMANIAN; SCLERACTINIA)

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Abstract. The Cretaceous coral genus *Preverastraea* is being revised, mainly on the basis of sample material. This cerioid, occasionally astreoid or phaceloid, genus is characterised by round or polygonal calices, compact septa in a regular hexameral symmetry and lonsdaleoid septa. The wall is of the same structure as the septa. The genera *Bogdanovicoenia*, *Paraacanthogyra*, and *Saxuligyra* are considered synonyms of *Preverastraea*. Related genera are *Aulastraeopora* and *Apoplacophyllia*, which only differ by their solitary or dendroid growth forms. There are altogether 13 species of *Preverastraea*. The genus, which occurred worldwide, is restricted to the period from the Late Barremian to the Late Cenomanian, being most common in the Aptian to Early Albian. Eighty-three samples are either known from the literature or have been to hand. This makes *Preverastraea* a rather rare genus.

Riassunto. Il genere *Preverastraea,* corallo del Cretacico, è stato revisionato principalmente sulla base di materiale raccolto sul terreno. Questo genere di tipo cerioide, occasionalmente tamnasteroide o faceloide, è caratterizzato da calici circolari o poligonali, da setti compatti arrangiati secondo una simmetria esamerale e da setti di tipo lonsdaleoide. La muraglia presenta la stessa struttura dei setti. I generi *Bogdanovicoenia*, *Paraacanthogyra* e *Saxuligyra* sono considerati sinonimi di *Preverastraea*. Generi simili come *Aulastraeopora* e *Apoplacophyllia* si differerenziano solo per la forma di crescita di tipo solitario o dendroide. In totale le specie di *Preverastraea* sono 13. Il genere, diffuso a scala globale e ristretto al periodo che va dal dal Barremiano superiore fino al Cenomaniano superiore, è maggiormente presente nell'Aptiano e nell'Albiano inferiore. Gli ottantatre esemplari che dall'esame della letteratura, o da campionamenti, risultano essere finora presenti, rendono *Preverastraea* un genere piuttosto raro.

Introduction

In 1909 Prever created the new genus *Aulastraeopora*, based on material from the Aptian of the Monti d'Ocre mountains in Italy. In the new genus Prever (1909) collected solitary as well colonial species with the same skeletal structure. The genus remained unknown; Wells (1932) established *Blothrocyathus* from the Aptian of Texas (which later turned out to be a junior synonym of *Aulastraeopora*). Various new species which are now considered *Preverastraea* were established and assigned to other genera by Wells (1932) and Hackemesser (1936).

After studying the type material, Beauvais (1976) separated the colonial coral species from *Aulastraeopora*, and created a new genus *Preverastraea*. She named the new genus after the Italian palaeontologist Pietro Lodovico Prever, the author of the large monograph on corals from the Monti d'Ocre complex. The description of the new genus was short but accurate. Beauvais did not mention any species of the new genus but provided illustrations of four species of material from the Prever collection. Species assigned to other genera but in reality belonging to *Preverastraea* were not considered by her. Until that time the genus *Preverastraea* was only known from the type locality in the Monti d'Ocre mountains. Later on knowledge of the genus was considerably enlarged by Morycowa & Marcopoulou-Diacantoni (1997, 2002), who described new material from Greece as well as reassigning to *Preverastraea* material formerly described by Hackemesser (1936) as *Phyllocoenia*.

The re-examination of the Italian type material, the collection of new material, mainly in Europe and Mexico, and the study of various coral type collections by the author revealed, on the one hand, that more *Preverastraea* species were originally established under other generic names, such as *Amphiastrea*, *Orbicella*,

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Paraacanthogyra, *Pleurostylina*, *Saxuligyra*, *Stiboriopsis*, and *Stylina*, and, on the other, that two species formerly considered *Preverastraea* did not belong to this genus but to new, as yet undescribed genera. Using previously unpublished material from Greece, Italy, Japan, Mexico, Tanzania, and the USA, the genus has been revised at both the generic and species level.

Abbreviations

The following abbreviations are used:

BSP, Bayerische Staatssammlung für Paläontologie und Geologie München, Germany,

CGS, Česká geologická sluzba, Praha, Czech Republic,

ERNO, Instituto de Geología, Estación Regional de Noroeste, Universidad Nacional Autónoma de México, Hermosillo, Mexico,

GSI, Geological Survey of India, Calcutta, India,

MB, Naturkundemuseum der Humboldt-Universität Berlin, Germany,

NIGP, Academia Sinica, Nanjing Institute of Geology and Palaeontology, China,

NMB, Naturhistorisches Museum Basel, Switzerland,

PU, Universita' degli Studi di Torino, Dipartimento di Scienze della Terra, Italy,

TMM, Texas Memorial Museum, Austin, USA,

TUM, The Tohoku University Museum, Sendai, Japan,

UJ, Jagiellonian University, Instytut Nauk Geologicznych, Kraków, Poland,

cl, inner calicular diameter (lumen),

cn, calicular diameter of the inner calice,

ccd, distance of calicular centres,

s, number of septa,

slo, number of lonsdaleoid septa.

The abbreviations used in the synonymy lists follow Matthews (1973):

*, earliest valid publication of the species name,

?, the assignation of this description to the species is doubtful,

non, the described material does not belong to the species concerned,

p, the described material belongs only in part to the species concerned,

v, the specimen was observed by the author.

Material

The material comes from various localities. Most of them are listed, commented and provided with additional references in Löser et al. (2005). Only details not reported in the 2005 publication are mentioned here. If no sample number is given, the material from the locality concerned was not available for study. Each sample number refers to only one specimen.

China

Xizang (= Tibet), Xainza county, Xungmai district, Qinggar, W Gomang lake (RC.2239 in Löser et al. 2005); Late Aptian to Albian. Samples: NIGP 65822, 65823, 65824.

Czech Republic

Central Bohemian region, Kolín, Vitezov (CZ.730); Bílá hora Formation, Late Cenomanian. Sample: CGS HF 1682.

Central Bohemian region, Praha, Neratovice (CZ.1753); Peruc-Koryzany Formation, Korycany Member, Late Cenomanian. Sample: CGS HF 2483.

Greece

Fokída, Agrostylia (GR.3537). Palaeontological data are published in Morycowa & Marcopoulou-Diacantoni (1997, 2002). The stratigraphy is discussed in Löser (2005: 237). The *Preverastraea* samples described by Morycowa & Marcopoulou-Diacantoni (1997, 2002) are very probably from the (? Early) Aptian, not from the Late Albian/Early Cenomanian.

Fokída, Agrostylia, Mariolada, S of the Kria Vrissi spring; (? Early) Aptian. Within the area of GR.3537, but distinguished by lithology. Sampled by the author. Samples: BSP 2003 XX 4123, 5438, 5439, 5440, 5447.

Fokída, Kiona mountains, Panourgias (= Dremisa) (GR.61). Material collected by Carl Renz and revised by Hackemesser (1936) without exact stratigraphy. The *Preverastraea* samples are very probably from Aptian to Albian or even very Early Cenomanian sediments. Samples: NMB D 6119, D 6120, D 6121, D 6125, D 6139, n/n.

Fokída, Kiona mountains, Panourgias (= Dremisa), sample location 5. Material collected by the author, probably of Aptian age, as indicated by rudists found with the corals. Sample: BSP 2003 XX 4722.

Kozani, Nea Nikopolis, sample location c4; Early Cenomanian. Locality briefly described by Brunn (1956); the gastropod fauna was revised by Kollmann (1987). Dated with *Orbitolina* (*Conicorbitolina*) *corbarica* and *Ichthyosarcolites* sp. as Early Cenomanian. Samples: BSP 2003 XX 6170.

Viotía, Aliartos, Diakopi plateau (GR.541); Evangelistria Schichten, Aptian. Samples: BSP 2003 XX 5441, 5444, 5445, 5446.

Viotía, Levadia, Perachorion, sample location 1 (GR.539); Evangelistria Schichten, Early Aptian. Sample: BSP 2003 XX 5739.

Viotía, Levadia, Perachorion, sample location 2; Evangelistria Schichten, Early Aptian. For details compare GR.539. Sample location 2 is a locality about 500 m NWW from sample location 1 on a recultivated area. The sample was collected in 1997 by the author. Sample: BSP 2003 XX 5772.

India

Tamil Nadu, NW of Moraviatoor (IND.670); Uttattur Gp, Dalmiapuram Fm, Late Albian. Sample: GSI 1766, 1767.

Tamil Nadu, Karai (IND.3235); Uttattur Gp, Dalmiapuram Fm, Late Albian. Sample: GSI 1768.

Italy

Abruzzi, L'Aquila, Monti d'Ocre; (?) Late Aptian (I.171). The locality "Monti d'Ocre" comprises several sample points which (as far as they have been found) belong to one and the same lithostratigraphic unit. They are lined up on a platform-basin transect and represent various facies types. Uncertainty about the stratigraphy is discussed in Löser (2006). Various sample locations are distinguished as follows (see also Parona 1909):

Fossa Mezza Spada (I.1732). Samples: PU 17938, 17952, BSP 2003 XX 5332.

Fossa Cerasetti (I.1734). Samples: PU 17939, PU 17940#1, 17940#2, 17940#3, 17948, 17949, 17950, 17954.

Fonte Cerasetti. The sample point lies between sample points 5 and 6 (Parona 1909). The material was sampled by the author in 1997. Sample: BSP 2003 XX 5322.

Japan

Iwate-ken, Shimohei-gun, Iwaizumi-cho, Moshi, Matsushima (JP.154); Hiraiga sandstone, Aptian to Early Albian. Sample: TUM 65326.

Mexico

Guerrero, Ciudad Altamirano, Chumbitaro, west flank of the Mal Paso syncline; Mal Paso Fm, Late Albian to Early Cenomanian.

The extensive coral fauna is still being prepared for publication by Harry Filkorn (Los Angeles). Data on the location and stratigraphy are provided by Buitrón-Sánchez & Pantoja-Alor (1998). Sample: BSP 2003 XX 2351.

Sonora, Municipio Arizpe, Arizpe, Cerro La Ceja; Mural Limestone, base of the Cerro La Espina Mbr, Early Albian. Samples: ERNO L-4270, L-4273, L-4274.

Sonora, Municipio Arizpe, Arizpe, Cerro La Ceja; Mural Limestone, top of the Cerro La Espina Mbr, Early Albian. Samples: ERNO L-4485, L-4486.

Sonora, Municipio Cucurpe, Cucurpe, La Mesa; Mural Limestone, base of the Cerro La Espina Mbr, Early Albian. Sample: ERNO L-4279.

Sonora, Municipio Cucurpe, Magdalena, La Lámina; Mural Limestone, top of the Cerro La Espina Mbr, Early Albian. Sample: ERNO L-4421.

Sonora, Municipio Opodepe, Tuape, Cerro de la Espina; Mural Limestone, Cerro La Espina Mbr, Early Albian. This locality corresponds to the sample point of the material described by Baron-Szabo & González-León (2003). The exact location within the Cerro La Espina Mbr is unknown, but the corals are most probably derived from the base. Samples: ERNO 3151, 3154, 3166, 3188.

Sonora, Municipio Opodepe, Tuape, Cerro de la Espina; Mural Limestone, base of the Cerro La Espina Mbr, Early Albian. Samples: ERNO L-4226, L-4235, L-4249, L-4250, L-4290, L-4291, L-4292, L-4303, L-4304, L-4433, L-4454.

Sonora, Municipio Santa Ana, Santa Ana; Mural Limestone, base of the Cerro La Espina Mbr, Early Albian. Sample: ERNO L-4816.

Sonora, Municipio Ures, Cerro de Oro (MEX.3201); Cerro de Oro Formation, Early Barremian to Early Aptian. This locality corresponds to the sample point of the material described by Baron-Szabo & González-León (1999). The exact location within the Cerro La Espina Mbr is unknown, but the corals are most probably derived from the base. Samples: ERNO 2141A, 2148-I, 2148-II, 2157, 2160.

Sonora, Municipio Ures, Cerro de Oro; Mural Limestone, Cerro La Espina Mbr, Early Albian. This locality corresponds to the sample point of the material described by Baron-Szabo & González-León (2003). The exact location within the Cerro La Espina Mbr is unknown, but the corals are most probably derived from the base. Samples: ERNO 3066, 3139.

Sonora, Municipio Ures, Cerro de Oro; Mural Limestone, base of the Cerro La Espina Mbr, Early Albian. Sample: ERNO L-4387.

Tanzania

Tanganyika, Mtwara, Kiturika Mts, Naiwanga, Naluë (EAT.983); Tendaguru fm, Kiturika mbr, Late Aptian. Sample: MB K 1384.

Ukraine

Sakarpatskaya: Lushanka river basin, ruch. Tysnikovatyj (UA.1412); Kamenelina Fm, Late Barremian to Early Aptian.

USA

Texas, Comal County, Fischer's Store Road (USA.1221); Lower Glen Rose Limestone, Early Albian. Sample: TMM UT-11470.

Texas, Williamson County, Roy Gun Ranch, San Gabriel River, north side; Edwards Limestone, late Middle Albian. The locality denomination is only known from collection material. The site is now probably inundated by the Georgetown lake (pers. comm. Keith Minor, August 2005). Sample: TMM UT-36122.

Details of the localities in Sonora (Mexico) and Texas (USA) are indicated in Löser & Minor (under review).

Methods

Where possible, transversal and longitudinal thin sections were obtained from the samples. Restrictions in the Basel, Calcutta and Turin collections did not allow preparation of thin sections from type material. In these cases acetate peels were drawn from sectioned corals or polished surfaces. Thin sections were examined, using a Zeiss STEMI 2000-C stereo microscope. Counts and measurements were obtained from thin sections, peels and samples or (in very few cases) from the illustrations in the literature. As many measurements and counts as possible were obtained from one colony. Microphotographs for illustration purposes were taken, using a transparency scanner Epson Perfection 4870 Photo with an optical resolution of 4,800 dots per inch. In some exceptional cases, when it was not possible to obtain either thin sections or peels, the specimens were photographed. Scanned images and photographs were transferred to grey-scale bit maps. Their quality was improved, wherever possible, by histogram contrast manipulation (contrast stretching). In a few cases gamma grey-scale correction was used to increase the contrast.

Systematic description

The term 'cycle' or 'septal cycle' refers to radial elements of equal width and length. The first three cycles are assumed to have been formed at the same time (Milne-Edwards 1857: 45; Vaughan & Wells 1943: 35-36).

Order **Scleractinia** Bourne, 1900
Suborder **Rhipidogyrina** Roniewicz, 1976
Family Aulastraeoporidae Alloiteau, 1957

Originally the family Aulastraeoporidae Alloiteau, 1957 was only established for the genus *Aulastraeopora*. Alloiteau assigned the new family to the suborder Amphiastraeina. Its systematic position was discussed by various authors (Kołodziej 1995; Baron-Szabo & Steuber 1996; Löser 1998; Morycowa & Marcopoulou-Diacantoni 1997, 2002; Morycowa & Kołodziej 2001). Details of its history and diagnostic features are provided in Löser (1998). Since Morycowa & Marcopoulou-Diacantoni (2002) its position in the suborder Rhipidogyrina has been well established.

Constitution of the family. *Apoplacophyllia* Morycowa in Morycowa & Marcopoulou-Diacantoni, 2002 (phaceloid/dendroid); *Aulastraeopora* Prever, 1909 (solitary), *Blothrocyathus* Wells, 1932 (considered a synonym of *Aulastraeopora*; compare Löser 1998) and *Preverastraea* Beauvais, 1976. *Bogdanovicoenia* Kuzmicheva, 2002, *Paraacanthogyra* Morycowa & Marcopoulou-Diacantoni, 1997 and *Saxuligyra* Eliášová, 1991 are all considered herein to be synonymous with *Preverastraea* (see below for details). The genus *Budaia* Wells, 1933 was assigned to the family by Baron-Szabo & Steuber (1996) as a valid genus, but later included in the synonymy of *Aulastraeopora* (Morycowa & Kołodziej 2001). The type of *Budaia travisensis* Wells, 1933,

type species of *Budaia*, shows the characteristics of *Tiarasmilia*, probably contradicting the description in Wells (1933). The position of *Tiarasmilia* is still uncertain.

Genus *Preverastraea* Beauvais, 1976

(= *Bogdanovicoenia* Kuzmicheva, 2002, *Paraacanthogyra* Morycowa & Marcopoulou-Diacantoni, 1997, *Saxuligyra* Eliášová, 1991)

Type species: *Aulastraeopora chelussii* Prever, 1909 by original designation in Beauvais (1976).

Remarks on the type species. The type species is a junior subjective synonym of *Stylina multistella* Stoliczka, 1873. According to the IRZN (Ride et al. 1999, Article 67.1.2) the type species remains unchanged even though it is considered a junior synonym. The selection of the type species was a bad choice since it is represented by three very small fragments from different colonies belonging to different species. A lectotype was not selected by Beauvais (1976). Herein PU 17940#1 is therefore designated as the lectotype.

Remarks on synonymy. *Saxuligyra* Eliášová, 1991 (two species were originally created) was not compared with *Preverastraea* by its author. According to Eliášová (1991) the genus is characterised by a neorhipidacanth microstructure, cerioid calicular arrangement, compact free septa in a hexameral symmetry, and a vesicular endotheca. The type material of both species was available to the author for examination. The specimens are greatly recrystallized and hardly any of the fine structures have been preserved. The author noticed that the endotheca consists of tabulae (in the centre of the calice) and of marginal dissepiments. No lonsdaleoid septa are present in the type species (*S. minor*), very probably due to the strong recrystallisation, but in *S. maior* they are present. *Saxuligyra* is therefore considered a junior synonym of *Preverastraea*. *Paraacanthogyra* Morycowa & Marcopoulou-Diacantoni, 1997 was not compared with *Preverastraea* by its authors. The only difference between them might be their multiplication by septal division. This is another genus that is represented by only one small specimen, which may actually be an intermediate stage between a cerioid and an astreoid calicular arrangement (this was not discussed by Morycowa & Marcopoulou-Diacantoni 1997). In this publication its type species is assigned to *P. felixi*, a species also found at the type locality of *Paraacanthogyra parnassensis*. The genus *Bogdanovicoenia* Kuzmicheva, 2002 was not compared with *Preverastraea* by its author and is herein considered synonymous with *Preverastraea*. It shows no structural difference.

Diagnosis. Cerioid, only occasionally astreoid or phaceloid, colony. Calices polygonal or circular. Budding intercalicinal. The septa are compact and free. Six septal systems in bilateral-radial symmetry. Septa with trabecular extensions. Lonsdaleoid septa present. The endotheca is formed by rich vesicular dissepiments (marginal) and tabulae (central). An inner calice formed by dissepiments may be present. The wall is septothecal; its structure is identical with that of the septa.

Species. Thirteen species are distinguished on the basis of the number of septal cycles and their calicular diameter (Fig. 1). As the calicular diameter is often elongated, the larger diameter is decisive and is always measured. The diameter of the inner calice, which often varies even within a colony, is not suitable for species identification. Septal cycles are equally developed in all calices, small or large. The completion of only the first but not the second septal cycle is not helpful for identification of the species. There are practically no specimens without septa of the second cycle. In most cases the first cycle is completed and the second consists of only two or three septa or is completed by lonsdaleoid septa.

Description and discussion of generic characteristics. Colonial coral with a mostly cerioid calicular arrangement, occasionally with an astreoid (due to the absence of the wall) or phaceloid one. In astreoid corals the septa may be confluent or non-confluent. Both cerioid and astreoid modes may appear in one and the same colony (see *Preverastraea diplothecata* in Hackemesser 1936; here Pl. 1, Fig. 5). At genus or species level the

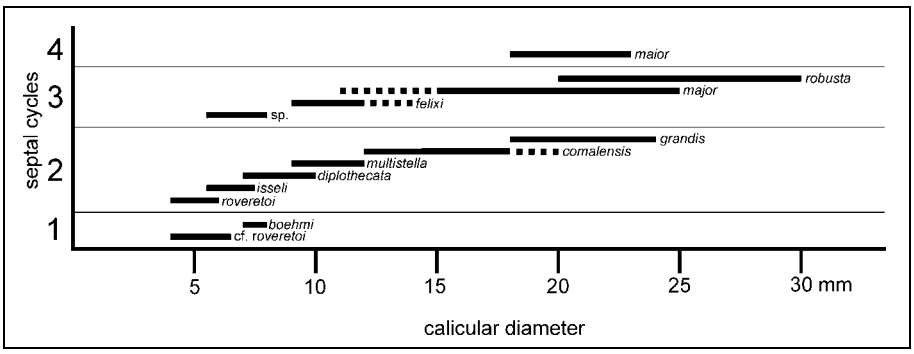

Fig. 1 - *Preverastraea* species with their calicular diameters and septal cycles.

calicular arrangement is therefore unsuitable as a distinguishing feature. Colonies with an astreoid calicular arrangement are rare and only known from the Late Albian of southern India, the Late Albian to Early Cenomanian of the Huetamo platform (Mexico), from some material of the Kiona Massif (Greece) and a few samples from the Early Albian of Sonora (Mexico). An astreoid arrangement only occurs if the calices are large. In astreoid corals the calices are circular. In cerioid and phaceloid corals they are polygonal, often with sharp edges and often elongated (as e.g. in *Acanthogyra*). Cerioid colonies show a pronounced relief where the walls form the highest part and the inner calice the lowest. Phaceloid corals are only known from colonies with small calicular diameters (*P. boehmi*, *P.* cf. *roveretoi*). The calices are densely packed. Each calice has its own wall. The septa are straight or slightly bent, free and compact. They appear in regular cycles in a hexameral symmetry. The cycles are distinguished by their septal thickness and length. The septal surface bears numerous small spines, which are expression of the secondary trabeculae. On their inner tips the septa have small, occasionally branching, trabecular extensions. In addition, the septal inner margin may also show ornamentations comparable to auriculae (as in the lectotype of the type species; see Pl. 3, Fig. 2). In addition to the septa, which run from the wall (if it exists) to the centre of the calice, there are also lonsdaleoid septa running from the dissepimental rings (or the inner calice) to the centre of the calice. They are short and may appear in two cycles. Although regular, they may be present or not in the whole calice. It should be noted that lonsdaleoid septa are not a regular feature of *Preverastraea* (as was assumed by Morycowa & Marcopoulou-Diacantoni 1997); their number may vary greatly even in one colony.

The endotheca consists of dense and regular tabulae in the central part of the calice and of numerous thin and vesicular dissepiments in the margin, which may form one or more regular dissepimental rings. These rings are more common in species of a smaller calicular diameter and less common (although they do appear) in astreoid calices. In certain colonies this ring (called 'pseudo-wall' or 'internal wall' by various authors and herein referred to as 'inner calice') is not only made up of dissepiments but also of skeletal elements having the same structure as septa and wall. The ring may be thick or thin; this may vary even within a colony. In the inner calice the septa normally become thinner and develop trabecular extensions.

The wall shows the same structure as the septa (called 'rhipidotheca' by Morycowa & Marcopoulou-Diacantoni 2002, 'type pruvostastréoïde' by Eliášová 1991). If the wall is not complete (as in astreoid colonies), isolated skeletal elements are found between the

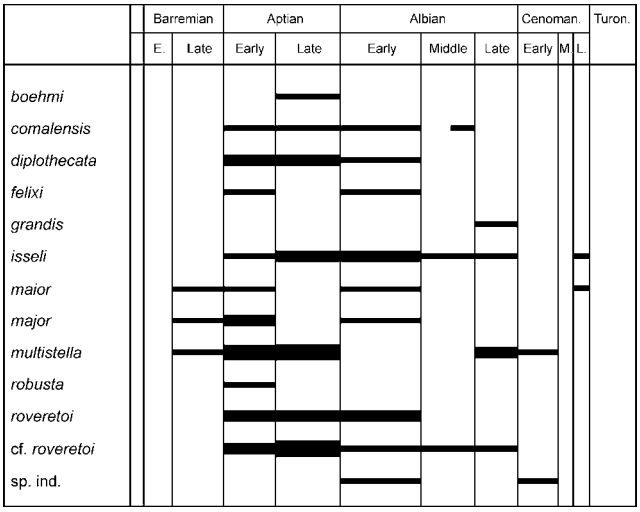

Fig. 2 - Stratigraphic distribution and commonness of *Preverastraea* species. The thickness of the bars indicates the number of regions (not localities) in which the species concerned was found.

calices, and sometimes it is impossible to say whether these are septa or parts of the wall. In cerioid colonies there is only one wall, and no costae are present. In phaceloid colonies each calice has its own wall but no costae are observed. Since the wall has the same structure as the septa, it shows the same ornamentation at its inner face as the septa. The coenosteum, if there is one, consists of thin vesicular dissepiments. Columella and synapticulae are absent.

Budding extracalicular. Marginal budding and septal division are mentioned by Morycowa & Marcopoulou-Diacantoni (1997), but were not clearly observed in the studied material.

The septal microstructure was studied in great detail by Morycowa & Kołodziej (2001) and there is nothing to be added to these observations. The septal microstructure is neorhipidacanth in both wall and septa. There are medium to large-size monoaxial trabeculae with secondary trabeculae branching out from them. The secondary trabeculae are expressed in spines on septal flanks and extensions in the calicular centre. Secondary septa (apophysal septa) clearly do not exist.

Distribution. The genus occurs from the Late Barremian to the Late Cenomanian. The occurrence in the Late Barremian is restricted to the Cerro de Oro Formation in Sonora (Mexico) and the Lushanka river basin (Ukraine). In both regions sediments are dated as Late Barremian to Early Aptian. At least for the Cerro de Oro Formation a Early Aptian age is more probable than a Late Barremian one (see Löser & Minor, under review) so that the first occurrence of *Preverastraea* is probably in the Early Aptian. The last occurrence is in the Late Cenomanian of the Czech Republic. The genus is most common in the Aptian to Early Albian (Fig. 2). *Preverastraea* with 83 known samples is a rare genus,

even with 13 distinguished species. Most examined samples are from a few localities: the Late Aptian of the Monti d'Ocre in Italy, the Aptian in various Greek localities, and the Late Barremian to Early Albian of Sonora (Mexico). Apart from these places, the genus is only indicated by a few specimens in China and India or just a single one in southern Mexico, Japan, and Tanzania.

Description of species

In the following description of the species, recurrent characteristics such as the microstructure, septal ornamentation, endotheca and wall are not repeated. If a good description of the species is available in the literature, it is referred to in this description. The term 'septa' always refers to septa connected to the wall and does not include lonsdaleoid septa. The term 'Further material' under 'Dimensions' refers to all the material available to the author, with the exception of separately indicated specimens (in most cases types).

Preverastraea boehmi (Prever, 1909)

Pl. 1, fig. 1

*v 1909 *Aulastraeopora Boehmi* Prever, p. 144, fig. 52-54, pl. 7, fig. 8

v 1976 *Preverastraea bohemi* (Prever) - Beauvais; pl. 5, fig. 5

Types. Two syntypes are available: PU 17938 and PU 17939. PU 17939 is a nonfigured specimen with a small polished section. PU 17938 is the specimen figured by Prever. Three thin sections of this specimen are available. Specimen PU 17938 is therefore designated herein as the lectotype.

Dimensions

cl	(4) 7 - 8 mm
cn	1.5 - 2 mm
cd	4.5 - 6 mm
s	6 - 9
slo	6 - 12

Description. A species with polygonal or circular calices where the calicular outline is not as sharp as it is in other species. Only six to nine thick septa and between six to 12 lonsdaleoid septa are counted. The first and second cycles cannot be distinguished, while the lonsdaleoid septa are developed in two cycles, even though the cycles are never complete throughout the calice. The inner calice is very strong and marginal dissepiments are abundant.

Remarks. The type material is poorly preserved. Although three thin sections are available, it is difficult to count septa and lonsdaleoid septa. The poor state of preservation makes it impossible to assign more material to this species. A second cycle to be completed was nowhere found in the type material. As in other species (*P. isseli*, *P. roveretoi*), completion of the second cycle would offer much scope for variation. But more material is needed for this. It cannot be excluded that *P. diplothecata* will turn out to be a younger synonym of *P. boehmi*.

Occurrence and material. Late Aptian: Italy (Reg. Abruzzi, Prov. L'Aquila) Monte d'Ocre, Fossa Mezza Spada (PU 17938); Fossa Cerasetti (PU 17939)

Preverastraea comalensis (Wells, 1932)

Pl. 1, figs 2-4

*v 1932 *Orbicella* (?) *comalensis* Wells, p. 240, pl. 33, fig. 1, 2

Type. By original designation the holotype is TMM UT-11470. It was almost completely destroyed, obviously by trying to obtain thin sections. The thin sections themselves were not found in the collections of the TMM. The remaining fragments are small.

Dimensions

	Holotype	Further material
cl	12 - 14 mm	12 - 15 (20) mm
cn	5 - 7 mm	4 - 8 (9) mm
ccd	10 - 13 mm	(8) 10 - 17 mm
s	12	12

Description. The holotype is a cerioid colony with elongated polygonal calices. Septa in two cycles, differing in length and thickness. Lonsdaleoid septa are present. The inner calice is not well defined, various dissepimental rings are found. Other material shows a slightly better defined inner calice and in addition various dissepimental rings. Lonsdaleoid septa numerous and regular, in two cycles (Pl. 1, fig. 3).

Remarks. The material from the Middle Albian (USA, Texas, Kendall and Bexar Counties, Cibolo creek) mentioned by Perkins (1974: 163) as *Montastrea*? *comalensis* was not to hand.

Occurrence and material. Early Aptian: Greece (Viotía) Levadia, Perachorion, sample location 2 (BSP 2003 XX 5772). Aptian: Greece (Viotía) Aliartos, Evangelistria, Diakopi plateau (BSP 2003 XX 5446). Early Albian: Mexico (Sonora) Municipio Arizpe, Arizpe, Cerro La Ceja (ERNO L-4270); USA (Texas) Comal County, Fischer's Store Road (TMM UT-11470). Late Middle Albian: USA (Texas) Williamson County, Roy Gun Ranch, San Gabriel River, north side (TMM UT-36122).

Preverastraea diplothecata (Hackemesser, 1936)

Pl. 1, fig. 5

v 1909 *Aulastraeopora Isseli* Prever, p. 142, fig. 47, pl. 10, fig. 31 [non fig. 44-46, pl. 10, fig. 32, 34]

v 1909 *Aulastraeopora Chelussii* Prever, p. 140, fig. 42

*v 1936 *Phyllocoenia diplothecata* Hackemesser, p. 17, pl. 2, fig. 6, 7

1997 *Preverastraea diplothecata* (Hackemesser, 1936) - Morycowa & Marcopoulou-Diacantoni, p. 259, fig. 8, pl. 4, fig. 4-6, pl. 6, fig. 1, 2

non 2001 *Preverastraea diplothecata* (Hackemesser, 1936) - Morycowa & Kołodziej, p. 187, fig. 2f, 3 [= *Preverastraea* sp.]

v 2003 *Preverastraea roveretoi* (Prever, 1909) - Baron-Szabo & González-León, p. 209.

Types. When the author visited the collection in Basel (NMB) in 1997, only one specimen of *Phyllocoenia diplothecata* was available (D 6121). Specimen D 6139 was labelled *Phyllocoenia felixi.* Later Morycowa & Kołodziej (2001) mentioned D 6139 as a syntype of *Phyllocoenia diplothecata*. Herein D 6121 is considered the holotype.

Dimensions

	Holotype	Further material
cl	7.5 - 8.5 mm	7 - 10 mm
cn	2 - 3 mm	2.2 - 3.5 (4) mm
ccd	6 - 8 mm	(5) 6 - 8 (9) mm
s	12 + s3	12

Description. The holotype shows the rare combination of a cerioid and astreoid calicular arrangement (see Pl. 1, fig. 5). In the astreoid part the septa are non-confluent and very occasionally subconfluent. A wall does not exist. In the cerioid part of the corallum the calices are polygonal with sharp margins and separated by a complete wall. Septa are regular, and the second and third cycles are almost identical in length and thickness. Lonsdaleoid septa are rare. The inner calice is well developed. Further material is exclusively cerioid. The start of the third septal cycle does not show in other specimens. In some specimens lonsdaleoid septa are present but not abundant.

Remarks. The species is very similar to *P. multistella*. It only differs by somewhat smaller calicular dimensions.

Occurrence and material. Aptian: Greece (Viotía) Aliartos, Evangelistria, Diakopi plateau (BSP 2003 XX 5444). (?) Aptian - Early Cenomanian: Greece (Fokída) Kiona mountains, Panourgias (NMB D 6121). (?) Early Aptian: Greece (Fokída) Agrostylia; Fokída, Agrostylia, Mariolada, S of the Kria Vrissi spring (BSP 2003 XX 5447). Late Aptian: Italy (Abruzzi, L'Aquila) Monti d'Ocre, Fossa Mezza Spada (BSP 2003 XX 5332); Fossa Cerasetti (PU 17948, paralectotype of *P. isseli*; PU 17940#3, paralectotype of *P. chelussii*). Early Albian: Mexico (Sonora) Municipio Cucurpe, Cucurpe, La Mesa (ERNO L-4279); Municipio Cucurpe, Magdalena, La Lámina (ERNO L-4421); Municipio Opodepe, Tuape, Cerro de la Espina (ERNO 3166, L-4290).

Preverastraea felixi (Hackemesser, 1936) (= *Paraacanthogyra parnassensis* Morycowa & Marcopoulou-Diacantoni, 1997)

Pl. 1, fig. 6

*v 1936 *Phyllocoenia felixi* Hackemesser, p. 16, pl. 2, fig. 1-4

v 1936 *Phyllocoenia felixi* var. *minor* Hackemesser, p. 17, pl. 2, fig. 5

1997 *Paraacanthogyra parnassensis* Morycowa & Marcopoulou-Diacantoni, p. 257, fig. 6, pl. 3, fig. 1-4

1997 *Preverastraea felixi* (Hackemesser, 1936) - Morycowa & Marcopoulou-Diacantoni, p. 260, fig. 9, pl. 5, fig. 1-6, pl. 6, fig. 3, 4

1997 *Preverastraea isseli* (Prever, 1909) - Morycowa & Marcopoulou-Diacantoni, p. 261, pl. 2, fig. 3-5

v? 2003 *Preverastraea felixi* (Hackemesser, 1936) – Baron-Szabo & González-León, p. 208, fig. 7D, H

Types. Among the various syntypes (NMB D 6119, D 6120, D 6139) the figured specimen D 6119 was designated as the lectotype. The holotype (by monotypy) of *Phyllocoenia felixi* var. *minor* Hackemesser, 1936 has no collection number. Morycowa & Kołodziej (2001) consider D 6139 a syntype of *Phyllocoenia diplothecata* Hackemesser, 1936.

Dimensions

	Holotype	Further material
cl	10 - 12 mm	(9) 10 - 12 (14) mm
cn	2.5 - 3 mm	3 (7) mm
ccd	8 - 13 mm	9 - 11 (13) mm
s	24	24

Remarks. A detailed description was given by Morycowa & Marcopoulou-Diacantoni (1997), to whom the type material was available. The material described by Baron-Szabo & González-León (2003) is of larger dimensions than the holotype. The holotype also shows a certain tendency to an astreoid arangement of calices; in some parts the wall is incomplete.

Occurrence and material. (?) Aptian – Early Cenomanian: Greece (Fokída) Kiona mountains, Panourgias (NMB D 6119, D 6120, D 6139, NMB n/a). (?) Early Aptian: Greece (Fokída) Agrostylia. Early Albian: Mexico (Sonora) Municipio Opodepe, Tuape, Cerro de la Espina (ERNO L-4454); Municipio Ures, Cerro de Oro (ERNO 3139, ERNO L-4887).

Preverastraea grandis (Stoliczka, 1873)

*v 1873 *Stylina grandis*, Stoliczka, p. 20, p. 21, pl. 3, fig. 3

non 1913 *Stylina grandis* Stol. - Felix, p. 98

non 1925 *Stylina grandis* Stol. - Felix, p. 10

Type. In the collection of the GSI there is only one type specimen (GSI 1768), which represents the holotype.

Dimensions

	Holotype
cl	18 - 24 mm
cn	5 - 6 mm
ccd	18 - 24 mm
s	12

Description. Astreoid colony. There is no wall between the calices. Septa in part confluent. Coenos-

teum consisting of dissepiments. Septa in two cycles, slightly differing in length. Lonsdaleoid septa rare. There is no columella as the drawing in Stoliczka (1873) would suggest. The specimen does not show any trace of a wall.

Remarks. *P. grandis* is represented by one small specimen with a small polished surface. It was not possible to obtain thin sections. The species hardly compares with any other material, having a very large calicular diameter and only 12 septa. It could be a senior synonym of *P. comalensis*, but this cannot be proved without more material from the type locality.

Occurrence and material. Late Albian: India (Tamil Nadu) Karai (GSI 1768)

Preverastraea isseli (Prever, 1909)
(= *Pleurostylina major* Baron-Szabo & González-León, 1999, *Saxuligyra minor* Eliášová, 1991)

Pl. 2, figs 1-4

*v 1909 *Aulastraeopora Isseli* Prever, p. 142, fig. 44, 46, pl.10, fig. 32 [non fig. 45, 47, pl. 10, fig. 31, 34]
v 1991 *Saxuligyra minor* Eliášová, p. 167, pl. 4, fig. 1, 2, pl. 6, fig. 1
v non 1994 *Preverastraea* cf. *isseli* (Prever 1909) - Löser, p. 15, pl. 5, fig. 3, 4
v 1994 *Preverastraea iseli* (Prever) - Liao & Xia, p. 68, pl. 5, fig. 1 [non pl. 5, fig. 2-4]
non 1997 *Preverastraea isseli* (Prever, 1909) - Morycowa & Marcopoulou-Diacantoni, p. 261, pl. 2, fig. 3-5 [= *P. felixi*]
v 1999 *Pleurostylina major* n. sp. - Baron-Szabo & González-León, p. 480, fig. 4h, j
v 2003 *Preverastraea roveretoi* (Prever, 1909) - Baron-Szabo & González-León, p. 209

Types. Three syntypes (PU 17948, 17949, 17950) are available; PU 17949 is designated as the lectotype, as it is the most figured specimen in Prever (1909). The remaining paralectotypes belong to other species of *Preverastraea*.

Dimensions

	Lectotype	Further material
cl	6 - 6.5 mm	(5.5) 6 - 7 (7.5) mm
cn	2.5 - 3 mm	(1.5) 2 - 3 (3.5) mm
ccd	5.5 - 6.5 mm	(4.5) 5 - 7 (8) mm
s	12	12

Description. The lectotype is a cerioid colony with polygonal and non-elongated calices. Septa occur in two cycles, the second cycle is not always complete. The cycles do not differ in length and thickness. Lonsdaleoid septa are abundant. They may complete the second cycle and include an additional 12 septa so as to complete three septal cycles. The inner calice is well developed. Further material may show two completed septal cycles and fewer lonsdaleoid septa.

Remarks. *Pleurostylina major* Baron-Szabo & González-León, 1999 is just a poorly preserved *Preverastraea*. *Saxuligyra minor* differs slightly by its more rounded and less polygonal calices and thinner dissepiments, although the latter may also be due to secondary thickening in the Italian material. The material described by Löser (1994) belongs to a new, as yet undescribed genus. The Mexican material is comparable with the Italian material, with the only difference that the inner calice may be thinner and slightly larger. But these characteristics may differ within a colony.

Occurrence and material. (?) Early Aptian: Greece (Fokída) Mariolada, S spring Kria Vrissi (BSP 2003 XX 5439). Late Aptian: Italy (Abruzzi, L'Aquila) Monti d'Ocre, Fossa Cerasetti (PU 17949). Late Aptian to Albian: China (Tibet) Xainza county, Xungmai district, Qinggar, W Gomang lake (NIGP 65824). Early Albian: Mexico (Sonora) Municipio Opodepe, Tuape, Cerro de la Espina (ERNO 3151, 3154, 3188, L-4250, L-4303, L-4304); Municipio Arizpe, Arizpe, Cerro La Ceja (ERNO L-4486); Mexico (Sonora) Municipio Santa Ana, Santa Ana (ERNO L-4816); Municipio Ures, Cerro de Oro (ERNO 2160, holotype of *Pleurostylina major*). Late Cenomanian: Czech Republic (Central Bohemian region) Praha, Neratovice (CGS HF 2483, holotype of *Saxuligyra minor*).

Preverastraea maior (Eliášová, 1991)
(= *Stiboriopsis sonoraensis* Baron-Szabo & González-León, 1999)

Pl. 2, figs 5-7

*v 1991 *Saxuligyra maior*, Eliášová, p. 167, pl. 5, fig. 1, 2
v 1999 *Stiboriopsis sonoraensis*, Baron-Szabo & González-León, p. 485, fig. 5d, e, g

Type. The holotype is CGS HF 1682 by original designation.

Dimensions

	Holotype	ERNO 2141A	ERNO L-4249
cl	18	18.5 - 23 mm	18 mm
cn	6	6 - 7.5 mm	7 mm
ccd	13 - 15 mm	13 - 14.5 mm	15 mm
s	48	48	48

Remarks. The type material is poorly preserved. An adequate description is given by Eliášová (1991). Baron-Szabo & González-León (1999) provide a more detailed description of their material, with a different taxonomic assignment. It is not clear why Baron-Szabo & González-León (1999) assigned their material to *Stiboriopsis*. This genus (the type of the holotype was lost in 1907 during an earthquake and subsequent fires; pers. comm. Thomas Stemann, Kingston, July 2006) is characterised by calicular series which in one series show no wall, and nonconfluent to subconfluent septa. The septa are compact and have paliform lobes. The wall is septothecal, and there exists a columella (all after Vaughan 1899). The Mexican material is ceriod and has no pali-

form lobes and no columella (even if a columella was claimed by Baron-Szabo & González-León 1999). In the holotype of *Saxuligyra maior* more septa reach the centre of the calice than in *Stiboriopsis sonoraensis*. The Czech and Mexican material probably represents two subspecies. But in view of the few specimens available, the creation of these subspecies would probably confuse the systematics even more rather than help to clarify it. The paratype of *Stiboriopsis sonoraensis* (ERNO 2148-II) belongs to *Preverastraea major* (but not to *P. maior*!) as it has only 24, not 48 septa.

Occurrence and material. Late Barremian to Early Aptian: Mexico (Sonora) Municipio Ures, Cerro de Oro (ERNO 2141A, holotype of *Stiboriopsis sonoraensis*). Early Albian: Mexico (Sonora) Municipio Opodepe, Tuape, Cerro de la Espina (ERNO L-4249). Late Cenomanian: Czech Republic (Central Bohemian region) Kolín, Vitezov (CGS HF 1682).

Preverastraea major (Hackemesser, 1936) (= *Amphiastraea bogdanovi* Kuzmicheva, 1980)

Pl. 1, figs 7-8

*v 1936 *Phyllocoenia major*, Hackemesser, p. 18, pl. 2, fig. 8
* 1980 *Amphiastraea bogdanovi* Kuzmicheva, p. 99, pl. 36, fig. 4
v p 1999 *Stiboriopsis sonoraensis*, Baron-Szabo & González-León, p. 485
2002 *Bogdanovicoenia bogdanovi* (Kuzmicheva, 1980) - Kuzmicheva, p. 136, pl. 11, fig. 2

Type. The holotype is NMB D 6125 by monotypy.

Dimensions

	Holotype	Further material
cl	17 - 18 mm	15 - 20 (25) mm
cn	3 - 4.5 mm	4 - 7 mm
ccd	15 - 18 mm	8 - 19 (35) mm
s	24	24

Description. Cerioid and astreoid colonies. In cerioid colonies the calices are polygonal with sharp edges. They may be slightly elongated, of rectangular appearance. The calices vary greatly in size and a colony with generally large calices may also include smaller ones. Septa thin and straight. The three cycles differ clearly (at least in the material from Greece) in terms of length and thickness. Lonsdaleoid septa poorly developed.

Remarks. Baron-Szabo & González-León (2003) assigned *Amphiastrea bogdanovi* to *Preverastraea felixi*, but the two species differ in the diameter of the calice. It is not clear whether *P. robusta* is a junior synonym of *P. major*. Sample ERNO L-4387 shows, for instance, a calicular diameter of 20 - 25 mm so that it is difficult to decide to which species it belongs. Two samples available from the type locality of *P. robusta* are assigned to *P. major*.

Occurrence and material. Late Barremian to Early Aptian: Lushanka river basin, ruch. Tysnikovatyj (Sakarpatskaya, Ukraine); Mexico (Sonora) Municipio Ures, Cerro de Oro (ERNO 2148-II, paratype of *Stiboriopsis sonoraensis*). (?) Aptian – Early Cenomanian: Greece (Fokída) Kiona mountains, Panourgias (NMB D 6125). (?) Early Aptian: Greece (Fokída) Mariolada, S spring Kria Vrissi (BSP 2003 XX 4123, 5440). Early Albian: Mexico (Sonora) Municipio Ures, Cerro de Oro (ERNO L-4387).

Preverastraea multistella (Stoliczka, 1873) (= *Aulastraeopora chelussii* Prever, 1909, *Aulastraeopora paronai* Prever, 1909)

Pl. 3, figs 1-3

*v 1873 *Stylina multistella*, Stoliczka, p. 20, pl. 3, fig. 1, 2
v 1909 *Aulastraeopora Chelussii* Prever, p. 140, fig. 41
v 1909 *Aulastraeopora Paronai* Prever, p. 141, fig. 43, pl. 10, fig. 35
v non 1976 *Preverastraea chelussii* (Prever) – Beauvais, p. 24, pl. 5, fig. 3 [= *P. diplothecata*]
v 1976 *Preverastraea paronai* (Prever) – Beauvais, pl. 5, fig. 6
v 1999 *Preverastraea paronai* (Prever, 1909) – Baron-Szabo & González-León, p. 483, fig. 4g, 6h

Types. In the collection of the GSI two syntypes where found (GSI 1766, 1767). Both are depicted. The better preserved specimen (GSI 1767) is designated herein as the lectotype.

Dimensions

	Lectotype	PU 17940#1	Further material
cl	10 - 12 mm	10 mm	9 - 12 mm
cn	5 mm	3.8 mm	(3) 4 - 7 mm
ccd	8 - 12 mm	-	(5) 9 - 12 mm
s	12	12	12

Description. The species with its greatly varying morphology is widely distributed. Astreoid as well cerioid samples are known. The lectotype is an astreoid colony with confluent to subconfluent septa. The septa are bent; outside the inner calice they are thick and inside thinner. The two septal cycles are almost identical in length and thickness. Lonsdaleoid septa are rare. The coenosteum consists of vesicular dissepiments. A wall is absent. The cerioid samples (e.g. the lectotype of *P. chelussii*) show regular polygonal calices. The septal cycles are more clearly defined, but the second septal cycle may be complete or incomplete in the same colony. Lonsdaleoid septa are common and may complete an incomplete second septal cycle. The wall is complete. The inner calice is generally present in both colony types.

Remarks. Astreoid samples are only known from the Late Albian to Early Cenomanian of India and the

Huetamo platform (Mexico). The Barremian to Albian samples from Greece, Italy, Mexico and Tanzania are all cerioid. In astreoid colonies lonsdaleoid septa are less developed, in cerioid colonies they are more common. The actually quite heterogenous material is lumped together herein under one name because the formation of astreoid or cerioid colonies and the abundance of lonsdaleoid septa are no stable characteristics but may vary within the same colony. The presence of lonsdaleoid septa (about whose function nothing is known) may be an additional feature which arises under special conditions. A comparable situation is found in *P. felixi* (Pl. 1, fig. 6) with lonsdaleoid septa clearly developed in the left (cerioid) part but not in the right (astreoid) part of the colony.

Occurrence and material. Late Barremian to Early Aptian: Mexico (Sonora) Municipio Ures, Cerro de Oro (ERNO 2148-I, 2157). Aptian: Greece (Viotía) Aliartos, Evangelistria, Diakopi plateau (BSP 2003 XX 5445). (?) Aptian: Greece (Fokída) Kiona mountains, Panourgias (BSP 2003 XX 4722). Late Aptian: Italy (Abruzzi, L'Aquila) Monti d'Ocre, Fossa Cerasetti (PU 17940#1, lectotype of *P. chelussii*); Fossa Mezza Spada (PU 17952, holotype of *P. paronai*); Tanzania (Tanganyika, Mtwara) Kiturika Mts, Naiwanga, Naluë (MB K 1384). Late Albian: India (Tamil Nadu [= Madras]) NW of Maruvattur (GPI 1766, 1767). Late Albian to Early Cenomanian: Mexico (Guerrero) Ciudad Altamirano, Chumbitaro, west flank Mal Paso syncline (BSP 2003 XX 2351).

Preverastraea robusta Morycowa in Morycowa & Marcopoulou-Diacantoni, 2002

* 2002 *Preverastraea robusta* Morycowa, p. 24, fig. 17a-c

Dimensions

	Holotype
cl	25 - 40 mm
cn	10 mm
s	24

Remarks. A detailed description is provided by Morycowa & Marcopoulou-Diacantoni (2002). As no other material has been assigned to this species, the description cannot be amended. This species is probably a junior synonym of *P. major*. It is true that it differs from all other species by its calicular diameter, but it is impossible that it differs by its 'very thick septa with [a] rather well preserved skeleton microstructure' (Morycowa & Marcopoulou-Diacantoni 2002). The state of preservation of a coral skeleton cannot be used to distinguish a species. Thick septa are also present in other species with large calices.

Occurrence and material. (?) Early Aptian: Greece (Fokída) Agrostylia

Preverastraea roveretoi (Prever, 1909) (= *Preverastraea marinosi* Morycowa in Morycowa & Marcopoulou-Diacantoni, 2002)

Pl. 3, figs 4-6

*v 1909 *Aulastraeopora Roveretoi* Prever, p. 143, fig. 48, 49, pl. 10, fig. 33

v 1909 *Aulastraeopora Isseli* Prever, p. 142, fig. 45, pl.10, fig. 34

2002 *Preverastraea marinosi* Morycowa, p. 24, fig. 16a-e

v 2003 *Preverastraea roveretoi* (Prever, 1909) – Baron-Szabo & González-León, p. 209

Type. The only available specimen PU 17954 is the holotype.

Dimensions

	Holotype	Further material
cl	5 - 5.5 mm	(4) 4.5 - 6 mm
cn	3 mm	2 - 3.5 mm
ccd	3.5 - 5.5 mm	3.5 - 6.5
s	12	12

Description. The holotype is a cerioid colony with polygonal and regular calices. The septa of the first cycle are strong, those of the second cycle are thinner. In some calices the second cycle is not completed or is completed only by lonsdaleoid septa as in *P. isseli*. Lonsdaleoid septa are well developed. They may complete the second septal cycle and form a third cycle of 12 lonsdaleoid septa. The inner calice may be very thick. Further material varies. It may show two complete septal cycles or in some calices only an incomplete second cycle. Lonsdaleoid septa are always present, but in some colonies their number is small.

Remarks. *Preverastraea marinosi* Morycowa should differ from all other species in terms of its calicular diameter and skeletal architecture. The first of these distinguishing features does not apply as the dimensions of the new species clearly coincide with those of *P. roveretoi*. The second distinguishing feature (the skeletal architecture) is doubtful as Morycowa does not mention having seen the Italian type material and a comparison with the skeletal architecture of the Italian species is not possible on the basis of the literature alone.

Occurrence and material. Aptian to Early Albian: Japan (Iwate-ken) Shimohei-gun, Iwaizumi-cho, Moshi, Matsushima (TUM 65326). (?) Early Aptian: Greece (Fokída) Mariolada, S spring Kria Vrissi (BSP 2003 XX 5438); Greece (Fokída) Agrostylia. Late Aptian: Italy (Abruzzi, L'Aquila) Monti d'Ocre, Fossa Cerasetti (PU 17950, paralectotype of *P. isseli*; PU 17954). Early Albian: Mexico (Sonora) Municipio Opodepe, Tuape, Cerro de la Espina (ERNO L-4226, L-4292, L-4433); Municipio Arizpe, Arizpe, Cerro La Ceja (ERNO L-4485); Municipio Ures, Cerro de Oro (ERNO 3066).

Preverastraea cf. **roveretoi** (Prever, 1909)

Pl. 2, fig. 8

v **1909** *Aulastraeopora Chelussii* Prever, p. 140, pl. 10, fig. 36 [non fig. 41, 42]

v 1994 *Preverastraea iseli* (Prever) – Liao & Xia, p. 68, pl. 5, fig. 3, 4 [non pl. 5, fig. 1, 2]

Dimensions

cl	(4) 5 - 6 (6.5) mm
cn	2 - 3 (4) mm
ccd	(3.5) 4 - 6 (7) mm
s	6 (8)

Description. The material comprises cerioid and some rare phaceloid coral colonies. In both types the calices are circular to polygonal and hardly elongated. There is only one septal cycle, although the beginnings of a second cycle are noticeable in places. Lonsdaleoid septa are present, they may complete the second septal cycle, but the total of septa and lonsdaleoid septa never exceeds 12. The inner calice may be very strong.

Remarks. This species resembles *P. roveretoi* very closely. Its only distinguishing feature is the practical absence of the second septal cycle. It is also the only species which occasionally shows a phaceloid calicular arrangement.

Occurrence and material. Early Aptian: Greece (Viotía) Levadia, Perachorion (BSP 2003 XX 5739). Aptian: Greece (Viotía) Aliartos, Evangelistria, Diakopi plateau (BSP 2003 XX 5441). Late Aptian: Italy (Abruzzi, L'Aquila) Monti d'Ocre, Fossa Cerasetti (PU 17940#2, paralectotype of *Aulastraeopora chelussii*); Fonte Cerasetti (BSP 2003 XX 5322). Late Aptian to Albian: China (Tibet) Xainza county, Xungmai district, Qinggar, W Gomang lake (NIGP 65822, 65823).

Preverastraea sp.

Pl. 3, figs 7-8

2001 *Preverastraea diplothecata* (Hackemesser, 1936) – Morycowa & Kołodziej, p. 187, fig. 2f, 3

Dimensions

cl	5.5 - 8 mm
cn	2.5 - 4 mm
ccd	(4.5) 5.5 - 8 mm
s	24

Description. Cerioid, in part astreoid, colony. Calices polygonal, regular and not elongated. Septa in three cycles, those in the first are strong and reach to the centre of the calice, in the second cycle they are slightly shorter and thinner and in the third they are short and thin. Almost no lonsdaleoid septa. The inner calice may be located very close to the wall (Pl. 3, fig. 8) so that it seems to have no lonsdaleoid septa.

Remarks. The material probably represents a new, as yet undescribed species. In view of past difficulties with the correct identification of *Preverastraea* species and the likelihood that still more species will be found under genera other than *Preverastraea*, the creation of a new taxon should be postponed.

Occurrence and material. (?) Aptian - Early Cenomanian: Greece (Fokída) Kiona mountains, Panourgias (NMB D 6139). Lower Albian: Mexico (Sonora) Municipio Opodepe, Tuape, Cerro de la Espina (ERNO L-4235, L-4291); Lower Albian: Mexico (Sonora), Arizpe, Cerro La Ceja (ERNO L-4273, L-4274). Early Cenomanian: Greece, Kozani, Nea Nikopolis, sample location c4 (BSP 2003 XX 6170).

Other species

Two species that were considered *Preverastraea* in the past do not belong to this genus: *Preverastraea tenuiseptata* Kołodziej, 1995 belongs to a new, as yet undescribed genus. It is characterised by a strong main septum, a well developed marginarium and exclusively lonsdaleoid septa. For some time *Acanthogyra aptiana* Turnšek & Mihajlović, 1981 was considered *Preverastraea*. This species also turned out to belong to a new, as yet undescribed genus (see also Morycowa & Marcopoulou-Diacantoni, 1997) which – although related to *Preverastraea* – differs from it by its septal budding and the larger number of lonsdaleoid septa.

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PLATE 1

Fig. 1 - *Preverastraea boehmi* (Prever, 1909). Thin section of a transverse section, slightly oblique. Late Aptian of Fossa Mezza Spada, Monti d'Ocre, L'Aquila, Italy. PU 17938A (lectotype of *Aulastraeopora boehmi* Prever, 1909). x 3.2.

Fig. 2 - *Preverastraea comalensis* (Wells, 1932). Transverse section. Early Albian of Fischer's Store Road, Comal County, Texas, USA. TMM UT-11470 (holotype of *Orbicella comalensis* Wells, 1932). x 3.

Fig. 3 - *Preverastraea comalensis* (Wells, 1932). Thin section of a transverse section. Early Albian of Cerro La Ceja, Arizpe, Municipio Arizpe, Sonora, Mexico. ERNO L-4270. x 4.

Fig. 4 - *Preverastraea comalensis* (Wells, 1932). Thin section of a transverse section. Early Aptian of Perachorion, Levadia, Viotía, Greece. BSP 2003 XX 5772. x 2.3.

Fig. 5 - *Preverastraea diplothecata* (Hackemesser, 1936). Transverse section. Aptian - Early Cenomanian of Panourgias, Kiona mountains, Fokída, Greece. NMB D 6121 (holotype of *Phyllocoenia diplothecata* Hackemesser, 1936). x 2.6.

Fig. 6 - *Preverastraea felixi* (Hackemesser, 1936). Transverse section. Aptian - Early Cenomanian of Panourgias, Kiona mountains, Fokída, Greece. NMB D 6119 (= lectotype of *Phyllocoenia felixi* Hackemesser, 1936). x 3.5.

Fig. 7 - *Preverastraea major* (Hackemesser, 1936). Thin section of a transverse section. (?) Early Aptian of S spring Kria Vrissi, Mariolada, Fokída, Greece. BSP 2003 XX 5440. x 2.7.

Fig. 8 - *Preverastraea major* (Hackemesser, 1936). Thin section of a longitudinal section. (?) Early Aptian of S spring Kria Vrissi, Mariolada, Fokída, Greece. BSP 2003 XX 5440. x 2.7.

PLATE 2

Fig. 1 - *Preverastraea isseli* (Prever, 1909). Transverse section. Late Aptian of Fossa Cerasetti, Monti d'Ocre, Abruzzi, L'Aquila, Italy. PU 17949 (= lectotype of *Aulastraeopora isseli* Prever, 1909). x 3.2.

Fig. 2 - *Preverastraea isseli* (Prever, 1909). Thin section of a transverse section. Late Aptian of Fossa Cerasetti, Monti d'Ocre, Abruzzi, L'Aquila, Italy. PU 17949 (= lectotype of *Aulastraeopora isseli* Prever, 1909). x 3.5.

Fig. 3 - *Preverastraea isseli* (Prever, 1909). Thin section of a transverse section. Late Cenomanian of Neratovice, Praha, Central Bohemian region, Czech Republic. CGS HF 2483 (= holotype of *Saxuligyra minor* Eliášová, 1991). x 2.7.

Fig. 4 - *Preverastraea isseli* (Prever, 1909). Thin section of a longitudinal section. Late Cenomanian of Neratovice, Praha, Central Bohemian region, Czech Republic. CGS HF 2483 (= holotype of *Saxuligyra minor* Eliášová, 1991). x 4.

Fig. 5 - *Preverastraea maior* (Eliášová, 1991). Thin section of a transverse section. Late Cenomanian of Vitezov, Kolín, Central Bohemian region, Czech Republic. CGS HF 1682 (= holotype of *Saxuligyra maior*, Eliášová, 1991). x 3.3.

Fig. 6 - *Preverastraea maior* (Eliášová, 1991). Thin section of a longitudinal section. Late Cenomanian of Vitezov, Kolín, Central Bohemian region, Czech Republic. CGS HF 1682 (= holotype of *Saxuligyra maior*, Eliášová, 1991). x 4.

Fig. 7 - *Preverastraea maior* (Eliášová, 1991). Thin section of a transverse section. Late Barremian to Early Aptian of Cerro de Oro, Municipio Ures, Sonora, Mexico. ERNO 2141A (=holotype of *Stiboriopsis sonoraensis* Baron-Szabo & González-León, 1999). x 2.3.

Fig. 8 - *Preverastraea* cf. *roveretoi* (Prever, 1909). Thin section of a transverse section. Late Aptian of Fonte Cerasetti, Monti d'Ocre, L'Aquila, Italy. BSP 2003 XX 5322. x 5.3.

PLATE 3

Fig. 1 - *Preverastraea multistella* (Stoliczka, 1873). Transverse section. Late Albian of Maruvattur, Tamil Nadu, India. GSI 1767 (= lectotype of *Stylina multistella* Stoliczka, 1873). x 3.

Fig. 2 - *Preverastraea multistella* (Stoliczka, 1873). Thin section of a transverse section. Late Aptian of Fossa Cerasetti, Monti d'Ocre, L'Aquila, Italy. PU 17940#1 (= lectotype of *Aulastraeopora chelussii* Prever, 1909). x 5.3.

Fig. 3 - *Preverastraea multistella* (Stoliczka, 1873). Thin section of a transverse section. Late Aptian of Fossa Mezza Spada, Monti d'Ocre, L'Aquila, Italy. PU 17952 (= holotype of *Aulastraeopora paronai* Prever, 1909). x 2.7.

Fig. 4 - *Preverastraea roveretoi* (Prever, 1909). Thin section of a transverse section. Late Aptian of Fossa Cerasetti, Monti d'Ocre, L'Aquila, Italy. PU 17950 (= paralectotype of *Aulastraeopora isseli* Prever, 1909). x 4.

Fig. 5 - *Preverastraea roveretoi* (Prever, 1909). Thin section of a transverse section. Late Aptian of Fossa Cerasetti, Monti d'Ocre, L'Aquila, Italy. PU 17954 (= holotype of *Aulastraeopora roveretoi* Prever, 1909). x 3.3.

Fig. 6 - *Preverastraea roveretoi* (Prever, 1909). Thin section of a longitudinal section. Late Aptian of Fossa Cerasetti, Monti d'Ocre, L'Aquila, Italy. PU 17954 (= holotype of *Aulastraeopora roveretoi* Prever, 1909). x 4.

Fig. 7 - *Preverastraea* sp. Thin section of a transverse section. Early Albian of Cerro La Ceja, Arizpe, Municipio Arizpe, Sonora, Mexico. ERNO L-4273. x 4.6.

Fig. 8 - *Preverastraea* sp. Thin section of a transverse section. Early Albian of Cerro de la Espina, Tuape, Municipio Opodepe, Sonora, Mexico. ERNO L-4291. x 6.4.

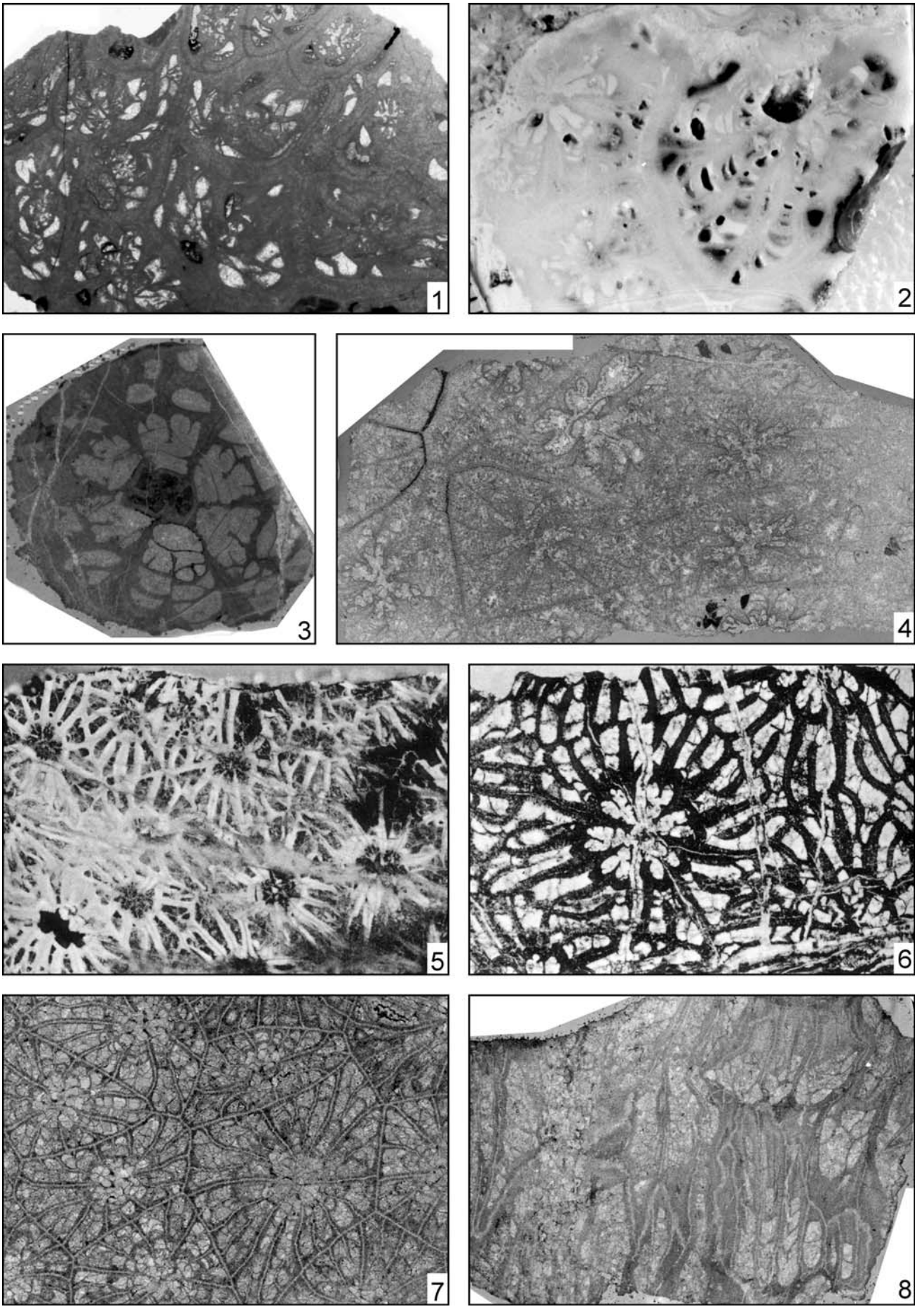
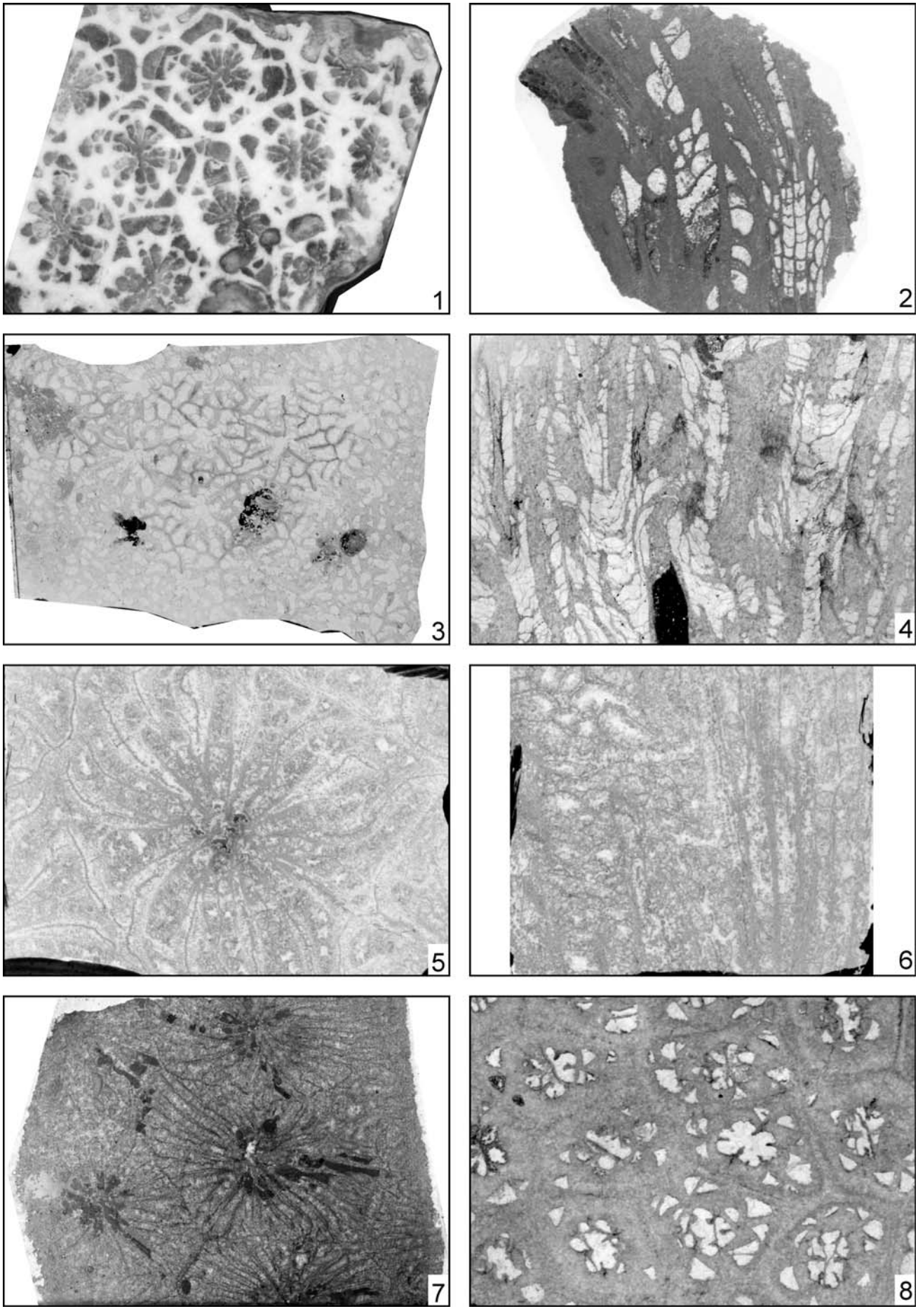


PLATE 1



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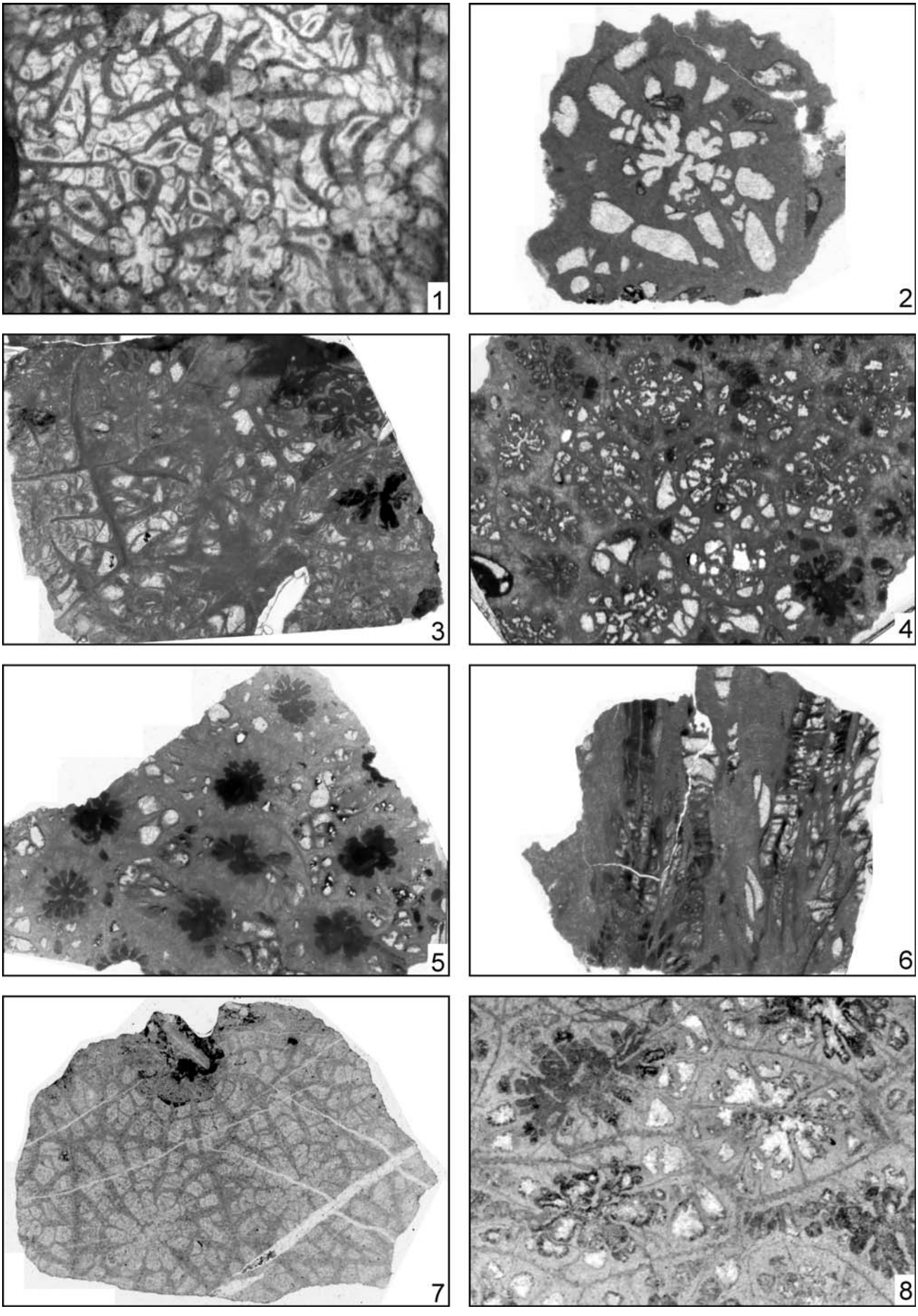

PLATE 3

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